

THE IMPACT OF EXTERNAL AND INTERNAL DRIVERS ON VALUE CREATION

GERNOT GRUBER

ABSTRACT

Protecting the environment and climate change are the main talking points in the modern world. This leads to increasing political involvement in the matter. This circumstance, as well as changing macro-economic parameters, are the background to the investigation undertaken in this paper. The main objective of the paper is to evaluate the impact of value drivers on company value and the relationship between them. Based on the research questions, an identification and quantification of internal drivers of company value constitutes the first step. Analysis 1 is done by means of a multiple linear regression analysis. In the second step, these examined internal drivers are used in an investigation to verify and quantify the influence of external drivers (GDP, environmental tax and the Fraser index). Analysis 2 is done via a specific structural equation model (path analysis). Data in this paper are drawn from selected industrial sectors (metal, paper, and chemical) of three European countries (France, Germany, and Italy) within the period of 2006-2015. The findings show that size and profit margin are the most relevant internal drivers. GDP is the most relevant external driver with an impact on internal drivers. GDP always has a positive impact on added value. The results also indicate that the impact of GDP is higher in periods of economic crisis. Another outcome of the paper is that only in France do the environmental tax and the Fraser index have a clear impact on added value.

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KEY WORDS

Added value, value driver, regression analysis, path analysis

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Introduction

The paper, chemical and metal industries (together with transportation) are considered to be the main "pollutants" of the atmosphere. According to Eurostat statistics, the share of all industrial processes and product uses was approximately 9% in 2015 (Eurostat, 2015). Across EU member states in 2015, greenhouse gas (GHG) emissions were the highest in Germany (21%), followed by the UK (13.3%), Italy (10.6%) and France (10.4%). The development of and changes in environmental behaviours, environmental

regulations and global economics thus represent the key focus of the paper. Public pressure to change the environmental mindset is increasing, which leads to more political involvement in the matter. Authorities and the public are beginning to realise the emerging damaging effects of emitting these types of gases. As a result, policies to reduce GHG emissions have been implemented (Mnif and Davison, 2012). The global economy is not a one-way street, which means that phases of recovery will be followed by downturns, and in the

worst case by periods of recession. Macroeconomic events have an impact on companies' cash flows and economic value (Kaszowska-Mojša, 2020; Kitrar and Lipkind, 2021). These events may be triggered by different policy and non-policy shocks which originate in domestic or foreign markets (Gongeta, 2018).

Given these factors, the objective of the paper is to evaluate the relationship between external and internal drivers and their direct and indirect impact on company value. Furthermore, an investigation will be done on the economic crisis as well as on periods of economic growth. The research will be carried out in selected industry sectors in France, Germany and Italy.

1. Literature review

Regulations which aim to reduce the negative impact on the environment are assumed to create costs for companies. To comply with the regulations, firms are forced to allocate inputs (e.g. labour or capital). Although regulation could generate environmental or other societal benefits, on the other hand, the internalisation of the environmental externality reduces a company's options, which leads to reduced profits. Accordingly, firms have to find the right balance between the beneficial effects of a regulation and the costs incurred to generate the desired benefits (Palmer et al., 1995).

Porter and van der Linde (1995) argued that environmental regulation which is designed properly does not impose higher costs on firms. Such environmental regulation can initiate innovation, which may partially or even more than fully compensate for the costs of complying with the regulations. This means that environmental regulation can trigger innovation which leads to more profit (e.g. improvements in energy or resource efficiency).

Krüger (2015) analysed the effect of mandatory GHG emissions disclosure on company value. The basis of the investigation was GHG emissions reporting for firms listed on the main market of the London Stock Exchange. The research revealed that firms with the highest effect of the regulation have significantly positive valuation effects. Increases in corporate value are higher for large firms as well as for firms in carbon-intensive industries. Capital market effects (e.g. higher liquidity) are the driver of the increased valuation of most affected firms. A paper by Albertini (2013) confirms a positive relationship between environmental performance and financial performance through the use of meta-analysis. The paper demonstrates significant differences in a relationship depending on the environmental and financial performance measures used. There are also differences by region as well as by activity sector and the duration of the studies.

Dang et al. (2018) analysed environmental regulation in different counties of the USA, by comparing the real effects of mandatory pollution abatement regulations or the designation of nonattainment status. Plants located in a county which is designated as nonattainment are required to take actions to comply with the mandatory requirement. Walker (2011, 2013) undertook an investigation on the effect of the Clean Air Act on the local economy and labour allocation. Khalid and Wei (2012) investigated a possible relationship between economic and environmental measures as well as trade liberalisation and demographic measures. They observed that there was a relationship between the measures mentioned. The results of an investigation by Hiroki and Keisuke (2011) on the effect of environmental performance on financial performance was that waste emissions did not have a significant

effect on financial performance. A GHG reduction in clean industries leads to an improvement in financial performance. Oxelheim and Wihlborg (2001) observed that macroeconomic events have an impact on a firm's cash flows and economic value. These events may be triggered by different policy and non-policy shocks which originate either at home or abroad. Sometimes these cashflow effects can be anticipated or forecasted and firms can steer against this development to reduce this impact by applying flexibility in sourcing, pricing and location of production.

According to a paper by Cutler et al. (1991), approximately 30% of the variance in stock returns is explained by macroeconomic variables. Lee et al. (2017) analysed the impact of firm-specific and macroeconomic factors on company performance. The investigation covered more than 1400 Chinese public non-financial firms within the period of 1999-2010, in other words, during the recent global crisis and during the non-crisis period. To avert a financial crisis during non-crisis and crisis periods alike, policymakers can improve the economy by giving priority to accelerating the consumer confidence index and exports as well as decreasing the money supply. Companies should improve financial measures such as cash flow per share, dividend yield, and leverage during non-crisis periods in order to strengthen the quality of the firm itself as well as to improve performance. The results of the paper provide a view to different impacts of financial factors in crisis and non-crisis periods. Investors should take factors which are harder to manipulate, such as shareholder ratio, company history, and company size, into account in their investment decisions.

A study by Chittedi (2015) examines the relationship between stock prices and the macroeconomic variables in the BRIC economies. The results show long-run and

short-run relationships which are not consistent for all BRIC countries. The findings illustrate that the identification of the direction of a relationship is useful for investors. Based on this fact, they can make more effective investment decisions than by estimating macroeconomic trends.

The objective of Herwadkar's (2017) paper was to verify that changed macroeconomic conditions contributed significantly to the sharp rise in corporate leverage in emerging market economies (EME) in the post-crisis period. The study used a set of macroeconomic factors including international factors, such as global GDP growth and US Federal Reserve policy. Mocnik (2010) presented evidence of a U-shaped relationship between economic development and the dynamics of enterprises. Another result of the paper is that economic development influences the dynamics of enterprises. Economic growth significantly affected the net entries in a U-shaped form, indicating that the positive (negative) rate of net entry decreases (increases) until a 10% growth in regional gross value (GVA) is achieved. If GVA growth exceeds 10%, the negative (positive) value of the rate of net entry decreases (increases).

Hussain et al. (2020) investigated the rate of adjustment for firms based on voluntary environmental reporting. The scope of the investigation was based on firms on the Malaysian capital market. The results showed that voluntary disclosure on environmental reporting gives firms greater ability to access cheaper external financing. The results are valid across differing endogenous and exogenous factors. This means that these firms are confronted with lower adjustment costs. Another outcome is that voluntary environmental disclosure has a positive impact on maximising company value.

Madaleno and Barbuta-Misu (2019) researched the determinants of financial performance and the impact of the financial crisis on these factors. The results showed that crisis periods exert a significant positive effect on financial performance, liquidity, asset turnover and labour productivity. The results show also that financial performance is negatively influenced by leverage independently of the crisis effect.

Maric et al. (2013) analysed the link between early-stage entrepreneurial activity and various economic factors. The findings of the paper showed that early-stage entrepreneurial activity (especially in the long term) is strongly influenced by economic development. The highest correlations were caused by GDP per capita and the unemployment rate. Furthermore, Al-Najjar and Anfimiadou (2012) analysed the relationship between eco-efficiency and company value. The idea behind eco-efficiency is that investments in environmental technology positively affect company value, since this is viewed by investors as increasing profit. In other words, eco-efficiency is about making production more efficient while also having less of an impact on the environment. The result of an investigation by Dowell et al. (2000) was the refutation of the idea that the adoption of global environmental standards by multinational enterprises constitutes a liability that decreases market value. On the contrary, the adoption of a single stringent environmental standard around the world shows a positive market valuation. Adopting stringent environmental standards could lead to higher profit than using lower local environmental standards.

Lopez-Gamero et al. (2009) examined the hypothesis that more proactive environmental management is done by firms which had earlier been identified as better environmental performers. The results

showed that firms can perform better when they adopt a proactive environmental management. The findings are in line with the resource-based view, which means that these resources are highly relevant to obtaining competitive advantage and improving financial performance.

The objective of a paper by Matsumara et al. (2014) was to investigate the effects of carbon emissions and the act of voluntarily disclosing such information on company value. They used carbon emissions data for 2006 to 2008 by S&P 500 firms from the Carbon Disclosure Project. The major finding was that, on average, for every additional thousand metric tons of carbon emissions, company value decreases by US\$212,000. The median emissions for the disclosing firms in the sample were 1.07 million metric tons. Another scope of investigation is to examine the effects of managers' decisions to disclose carbon emissions on company value. The results revealed a significant higher median value of firms which disclosed their carbon emissions compared to non-disclosing firms. It seems that the markets penalise all companies for their carbon emissions. It also seems that an additional penalty is levied on firms that do not disclose emissions information. This illustrates the fact that capital markets consider carbon emissions as well as the act of voluntary disclosure of this information in company valuations.

The analysis shows that the topic under investigation is multidimensional and analysed from different points of view – of which those featured in the abovementioned literature were: 1) environmental regulation; 2) GHG disclosure (mandatory and voluntary); 3) macroeconomic conditions; 4) economic growth, energy consumption and trade regulation (Table 1).

Table 1. Summary of literature review

Author	Objective	Findings
Palmer et al., 1995	The impact of regulations on profits	Trade-off between the beneficial effects of regulation
Porter, van der Linde, 1995	The impact of environmental regulation on the costs incurred by firms	Environmental regulation can also trigger innovation which leads to profits
Krüger, 2015	Mandatory greenhouse disclosure	Large firms and firms from carbon-intensive industries are most affected
Albertini, 2013	The relationship between environmental and financial performance	Confirms a positive relationship; strength depends on measures, regional differences, activity sector and the duration of the study
Dang et al., 2018	Analysing the effects of environmental regulation	Financially constrained firms spend less on future pollution abatement; financially unconstrained firms spend more on pollution abatement
Walker, 2011, 2013	Analysing the effect of clean air on the local economy and labour allocation	Re-allocative costs of environmental policy are significant; employment falls in affected sectors
Khalid and Wie, 2012	The relationship between economic growth, carbon emission, energy consumption, and trade liberalisation	The existence of an environmental Kuznets curve could not be confirmed in the short term; the long-run curve is confirmed between carbon emission and growth, energy consumption and trade openness
Hiroki and Keisuke, 2011	The effect of environmental performance on financial performance	An increasing firm growth rate leads to partial effects of waste emissions on worsening financial performance, whereas the partial effects of GHG emissions on financial performance are increasing
Oxelheim and Wihlborg, 2001	The impact of macroeconomic fluctuations on value-based management	Suggestion to distinguish the cash flow of firms in neutral macroeconomic conditions and macroeconomic fluctuations
Cutler et al., 1991	The relationship between macroeconomic variables and stock returns	Approximately one-third of macroeconomic variables explain the variance in stock returns
Lee et al., 2017	The influence of company and macroeconomic variables on company performance during a crisis	Companies with higher top ten shareholder ratios or companies that are older exhibited saliently higher performance during a crisis, but performed poorly during the non-crisis period
Chittedi, 2015	The relationship between stock prices and macroeconomic variables in BRIC countries	A long-run and a short-run relationship exists between macroeconomic variables and stock prices; this relationship is not consistent for all BRIC countries
Herwarkar, 2017	The impact of macroeconomic conditions	Large but less profitable firms have raised more resources from the debt market in the post-crisis period
Mocnic, 2010	The relationship between economic development and the dynamics of enterprises	The dynamics of enterprises are influenced by the level of economic development achieved
Hussain et al., 2020	Adjustment for firms based on voluntary environmental reporting	Positive impact of voluntary environmental disclosure on maximising company value
Madaleno and Barbuta-Misu, 2019	Factors of financial performance and the impact of the financial crisis on these factors	The crisis exerts an effect on financial performance, liquidity, asset turnover, and productivity
Maric et al., 2013	Dependency of entrepreneurial activity on economic factors	Economic development plays an important role in early-stage entrepreneurial activity, especially in the long term
Al-Najjar and Anfimiadou, 2012	The relationship between eco-efficiency and firm value	Eco-efficiency investments have a positive effect on company value
Dowell et al., 2000	Investigation into the adoption of global environmental standards	Private valuations may incorporate negative environmental externalities

Lopez-Gamero et al., 2009	The impact of proactive environmental management practices	Proactive environmental management leads to improved company performance
Matsumura et al., 2014	The impact of voluntary carbon emission disclosure on company value	The effects of managers' decisions on company value

Source: Own elaboration.

The analysis allowed to formulate the following hypotheses:

H1: The impact of GDP on company value is higher than the impact of environmental tax and the Fraser index on company value

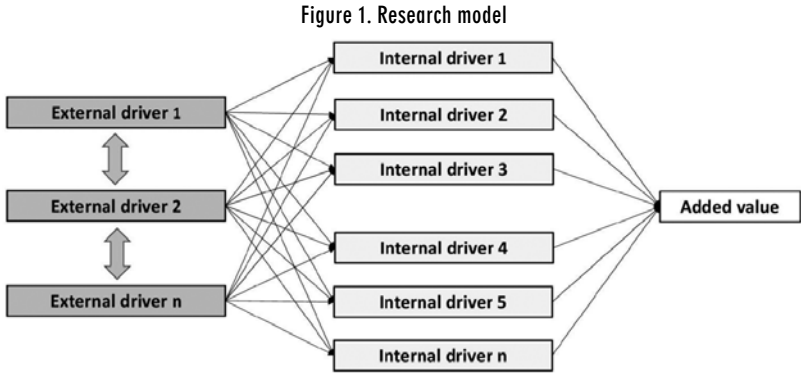
H2: The impact of external drivers on company value is higher in periods of economic crisis than in periods of growth

2. Methodology

The objective of this paper is to identify the relationship between internal and external value drivers of companies and added value within selected industries in France, Germany, and Italy in different periods and to compare the situation in these countries. These objectives lead to the following re-search tasks:

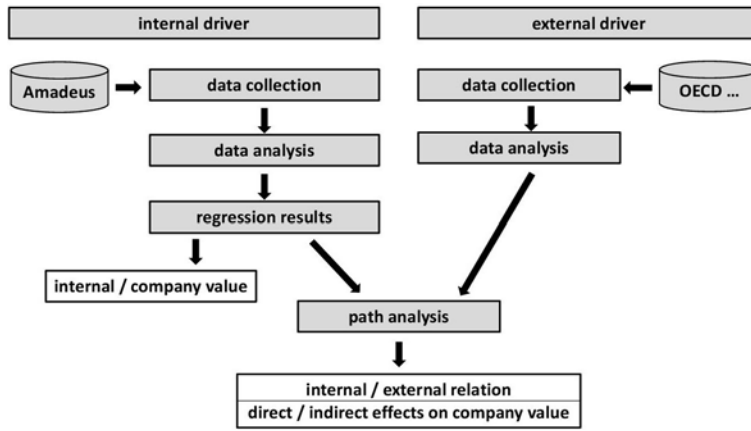
- Quantification of internal drivers of added value
- Identification of the relationship between external and internal drivers
- Identification of direct and indirect effects on added value

The investigation will be done based on a two-step approach. Step 1 examines the relationship between internal drivers (the independent variable) and added value (the dependent variable). The findings of Step 1 will represent the starting point of research for Step 2. The aim of Step 2 is to identify and quantify the relationship between external drivers and internal drivers. Finally, the full model will illustrate direct and indirect effects on added value.



Source: Own elaboration.

Figure 2. Sources / processing of internal and external drivers



Source: Own elaboration.

Calculation of the indirect effects of external drivers on added value:

$$(EVT; av) = (EVT; ID_i) * ID_i + \dots + (EVT; ID_n) * ID_n \quad (1)$$

$$(GDP; av) = (GDP; ID_i) * ID_i + \dots + (GDP; ID_n) * ID_n \quad (2)$$

$$(FI; av) = (FI; ID_i) * ID_i + \dots + (FI; ID_n) * ID_n \quad (3)$$

(*;av) indirect effect of the external driver on added value

av added value

GDP gross domestic product

EVT environmental tax

FI Fraser index

ID_i internal driver (profit margin, size, ROA, equity ratio, turnover wc ratio, sales growth)

2.1. Sample

The financial information data used in the study are figures from the Amadeus database, which is provided by Bureau van Dijk Electronics. Data in this paper are analysed over the period from 2006 to 2015. The figures are retrieved from the

Amadeus database by using the following selection criteria: NACE code, 17 (paper industry), 20 (chemical industry) and 24 (metal industry); company size: "large" and "very large"; country: France, Germany and Italy.

Table 2. Samples per country

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
France	64	64	68	69	68	69	69	68	67	64	670
Germany	45	56	60	61	59	61	61	59	52	29	543
Italy	84	89	93	98	98	98	98	98	97	96	949
Total	193	209	221	228	225	228	228	225	216	189	2162

Source: Own elaboration.

Table 3. Samples per industry

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Chemical	79	85	91	93	92	93	93	93	89	80	888
Metal	80	85	91	95	93	95	95	93	88	79	894
Paper	34	39	39	40	40	40	40	39	39	30	380
Total	193	209	221	228	225	228	228	225	216	189	2162

Source: Own elaboration.

2.2. Overview of variables

2.2.1. Internal drivers

Du Pont created a metric concept called the value driver tree, which splits value-based metrics such as EVA and ROI into their sub-metrics to show the source of added value. Value drivers include measures of the balance sheet and profit & loss (growth, margins, capital efficiency and leverage). According to Du Pont's concept, selected figures of profit & loss, the balance sheet and the ratios between them will be used as independent variables:

- Profit margin (EBIT / sales);
- Sales growth (sales growth to previous year);
- Size (log of total assets);
- Turnover working capital ratio (sales / working capital);
- Return on assets (EBIT / total assets);
- Equity ratio (equity / total assets).

The relationship between the internal value drivers as independent variables and added value as the dependent variable will be analysed using multiple linear regression:

$$(F\bar{I};av) = (F\bar{I};ID_i) * ID_i + \dots + (F\bar{I};ID_n) * ID_n$$

(4)

- y
- predicted value of the response variable
- b_0
- y-intercept
- b_i
- slope of y with variable xi while all other x are held constant

A stepwise regression procedure using various independent variables with added value as the dependent variable was used in this analysis. All variables which are included in the results as presented are significant at the 5% level. A simple regression model is the standard model, which

is based on the analysis of two variables. Multiple regressions are applied in cases which have more than two variables. The entire multiple regression is based on a simple regression modelling concept, but has been modified to incorporate numerous variables.

Table 4. Variables of regression analysis

variable	type of variable
year	number
sector	text
economic crisis	flag
size	independent variable
equity ratio	independent variable
profit margin	independent variable
turnover wc ratio	independent variable
ROA	independent variable

sales growth
added value

independent variable
dependent variable

Source: Own elaboration.

Furthermore, a “crisis indicator” is applied, which represents dummy values which vary according to the global GDP growth rate – if it is more than 0.1% lower

than the growth rate of the previous year, the value is “y”; otherwise it is “n”.

Table 5. Global GDP growth rate, derived crisis indicator

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
World	3.91	4.38	4.32	1.85	-1.68	4.30	3.13	2.51	2.66	2.84	2.86
crisis indicator		n	n	y	y	n	y	y	n	n	n

Source: World Bank, 2021.

2.2.2. External drivers

Empirical studies have shown that typical indicators of an economy such as GDP, interest rate and inflation are the most effective measures for analysis. This study uses GDP as well as additional parameters to enhance the level of significance. Addi-

tional parameters will be the environmental tax and the Fraser index.

The sources of the macro data are the European Commission's Eurostat database, the Organisation for Economic Co-operation and Development (OECD), and the Fraser Institute.

Table 6. GDP growth rate

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
France	2.6	2.4	0.0	-2.8	1.9	2.2	0.4	0.6	1.0	1.0
Germany	3.9	3.4	0.8	-5.6	3.9	3.7	0.7	0.6	1.0	1.0
Italy	2.1	1.3	-1.1	-5.5	1.6	0.7	-2.9	-1.7	-0.2	0.8

Source: OECD, 2021.

Table 7. Implicit tax rate on energy

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
France	207.5	205.7	196.1	201.7	205.0	223.6	219.0	226.3	246.7	265.4
Germany	235.5	239.4	231.1	246.1	225.3	248.6	240.0	227.4	235.0	223.8
Italy	291.0	276.5	255.7	285.0	287.6	335.7	381.8	379.5	418.3	383.2

Source: European Commission, 2021.

The Fraser index measures the degree of economic freedom present in five major areas:

- Size of government
- Legal system and security of property rights
- Sound money
- Freedom to trade internationally
- Regulation

These major areas include 24 components for setting up the index. Many of those components consist of several sub-components. In total, the index comprises 42 distinct variables. The sources of all variables are third parties, such as the International Country Risk Guide, the Global Competitiveness Report, and the World Bank's Doing Business project. The subjective

judgment of the authors does not influence the index. This also enables transparency and allows researchers to replicate the index. The index for past years is updated with each new edition to take account of revisions in the underlying data.

Table 8. Fraser index

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
France	7.308	7.489	7.412	7.424	7.408	7.318	7.255	7.212	7.341	7.338
Germany	7.675	7.550	7.470	7.537	7.564	7.665	7.621	7.650	7.653	7.667
Italy	7.262	7.157	7.078	6.982	7.193	7.230	7.222	7.191	7.252	7.320

Source: Fraser Institute, 2021.

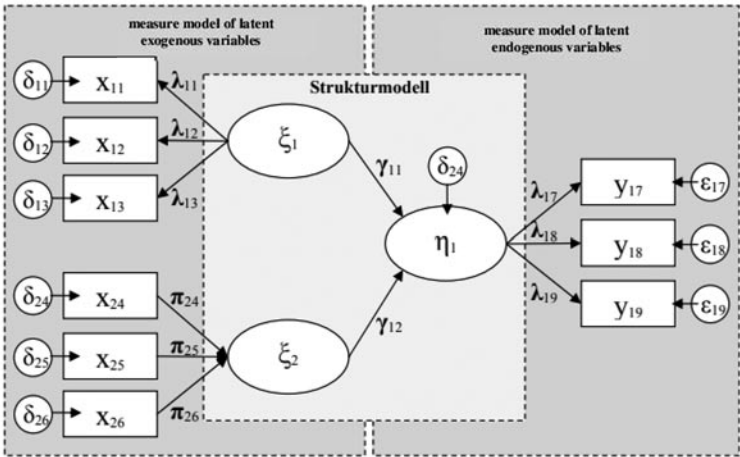
2.3. Model construction

The structural equation model is a combination of factor analysis and multiple regression analysis. This model enables an analysis of the structural relationship between measured variables and latent constructs.

Measurement model: Represents the theory that specifies how measured variables come together to represent the theory.

Structural model: Represents the theory that shows how constructs are related to other constructs.

Figure 3. Structural equation model



Source: Fuchs, 2011.

Basically, a linear structural equation model can be derived out of the statistical procedure of a regression analysis.

Structural model:

$$\eta = \Gamma * \xi + \zeta \tag{5}$$

Measure model of latent endogenous variables:

$$y = \lambda * \eta + \varepsilon \tag{6}$$

Measure model of latent exogenous variables:

$$x = \lambda * \xi + \delta \tag{7}$$

η latent endogenous variable, which is explained in the model,

Γ coefficient matrix,

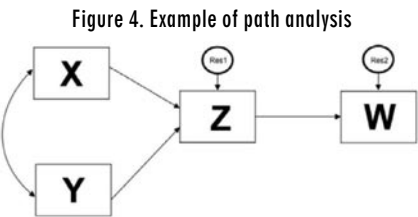
ξ latent exogenous variable, which is not explained in the model,

Λ coefficient matrix,

- x indicator of latent exogenous variable,
- y indicator of latent endogenous variable,
- δ measure error / residual variable of indicator x ,
- ε measure error / residual variable of indicator y ,
- ζ measure error / residual variable of latent exogenous variable.

The basis of the structural equation modelling depends upon path analysis, which makes it possible to analyse more than one regression model at the same

time. The indirect and direct effects can be measured at the same time. The direct effect is the effect of one variable on another variable without any mediation, while the indirect effect arises from the intervention of a variable which plays the role of a mediator between independent and dependent variables. This variable is called the mediator variable. The total effect is the sum of the direct effect and the indirect effect of a variable on another variable (Civelek, 2018).



Source: Civelek, 2018.

3. Research results

3.1. Descriptive statistics

Descriptive statistics are provided in the

following tables for each country (left: crisis indicator = n, right: crisis indicator = y)

Table 9. Descriptive statistics - France

	Mean	Std. Deviation	N		Mean	Std. Deviation	N
added value	10,4100	3,08276	394	added value	9,7404	4,61793	275
size	12,3163	,98496	394	size	12,3033	,99682	275
equity ratio	40,3189%	24,98228%	394	equity ratio	40,3751%	24,20775%	275
profit margin	3,9654%	8,13611%	394	profit margin	2,4323%	10,64764%	275
turnover wc ratio	19,2181	146,62250	394	turnover wc ratio	-18,7829	320,75926	275
ROA	5,090%	10,6622%	394	ROA	3,778%	12,0447%	275
sales growth	6,5523%	31,48112%	394	sales growth	2,0866%	40,04129%	275

a. country = FR, CI = n

a. country = FR, CI = y

Source: Own elaboration.

Table 10. Descriptive statistics - Germany

	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,235	,120	,261	-,034	,261	,034
	,235	1,000	-,051	-,026	-,098	-,018	-,011
	,120	-,051	1,000	,284	-,057	,312	-,027
	,261	-,026	,284	1,000	-,061	,890	,073
	-,034	-,098	-,057	-,061	1,000	-,080	-,006
	,261	-,018	,312	,890	-,080	1,000	,124
	,034	-,011	-,027	,073	-,006	,124	1,000

a. country = DE, CI = n

Source: Own elaboration.

Table 11. Descriptive statistics - Italy

	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,235	,120	,261	-,034	,261	,034
	,235	1,000	-,051	-,026	-,098	-,018	-,011
	,120	-,051	1,000	,284	-,057	,312	-,027
	,261	-,026	,284	1,000	-,061	,890	,073
	-,034	-,098	-,057	-,061	1,000	-,080	-,006
	,261	-,018	,312	,890	-,080	1,000	,124
	,034	-,011	-,027	,073	-,006	,124	1,000

Source: Own elaboration.

3.2. Correlation analysis following tables (above: crisis indicator = n, below: crisis indicator = y).
Correlation statistics are provided in the

Table 12. Correlation analysis - France

	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,235	,120	,261	-,034	,261	,034
	,235	1,000	-,051	-,026	-,098	-,018	-,011
	,120	-,051	1,000	,284	-,057	,312	-,027
	,261	-,026	,284	1,000	-,061	,890	,073
	-,034	-,098	-,057	-,061	1,000	-,080	-,006
	,261	-,018	,312	,890	-,080	1,000	,124
	,034	-,011	-,027	,073	-,006	,124	1,000

a. country = FR, CI = n

	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,227	,173	,452	,082	,354	,089
	,227	1,000	-,056	-,012	,084	-,039	,097
	,173	-,056	1,000	,220	,060	,260	-,014
	,452	-,012	,220	1,000	,100	,816	,152
	,082	,084	,060	,100	1,000	,097	,035
	,354	-,039	,260	,816	,097	1,000	,178
	,089	,097	-,014	,152	,035	,178	1,000

a. country = FR, CI = y

Source: Own elaboration.

Table 13. Correlation analysis - Germany

	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,885	-,065	,173	-,031	-,044	-,061
	,885	1,000	-,110	,099	-,015	-,221	-,068
	-,065	-,110	1,000	,132	,001	,185	-,044
	,173	,099	,132	1,000	-,076	,669	,131
	-,031	-,015	,001	-,076	1,000	-,063	,015
	-,044	-,221	,185	,669	-,063	1,000	,208
	-,061	-,068	-,044	,131	,015	,208	1,000

a. country = DE, CI = n

	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,467	,031	,313	-,018	,164	,130
	,467	1,000	-,088	,151	,003	-,132	,085
	,031	-,088	1,000	,045	,003	,068	-,037
	,313	,151	,045	1,000	-,078	,651	,287
	-,018	,003	,003	-,078	1,000	-,094	-,018
	,164	-,132	,068	,651	-,094	1,000	,325
	,130	,085	-,037	,287	-,018	,325	1,000

a. country = DE, CI = y

Source: Own elaboration.

Table 14. Correlation analysis - Italy

	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,255	,379	,584	,053	,455	,046
	,255	1,000	,085	-,022	-,001	-,077	-,032
	,379	,085	1,000	,418	,007	,284	-,039
	,584	-,022	,418	1,000	,004	,532	,082
	,053	-,001	,007	,004	1,000	,020	,002
	,455	-,077	,284	,532	,020	1,000	,083
	,046	-,032	-,039	,082	,002	,083	1,000
a. country = IT, CI = n							
	added value	size	equity ratio	profit margin	turnover wc ratio	ROA	sales growth
Pearson Correlation	1,000	,147	,358	,373	-,025	,451	,146
	,147	1,000	-,030	-,199	-,064	-,209	-,104
	,358	-,030	1,000	,301	,064	,406	,025
	,373	-,199	,301	1,000	-,006	,277	,150
	-,025	-,064	,064	-,006	1,000	-,003	-,010
	,451	-,209	,406	,277	-,003	1,000	,339
	,146	-,104	,025	,150	-,010	,339	1,000
a. country = IT, CI = y							

Source: Own elaboration.

3.3. Regression analysis

The results of the application of the regression model to the internal value drivers (research 1) are provided in the tables below. Based on equation [4], it shows the

model summary and the regression coefficients for each country in periods during a downward swing (below) as well as periods of economic growth (above).

Table 15. Regression analysis - France

Model Summary ^a									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,584 ^b	,341	,340	2,54689	,341	290,058	1	560	,000
2	,643 ^c	,413	,411	2,40619	,072	68,406	1	559	,000
3	,671 ^d	,450	,447	2,33160	,037	37,340	1	558	,000
4	,679 ^e	,461	,457	2,31033	,011	11,321	1	557	,001
a. country = IT, CI = n									
b. Predictors: (Constant), profit margin									
c. Predictors: (Constant), profit margin, size									
d. Predictors: (Constant), profit margin, size, ROA									
e. Predictors: (Constant), profit margin, size, ROA, equity ratio									
Coefficients ^{a,b}									
Model	Unstandardized Coefficients			Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		
	B	Std. Error		Beta			Lower Bound		Upper Bound
1	(Constant)	9,553	,108		88,154	,000	9,340		9,766
	profit margin	,111	,007	,584	17,031	,000	,098		,124
2	(Constant)	-,075	1,169		-,064	,949	-2,370		2,220
	profit margin	,112	,006	,590	18,207	,000	,100		,124
	size	,798	,096	,268	8,271	,000	,608		,987
3	(Constant)	-,746	1,138		-,656	,512	-2,981		1,489
	profit margin	,089	,007	,470	12,660	,000	,075		,103
	size	,842	,094	,283	8,981	,000	,658		1,026
	ROA	,052	,009	,227	6,111	,000	,035		,069
4	(Constant)	-,919	1,128		-,815	,416	-3,136		1,297
	profit margin	,081	,007	,427	10,959	,000	,066		,095
	size	,807	,093	,271	8,622	,000	,622		1,001

equity ratio	,018	,005	,116	3,365	,001	,007	,028
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a. country = IT, CI = n

b. Dependent Variable: added value

Model Summary^a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,451 ^b	,204	,202	3,36585	,204	98,551	1	385	,000
2	,520 ^c	,270	,267	3,22611	,067	35,075	1	384	,000
3	,595 ^d	,354	,349	3,03961	,084	49,569	1	383	,000
4	,605 ^e	,367	,360	3,01410	,012	7,511	1	382	,006

Source: Own elaboration.

Table 16. Regression analysis - Germany

Model Summary^a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,885 ^b	,784	,783	,46828	,784	1081,588	1	298	,000
2	,899 ^c	,808	,807	,44230	,024	37,048	1	297	,000

a. country = DE, CI = n

b. Predictors: (Constant), size

c. Predictors: (Constant), size, ROA

Coefficients^{a,b}

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1,400	,291		4,808	,000	,827	1,973
	size	,792	,024	,885	32,888	,000	,744	,839
2	(Constant)	,917	,286		3,206	,001	,354	1,480
	size	,823	,023	,920	35,305	,000	,777	,869
	ROA	,013	,002	,159	6,087	,000	,009	,017

a. country = DE, CI = n

b. Dependent Variable: added value

Model Summary^a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	,467 ^b	,218	,215	1,55755	,218	67,343	1	241	,000
2	,528 ^c	,279	,273	1,49957	,060	19,997	1	240	,000

a. country = DE, CI = y

b. Predictors: (Constant), size

c. Predictors: (Constant), size, profit margin

Coefficients^{a,b}

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1,997	1,073		1,862	,064	-,116	4,110
	size	,729	,089	,467	8,206	,000	,554	,904
2	(Constant)	2,475	1,038		2,383	,018	,429	4,520
	size	,670	,086	,430	7,748	,000	,500	,841
	profit margin	,055	,012	,248	4,472	,000	,031	,079

a. country = DE, CI = y

b. Dependent Variable: added value

Source: Own elaboration.

Table 17. Regression analysis - Italy

Model Summary ^a									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.885 ^b	.784	.783	.46828	.784	1081,598	1	298	.000
2	.899 ^c	.808	.807	.44230	.024	37,048	1	297	.000

a. country = DE, CI = n

b. Predictors: (Constant), size

c. Predictors: (Constant), size, ROA

Coefficients ^{a,b}								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1,400	,291		4,808	,000	,827	1,973
	size	,792	,024	,885	32,888	,000	,744	,839
2	(Constant)	,917	,286		3,206	,001	,354	1,480
	size	,823	,023	,920	35,305	,000	,777	,869
	ROA	,013	,002	,159	6,087	,000	,009	,017

a. country = DE, CI = n

b. Dependent Variable: added value

Model Summary ^a									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.467 ^b	.218	.215	1,55755	.218	67,343	1	241	.000
2	.528 ^c	.279	.273	1,49957	.060	19,997	1	240	.000

a. country = DE, CI = y

b. Predictors: (Constant), size

c. Predictors: (Constant), size, profit margin

Coefficients ^{a,b}								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1,997	1,073		1,862	,064	-,116	4,110
	size	,729	,089	,467	8,206	,000	,554	,904
2	(Constant)	2,475	1,038		2,383	,018	,429	4,520
	size	,670	,086	,430	7,748	,000	,500	,841
	profit margin	,055	,012	,248	4,472	,000	,031	,079

a. country = DE, CI = y

b. Dependent Variable: added value

Source: Own elaboration.

Major results of the regression analysis:

Size is a relevant variable in all observed variants.

Profit margin is – with one exception – also a relevant variable in all observed variants.

Return on assets and equity ratio are relevant variables in France and Italy in periods during a downward swing as well as during periods of economic growth.

The results show that “added value” (dependent variable) of France and Germany can be explained by two of the six independent variables, while the regression equation of Italy consists of four independent variables.

“Sales growth” and “turnover wc ratio” (independent variables) did not turn out to be significant for any result.

Model summary (goodness of fit):

Germany: High r^2 (0.807) during economic growth, but a massive decline during an economic crisis.

France and Italy: Similar r^2 in both economic periods observed.

France: Low r^2 during periods of economic growth.

3.4. Path analysis

The results of research part 2 – identi-

cation of direct (equation (4)) and indirect (equations (5) to (7)) influences are shown in the following tables, where different background colours show the different nature of particular effects:

Yellow represents the effects of the external driver on the internal driver

Green represents the effects of the internal driver on added value

Blue represents the indirect effects of the external driver on added value

Table 18. Path analysis results - France

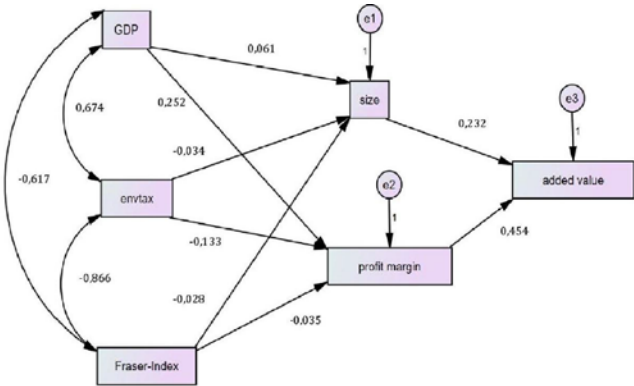
standardised effects							
country	economic crisis		GDP	environmental tax	Fraser index	profit margin	size
France	yes	profit margin	0.252	-0.133	-0.035	0.000	0.000
		size	0.061	-0.034	-0.028	0.000	0.000
		added value	0.129	-0.068	-0.022	0.454	0.232
France	no	profit margin	0.181	0.074	0.042	0.000	0.000
		size	-0.026	0.035	0.023	0.000	0.000
		added value	0.042	0.028	0.017	0.267	0.243

Source: Own elaboration.

GDP has a positive impact on added value in all economic periods. In times of economic crisis, the environmental tax and the Fraser index have a negative impact on

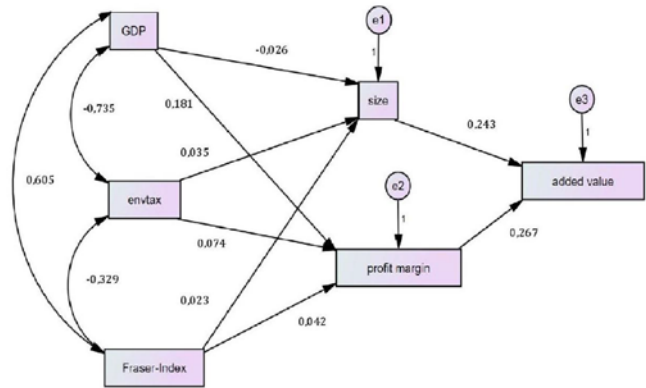
added value. In other periods, all external drivers have a positive impact on added value.

Figure 5. Path model - France, crisis = yes



Source: Own elaboration.

Figure 6. Path model - France, crisis = no



Source: Own elaboration.

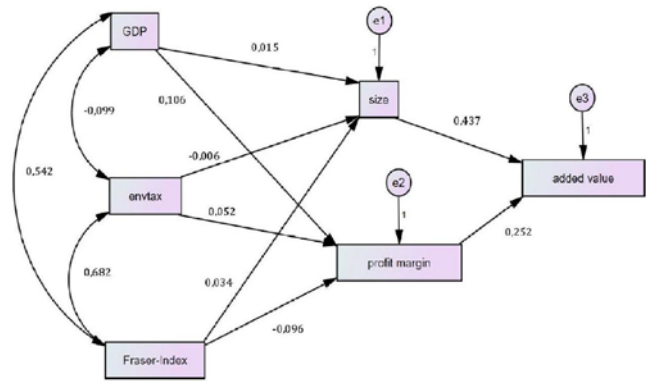
Table 19. Path analysis results - Germany

standardised effects							
country	economic crisis		GDP	environ-mental tax	Fraser index	profit margin	size
Germany	yes	profit margin	0.106	0.052	-0.096	0.000	0.000
		size	0.015	-0.006	0.034	0.000	0.000
		added value	0.033	0.010	-0.009	0.252	0.437
Germany	no	ROA	0.119	0.137	-0.046	0.000	0.000
		size	-0.015	-0.026	-0.027	0.000	0.000
		added value	0.005	-0.003	-0.031	0.154	0.893

Source: Own elaboration.

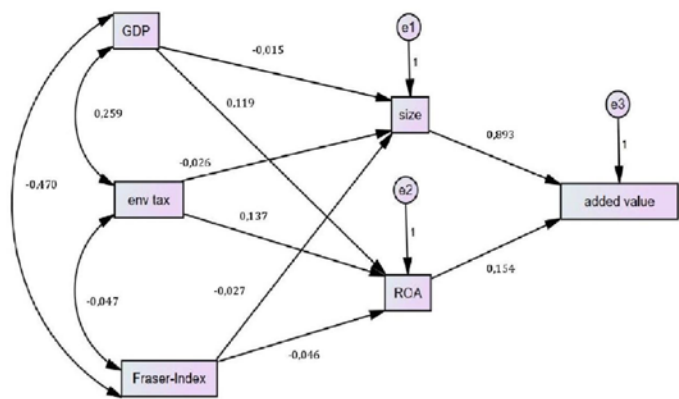
GDP has a positive impact on added value in all economic periods. In times of economic crisis, the Fraser index has a negative impact on added value. In other periods, the environmental tax and the Fraser index have a negative impact on added value.

Figure 7. Path model - Germany, crises = yes



Source: Own elaboration.

Figure 8. Path model - Germany, crises = no



Source: Own elaboration.

Table 20. Path analysis results - Italy

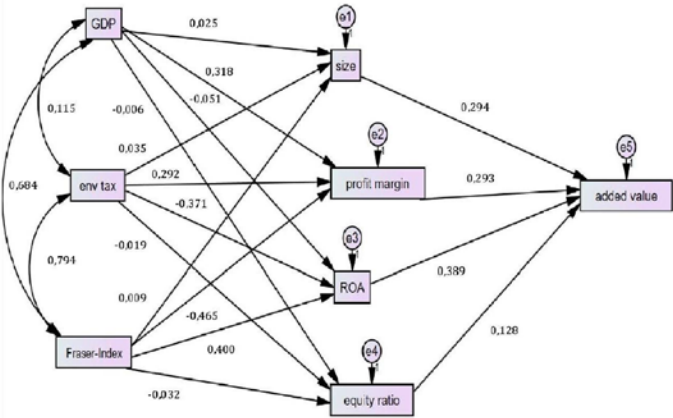
		standardised effects							
country	eco-nomic crisis		GDP	environ-mental tax	Fraser index	equity ratio	return on asset	profit margin	size
Italy	yes	equity ratio	-0.006	-0.019	-0.032	0.000	0.000	0.000	0.000
		return on assets	-0.051	-0.371	0.400	0.000	0.000	0.000	0.000
		profit margin	0.318	0.292	-0.465	0.000	0.000	0.000	0.000
		size	0.025	0.035	0.009	0.000	0.000	0.000	0.000
		added value	0.080	-0.051	0.018	0.128	0.389	0.293	0.294
Italy	no	equity ratio	-0.013	0.055	0.027	0.000	0.000	0.000	0.000
		return on assets	0.122	-0.020	-0.022	0.000	0.000	0.000	0.000
		profit margin	0.111	0.047	-0.103	0.000	0.000	0.000	0.000
		size	0.000	0.051	-0.010	0.000	0.000	0.000	0.000
		added value	0.078	0.039	-0.052	0.126	0.234	0.461	0.293

Source: Own elaboration.

GDP has a positive impact on added value in all economic periods. In times of economic crisis, the environmental tax has

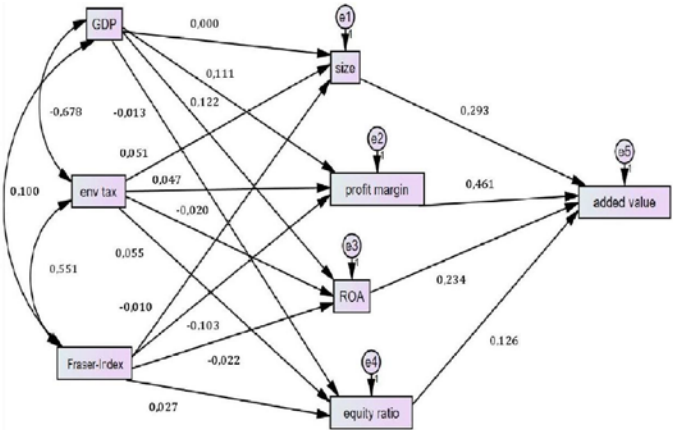
a negative impact on added value, while in other periods the Fraser index has a negative impact on added value.

Figure 9. Path model - Italy, crises = yes



Source: Own elaboration.

Figure 10: Path model - Italy, crises = no



Source: Own elaboration.

Validation of hypotheses: drivers on added value is provided in the table below.
A summary of the direct effect of external

Figure 11. Direct effects of external drivers on added value

Country	Economic crisis	GDP	environmental tax	Fraser index
France	y	0.129	-0.068	-0.022
France	n	0.042	0.028	0.017
Germany	y	0.033	0.010	-0.009
Germany	n	0.005	-0.003	-0.031
Italy	y	0.080	-0.051	0.018
Italy	n	0.078	0.039	-0.052

Source: Own elaboration.

H1: The impact of GDP on company value is higher than the impact of environmental tax and the Fraser index on company value

GDP has the highest impact on added value in each country.

Hypotheses 1 is validated.

H2: The impact of external drivers on company value is higher in periods of economic crisis than in periods of growth

There is no clear picture here. An isolated analysis of the impact of GDP in all countries could be validated. An analysis of all external drivers in France could also be validated (only comparing absolute values; the signs may change). Germany and Italy do not have further external drivers to validate.

Hypotheses 2 is validated regarding the external driver GDP. Hypotheses 2 is not validated regarding the external drivers of environmental tax and the Fraser index.

4. Discussion

Compared to existing studies which used either internal or external drivers, this paper attempts to combine the direct and indirect impacts of both types of drivers. This should serve to illustrate the effects of external impacts in a changing business environment which is characterised by economic peaks and troughs as well as changing business regulations and environmental protection rules.

The findings of the paper are in line with the results achieved by Khalid and We (2012), who confirmed the long-run inverted U-shaped relationship (the environmental Kuznets curve) between carbon emission and growth, energy consumption, trade openness and population density in Pakistan. It is interesting to note that population density is also a contributor to environmental degradation in Pakistan. A positive relationship between the volume of waste emissions and financial perform-

ance, as identified by Hiroki and Wei (2011) based on data from Japanese manufacturing firms from 2004 to 2008, has not been precisely confirmed for the analysed countries, inasmuch as the impact identified in this paper is not unanimous and is relatively small.

Oxelheim and Wihlborg (2001) argued that macroeconomic events have an impact on a firm's cash flows and economic value. Their conclusions are also supported by the findings of this paper, which can be demonstrated e.g. in the specific case of Germany, where in non-crisis periods size represents the major determinant of the added value, whereas its significance decreases in non-crisis periods. Lee et al. (2017) conducted an investigation into the resistance of Chinese firms during the global financial crisis. He explained that firms with higher top ten shareholder ratios or firms that are older exhibited saliently higher performance during the crisis but performed poorly during the non-crisis period. The finding in their paper was that the determinants of company performance vary across non-crisis and crisis periods.

The approach in this paper is characterised by using a set of external drivers to evaluate the impact on internal drivers (direct effect) and added value (indirect effect). Alternatively, each external driver could be used separately in undertaking the investigation. Based on these findings, an alternative view, namely a comparison between the impacts of a single external driver, would be possible.

Conclusions

An analysis of correlations of external drivers shows no clear picture. Only Italy has two correlations with the same sign (positive correlation between GDP / the Fraser index and the Fraser index / the environmental tax) in both economic periods observed. France has only one correlation

with the same sign (negative correlation between the Fraser index / the environmental tax) in both economic periods. All other correlations between the external drivers (GDP / the Fraser index / the environmental tax) have alternating signs. The results of the paper show that size and profit margin are most relevant internal drivers (11 times), and that there is no change in relevant factors in France and Italy throughout the economic periods observed, while there is a change of factors in Germany.

Added value is determined by two independent variables in France and Germany, while the added value of Italian companies is determined by four independent variables. In all periods observed in France and Germany, the variable with the highest coefficient remains the same.

The results of this investigation illustrate that GDP (an external driver) is the most commonly relevant driver with an impact on internal drivers, and that GDP is the only driver whose sign does not change (+/-). GDP always has a positive impact on added value. This means that GDP is positively correlated with added value. The impact of GDP is higher during economic crisis periods.

There is a clear picture of environmental tax and the Fraser index in France. During an economic crisis, these drivers have a negative impact on added value, whereas in periods of economic growth they have a positive impact.

There is also a clear outcome in Germany which means that the Fraser index always has a negative impact, but we do not have homogenous results of the impact of environmental tax on added value. Environmental tax has a negative impact in Italy during crisis periods and a positive impact on added value during times of economic growth. There are no homogenous results of the impact of the Fraser index on added value.

The paper illustrates the relationship between internal and external drivers and value creation. The investigation undertaken in this paper could be extended in the future by reducing certain inherent limitations. One of the main limitations is the number of sectors and annual observations. To get a clearer picture, an investigation of additional industrial sectors (with lower levels of carbon emissions and energy consumption), more countries, and an extension of the timeframe of the research (i.e. up to 25 years) would lead to more convincing results, especially by focusing on the impact of the environmental tax.

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