The Impact of Contracting on the Portuguese National Health System

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Abstract: All treatments, materials, instruments, exams, vaccines, tests, hospitalizations, surgeries, human resources, investigations, medicines, autopsies, among many other services provided by the National Health System (SNS). Therefore, funding is required, and the external services and supplies to which the SNS must constantly update its technologies and the necessary and continuous training and essential maintenance and cleaning expenses. Moreover, health financing has been a matter of great concern, both nationally and internationally, as health expenditures are growing faster than economic growth. Over the years, efficiency in resource allocation has always been a desirable objective, but one that is not easy to achieve. The truth is that there is much waste in allocating resources. Thereby, this study analyzes the impact of the contractualization process to which Portugal has adhered, which is most similar to a privatization model; that is, we sought to understand whether the contractualization of the SNS has a favorable effect on the economic level. However, after the entire process and development of the work, it is concluded that the contracting had a negligible impact. The repercussion that it had on the economic performance of Portuguese Hospitals was in a negative sense. In the statistical analyses it was used tests of differences between averages, to check the behavior of the economic performance of hospitals towards the contracting process. It was taken data of reports and accounts from a sample

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of fifteen Portuguese Hospitals S.A. that went through this contracting process from 2003 to 2017, in order to calculate the four indicators, such as: Return On Assets (ROA); Return On Equity (ROE); Economic Value Added (EVA) and the Market Value Added (MVA). For each of these indicators, were analyzed and compared the resulted effects between the period of two years before and two years after the contracting process. From the obtained results, we can conclude that contracting process had little impact on the economic performance of Portuguese Hospitals and the resulting impact was not favorable.

1 Introduction

Health is a vital sector in the economy and society. It has a significant impact not only on a personal level but also on a social level, in the development of companies, in the State itself, and its economic, financial, political, scientific, and technological growth. Efficiency in allocating resources has always been a desirable goal over the years, but it is not easy to achieve. The truth is that there is a lot of loss in the allocation of resources.

All health systems currently in existence were based on their development and evolution on two primary models: the Bismarckian Model and the Beveridgean Model. These models are based on the principle that access to health care does not depend on citizens' ability to pay, but only on their needs, so the contribution depends on income (Carrondo, 2014) [1].

The Bismarckian Model was first adopted in Germany in 1883, with Chancellor Otto Bismarck, who inaugurated and developed this system, which today still influences central Europe's health systems. This social security model, imposed by the State, is based on the following characteristics: insurance is mandatory; intends to guarantee the risk coverage of workers for others; its funding comes from social contributions based on wages, in charge of employers and workers, and the management of each benefit is organized in boxes, which are managed by the State, with the participation of taxpayers.

Although it is based on social insurance, where access to citizens is universal, this insurance is conditioned by the employment situation - once it is supported by the contributory effort of wages and employers. In this way, the model benefits the most disadvantaged workers, not leaving aside those workers who have more fair wages through this health insurance scheme [2] (Simões, 2004). This model was adopted and adapted by other countries, like Austria, Holland, or Switzerland [3].

The Beveridgeano Model originated in England and has as main characteristics universal rights, intended for all citizens, limited by the financial, human, and technical resources available, but ensuring social minimums for all, in conditions of need. It is a public system based on four basic principles: universal access, the inclusion of all treatments, free of charge, and financing from the general state budget. Its financing derives from tax taxes, in which the right to health is independent of work and employment, which corresponds to the well-known national health services [3].

Some countries, such as France, Belgium, and Japan, represent a mixed model, which, although inspired by the Bismarckian system, associates the compulsory insurance principle with social protection, opening up numerous non-contributory benefits to the most disadvantaged [3]. These two models forced employers and employees to discount health insurance in a combination of public and private providers to ensure citizens' health.

Due to several economic, political, and social factors, there was a need to resort to mixed models that result from the combination of the Bismarck and Beveridge Models, bringing typical market mechanisms to the traditional health system. In this context, the Market Model emerges, which is structured according to the purchasing power of health insurance by individuals and companies; that is, adherence depends on citizens' consumption capacity [4] (Dinis, 2013).

The United States of America (USA) does not have a public health system similar to the European one, as it is not based on the Beveridge Model or the Bismarck Model. Its health system has a mixed social and private insurance system, in which systems are opposed [3]. This model is organized based on the ability of individuals and companies to purchase health insurance.

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According to Simões and Barros [5] (2007), the Portuguese Health System is characterized by the simultaneous existence of three systems: the National Health Service (SNS), public and private insurance schemes for certain professions, and mandatory for their beneficiaries (health subsystems) as well as voluntary private health insurance.

The financing of the Portuguese health system, as in most European health systems, results from a combination of public and private financing, in which private insurance tends to be complementary to public insurance. This health system is coordinated by the Ministry of Health, which provides and finances public health care.

Contextually, this study analyzes the impact of the contracting process to which Portugal has adhered and most closely resembles a privatization model. It sought to understand whether the National Health System contracting has a favorable effect on an economic level. However, after all the process and development of the work, it is concluded that the contracting revealed a minor impact. The repercussion it had on the level of the economic performance of Portuguese Hospitals was negative. Health financing has been a significant concern in the national and international context, as health spending is growing faster than economic growth.

In brief, the article is organized into four points: Introduction, Methodology, Discussion of Results, and Final Considerations.

Regarding point 2 - Methodology, this will be responsible for presenting the model used to assess the impact of the contracting process and respective assumptions. The base model that will support the work refers to the work developed and analyzed by Anuatti-Neto et al. [6] and Cardoso et al. [7], which consists of an analysis of the impact of privatization on companies. This model was subject to some modifications in terms of assumptions due to the need to adapt to the theme and was applied to analyze the impact of contractualization on the National Health System.

Section 3 - Discussion of the results is dedicated to the presentation and analysis of the main empirical results obtained through applying the model adopted to analyze the impact of contracting.

Finally, point 4, referring to the Final Conclusions, presents the most important results achieved throughout the work.

2 Methodology

This study's main objective is to analyze the impact of contracting the national health system in Portugal. Initially, the intention was to analyze the impact of privatization on the national health system. However, as previously mentioned, in Portugal, at least until today, there is no privatization situation in the health sector, the contracting process being the closest to the privatization system to which Portugal has adhered to. Then, calculations were carried out to verify the impact of this process on the performance of Portuguese Hospitals.

In a current universe of 41 Public-Private Entities in this area, where 11 are EPE hospitals, 8 are local EPE health units, and 22 are EPE Hospital Centers. All EPE Hospitals that suffered aggregations in the same period of analysis and all EPE Hospitals that do not present published data and are necessary to complete the study, relating to the period between 2002 and 2007, were excluded. Thus, 15 public sector hospitals were considered to have transformed Hospitals Corporations into Public Business Entities.

#	Designation of the Health Unit
1	Hospital Center of Alto Minho
2	Hospital Center of Médio Tejo
3	Hospital Center of Cova da Beira
4	Hospital Center of Vila Real / Peso da Régua
5	Disctrict Hospital of Figueira da Foz
6	Garcia de Orta Hospital
7	Infante Dom Pedro Hospital
8	Pulido Valente Hospital
9	Santo André Hospital
10	São Gonçalo Hospital
11	São Sebastião Hospital
12	Coimbra Regional Oncology Center
13	Lisboa Regional Oncology Center
14	Padre Américo Vale Sousa Hospital
15	IPO Porto

Table 1: Sample of Public Hospitals used in the study.

The study considers a two-year lag period for the assessment of economic performance, as in the studies by [6] Anuatti-Neto et al. (2005) and Cardoso et al. [7].

2.1 Data analysis

In order to measure the impact of contracting the National Health System in Portugal, four economic performance indicators were analyzed: Economic Value Added (EVA), Market Value Added (MVA), Return On Assets (ROA), and Return On Equity (ROE). Table 2 adapted from [7] presents all these indicators and respective calculation formulas. Also, to calculate these indicators, data from the Hospitals' reports and accounts were used.

Indicators	Calculation
ROA - Return on Assets	ROA=(Operational Result)/(Total Active)
ROE - Return on Equity	ROE=(Liquid Result)/(Own Capital)
EVA - Economic Value Added	EVA = Operating Income (1-Income Tax Rate) - Weighted Average Cost of Capital × Invested Capital
MVA - Market Value Added	MVA = Company's Total Market Value - Capital Invested

Table 2: Profitability and Economic Performance Indicators.

Thereby, to be able to check the calculation of the EVA indicator, it is necessary to estimate the Capital Asset Pricing Model (CAPM), the Cost of Equity Capital (Kcp), the Cost of Equity Capital (Kca), and Weighted Average Cost of Capital (CMPC).

To determine the Cost of Equity (Kcp), CAPM was used, according to Equation 1 [8].

$$E(r) = rf + \beta L \ (rm - rf) \qquad (1)$$

For the calculation, it was necessary to obtain the following values: Risk-free return rate (rf), Beta of the Indebted Hospital (β_L), and the expected market return (rm).

In order to obtain market profitability, daily quotations for the PSI-20, from 2003 to 2017, were removed from the website: investing.com. Then, a rate of return was calculated for each day and, finally, the average return for each year was calculated. From the average of all the years under analysis, we obtained an estimator for the average profitability of the market.

To measure the β_U, first, a synthetic β was determined, through the Degree of operational leverage, by Equation 2 [8]:

β_U Operating Leverage Degree = (Variation in Operating Result) / (Variation in Sales) (2)

After obtaining the synthetic β_U, the leveraged Beta was calculated using Equation 3 [8]:

$\beta\_L = \beta\_U$ (1+ (1-Tax rate) ((Foreign Capital) / (Equity)) (3)

Equation 4 [8] was used to calculate the Cost of Foreign Capital (Kca) for each year *n*:

Kca= 〖Financial Results〗 _ (year n) / ((〖Foreign Capital〗 _ (beginning of year n) + 〖Foreign Capital〗 _ (end of year n)) / 2) (4)

After gathering the necessary values, the Weighted Average Cost of Capital was calculated by Equation 5 [8]:

CMPC = (Foreign Capital) / (Total Assets) × Kca (1-Tax Rate) + (Equity) / (Total Assets) × Kcp (5)

Finally, in order to calculate the Invested Capital, the following Equation 6 was used:

Capital Invested = Total Equity + Total Liabilities-Suppliers (6)

The equation presented above was the same used to measure Invested Capital and approximation Equation 7 [9]. Considering that, in hospitals' total capital, the most essential non-renumbered component corresponded to the suppliers' section, it was decided to estimate the capital invested by the difference between total capital and suppliers.

Capital Invested = Fixed Assets + Working Capital Needs + Active Treasury (7)

After gathering all the necessary values, it finally became possible to calculate the EVA indicator. Two different forms of calculation determined the MVA indicator: one of the forms used was direct, updating the previously determined EVA indicator; the other method of calculation used was through Multiple Methods, where two different multiples were used.

Equation 8 [10] illustrated below was used to calculate the MVA indicator's value by updating the EVA.

MVA = $\sum\_$ (i = 1) ^ n (〖Operating Income〗 _i × (1-tax rate) -CMPC × 〖Invested Capital〗 _ (i-1)) / (1 + CMPC) ^ i (8)

Considering that the sample of the present study is not quoted on a stock exchange, to determine the

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market value of each of the Hospitals, the Multiple Method was used, using two separate multiples: the multiple Price to Earnings Ratio (PER) and the multiple Enterprise Value Multiple (EVM).

Subsequently, to verify the Hospitals' performances comparatively, before and after the contracting process, a difference test between means was also carried out, using a database between 2003 and 2004 referring to the period before contracting and 2005 to 2017, corresponding to the period after contracting. It should be noted that there were many aggregations of hospitals, starting in 2008, and not all the necessary reports and accounts were available, so the sample is not the best.

3 Results and Discussion

This section presents the values of the indicators obtained, that is, where the analysis of the impact of contracting on economic performance in Portuguese hospitals is presented.

Tables 3 and 4 show all values obtained for profitability indicators, namely ROE and ROA.

The values of the ROA indicator, shown in Table 3, are expressed as a percentage. It appears that, in almost all Hospitals, the profitability of the asset is negative, and this means that the operating results were negative, that is, that the Hospitals have operating costs and losses higher than operating income and gains.

Tables 5, 6, 7, and 8 show the EVA and MVA indicators' values. In order to simplify, the following numbering was assigned to the acronym MVA; MVA1- is the MVA, calculated by updating the EVA; MVA2- refers to the MVA estimated using the multiple PER to reach the market value of the Hospitals and MVA3- is based on the MVA obtained, using the multiple EVM to reach the market value of the Hospitals.

Table 6 presents the results obtained for the MVA1 indicator, that is, the MVA calculated by the EVA update method.

3	Hospital Center of Cova da Beira	-0,0783	-0,1344	-0,2700	-0,1488	-0,0740
4	Hospital Center of Vila Real / Peso da Régua	-0,0124	-0,1591	-0,0182	-0,1157	-0,0361
5	District Hospital of Figueira da Foz	-0,0954	-0,0927	-0,0203	-0,2631	-0,1406
6	Garcia de Orta Hospital	-0,0886	-0,0461	-0,0051	-0,1221	-0,01646
7	Infante Dom Pedro Hospital	-0,0181	-0,0596	-0,1704	-0,3278	-0,5426
8	Pulido Valente Hospital	-0,1976	-0,0834	-0,2103	-0,2431	0,0292
9	Santo André Hospital	-0,0069	-0,0401	-0,1673	-0,1251	-0,0019
10	São Gonçalo Hospital	-0,0459	-0,0661	-0,2531	-0,4887	-0,6307
11	São Sebastião Hospital	0,0161	0,0230	0,0003	0,0096	0,0168
12	Coimbra Regional Oncology Center	-0,0287	-0,0418	0,0726	-0,0336	-0,0255
13	Lisboa Regional Oncology Center	-0,0162	-0,0116	-0,0079	-0,0358	-0,0282
14	Padre Américo Vale Sousa Hospital	-0,1306	-0,1343	-0,1535	-0,1805	0,0402
15	IPO Porto	-0,1226	-0,0824	-0,0234	-0,0147	0,1142

Table 3: Values obtained for the ROA indicator by Hospital before and after contracting.

The values presented in Table 6, referring to the MVA1 indicator, are expressed in millions of euros. Table 7 shows the results obtained for the MVA2 indicator, that is, the MVA obtained, using the Multiple PER as an intermediate calculation to determine the market value of the Hospitals.

Finally, in Table 8, the values obtained for the MVA2 indicator are presented, and the MVA was measured, using the Multiple EVM as an intermediate calculation, to determine the market value of the Hospitals.

ROA						
N	Hospital Designation	2003	2004	2005	2006	2007
1	Hospital Center of Alto Minho	-0,0258	-0,03094	-0,04164	-0,1268	-0,0595
2	Hospital Center of Médio Tejo	-0,1651	-0,0986	-0,0882	-0,1653	-0,1748

ROE						
N	Hospital Designation	2003	2004	2005	2006	2007
1	Hospital Center of Alto Minho	0,0020	-0,3877	-3,9365	-0,1227	-0,0353

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2	Hospital Center of Médio Tejo	-0,1997	-0,1013	-0,0401	-0,2221	-0,3083
3	Hospital Center of Cova da Beira	-0,1077	-0,2347	-0,5043	-0,3574	-0,2361
4	Hospital Center of Vila Real / Peso da Régua	0,0027	-0,1905	-0,3213	-0,4204	-0,1862
5	District Hospital of Figueira da Foz	-0,1593	-0,0951	0,1521	-0,7397	-0,3051
6	Garcia de Orta Hospital	-0,1374	0,0455	-0,1338	-0,5424	-5,2694
7	Infante Dom Pedro Hospital	0,0026	0,0203	-0,2078	-0,3515	-1,0943
8	Pulido Valente Hospital	-0,4982	-0,2230	-2,8156	1,8762	-0,0918
9	Santo André Hospital	0,0071	0,0171	0,0320	-0,0384	0,0195
10	São Gonçalo Hospital	0,0275	-0,0236	-0,3640	-2,3114	1,7811
11	São Sebastião Hospital	0,0219	0,0345	0,0367	0,0328	0,0332
12	Coimbra Regional Oncology Center	0,0059	0,0033	0,0115	0,0035	0,0154
13	Lisboa Regional Oncology Center	0,0019	0,0270	0,0153	0,0047	0,0047
14	Padre Américo Vale Sousa Hospital	-0,1728	-0,2102	-0,1248	-0,2313	0,0860
15	IPO Porto	-0,1014	-0,0253	0,0213	-0,0242	0,1824

Table 4: Values obtained for the ROE indicator per Hospital before and after contracting.

EVA						
N	Hospital Designation	2003	2004	2005	2006	2007
1	Hospital Center of Alto Minho	-65,23	-49,47	11,32	91,80	-83,88
2	Hospital Center of Médio Tejo	98,30	-188,14	-133,60	141,33	-36,17
3	Hospital Center of Cova da Beira	-90,82	-58,18	55,62	65,89	-10,74
4	Hospital Center of Vila Real / Peso da Régua	-154,04	-19,36	28,09	491,17	53,44
5	District Hospital of Figueira da Foz	-21,74	-35,05	-33,63	70,16	-2,90
6	Garcia de Orta Hospital	-46,91	-121,96	-92,52	37,35	47,46
7	Infante Dom Pedro Hospital	-135,67	-118,51	-26,04	192,44	119,75
8	Pulido Valente Hospital	15,93	-27,42	7,65	-7,78	-77,03
9	Santo André Hospital	-138,13	-115,09	422,76	-65,32	-142,26
10	São Gonçalo Hospital	-22,31	-15,65	-5,03	20,59	36,43
11	São Sebastião Hospital	-281,20	-283,34	-230,29	-297,73	-339,29
12	Coimbra Regional	-103,55	-91,43	-161,97	-32,04	-117,59

	Oncology Center					
13	Lisboa Regional Oncology Center	-246,61	-304,22	-254,04	-163,46	-277,88
14	Padre Américo Vale Sousa Hospital	-60,33	-73,95	-64,40	1,96	-123,39
15	IPO Porto	-113,95	-226,41	-216,16	-238,35	-580,53

Table 5: Values obtained for the EVA indicator by Hospital before and after contracting.

MVA1						
N	Hospital Designation	2003	2004	2005	2006	2007
1	Hospital Center of Alto Minho	-26,29	-35,28	-20,31	171,76	-156,94
2	Hospital Center of Médio Tejo	-914,49	5172,18	4813,85	5607,16	-1434,88
3	Hospital Center of Cova da Beira	-35,61	-51,81	-102,09	241,29	-39,35
4	Hospital Center of Vila Real / Peso da Régua	-30,47	-8,73	-18,95	62,19	6,77
5	District Hospital of Figueira da Foz	-11,85	-49,59	-73,11	-795,81	32,85
6	Garcia de Orta Hospital	-32,12	-212,18	-208,42	-82,80	-105,23
7	Infante Dom Pedro Hospital	-36,29	-106,09	-9,35	-425,73	-264,93
8	Pulido Valente Hospital	74,20	-253,08	-67,25	-229,62	-2273,12
9	Santo André Hospital	-37,82	-102,75	-3110,19	534,24	1163,50
10	São Gonçalo Hospital	-7,45	-12,54	-0,82	-15,52	-27,45
11	São Sebastião Hospital	-59,72	-280,74	-671,47	-4105,11	-4678,18
12	Coimbra Regional Oncology Center	-38,84	-93,46	-485,40	-139,05	-510,38
13	Lisboa Regional Oncology Center	-80,87	-337,96	-574,01	-856,44	-1455,91
14	Padre Américo Vale Sousa Hospital	-27,77	-91,70	-99,10	2,23	-140,22
15	IPO Porto	-52,70	-354,67	-756,96	-2904,36	-6982,56

Table 6: Values obtained for the MVA1 indicator by Hospital before and after contracting.

MVA2						
N	Hospital Designation	2003	2004	2005	2006	2007
1	Hospital Center of Alto Minho	-4,80	-581,25	-1170,69	-376,51	-110,45

N	Hospital Designation					
2	Hospital Center of Médio Tejo	-1346,93	-655,26	-292,23	-1078,58	-1128,43
3	Hospital Center of Cova da Beira	-406,92	-625,60	-929,79	-475,09	-212,99
4	Hospital Center of Vila Real / Peso da Régua	-28,49	-269,31	34,07	-700,61	-110,20
5	District Hospital of Figueira da Foz	-194,41	-106,96	188,31	-536,99	-173,04
6	Garcia de Orta Hospital	-516,32	164,25	-443,00	-1608,82	-1702,97
7	Infante Dom Pedro Hospital	-26,84	25,41	-499,11	-480,36	-718,20
8	Pulido Valente Hospital	-705,90	-240,92	-832,68	-597,92	-98,98
9	Santo André Hospital	-14,62	18,68	524,94	-609,76	19,02
10	São Gonçalo Hospital	7,40	-11,60	-128,05	-222,46	-217,60
11	São Sebastião Hospital	41,46	103,28	118,82	101,58	108,75
12	Coimbra Regional Oncology Center	-16,84	-13,00	6,08	-19,50	9,97
13	Lisboa Regional Oncology Center	-50,28	79,03	11,90	-46,82	-44,91
14	Padre Américo Vale Sousa Hospital	-483,72	-514,41	-298,30	-413,80	137,18
15	IPO Porto	-649,25	-210,19	53,39	-202,71	1202,97

Table 7: Values obtained for the MVA2 indicator by Hospital before and after contracting

N	Hospital Designation	2003	2004	2005	2006	2007
	MVA3					
1	Hospital Center of Alto Minho	-20,01	-201,57	-193,27	-141,66	-65,56
2	Hospital Center of Médio Tejo	-266,13	-145,69	-118,63	1188,51	-193,38
3	Hospital Center of Cova da Beira	-65,09	-97,59	-161,53	-74,63	-39,70
4	Hospital Center of Vila Real / Peso da Régua	-5,65	-75,24	-98,38	-453,37	-49,07
5	District Hospital of Figueira da Foz	51,30	-46,25	-13,90	-95,86	-37,93
6	Garcia de Orta Hospital	-142,87	-60,18	-14,04	-424,88	-177,23
7	Infante Dom Pedro Hospital	-32,07	-45,89	-115,75	-163,15	-240,79
8	Pulido Valente Hospital	-132,02	-43,47	-85,15	-109,52	12,82
9	Santo André Hospital	-32,93	-59,07	-1139,72	-582,38	-25,54
10	São Gonçalo Hospital	-14,23	-18,18	-35,07	-46,48	-47,06
11	São Sebastião Hospital	-3,20	2,67	-17,20	-19,74	-18,80
12	Coimbra Regional Oncology Center	-59,51	-57,43	29,76	-65,52	-53,33
13	Lisboa Regional Oncology Center	-77,83	-79,22	-43,97	-104,19	-99,59
14	Padre Américo Vale Sousa Hospital	-37,10	-51,41	-44,63	-34,83	22,97
15	IPO Porto	-200,98	-131,70	-61,22	-56,22	139,47

Table 8: Values obtained for the MVA3 indicator by Hospital before and after contracting

Looking at Tables 3, 4, 5, 6, 7, and 8, analyzing the values obtained for each economic performance indicator, two years before and two years after contracting, it can be seen that hiring did not significantly impact the performance of these indicators. However, it can be seen that in more than half of the Hospitals, there was a downward evolution in most of the indicators, in line with the study by Dinis [4].

It can be seen that, except for the Garcia da Orta, Infante Dom Pedro, and São Gonçalo Hospitals, the difference in profitability before and after contracting was very insignificant. Pulido Valente, Santo André, São Sebastião, Padre Américo Vale Sousa Hospitals, Portuguese Institute of Oncology Porto Francisco Gentil, Regional Oncology Center of Lisbon and Coimbra had a very similar behavior regarding contracting, which means that in all of them there was an improvement in the return on Equity after contracting. The Hospital de São Gonçalo stands out, as this was the one that most benefited from the contracting; however, both its net result and the value of Equity went from positive in 2003 to negative in 2007. As for the other Hospitals, Centro Hospitalar do Alto Minho, Médio Tejo, Cova da Beira, Vila Real, and Figueira da Foz also had very similar behaviors, but in a reverse behavior to those previously mentioned, as their return on Equity Capital worsened with the contracting. It should be noted that the Hospital that most worsened its recovery after contracting was Hospital Garcia da Orta. According to the 2007 report and accounts of this same Hospital, due to reasons of national health policy, some of the prices or tariffs charged are lower than those necessary to ensure income that allows the coverage of the total operating costs and adequate levels of remuneration for invested capital, as well as self-financing.

Furthermore, of the fifteen hospitals, there is only an increase in economic performance in six of them: Hospital de São Gonçalo, Infante Dom Pedro, Garcia da Orta, Figueira da Foz District, Centro Hospitalar Cova da Beira, and Centro Hospitalar Peso da Régua Vila Real. In this way, these six hospitals started to create more value after going through a contracting

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process. In this sense, the Hospital where there was greater value creation, after contracting, was the Hospital de São Gonçalo. The other Hospitals, given the contracting, did not obtain better results about value creation since they lost value after the contracting process. It should be noted that the Hospital that most deteriorated in value, that is, devalued, was the Portuguese Institute of Oncology of Porto São Francisco Gentil.

In order to further develop this analysis, a hypothesis test was applied to test the normality of the data, where the Hypothesis null (H0) means that the data distribution is normal and Hypothesis 1 (H1) implies that the data distribution is not normal. The test used to test the data's normality was the Shapiro Wilk test since the sample is small and less than 30. The level of significance considered in the study was 5%. Thus, table 9, appendix A and B, shows that only the data from the MVA3 indicator follow a normal distribution; the remaining data from the other indicators do not follow a normal distribution.

Indicators	SIG	Decision
ROA	0,001	Reject H0
ROE	0,006	Reject H0
EVA	0,048	Reject H0
MVA 1	0,000	Reject H0
MVA 2	0,004	Reject H0
MVA 3	0,609	Accept H0

Table 9: Normality test.

Subsequently, on the ROA, ROE, EVA, and MVA indicators, where the null hypothesis was rejected in the previous normality test, a non-parametric test of the difference between means was applied, whose name is Mann Whitney test for two different samples. For the MVA3 indicator, where the null hypothesis was accepted in the previous normality test, a parametric T-student test was applied for two different samples.

Concerning the Mann Whitney test that was applied, the Hypothesis null (H0) means that there is a similarity between the indicators' means, and Hypothesis 1 (H1) indicates no similarity between the means of the indicators. The level of significance considered was 5% (Table 10). When observing the results obtained in Table 10, it can be concluded that the null hypothesis is accepted in all variables, so there is a statistical similarity between the means of the indicators, as all parameters are higher than the 5% significance level. Thus, it appears that the economic indicators are statistically equal when compared before and after contracting.

Indicators	SIG	Decision

ROA	0,933	Accept H0
ROE	0,686	Accept H0
EVA	0,800	Accept H0
MVA 1	0,476	Accept H0
MVA 2	0,305	Accept H0

Table 10: Mann Whitney test.

Finally, the last test performed in the SPSS was the T-student parametric hypothesis test for two independent samples, in which the null hypothesis (H0) means that there is a similarity between the means of the indicators and the hypothesis 1 (H1) means that there is no there is a similarity between the averages of the indicators. The level of significance, again considered, was 5%. Table 11 shows the results obtained.

Indicators	SIG	Decision
MVA3	0,209	Aceitar H0

Table 11: T-Student test.

Thereby, through the analysis of Table 11, it can be verified that the significance of the coefficient is 0.209, that is, much higher than 5%, so the null hypothesis is not rejected, which means that there is a similarity between the averages of the indicators. Thus, it is concluded that the economic indicators are not statistically different when compared before and after the contracting process.

4 Final Remarks

The study explored the impact on the National Health System in the perspective of the contracting process by analyzing the behavior of the economic performance of a sample of fifteen Hospitals in the period between 2003 and 2017.

The main results found in this study, which qualitatively analyzes the Hospitals' economic data, allow us to conclude that, in Portugal, the behavior of the Portuguese Hospitals' financial performance *vis-à-vis* the contracting process was not very significant and unfavorable. This conclusion is in line with the study by Dinis [4].

Furthermore, we found that only eight Hospitals created value in relation to the contracting, more specifically, Hospital Pulido Valente, Hospital de Santo André, District Hospital Figueira da Foz, Hospital Padre Américo Vale de Sousa, Centro Hospitalar Médio Tejo, Centro Hospitalar Cova da Beira and the Regional Oncology Centers of Lisbon and Coimbra.

The Hospital that, with the contracting process, created more value in a relevant way continues to be the Portuguese Oncology Institute of Porto São Francisco Gentil. In turn, the Hospital that started to create less value compared to contractualization, in a more significant way, is no longer Garcia da Orta, becoming Infante Dom Pedro.

Contextually, there is still no other study that analyzes the impact of contracting the national health system on hospital profitability and economic performance indicators. So, this is an innovative study.

5 Study Limitations and Prospective Research Lines

There are already other studies that analyze this impact. However, they do not use the same methodology to perform the fundamental analysis. In fact, all the policies adopted affect the State budget and the health of all taxpayers and compromise future generations. This is a very appreciated and essential topic these days, so it needs to be analyzed and studied.

In fact, there were no hospital reports and accounts before 2003. In the sample of hospitals analyzed, we were only able to access data from 2003 and 2004.

As study limitations, it is possible to emphasize the absence of accounting data in the period before contracting, since only data related to the years 2003 and 2004 were found. Besides, there was a scarcity of studies developed with the same object of research, the inexistence (or lack of knowledge) of a similar study, and the sample size (despite being a sample for convenience).

This work may be a starting point for other studies about the impact of contracting and the National Health System's sustainability. In this sense, it is considered that it would be interesting to analyze the effect of the policies and reforms adopted in Portugal within the scope of contracting the National Health System.

This study may also be a useful contribution to the future realization of economic-financial research, to verify the solvency and financial balance of each hospital, before and after contracting, as well as a study of issues related to sustainability and problematic in the efficiency of the distribution and allocation of resources, in an equitable way for the whole country.

Regardless of the results obtained and the limitations identified since there are not many studies on this topic, it is still expected that this study will arouse interest on the part of readers and alert them to the question of the importance of efficiently managing available resources to claim a more just, pragmatic, efficient and equal National Health System for all.

Appendix A
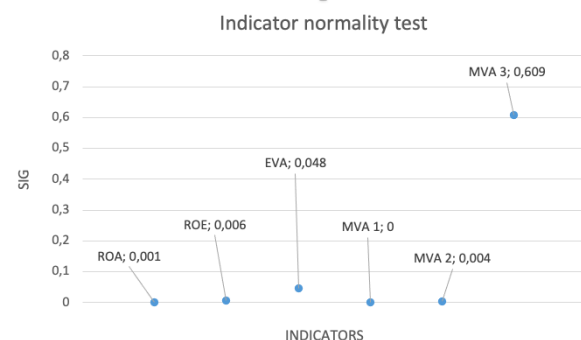
Appendix B

Indicators	SIG	Decision
ROA	0,001	Reject H0
ROE	0,006	Reject H0
EVA	0,048	Reject H0
MVA 1	0	Reject H0
MVA 2	0,004	Reject H0
MVA 3	0,609	Accept H0

Contribution of individual authors to the creation of a scientific article (ghostwriting policy)

Author Contributions: All the authors contributed equally to the development of the present paper. All phases of the paper development have been proper discussed and worked on by the authors. All authors have read and agreed to the published version of the manuscript.

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