



# THE EFFECTS OF OWNERSHIP, BOARD SIZE AND BOARD COMPOSITION ON THE PERFORMANCE OF ITALIAN WATER UTILITIES

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# Il settore idrico italiano

- In base ai dati AEEG: **1235 operatori**
- **75% sono Comuni e altri enti pubblici** che gestiscono in proprio il servizio idrico (distribuzione, depurazione, fognatura etc)
  - 79% sono localizzati al nord, soprattutto Lombardia e Trentino
- **25% sono aziende (304)**, la più «antica» delle quali è la Società Acque Potabili di Torino (1852)
- **Ci sono Regioni con un solo gestore (Puglia, Basilicata) o due (Sardegna); altre con numerosi gestori (Lombardia, Trentino and Sicilia: 403, 320 e 77)**
- In alcune Regioni i gestori sono solo enti pubblici (Molise e Valle d'Aosta) mentre in altre solo società privatistiche (Basilicata, Friuli, Puglia, Sardegna, Umbria e Veneto)

# Assetto proprietario delle società

	N.	%
PUBBLICO	162	53%
MISTO	64	21%
PRIVATO	78	26%
	304	100%

Delle private solo 12 svolgono il servizio idrico integrato

# Numero di soci

- Minimo di 1 solo socio (es. società municipalizzate, MM a Milano)
- Massimo nelle società quotate
  - Acegas-APS (ora Hera a seguito di OPAS)
  - Hera
  - Società Acque Potabili (Gruppo Iren)
    - A2A ciclo idrico, ACEA ato 2 e ato 5, Iren Acqua Gas

# L'accezione di performance

<b>Aree di performance</b>	<b>Significato</b>	<b>Stakeholder di riferimento</b>
Redditività	Massimizzare il risultato economico	1. Proprietà
Indebitamento	Mantenere il ricorso al capitale di terzi al di sotto di una certa soglia	1. Proprietà 2. Finanziatori
Efficienza	Ridurre lo spreco di risorse	1. Proprietà 2. Collettività 3. Clienti
Investimenti	Mantenere un giusto livello di investimenti	1. Clienti
Tariffe	Evitare incrementi ingiustificati della tariffa	1. Clienti

# Introduction

- Over the last 25 years the global water industry has been the focus of debate regarding how best to improve the economic performance, organizational efficiency and financial viability of water utilities.
- **Water services have accordingly been privatized in several countries, notwithstanding conflicts between the profit-seeking behavior of private partners and the public objectives of a water service (Hall 2001).**
- Within Europe the UK, France, Portugal, Spain and Italy have all been involved in privatization processes, with diverse results (for a literature review see Abbott and Cohen 2009, Berg and Marques 2011).
  - **In Italy both the performance and the characteristics of water utilities' boards are conditioned by specific legal provisions.**

# The Italian water industry: utilities board

- **Fully publicly-owned** utilities can appoint no more than 5 board members, according to law 78/2010
- **Mixed owned utilities** have no limitations concerning board size: a restriction is provided only for the number of members appointed by the public shareholders, which must be no more than 5
- The law banned the appointment of any **politicians** who operated in the previous three years as administrators of the local government owning the utility
- The **close connection between Italian utilities** (water, electricity and gas) **and local government** causes the dominance of politically connected directors on the boards of Italian utilities, who exert a negative effect on the firms' performance (**Menozzi et al., 2011**).



# Main goals

- Building on agency theory (Jensen and Meckling 1976), this paper seeks to add to the existing literature on water utility management by investigating ***whether the board size and composition and the ownership of Italian water utilities do affect firms' decisions, and how they ultimately impact on performance.***

Despite the relevance of this issue, the water industry literature to date has focused mainly on the ownership/performance linkage and lacks empirical studies investigating the relationship between performance and board size and composition.

# Data collection

- Latest report published in 2011 by Co.N.Vi.R.I., the former Italian national water authority: 163 Italian water utilities
- Excluded companies that operate in just one of the two subsectors identified (water supply and wastewater) or that are multi-utilities (e.g. providing gas, waste management and energy)
- The reduced list was cross-checked with the **AIDA** (Analisi Informatizzata delle Aziende Italiane) database of Bureau Van Dyck
  - Data on: board size, percentage of women on the board of directors, age of directors, ownership structure (“fully publicly-owned firm” and “not fully publicly owned” firms)
- Internet, and in particular the **firms’ websites, local newspaper websites and the main web search engines** were used to identify if each director on the board had a degree and held or had held political assignments, candidacies in national and local elections, and/or membership of a political party (“**politically connected**”). These sources have been used also to collect data on **population served** by each firm

# Data collection

- **AIDA** database was used to collect the most well-known and commonly used **economic and financial items** referred to 2011:
  - DEPENDENT VARIABLES
    1. return on investment (ROI)
    2. return on equity (ROE)
    3. return on assets (ROA)
    4. return on sales (ROS)
    5. debt to equity ratio (D/E)
    6. financial autonomy (Fin.Aut.) measured as the net asset to total asset
    7. net financial position (NFP) measured as financial liabilities minus cash and cash equivalents
    8. total assets
    9. total revenues, and
    10. number of employees

# Data collection

- The final panel obtained includes **72 water utilities** that operate only in the water and wastewater industry, serving around 31 million customers, for which we collected information about their **335 board members (2011)**
- **Ownership:** the majority of utilities are fully publicly-owned, while mixed and privately-owned firms account for only 27% of the panel selected.
- **Size:** Based on EU parameters, the utilities are mainly small and medium-sized enterprises from the point of view of their numbers of employees and turnover; however, 63.9% of them are large if we consider their annual balance sheet totals
- **Geographical location:** 60% of the utilities are located in the north, 21% are located in the center and 19% in the south of Italy

# Descriptive statistics

Variable	No.	Min.	25%	Median	Mean	75%	Max.
ROI	72	-12.550	1.612	4.890	6.071	9.275	21.940
ROE	72	-118.9	0.2675	1.175	2.29	7.415	47.63
ROA	72	-3.15	1.022	2.525	2.59	4.03	8.58
ROS	72	-33.01	2.758	6.44	6.442	11.25	22.92
D/E	72	-5.47	0.4075	0.995	2.036	3.045	15.7
Fin. Aut.	72	-4.56	10.22	20.3	25.16	37.45	75.87
NFP	72	-27,650	2,165	9,355	29,600	35,880	307,400
Assets, €'000	72	1,647	29,270	73,690	163,400	132,100	1,603,000
Total Revenues, €'000	72	1,392	8,501	20,200	45,430	45,650	442,300
No. of employees	72	11	41.75	103	223.8	235.8	1957
Population served	72	10,860	81,130	140,700	425,900	478,800	4,070,000
No. of directors	72	1.000	3.000	5.000	4.653	5.000	9.000
% of women	72	0.0000	0.0000	0.0000	0.1005	0.2000	0.4000
% politically connected	72	0.0000	0.5550	0.6700	0.6467	0.8000	1.0000
Average age of directors	72	43.00	51.00	55.00	55.45	60.00	70.00
% graduates	72	0.0000	0.3300	0.6000	0.5757	0.8150	1.000

# Method: OLS regression

$$Y = \beta_0 + \beta_1 BS + \beta_2 POL + \beta_3 WOM + \beta_4 GRAD + \beta_5 AA + \beta_6 OS + \beta_7 TR + \beta_8 TA + \beta_9 NE + \beta_{10} POP + \varepsilon$$

## *Independent variables:*

BS: Board size, i.e. the square of the number of board directors;

POL: Percentage of politically connected directors on the board;

WOM: Percentage of female directors on the board;

GRAD: Percentage of graduate directors on the board;

AA: Average age of board members;

OS: Ownership structure, a dummy variable (0 if the water utility is totally publicly-owned or 1 if it is not totally publicly-owned);

## *Control Variables:*

TR: Total revenues for the population served;

TA: Total assets (annual balance sheet total) for the population served;

NE: Number of employees for the population served;

POP: log transformation of the population served.

# Robust check

- Spearman's correlation analysis was performed and a Variance Inflation Factor (VIF) was used
- Since we found a VIF of above 5 for both TR and TA in all the functions, one of these variables had to be removed from the regression model. To determine the best one to remove, each one was removed individually and then the regression equation that explained the most variance ( $R^2$  of the highest) was selected. **In all cases we removed TR**
- The robustness of the model was then evaluated through residual analysis. The residuals' normality was verified with diagnostic plot analysis and the Shapiro-Wilk test
- After the outliers detection, we also try to apply the Maximum Likelihood Robust Regression

# Results

- For **ROA** the Shapiro-Wilk test allowed us to reject the null hypothesis
- With reference to **ROE, ROI, D/E and NFP**, neither the outlier detection through diagnostic plot analysis nor robust regression rejected the null hypothesis. Thus, we were not able to infer anything from the results.
- Considering **ROS and Fin.Aut.** the diagnostic plot analysis highlighted the presence of three anomalous data. Consequently, we first eliminated the outliers and then ran the complete model again. The Shapiro-Wilk test allowed us to reject the null hypothesis



# Board size

- Board size slightly influences the profitability of Italian water utilities from the point of view of ROA (10% significance level), ROI (10%) and ROE (1%).
- Thus, the empirical evidence suggests that **larger boards positively affect performance**. Firms can consequently structure their boards with more members, to acquire a broader range of knowledge and experience, within the regulatory constraints.
- However, the results are not robust, so further empirical tests are necessary to confirm these findings

# Ownership structure

- **Privately-owned firms show higher profitability** when ROS (1%) is considered, **but are more debt-dependent** than fully publicly-owned firms, since their Fin. Aut. is negatively affected by the presence of private shareholders (5%).
- This result confirms evidence from previous studies on Italian water utilities (Guerrini *et al.*, 2011)
- Guerrini *et al.* (2011) and Romano *et al.* (2013) demonstrate that the good performance of private firms could be explained by their higher tariffs and lower amounts of investments. At the same time, the greater solvency and financial autonomy of publicly-owned companies lead them to pay lower interest rates.
- Our results partially confirm the findings of Dewenter and Malatesta (2001), since they show that SOEs are significantly less profitable than privately-owned firms but use more leverage than them.

# Board composition: political connectedness

- The boards of Italian water utilities are dominated by politically connected directors, who account for the great majority of board members.
- There is no significant correlation between the ownership structure and the percentage of politically connected directors on the board.
- The **presence of politically connected directors boosts access to finance but negatively affects firms' financial structures**, in terms of decreasing their financial autonomy (1%) and increasing their debt to equity ratio (1%)
- Politically experienced directors might help the firm gain access to finance from banks, as highlighted by Claessens *et al.* (2008), Khwaja and Mian (2005) and Li *et al.* (2007).
- Yet, in contrast to the existing literature (Faccio 2006, 2010, Goldman *et al.* 2009, Niessen and Ruenzi 2010, Menozzi *et al.* 2011), our research highlights that politically connected directors **do not exert a negative impact on profitability in Italian water utilities, in terms of the profitability ratios analyzed.**

## Board composition: educational background

- **Graduate board members do slightly affect profitability in terms of ROA (10%) and ROS (5%), in a negative way.**
- This result seems to refute the argument that more highly educated managers have greater know-how and more skills that are essential for a firm's success; it may be explained by the **low percentage of graduate board members in our dataset.**
- Furthermore, many of the graduate board members in our study (20%) have **degrees that do not provide them with knowledge and skills in economics or law, nor in engineering or geology**; lastly, we were not able to find out which subject **16% of the degree-holding directors graduated in.**
- Thus, in contrast to Rose (2007), we can relate this result to the fact that having a degree is not in itself sufficient to make a significant contribution to improving firm decision-making and thus performance

# Board composition: age

- Our empirical findings seem to partially confirm that demographic variables, such as the age of board members, can help understand the values and cognitive bases that ultimately affect firm performance (Hambrick and Mason 1984, Erhardt *et al.* 2003).
- As a matter of fact, **the age of board members negatively affects both profitability** (in terms of ROS – 10%) **and financial structure** (considering both Fin.Aut. and NFP – both 5%).

# Board composition: gender

- The **percentage of female board members affects neither economic nor financial indicators**, with the sole exception of a slightly negative influence on ROA and ROS (10%).
- Since the female board members in our dataset **do not reach the critical mass** of three or more women per board (Erkut *et al.* 2008), we can suppose that, as a token presence (Kanter 1977), these women may not feel comfortable on homogeneously male-dominated boards and have difficulties being heard and listened to on an equal basis with other board members.
- Their contributions are not therefore exploited as they could be, given broader representation.

# Limitations

- Further research is needed in order to overcome the limitations of this study.
- First of all, it may be interesting to add **other measures of performance**, for example efficiency estimates obtained with other methods such as Data Envelopment Analysis, or to use the **tariff** charged to customers as a dependent variable.
- Moreover, it may be interesting to extend the dataset to include **multi-year data** and to add information about **multi-utilities** offering more than one public service, considering the scope of operation as a control variable to explain firms' performance.
- Finally, another limitation is the **endogeneity problem**, which impacts much of the board related literature (Hermalin and Weisbach, 2000). Board composition may influence firm performance, but the latter may in turn influence the selection of board members.

# New research...

- Three-year period analyzed (2010-2012)
- The final panel obtained includes 255 observations regarding 85 water utilities that operate only in the water and wastewater industry, providing all the water services, for which we collected information about their 1,118 board members
- We estimate the level of efficiency of water utilities with a non-parametric frontier model known as Data Envelopment Analysis (DEA)



Ownership	n.	%	mean q individual	mean q group
not fully publicly-owned firm	81	32%	0.528	0.528
fully publicly-owned firm	174	68%	0.483	0.483
Board size	n.	%	mean q individual	mean q group
1,2,3 members	118	46%	0.489	0.486
4,5,6 members	101	40%	0.506	0.511
7,8,9 members	36	14%	0.502	0.495
% politics	n.	%	mean q individual	mean q group
0-33%	81	32%	0.525	0.529
33-66%	94	37%	0.447	0.443
66-100%	80	31%	0.528	0.529
% degree	n.	%	mean q individual	mean q group
0-33%	76	30%	0.381	0.382
33-66%	104	30%	0.587	0.59

<b>% women</b>	<b>n.</b>	<b>%</b>	<b>mean q individual</b>	<b>mean q group</b>
<b>0-33%</b>	233	91%	0.498	0.497
<b>33-66%</b>	19	7%	0.418	0.422
<b>66-100%</b>	3	1%	0.959	0.959
<b>average age</b>	<b>n.</b>	<b>%</b>	<b>mean q individual</b>	<b>mean q group</b>
<b>39-48</b>	58	23%	0.472	0.486
<b>49-58</b>	160	23%	0.523	0.52
<b>59-68</b>	37	63%	0.425	0.415
<b>group</b>	<b>n.</b>	<b>%</b>	<b>mean q individual</b>	<b>mean q group</b>
<b>yes</b>	66	26%	0.505	0.505
<b>no</b>	189	74%	0.494	0.494
<b>gross sale</b>	<b>n.</b>	<b>%</b>	<b>mean q individual</b>	<b>mean q group</b>
<b>yes</b>	135	53%	0.523	0.523