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Environmental and financial performance in Italian waste management firms

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Abstract. This paper examines the effects of environmental management on financial performance of Italian urban waste management firms (WMFs). In particular, we sought to test whether compliance with the "hierarchical" principle of the EU waste management system can positively impact WMF's financial performance. Using a quantitative, methodological approach, we tested the relationship between differentiated urban waste collections on total urban waste (DW), calculated for each of 87 Italian provinces, as well as company performance, measured by the Value Added (VA) to the 335 WMFs, operating mainly in each province, for the period 2010-2013. The results obtained from different tests highlight a statistically significant positive correlation between the level of DW and firm performance. Our findings are consistent with the resource-based view and contribute to the literature on environmental and firm performance.

Keywords: Italian waste management firms, financial performance, differentiated urban waste collection

1. Introduction

Waste management has been the subject of significant debate in both national and international contexts. Although discussions have been both wide-ranging and searching, the relevance of the topic from an environmental, social, and financial perspective shows that development of further research is vital.

This work seeks to contribute to the debate regarding the eventual financial benefits of implementing environmental strategies, particularly for waste management firms. The analysis examines the Italian urban waste management firms (hereinafter, "WMFs"). The companies we studied are major players in the waste management system based on the "hierarchical" principle, regulated at the EU level (Directives 2006/12 and 2008/98) and establishing the following order of priority:
a) prevention;
b) reuse and preparation for reuse;
c) recycle;
d) recovery; and
e) disposal.
The WMFs are directly involved beginning at step c), relating to materials recycling but only negligibly in step b); therefore, our work focused on these stages, using differentiated urban waste collection as our main indicator in measuring compliance with the "hierarchical" principle.

Considering this premise, the goal of our research was to investigate the relationship between environmental management and financial performance of Italian WMFs. Our main hypothesis was that there is a correlation between implementation of environmental management systems—*i.e.*, a higher level of differentiated urban waste collection on the total urban waste (hereinafter DW)—and WMFs financial performance. We sought to answer the question whether collection of differentiated urban waste (for reuse and recycling) can generate profitability and launch a virtuous cycle, encouraging future development of environmental management systems in the WMFs.

The issue has been widely debated by many scholars who analyse the relationship between environmental management and financial performance, but who almost never consider the WMFs. For this reason, we have tried to expand the analysis by verifying the impact of environmental management on their performance.

The next section outlines the varying theoretical approaches authors of the literature have used: resource-based theory (Grant 1991, Conner 1991, Barney 1991, Klassen and Whybark 1999, Russo and Fouts 1997); performance analysis: financial, market, technological (Vandermerwe and Oliff 1990, Ameer and Othman 2012, Bowman and Haire 1975, Klassen and McLaughlin 1996, Sharma and Vredenburg 1998, Judge and Douglas 1998, Porter and Van Der Linde1995). Most of these seek to establish a link between "green management" (proactive environmental strategies) and a firm's performance (premium pricing, increased sales/profitability, greater social approval and/or legitimacy, etc.). Some studies are qualitative, but most take a quantitative approach (regression analysis, rank test, equation models, etc.); the independent variable is often representative of environmental performance while the dependent variables are indicators concerning accounting (ROA, ROE, etc.), market (stock prices, Tobin's Q, market share, etc.), or social approval (perceived financial and environmental impact, customer satisfaction, market position, etc.). Results are mixed, but a positive correlation between environment and firm performance is predominant.

Using a quantitative methodological approach, we tested the relationship between DW, calculated for each of 87 Italian provinces (database ISPRA), and company performance, measured by the Value Added (hereafter VA) to the 335 WMFs (AIDA database) for the period 2010-2013. We used the statistical tools of correlation and regression. The results demonstrated a significant correlation between financial performance and other explanatory variables: province population, WMF's revenue, firm size, the province's urban waste and energy consumption. Most significant is the regression analysis, which highlights statistically significant results and proves consistent with our hypothesis.

The remainder of this paper is structured as follows. Section 2 presents some background literature relevant to the field, regarding the relationship between environmental and financial performance. Section 3 describes the methodology, models, and empirical results. Finally, section 4 provides some conclusions and some ideas for future research.

2. Analysis of the literature

International experts in the field of sustainable growth hold that maintaining good levels of waste management efficiency is an essential requirement for building sustainable development. This is valid not only from an environmental and social perspective but also from an economic point of view (Abert, Alter and Bernheisel 1974, Barnard and Olivetti 1990, Hart 1995, Hung, Ma and Yang 2007). However, most studies in this area do not expressly refer to those WMFs who are important actors in the sustainable development process. The effects of environmental management on financial performance are often analysed in general terms without reference to specific industries; manufacturing firms are often examined in the literature (Molina-Azorín, Claver-Cortés and López-Gamero 2009).

Examination of the literature supports the existence of a positive correlation between sustainability and financial performance, although results are sometimes mixed. In particular, some scholars believe that greater attention to environmental management generates competitive advantages (low cost and

differentiation) and thus improves profitability for the firms (Klassen and McLaughlin 1996, Sharma and Vredenburg 1998, Judge and Douglas 1998).

Many articles analyse this correlation, despite the difficulties of observing the benefits of environmental management; for this reason they may be underestimated. Some of these contributions argue that there is a positive correlation between environmental management and firm's performance since pollution prevention systems increase operating efficiency and profitability (Russo and Fouts 1997). The authors test their research hypotheses, based on the resource-based view, using *return on assets* (ROA) as the dependent variable. Their results indicate that "it pays to be green" and that this correlation strengthens with industry growth.

Consistent with the resource-based view, Klassen and Whybark (1999) demonstrate that investment in environmental technologies, such as pollution prevention technologies, significantly affects both manufacturing (cost, quality, speed, and flexibility) and environmental performance, for a sample of manufacturing plants.

King and Lenox (2002) selected two variables to measure financial performance: *return on assets* (ROA) and Tobin's Q, calculated by dividing the sum of firm equity value, book value of long-term debt, and net current liabilities by total assets. They find a significant correlation between waste prevention and firm profitability, but no evidence that firms profit from reducing pollution by other means; they therefore conclude that the benefits of waste prevention alone are responsible for the observed association between lower emissions and profitability.

Similar findings have obtained for Hart and Ahuja (1996) who demonstrate that reduced emissions are correlated with future financial performance: *return on sales* (ROS) and *return on assets* (ROA) within one or two years, while *return on equity* (ROE) presents a longer time lag.

Klassen and McLaughlin (1996) found that environmental awards for reduced emissions led to significant and positive change in the firm's in market valuation, measured by stock market returns; therefore, they conclude that environmental performance—through both market gains and cost savings—affects firm financial performance.

Judge and Douglas (1998) found positive, significant impact in the integration of environmental issues into strategic planning on financial performance; they measure performance through *return on investment* ROI, earnings growth, sales growth, and market share change.

Guenster, Bauer, Derwall and Koedijk (2011) suggest that eco-efficient companies have higher equity returns: they prove the existence of a positive, although not linear, correlation between Tobin's Q and environmental performance.

Other scholars argue that the adoption of policies oriented towards social responsibility can enhance a company's competitiveness through image improvement (Davis 1973), quality (Bowman and Haire 1975), and technological innovation (Porter and Van Der Linde 1995). Corporate Social Responsibility (CSR) generates reputational advantages resulting in sales benefits because customers may be sensitive to social issues (Vandermerwe and Oliff 1990).

Ameer and Othman (2012) studied the relationship between sustainability practices and financial performance in a population of 100 top sustainable global companies. They find significantly higher mean sales growth, return on assets, and profit before taxation and cash flows from operations in some activity sectors of the sustainable companies, compared to the control companies, over the period 2006–2010. Therefore, the results cannot be extended to the entire population, but only to certain companies operating in specific industries. However, as other scholars such as Ameer and Othman outline in their work, the relationship between sustainability practices and corporate financial performance is bidirectional in nature. It is not clear what trajectory the link between environment investment and profitability has, or which independent variable that relationship presents.

Waddock and Graves (1997) also report that several financial measures, including ROA, relate significantly to environmental performance indicators, but the authors express some doubts regarding the direction of causality. They raise such questions as: "Are the most environmentally conscious companies to realize increased profitability or, conversely, do more profitable companies tend to invest in pollution prevention and emissions reduction activities?"

Contrary to earlier reports, other scholars highlight the absence of a positive impact on financial performance of environmental management. Some scholars, therefore, argue that improved environmental performance leads to reduction of firm's profitability, due to the significant costs incurred in complying with environmental regulations.

Watson, Klingenberg, Polito and Geurts (2004) analyse the impact of introducing Environmental Management Systems (EMS) on financial performance, employing both accounting and stock market indicators. They conclude that there is no evidence confirming the existence of a positive correlation between EMS adoption and financial performance.

Others scholars highlight that environmental management causes high operating costs and risks that should lead to lower financial performance (Friedman 1962, Jaffe, Peterson, Portney and Stavins 1995, Walley and Whitehead 1994). Cordeiro and Sarkis (1997) pointed out that high environmental performance is significantly negative in relation to industry analyst *earnings-per-share* (EPS) growth forecasts.

There is also scientific evidence demonstrating different effects, in terms of sign and value, of each environmental performance on financial performance (Iwata and Okada 2011). Jaffe *et al.* (1995) find little support for the conventional wisdom that environmental regulations have large adverse effects on competitiveness. They state that there are many reasons why the effects of new environmental regulations on business performance may have modest impact, however difficult to detect.

González-Benito J. and González-Benito Ó. (2005) partially support the idea that environmental management can bring about competitive opportunities for companies, although they also find that some environmental practices produce negative effects. They thus conclude that there is no one single response for the question of whether environmental proactivity has positive effects on business performance and that this relationship must be disaggregated into more specific and concrete relationships.

Environmental issues are also components of corporate social responsibility (CSR) aspects covering environmental implications of a company's operations, products and facilities, such as: eliminating waste and emissions; maximizing efficiency and productivity of resources; and minimizing practices that might adversely affect the enjoyment of a country's resources by future generations (Mazurkiewicz 2004). The relationship between CSR and firm performance is the subject of numerous studies. Some examine the effects of CSR on firm performance in a multi-industry setting to find evidence to support the theory that the effects of CSR differ in different industry settings. Their study lends support to research investigating the conditions under which CSR is most effective. Results vary significantly based on company size, industry, and marketing budget (Arendt and Brettel 2010). No statistically significant correlation was found between CSR and financial performance by Aupperle, Carroll and Hatfield (1985). They used both short-term (one year) and long-term (five years) *return on assets* (ROA) adjusted for risk, and concluded that there was no evidence to support a possible positive or negative relationship between profitability and an orientation toward CSR. Arlow and Gannon (1982) achieved similar results using a contingency approach to analyse the effect of CSR on profitability, based on factors such as size, relevance of a social issue, and industry characteristics, and found that the relationship between social responsiveness and economic performance, at least in the short term, is inconclusive.

As we can see through the brief literature review reported above, the correlation between environmental management and financial performance in the WMFs has not been the subject of any discernible research, leading us to conclude that it has not been previously examined in the literature. Our goal is to fill this gap and examine this relationship in a context in which the main actors (WMFs) are those who plan important role in the sustainable development process.

3. Methods and discussion

3.1 Research sample

To measure the differentiated urban waste, we use data from the Italian Institute for Environmental Protection and Research, ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale), which provides detailed information on differentiated urban waste levels for each Italian province and region between 2010 and 2013. The database covers data from 110 Italian provinces and contains information about population, total urban waste, differentiated urban waste and others details.
Data on financial performance and firm characteristics was obtained from AIDA. AIDA is a Bureau van Dijk's product providing information on companies in Italy, with up to five years of historical data. Due to examine the financial performance of WMFs, we consider only firms whose ATECO code was 38.11, 38.21.00, 38.21.01, 38.21.09 in the period 2010-2013. Moreover, due to ISPRA reports that many WMFs operate in more than one province or have registered headquarters in different provinces from where they operate, we selected WMFs based on their operating province. For this step, we had 335 WMFs from 2010-2013. We used financial statement data from AIDA, including the amount of VA, to define financial performance.
We then merged the two databases: the first for differentiated urban waste level in each province, the second for financial performance. We excluded firms with missing values for financial performance. We also excluded Italian provinces that were not a main operating site of any WMF on our list.

3.2 Empirical design

To measure the level of DW, we used the value assigned by the ISPRA website, which indicates the value of differentiated urban waste collection and the total urban waste in each Italian province. The model then calculates its natural logarithm. Based on the resourced-based theory (Klassen and Whybark 1999, Fout and Russo 1997,Hart 1995), we believe that the more urban waste that is differentiated, the more resources the WMFs have, and thus the higher the performance.
To measure the WMFs performance, we used the VA as calculated on the AIDA database[1].
To isolate the effect of the differentiated urban waste on WMF performance, we controlled for an array of firm characteristics and other variables documented as important determinants of firm performance by previous studies.
A province's population (hereinafter, "population") is a proxy for the province's dimension. We extracted this data from the ISPRA database. A bigger province may produce more urban waste and create more resources for WMFs operating in that province. As the theory of resource-based perspective suggests, we believe there is a positive correlation between the WMF's performance and population.
The average of a provincial WMF's revenue (hereinafter, "revenue") is a measure extracted directly from the firm's income statement. We calculated the average revenue of all WMFs operating in that province.
The average of provincial WMF's total assets (hereinafter, "size") traditionally represents the size of the firms. We expected that larger firms were likely the best performers because of their potential financial consistency.
A province's total urban waste (hereinafter, "urban waste") was gathered from the ISPRA database. It is a proxy for the total input amount in the WMF's firm. As the resource-based perspective suggests, we expected there to be a positive correlation between the total input value and the WMF's performance.
Provincial energy consumption (hereinafter, "energy consumption") is the total value of energy consumed in a province, ostensibly a good proxy for industrial production output. We obtain the energy consumption data from Terna S.P.A statistics and forecast service. Terna S.P.A is the principle

[1] The results are consistent if we use an alternative measure of firm performance, such as return on investment (ROI).

corporation managing and offering energy service to all Italian provinces. We selected energy consumption in the entire industry's sectors, for each Italian province from 2010-2013[2].
The literature contains some studies using energy consumption as a proxy for spot consumption (Da and Yun 2010), for GDP (Rawski 2001), or even to represent economic activities (Kunnast and Myllyntaus 2009). This issue can be controversial. On the one hand, the more energy consumed, the greater the cost of the input spent in the production process (Sahuand Narayanan 2011). Therefore, one may expect energy consumption to be negatively correlated to firm performance. On the other hand, due to be considered as a good proxy of the economy output (Rawski 2001) a better economic result may enhance financial firm performance and thus, it is believed that there would be a positive correlation between the Energy consumption and performance of a firm.

3.3 Models

We examined the effects of DW on financial performance of WMFs using the following model:

$$VA_{i,t} = \alpha_0 + \alpha_1 DW_{i,t} + \alpha_2 Controls_{i,t} + Year_i + \varepsilon_{i,t} \quad (1)$$

Where $VA_{i,t}$ refers to our financial performance measures of the average VA of WMFs in the Province *i* in year *t*. We considered the Log of one plus value of DW in that province (paragraph 3.4.1 explains this reasoning). $Controls_{i,t}$ is the set of variables: the $Province_i$ population year t; the average revenue of WMFs in the $Province_i$, year t; the average WMF size in the $Province_i$, year t; total value of urban waste in the $Province_i$ in the year t and provincial level of energy consumption in $Province_i$, year t. We added the time and both time and entity fixed effects in the model. Then, we compared the results from three models: the first with time fixed effects model, the second with both time and entity fixed effects model and the last with random effects.

3.4 Models

3.4.1 Summary statistics

Table 1: Summary statistic

The sample consists of firms covered by AIDA working on urban waste, ISPRA database, and Terna S.p.A statistical data between 2010 and 2013.

Variable	mean (1)	p25 (2)	p50 (3)	p75 (4)	sd (5)
Total_Assets	30070.74	4042.46	11252.06	20454.63	113175.67
Revenue	15548.38	3139.36	6682.65	15202.21	35223.28
Population	618855.42	289179.00	403750.00	801594.00	642700.91
Urban_waste	318365.62	146101.94	227024.92	352558.11	348758.40
Diff. U.Waste	125708.47	42852.09	87780.99	147056.43	126437.13
VA	7235.13	1258.89	2869.26	7364.23	15582.38
Energy_Consump.	3084.14	1267.70	2314.30	3709.10	2914.34

Table 1 summarizes all variables used in the empirical analysis. Columns (1), (3), (5), respectively, report mean, median, standard deviation of the variables used for the whole sample. Similarly, columns (2), (4) report their first and the third quartile. It is important to note that the mean value of all variables in the table are significantly far from their respective median value. Furthermore, their correspondent standard deviation is obviously relevant value. For these reasons, we believe that these

[2]http://www.terna.it/default/Home/SISTEMA_ELETTRICO/statistiche/consumi_settore_merceologico/consumi_settore_merceologico_provincie.aspx.

variables have skewed distribution and suggest the presence of some very large values, so we use the natural logarithm of variables in the regression to attenuate their effects.
Thus, Table 2 presents the Pearson correlation matrix between the average of firm performance and the differentiated urban waste level in each province's firm's characteristic variables and energy consumption at the province level.

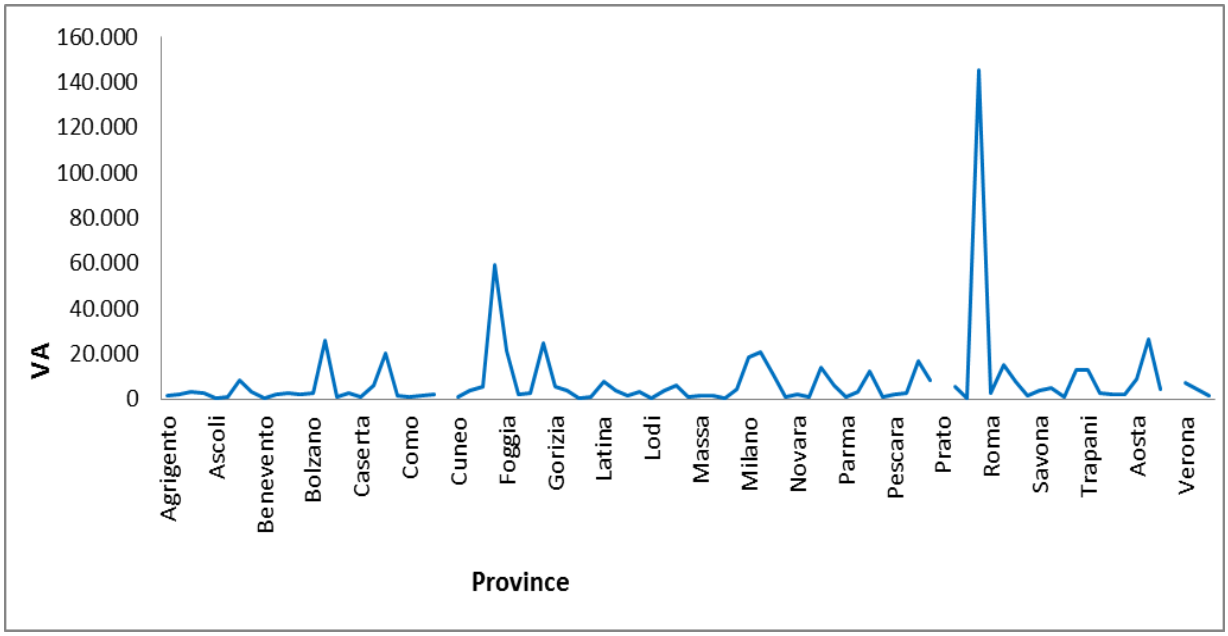
Table 2: Pearson correlation matrix

The sample consists of firms covered by AIDA that only work with urban waste, ISPRA database, and Terna S.p.A statistical data from 2010-2013.
The asterisk (*) denotes significance at the 5% level or better.

	VA	Population	Revenue	Firm_size	Energy~	DW	UW
VA	1.0000						
Population	0.2637*	1.0000					
	0.0000						
Revenue	0.4466*	0.3770*	1.0000				
	0.0000	0.0000					
Firm_size	0.4153*	0.3528*	0.9127*	1.0000			
	0.0000	0.0000	0.0000				
Energy_cons.	0.2101*	0.5051*	0.2075*	0.1791*	1.0000		
	0.0001	0.0000	0.0001	0.0009			
DW	0.3549*	0.5286*	0.2283*	0.1947*	0.5380*	1.0000	
	0.0000	0.0000	0.0000	0.0003	0.0000		
UW	0.3034*	0.9701*	0.4157*	0.3805*	0.5098*	0.5514*	1.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

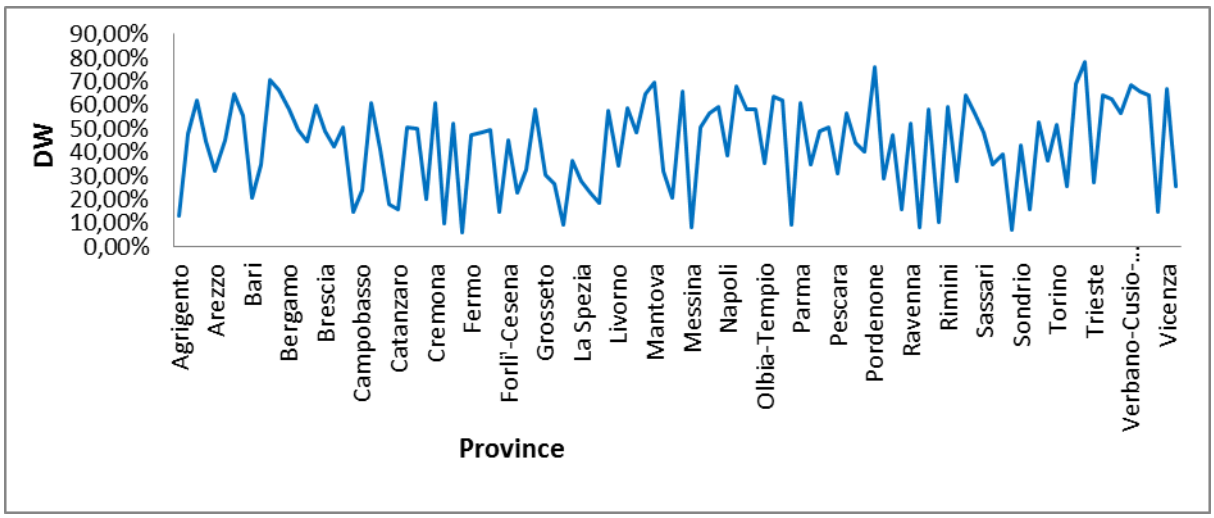
All paired correlations are significantly different from zero at the 1% level. As expected, our measures of performance, VA, correlate highly with each other (*i.e.*, correlation coefficient with DW 0.355 and significant at the 1% level). Consistent with our hypothesis, VA correlates positively with population, revenue, size, urban waste, and energy consumption. We find also that the relation between energy consumption and VA is significantly positive (correlation coefficients of approximately 0.21 and significant at the 1% level).

Figure 1: Average Value Added (VA) in WMFs at the provincial level 2013



VA in the WMFs presents fluctuations during the entire period from 2010 to 2013.
Figure 1 shows the average of VA in Italian provinces in 2013. As observed in greater detail, Rimini was the province with the highest VA for WMFs (€145,223 million). Second place goes to WMFs operating in Florence with VA of about €59,268 million.

Figure 2: Differentiated urban waste collection (DW) in Italian provinces 2013



Urban waste in most Italian provinces increases over time and the DW follows the same pattern. In Figure 2, we trace the line representing the DW in Italian provinces in 2013. Treviso is the province with the highest amount of DW with 78.2% of the total urban waste in 2013. The lowest provinces in the list are Enna (6%), Siracusa (7.13%) and Reggio di Calabria (8.3%). Similar patterns can be found in data for the provinces from 2010 to 2012.

3.4.2 Regression results

In this subsection, we examined the effect of DW on the WMF's performance using the multivariate regression analysis in which the dependent variable is Logarithm of VA of WMFs a single province.
First, we regressed DW, population, revenue, size, urban waste, energy consumption, on firms VA with fixed effects on the time, and standard errors are clustered for provinces. We also tested with VIF 4.45 (<10) means the multicollinerity was not an issue in our test. Our Wooldridge test for autocorrelation (F statistic was 9.38 and p value was 0) in panel data rejects the null hypothesis on the autocorrelation and requires us to confront this problem in our test. Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (chi square was 118.12 and p-value was 0) also suggests that there is heteroskedasticity on our panel data. Thus, we replicated the same regression but this time with fixed effects on both time and entities. In the last test, we performed the same regression but with random effects, and then compared the results from the three different tests.

Table 3: Regression results on the WMF's financial performance

(*** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.)

VA	Fixed effects in time (1)	Fixed effects (2)	Random effects (3)
Population	-0.593	-0.452	-0.550
	(-0.8)	(-0.8)	(-1.1)
Revenue	0.340	0.115	0.190
	(1.5)	(1.1)	(1.8)
Firm_size	0.067	-0.091	-0.024
	(0.3)	(-0.8)	(-0.2)
UW	0.545	0.442	0.581
	(0.8)	(0.8)	(1.1)
Energy_cons.	-0.007	-0.347***	-0.223**
	(-0.1)	(-5.3)	(-3.3)
DW	4.491***	5.320***	5.279***
	(13.1)	(6.7)	(6.3)
_cons	-0.979	0.765	-0.356
	(-1.0)	(0.9)	(-0.5)
Adjusted R_square	0.292	0.212	
Sample size	341	341	341

Table 3 presents estimates from regressions of VA, population of each province, average WMF's revenue, WMF's size, size of urban waste, energy consumption, and waste differentiated level. The sample is the average value of WMFs operating in 87 Italian provinces.
The table reports the results of the regressions in equation (1). In the first column (1), we present the results from regression containing yearly fixed effects; standard errors clustered by the average of WMFs in each province are in parentheses. The second column (2) presents results from regression containing fixed effects and the third column (3) with random effects.
A quick look confirms our hypothesis about the relation between the DW and WMFs performance. All coefficients from our three tests are statistically significant (Coefficients of DW are 4.491, 5.320, 5.279 for the three tests, respectively). Control variables show results a bit different from our expectations.
In the first test, population expresses a negative impact on the WMFs performance even if it is not statistically significant. Other control variables show signs as predicted, except the last case. As discussed earlier, these are controversial relating to energy consumption and in this case, the negative sign means that the more energy was consumed, the worse the WMFs performed.

With respect to the subsequent test, the results do not vary, except that the result for energy consumption is confirmed and found to be statistically more significant; the impact of size relates negatively to performance. The DW coefficient is bigger than in the first case, and means that the existence of a local DW policy may improve WMF's performance. However, in this test, only the coefficient for DW is statistically significant.
The last test—a random effects test—obtained very similar results to the second test, but the coefficient of DW was not strong as with the fixed effects case (the second test).
We tried the Hausman test to check which one was better as between the random effects or fixed effects. Chi square from the Hausman test gave the chi square as 70.45 and p-value significant at 1% level, suggesting that the fixed effects test was better.
In sum, our results again confirmed the previous section's hypothesis, where we expected there to be a positive correlation between the DW level and the WMF's performance. The more urban waste a province can differentiate, the better financial performance the WMFs can achieve.

4.Conclusions

In this study, we tackled the relationship between two elements: the introduction of environmental management systems as observed through DW, and the resulting impact on financial performance of WMFs. We found evidence supporting the resourced-based theory (Klassen and Whybark 1999, Fout and Russo 1997, Hart 1995) according to which there is a positive correlation between environmental management and financial performance. The results indicate that the more WMFs can use differentiated urban waste collected as a "resource," the better their financial performance in terms of VA. We also found that the effects of environmental management on financial performance depend on the measure indicators one uses. In other words, results may conflict with previous research if one chooses other indicators for financial performance. Nevertheless, the findings from this research may lend support to current European Community policies on waste management and can help increase awareness in local public institutions (regions, provinces, and municipalities) of the importance of conformance to the "hierarchical" principle regulated at the EU level for the wealth of the local WMFs.

This research, however, is not without limitations. The first is the lack of quantitative data about differentiated urban waste collected at the WMF level; we therefore had to base our study on the DW data relating to Italian provinces. This limitation is the consequence of the difficulty of collecting data about DW specifically relating to individual WMFs. Another is the necessity of extending the study to other performance indicators that could also take into consideration the cost of waste recycling in addition to profitability. Such considerations could lead to future studies focused at the firm level and comparing results obtained in different European countries. Furthermore, we believe it would be interesting to consider the bilateral correlation between environmental management and WMF's performance.

References

Abert, J., Alter, H., Bernheisel, F. J. 1974. 'The economics of resource recovery from Municipal Solid Waste.' *Science* 183 (4129): 1052-1058.
Ameer, R., Othman, R. 2012. 'Sustainability practices and corporate financial performance: A study based on the top global corporations.' *Journal of Business Ethics* 108 (1): 61-79.
Arendt, S., Brettel, M. 2010. 'Understanding the influence of corporate social responsibility on corporate identity, image, and firm performance.' *Management Decision*48 (10): 1469-1492.
Arlow, P., Gannon, M. J. 1982. 'Social responsiveness, corporate structure and economic performance.' *Academy of Management Review* 7 (2): 235-241.

Aupperle, K. E., Carroll, A. B., Hatfield, J. D. 1985. 'An Empirical Examination of the Relationship between Corporate Social Responsibility and Profitability.' *Academic Management Journal* 28 (2): 446-463.
Barnard, R., Olivetti, G. 1990. 'Rapid assessment of industrial waste production based on available employment statistics.' *Waste Management & Research* 8 (1): 139-144.
Barney, J. 1991. 'Firm resources and sustained competitive advantage.' *Journal of Management* 17: 771-792.
Bowman, E. H., Haire, M. 1975. 'A strategic posture towards CSR.' *California Management Review*18 (2): 49-58.
Conner, K. R. 1991. 'A historical comparison of resource-based theory and five schools of thought within industrial organization economics: Do we have a new theory of the firm?' *Journal of Management* 17 (1): 121-154.
Cordeiro, J. J., Sarkis J. 1997. 'Environmental proactivism and firm performance: Evidence from security analyst earnings forecasts.' *Business Strategy and the Environment* 6 (2): 104-14.
Da, Z.,Yun, H. 2010. 'Electricity consumption and asset prices.' thttp://ssrn.com/abstract=1608382.
Davis, K. 1973. 'The case for and against business assumption of social responsibilities.' *Academic of Management Journal* 16 (2): 312-322.
Friedman, M. 1962. *Capitalism and Freedom*, Chicago: University of Chicago Press.
González-Benito, J., González-Benito, O. 2005. 'Environmental proactivity and business performance: an empirical analysis.' *Omega* 33 (1): 1-15.
Grant, R. M. 1991. 'The resource-based theory of competitive advantage.' *California Management Review* 33 (3): 114-135.
Guenster, N., Bauer, R., Derwall, J., Koedijk, K. 2011. 'The economic value of corporate eco-efficiency.'*European Financial Management* 17 (4): 679-704.
Hart, S. L. 1995. 'A natural resource-based view of the firms.' *Academy of Management Review* 20 (4): 874-907.
Hart, S. L., Ahuja, G. 1996. 'Does it pay to be green? An empirical examination of the relationship between emission reduction and firm performance.' *Business Strategy and the Environment* 5 (1):30-37.
Hung, M. L., Ma, H. W., Yang, W. F. 2007. 'A novel sustainable decision making model for municipal solid waste management.' *Waste Management* 27 (2): 209-219.
Iwata, H., Okada, K. 2011. 'How does environmental performance affect financial performance? Evidence from Japanese manufacturing firms.' *Ecological Economics* 70 (9): 1691-1700.
Jaffe, A. B., Peterson, S. R., Portney, P. R., Stavins, R. N. 1995. 'Environmental regulation and the competitiveness of US manufacturing: what does the evidence tell us?' *Journal of Economic Literature* 33 (1): 132-163.
Judge, W. Q., Douglas, T. J. 1998. 'Performance implications of incorporating natural environmental issues into the strategic planning process: an empirical assessment.' *Journal of Management Studies* 35 (2): 241-62.
King, A., Lenox, M. 2002. 'Exploring the locus of profitable pollution reduction.' *Management Science* 48 (2): 289-299.
Klassen, R. D., McLaughlin, C. P. 1996. 'The impact of environmental management on firm performance.' *Management Science* 42 (8): 1199-1214.
Klassen, R. D., Whybark, D. C. 1999. 'The impact of environmental technologies on manufacturing performance.' *Academy of Management Journal* 42 (6): 599-615.
Kunnas, J., Myllyntaus, T. 2009. 'Postponed leap in carbon dioxide emissions: The impact of energy efficiency, fuel choices and industrial structure on the Finnish economy, 1800-2005.', *Global Environment* 3: 154-189.
Mazurkiewicz, P. 2004. 'Corporate environmental responsibility: Is a common CSR framework possible.' *World Bank* is available at www-wds.worldbank.org.

Molina-Azorín, J. F., Claver-Cortés, E., López-Gamero, M. D., Tarí, J. J. 2009. 'Green management and financial performance: A literature review.' *Management Decision* 47 (7): 1080-1100.
Porter, M. E., Van Der Linde, C. 1995.'Green and competitive: Ending the stalemate.' *Harvard Business Review* September-October: 120-135.
Rawski, T. G. 2001. 'What is Happening to China's *GDP* Statistics?' *China Economic Review* 12: 347-354.
Russo, M. V., Fouts, P. A. 1997. 'A resource-based perspective on corporate environmental performance and profitability.' *Academy of Management Journal* 40 (3): 534-559.
Santosh Kumar, S., Narayanan, K. 2011. 'Energy Intensity and Firm Performance: Do Energy Clusters Matter?' *Munich Personal RePEc Archive* Paper n. 43457: 1-25.
Sharma, S., Vredenburg, H. 1998. 'Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities.' *Strategic Management Journal* 19 (8): 729-753**.**
Vandermerwe, S., Oliff, M. D. 1990.'Customers drive corporations green.' *Long Range Planning* 23 (6): 10-16.
Waddock, S. A., Graves, S. B. 1997. 'The corporate social performance – financial performance link.' *Strategic Management Journal* 18 (4): 303-319.
Walley, N., Whitehead, B. 1994. 'It's not easy being green.' *Harvard Business Review* May-June: 46-52.
Watson, K., Klingenberg, B., Polito, T., Geurts, T. G. 2004. 'Impact of environmental management system implementation on financial performance: A comparison of two corporate strategies.' *Management of Environmental Quality: An International Journal* 15 (6): 622-628.