

Firm growth, business risk, and corporate social responsibility in Taiwan's food industry

SHIU-WAN HUNG¹, CHIAO-MING LI¹, JOE-MING LEE^{2*}

¹*Department of Business Administration, National Central University, Jung-li City, Taoyuan, Taiwan*

²*Department of Applied Economics, Fo Guang University, Jiaosi Shiang, Taiwan*

*Corresponding author: jmlee@mail.fgu.edu.tw

Citation: Hung S.-W., Li Ch.-M., Lee J.-M. (2019): Firm growth, business risk, and corporate social responsibility in Taiwan's food industry. *Agricultural Economics – Czech*, 65: 366–374.

Abstract: This study applies the multiple-regime panel smooth transition regression (MR-PSTR) estimation to investigate the non-linear dynamic relationship between a firm's corporate social responsibility (CSR) and firm growth in the food industry under the size threshold, using a panel of 30 Taiwanese food firms during 2007–2017. Our empirical results reveal that firm growth and firm size present a non-linear relationship, and that firm growth is different under the size threshold value and the control variables of firm age, CSR, R&D innovation, and finance policy. Corporate social responsibility helps reduce business risk. Regardless of the type and size, for many food industries, CSR is no longer an arbitrary choice, but an essential requirement.

Keywords: finance policy; firm size; non-linear dynamic relationship; R&D innovation

The food industry has an important responsibility to maintain the food safety for the general public, and thus, it has a more important mission: to have a high standard of corporate social responsibility (CSR). According to Smith et al. (2007), corporate social responsibility refers to an organization's consideration of multiple stakeholders and its impact on the world. Stakeholders include shareholders, employees, creditors, customers, suppliers, governments, competitors, communities, and the general public. In today's challenging environment, firm growth and business risks are constantly changing. The management of risk is not a single act of decision or action, but a complex multi-stage process. Under the conditions of a fast-changing global environment, a static approach for examining and analysing CSR can contradict the principle of effectiveness. Risk management means collecting and processing information about risks, making and implementing decisions as to the choice and application of the type of management, and the monitoring and analysis of the results

from the application of the chosen method. All this should be examined as a continuous process, making up a part of the general responsibilities of business management. As an important element of a company's general management, risk management should correspond with the requirements covering the aspects of dynamics, flexibility, and adaptability of its adopted business decisions.

The past literature discussion about firm growth has sometimes overlooked business risks, with many studies focusing on profitability. As firms target better ways to reduce business risks, CSR has become a hot topic. Huda et al. (2018) examined the understanding of the care for protecting the environment with the goal of producing responsible awareness, especially by economic agents such as shareholders and managers in order to promote sustainable benefits. List and Momeni (2017) found that CSR has become a cornerstone of modern business practice. The more CSR activities the company is committed to perform in the corporate and social sectors, the greater is the de-

<https://doi.org/10.17221/339/2018-AGRICECON>

gree of corporate growth. Manning (2018) provided a plurality of expectations as to what CSR delivers to both individuals and a organizational stakeholders. In addition, a greater CSR vision can enhance a company's CSR performance.

While the issue of CSR has attracted much attention, questions about it have not been answered using a broad panel of firms over an extensive period of time. This research thus looks to document several new patterns concerning firm growth, business risks, and CSR. Past business strategies in the food industry concentrated mainly on the firm's core businesses, thus leaving firm growth focus at the profitability issues. The food industry may ignore CSR because it does not help to obtain short-term profit immediately. As such, firm growth, business risks, and CSR, as well as their relationship to one another, continue to be important issues for strategic management. In particular, the attitude of food industry management toward quality is closely related to the health of the public, and hence the enthusiasm for CSR is more important in comparison with the other industries. Therefore, through this study target, this paper analyses the relationship between the food industry and CSR and further observes the impact of CSR on firm risks, as a reminder for the importance of sustainable development and CSR in the food industry.

LITERATURE REVIEW

This paper addresses two questions related to corporate social responsibility and firm growth under the size threshold: i) what is the relationship between changes in vendor growth and business risk; ii) what happens to corporate social responsibility and firm growth? For both the firms and the policy makers, a more detailed empirical analysis of the firm growth determinants going beyond the traditional size growth relationship should be of great importance. For instance, Evans (1987a,b) examined the effect of firm size on growth, using data on manufacturing firms in the United States, finding that younger and small-sized firms tend to grow with profits. Most studies in the literature on the determinants of firm growth have focused on the relationship between initial firm-specific conditions and firm growth.

Brief review of business risks and firm growth

The growth theory prescribes that both return and risk increase when the debt ratio increases. Nu-

merous accounting measures of risk and return help evaluate this trade-off. Bettis and Mahajan (1985) showed that a trade-off exists between profitability and risk; in their findings, firms that diversified into unrelated businesses usually have lower returns on assets (ROA) than firms that did not do so. However, the ROA of unrelated diversified firms also has lower standard deviations, representing lower risk.

Business risk management can particularly increase shareholder value by reducing uncertainty and thus, the expected costs of financial distress and underinvestment. This research also discusses how these findings relate and contribute to business risks and firm growth. As a dynamical process, risk management passes through several stages. In the scientific literature, there is no uniformly adopted opinion regarding the number and names of the stages, with proposed models having different numbers and names of stages. Risk and firm growth could also have a converse relationship as opposed to the view that firm growth is in proportion to the measure of risk assumed. We shall examine a conceptual model of firm growth with risk management.

Hypothesis 1. Expansion of the size threshold can lead to a deviation of business risks, thus supporting that different firm size attributes of firm growth produce completely different business risks.

Brief review of corporate social responsibility and firm growth

Maloni et al. (2006) showed that the food industry faces many significant risks based on the public criticism of CSR issues in the supply chain. Kong (2012) found that investors' or consumers' concerns for CSR in the food industry could be significantly influenced by the mounting attention given to CSR-related events. Assiouras et al. (2013) noted that CSR importance has a moderation effect on the relationship between CSR and blame attribution, brand evaluation, and buying intention in the food industry. Smith et al. (2018) used student experiments to show that CSR might engender a halo effect for consumer products. Barrage et al. (2014) established the effectiveness of advertising in countering negative consumer perceptions. However, even in these fields or experimental studies, they did not always easily separated the costly signalling from delegated giving, as well as the halo effect.

Corporate social responsibility occupied the attention of practitioners and academics for decades,

and it is a field with remarkable meaningfulness for academia, industry, and society. In this study, we believe that once firms invest in CSR activities, there must be business risks that could help the firms to achieve the agendas set for CSR. The business risks affect the stakeholders, meaning that they have remarkable power and legal rights to influence firms' decisions. However, previous studies have rarely explored the business risk issues of firms' CSR practices, seldom indicating the antecedents of business risk perceptions that might influence their behaviours and attitude toward such practices. Thus, this study examines the relationships between firms' CSR practices and business risks and explores the mediating roles of CSR attributes in this framework.

Hypothesis 2. Corporate social responsibility has a significant impact on business risk.

Brief review of firm growth, firm R&D, and finance policy

Evans (1987a,b) applied Jovanovic's theoretical model (1982) to test the relationships among manufacturing firm growth, firm size, and firm age in the U.S.. Some studies on firm growth started to focus on the elements of innovation and R&D in the mid-1990s. For example, Audretsch (1995) showed that the post-entry performance of new firms and technological conditions are closely related.

The literature has also investigated the relationship between an outward finance policy and firm growth. Hall et al. (2004) posited that firm growth is positively related to the proportion of internal financial resources in terms of the retained profit used to finance a firm's assets. If a firm's underinvestment risk and its internal financial resources are insufficient, then it would be reasonable to turn to short-term debt as a second financial alternative, such as short-term loans or trade credits, before choosing long-term loans as a financial source. With access to sufficient financial assets, firms are able to develop their growth capacity in different ways. In terms of finance policy, R&D, and firm growth, most studies in the empirical literature have supported the former view.

Hypothesis 3. Firm size has a non-linear threshold effect on firm R&D.

Hypothesis 4. Firm growth has a threshold effect on a firm's finance policy input. A moderate finance policy can effectively improve inefficiencies in firm growth.

MATERIAL AND METHODS

Research design model

Our study follows Gibrat (1931), references Beck and Levine (2002) who examined the relationship between finance and industrial growth under Fama and French (1973, 1995), employs a second-order logarithmic expansion of growth rate (GR), and adds natural logarithms and squared terms to measure growth, age, R&D, business risk, debt, and CSR in our extensive model. We take a sample of 30 food firms that won the CSR Corporate Citizen Awards from Common Wealth Magazine over 2007–2017, and we use the corporate social performance of these enterprises to measure the number of CSR activities:

$$\ln GR_{it} = \beta_0 + \beta_1 \ln Age_{it-1} + \beta_2 \ln Size_{it-1} + \beta_3 \ln R\&D_{it-1} + \beta_4 \ln Risk_{it-1} + \beta_5 \ln Debt_{it-1} + \beta_6 \ln CSR_{it-1} + u_{it} \quad (1)$$

Equation (1) presents the growth rate of total assets (GR_{it}), the firm's operating period (Age_{it}), the firm scale ($Size_{it}$), a firm's research investment ($R\&D_{it}$), a firm's business risk ($Risk_{it}$), firm loans ($Debt_{it}$), and a firm's corporate social responsibility (CSR_{it}) in logarithmic terms; all the variables' definitions are available in Table 1; β_i – slope coefficients; u_{it} – individual intercepts.

Brief review of non-linear panel unit root test

Most panel data models assume that disturbances in panel models are cross-sectionally independent. Pesaran et al. (2004) pointed out that cross-section dependency continues to exist in large panels as well as in small panels. This section draws heavily on the work of Pesaran et al. (2004) and Omay and Kan (2010), who considered a non-linear panel unit root test under cross-section dependence. We apply a cross-section dependency (CD) test:

$$\Delta Y_{it} = U_i + \beta_i' x_{it} + U_{it} \quad (2)$$

where: ΔY_{it} is firm growth; $t = 1, 2, \dots, T$ is the time domain, for the cross-section units $i = 1, 2, \dots, N$; x_{it} represents a $k \times 1$ vector of observed time-varying regressors. The individual intercepts (U_{it}), and slope coefficients (β_i) are defined as a compact set permitted to vary across i .

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \quad (3)$$

<https://doi.org/10.17221/339/2018-AGRICECON>

Table 1. Definitions of the variables

Variable	Abbreviation	Definition	Theoretical predicted sign
Dependent variable			
Firm growth	<i>GR</i>	growth rate of total assets	
Internal variables			
Firm age	<i>Age</i>	age of establishment of the firm and established date divided by 365	+/-
Firm research	<i>R&D</i>	research investment of the firm	+/-
Financial policy and risk variables			
Business risk	<i>Risk</i>	business risk by a firm's qualified own performance; proxy: VAR of profitability (ROA) by the GARCH model	+/-
Loan	<i>Debt</i>	degree to which a company uses fixed-income securities such as debt and preferred equity	+/-
Corporate social responsibility variable			
Corporate social responsibility	<i>CSR</i>	a moral or ideological theory that focuses on whether corporates have a responsibility to contribute to society, and the degree of commitment to CSR	+/-
Threshold variable			
Firm scale	<i>Size</i>	scale of total assets (10 million TWD)	+/-

“+” means that the leverage increases with the factor; “-” means that the leverage decreases with the factor; “+/-” means that both positive and negative relations between leverage and the factor are possible

Source: authors' own calculations based on data provided by the Taiwan Economic Journal database (TEJ 2018)

The *CD* test statistic has exactly mean zero for fixed values of *T* and *N*, under a broad class of panel data models. Here, ρ_{ij} is the sample estimate of the pair-wise correlation of the residuals.

Brief review of MR-PSTR model

This study applies the MR-PSTR model developed by Omay and Kan (2010), sets firm size as the threshold variable, and determines the relative influence of all variables on firm growth. The sample period for the study is from 2007 to 2017, covering 30 food firms' seasonal and panel data. These food firms are listed in the Taiwan stock market, and their main business is to produce and develop food or raw materials. These food firms provide consumers with a variety of choices in edible products, and so the distance between the image of the firms and consumer life is close. The objectives of this

present study are twofold: i) to employ the MR-PSTR model to prove a non-linear relationship between firm size and firm growth; ii) to set up control variables for business risk and *CSR* to explore the relationship between firm *CSR* and firm growth according to different ranges of firm size.

We use the MR-PSTR model, which imposes a common regime-switching mechanism while allowing for considerable heterogeneity in the timing of the regime changes across a series. We first briefly review the MR-PSTR model as follows in Equation (4).

It is usually preferable to interpret the sign of these regression coefficients, which indicate an increase or a decrease in *CSR* depending on the real gross firm scale ($Size_{it}$) as a threshold variable.

A generalisation of the MR-PSTR model to allow for more than two different regimes is the additive model [Equation (5)].

$$\ln GR_{it} = \alpha_{0i} + \delta_i t + \beta_{1i} \ln Age_{it-1} + \beta_{2i} \ln Size_{it-1} + \beta_{3i} \ln R \& D_{it-1} + \beta_{4i} \ln Risk_{it-1} + \beta_{5i} \ln Debt_{it-1} + \beta_{6i} \ln CSR_{it-1} + \varepsilon_{it} + [\beta_{1i} \ln Age_{it-1} + \beta_{2i} \ln Size_{it-1} + \beta_{3i} \ln R \& D_{it-1} + \beta_{4i} \ln Risk_{it-1} + \beta_{5i} \ln Debt_{it-1} + \beta_{6i} \ln CSR_{it-1}] g(q_{it}; \gamma, c) + \varepsilon_{it} \quad (4)$$

$$\ln GR_{it} = \alpha_{0i} + \delta_i t + \beta_{1i} \ln Age_{it-1} + \beta_{2i} \ln Size_{it-1} + \beta_{3i} \ln R \& D_{it-1} + \beta_{4i} \ln Risk_{it-1} + \beta_{5i} \ln Debt_{it-1} + \beta_{6i} \ln CSR_{it-1} + \sum_{j=1}^r [\beta_{1i} \ln Age_{it-1} + \beta_{2i} \ln Size_{it-1} + \beta_{3i} \ln R \& D_{it-1} + \beta_{4i} \ln Risk_{it-1} + \beta_{5i} \ln Debt_{it-1} + \beta_{6i} \ln CSR_{it-1}] g(q_{it}^{(j)}; \gamma, c) + \varepsilon_{it} \quad (5)$$

In Equation 5, the transition functions $g(q_{it}^{(j)}; \gamma_j, c_j)$, $j = 1, \dots, r$ depend on the slope parameter γ_j and on the location parameter c_j , r – threshold variable. In particular, the multiple regime model is an obvious alternative in diagnostic tests of no remaining heterogeneity. The evaluation of an estimated MR-PSTR model is an essential part of the model-building procedure, including the tests of parameter constancy over time and of no remaining non-linearity.

ANALYSIS OF EMPIRICAL RESULTS

For comparison, the sample period for the study is from 2007 to 2017 for 30 food firms. The data are obtained from the Taiwan Economic Journal (TEJ) database (TEJ 2018) and based on the CSR Corporate Citizen Awards of Common Wealth Magazine. We use the corporate social performance of these enterprises to measure the number of corporate social responsibility activities.

Table 2 reports the descriptive statistics of the food firms' average ratios for the variables firm growth, size, age, debt, R&D, and CSR. Firm growth is between (–97.86 to 179.85%), and the mean is (22.52%), showing that the firms exhibit a large difference in revenue growth. We see that firm size is between 9.795 million and 21.56 million USD, which is a large size difference. Here, firm age is between 1 and 59 years. CSR is between 0 and 141.68%, which denotes whether a firm issued a high-CSR or low-CSR report, hoping to create firm value. The debt ratio is between (0 and 118%), and the mean is (40.66%), which explains a great difference between the high and low indicators and implies that the firms' overall operating performances have different financial policies. The R&D ratio is between (0 and 233.25%), and its mean is (5.41%), which implies that manufacturers

have different degrees of R&D, highlighting that not all of them target R&D with the same degree of attention. Risk is between (0 and 8 898.1%), and the theory prescribes that both return and risk increase when the debt ratio rises. Numerous accounting measures of risk and return can help evaluate the trade-off.

In the empirical design, we set the size as the threshold variable and the control variables include age, R&D, risk, debt, and CSR. Following Omay and Kan (2010), this paper investigates the stochastic properties of the dependent and independent variables. For this purpose, we apply the linear IPS test (Im et al 2003), which considers cross-section dependence, in addition to non-linear panel unit root tests proposed by Ucar and Omay (2009). The tests labelled as UO (Ucar and Omay 2009) and EO (Emirmahmutoğlu and Omay 2014), form a power test when the series under investigation follows non-linear and asymmetric processes, respectively (Table 3).

We next apply a sequence of tests to determine the order m of the logistic function. Table 3 shows the results of the specification test sequence. We select $m = 2$ if the rejection of H_2 is the strongest one.

Tables 4–5 present the test of linearity results between firm size and firm growth. We apply the linearity tests – the Wald LM test (LMW), the Fisher LM test (LMF), and the likelihood ratio test (LRT). The results offer strong evidence that the relationship between firm size and firm growth is non-linear.

The next step is to determine the number of transitions in the model. Table 6 presents the test for no remaining non-linearity, which consists of checking whether there are two transition functions ($H_0: r = 1$) or whether there are at least three transition functions ($H_1: r = 2$). The testing results show that a reasonable number of thresholds is $r = 2$, which means that there are two regions. Each region has three regimes. Given

Table 2. Summary statistics of food firms

	Mean	Std. dev.	Maximum	Minimum	Skewness	Kurtosis
Firm growth (%)	22.52	238.40	179.85	–97.860	53.20	3 534.10
Firm scale (million USD)	14.94	1.43	21.56	9.795	0.80	1.36
Firm age (year)	18.00	0.10	59.00	1.000	0.01	0.56
Business risk (%)	182.38	356.24	8 898.10	0.000	7.98	108.35
Loan (%)	40.66	17.46	118.18	0.000	0.19	–0.26
Firm research (%)	5.41	8.83	233.25	0.000	7.54	30 947.00
Corporate social responsibility	3.98	5.92	141.68	0.000	223.73	10 192.30

Source: authors' own calculations based on data provided by the Taiwan Economic Journal database (TEJ 2018) and the CSR Corporate Citizen Awards of Common Wealth Magazine (2018)

<https://doi.org/10.17221/339/2018-AGRICECON>

Table 3. Non-linear and linear panel unit root tests under cross-section dependence

	UO	EO	IPS
Panel unit root tests			
ΔY_{it}	-2.31 (0.000)	5.32 (0.02)	-2.30 (0.01)
$\hat{\partial}_{it}$	-2.16 (0.000)	5.42 (0.02)	-2.00 (0.01)
Asymmetry tests			
ΔY_{it}	–	-1.82 (0.02)	–
$\hat{\partial}_{it}$	–	1.35 (0.07)	–
Cross-section dependency tests (CD)			
CD_{LM1}	–	6.06 (0.02)	–
CD_{LM2}	–	146.93 (0.00)	–
CD_{LM3}	–	8.82 (0.00)	–

values in parentheses are p -values; UO – Ucar-Omay test by Ucar and Omay (2009); EO – Emirmahmutoğlu Omay test by Emirmahmutoğlu and Omay (2014); IPS – linear test by Im et al (2003); CD_{LM1} , CD_{LM2} , CD_{LM3} – under the null hypothesis the CD statistics converge to a normal standard distribution; ΔY_{it} is constructed from firm growth; $\hat{\partial}_{it}$ is data set for the independent variable

Source: authors' own calculations based on data provided by the Taiwan Economic Journal database (TEJ 2018) and the CSR Corporate Citizen Awards of Common Wealth Magazine (2018)

the choices of $r_{\max} = 3$ and $m = 2$, the optimal (LM_F criterion) number of threshold functions is $r = 1$.

Table 7 presents a positive relationship of small-scale firms and firm age (17.33), but it is not significant. Middle-scale firms' age and firm growth have a negative relationship (-26.01), but it is not significant. However, large-scale firms' age and firm growth have a significant positive relationship (61.58). From practical insights, large and younger food firms have growth

Table 4. Test of linearity

	Wald tests (LM_W)	Fisher tests (LM_F)	LRT tests (LR_T)
Statistics	92.14	5.56	92.71
p -value	0.000*	0.000*	0.000*

*denotes significance at the 5% level; H_0 : linear model against H_1 : PSTR model with at least one threshold variable ($r = 1$); PSTR – panel smooth transition regression

Source: authors' own calculations based on data provided by the Taiwan Economic Journal database (TEJ 2018) and the CSR Corporate Citizen Awards of Common Wealth Magazine (2018)

potential, because they are likely to be more flexible organisations, and it is possible to bring forth greater revenue growth contribution. The transition function is a logistic specification ($m = 2$ with two regimes), C is the location parameter in the region, and the values are (12.36) and (17.11). The above results show that there are structural changes at the point.

Our study shows a negative relationship between debt ratio and firm growth for small-scale firms, indicating that small-scale firms have more conservative financial policies to reduce their debt structure and enhance revenue growth. We also see that middle-scale and large-scale firms have a positive debt ratio and firm growth relationship. In particular, large-scale firms' debt ratio coefficient (5.02) is greater than that of middle-scale firms (1.53) and there is a more significant relationship. Therefore, we believe that middle-scale firms and large-scale firms raise their debt ratio to enhance revenue growth. This result offers strong evidence to support H_4 .

The results show a significantly positive relationship between firm growth and R&D for all firms. In particular, middle-scale firms' R&D coefficient (11.37) is greater than that of large-scale and small-scale firms, showing that middle-scale firms have the most-effective R&D coefficient (8.43) for revenue growth, providing maximum benefit. In particular, as the food industry pays more attention to R&D, it can establish stronger core competitiveness through it. Therefore, creating a market advantage to maintain R&D efficiency is important. This result offers strong evidence to support H_3 .

We also find that middle-scale and large-scale firms have a negative relationship between their debt ratio and firm growth. In particular, large-scale firms' business risk coefficient (-0.43) is greater than that of middle-scale firm (-0.001) and exhibits

Table 5. Sequence of homogeneity tests for selecting number of regimes (m)

Statistics	H_3 : $B_3 = 0$	H_2 : $B_2 = 0 B_3 = 0$	H_1 : $B_1 = 0 B_2 = B_3 = 0$
F	$F_3 = 1.45$	$F_2 = 0.84$	$F_1 = 3.31$
p -value	0.115	0.632	0.000*

*denotes significance at the 5% level; select $m = 2$ if the rejection of H_2 is the strongest one; otherwise, select $m = 1$; H – hypothesis; B – slope coefficient; F – F statistics

Source: authors' own calculations based on data provided by the Taiwan Economic Journal database (TEJ 2018) and the CSR Corporate Citizen Awards of Common Wealth Magazine (2018)

Table 6. Testing the number of regimes (m) – test of no remaining non-linearity

Test	H_0 : PSTR with $r = 1$ against H_1 : PSTR with at least $r = 2$		H_0 : PSTR with $r = 2$ against H_1 : PSTR with at least $r = 3$	
	statistics	p -value	statistics	p -value
Wald tests (LM_w)	24.20		5.84	0.322
Tests (LM_F)	4.50	0.000	1.05	0.382
LRT tests (LR_T)	24.86		8.54	0.322

*denotes significance at 5% level; max $r = 3$, $m = 1$, and the reasonable number of thresholds is $r = 1$; PSTR – panel smooth transition regression

Source: authors' own calculations based on data provided by the Taiwan Economic Journal database (TEJ 2018) and the CSR Corporate Citizen Awards of Common Wealth Magazine (2018)

a more significant relationship. This result offers strong evidence to support H_1 .

Small-scale firms have a positive relationship between CSR and firm growth, indicating that CSR for small-scale firms (0.037) has a positive effect. Middle-scale firms (0.08) and large-scale firms (0.21) that have a positive relationship between CSR and firm growth denote a good CSR image. Therefore, the goal of middle-scale firms and large-scale firms should be to create value from CSR, and combining a good investment plan with professional management of CSR will help firms to achieve more revenue growth.

We further use CSR performance as the mediator for risk versus CSR. For small-scale firms (0.19), middle-scale firms (0.52), and large-scale firms (0.19) there is a significantly increasing relationship between business risk and firm growth by CSR, which implies through CSR that firms can present how highly they consider the environment and society. CSR has a strong positive effect on the relationship between CSR disclosure and firm risk. This result offers strong evidence to support H_2 .

In terms of policy implications and to investigate whether the firm's growth theory is different from the past, we add CSR under different scales of firms to understand the structure of the relation-

Table 7. Parameter estimation results for the PSTR model

	Small-scale firm	Middle-scale firm	Large-scale firm
Internal variables			
Age	17.33 (30.5500)	−26.010 (68.1274)	61.58*** (21.1538)
R&D	1.29*** (0.6149)	11.370*** (3.9320)	8.43 (9.1013)
Financial policy and risk variables			
Risk	−0.44** (0.0870)	−0.001*** (0.0007)	−0.43*** (0.0880)
Risk × CSR	0.19** (0.0790)	0.520*** (0.0770)	0.19** (0.0760)
Debt	−0.09 (0.1893)	1.530 (3.6709)	5.02*** (2.7805)
Corporate social responsibility variable			
CSR	0.03*** (0.0099)	0.080*** (0.0602)	0.21*** (0.2651)
C_1		12.36 (17.110)	
Y_1		−4.64 (0.004)	
SSE		354.73	

***, **, and * denote significance at the 1, 5, and 10% levels, respectively; C – location parameter; γ – slope parameter (smooth parameter or transition speed); SSE – the sum of squared errors; Age – firm age; R&D – firm research; Risk – business risk; CSR – corporate social responsibility; Risk × CSR – interaction of Risk and related CSR; Debt – loan; PSTR – panel smooth transition regression

Source: authors' own calculations based on data provided by the Taiwan Economic Journal database (TEJ 2018) and the CSR Corporate Citizen Awards of Common Wealth Magazine (2018)

<https://doi.org/10.17221/339/2018-AGRICECON>

ship between firm growth and CSR. For Taiwan's food industry, firm growth and CSR present a strong positive effect. We observe that CSR under different scales of firms reduces the impact of business risks. Therefore, the food industry needs sustainable development, and corporate social responsibility is important for maintaining a good image to society. The implementation of corporate social responsibility by firms enhances their positive attitude and can help their product quality to exude a self-disciplined spirit.

After the food scares in Taiwan, many consumers realised the importance of food safety. In the past, many food firms in Taiwan aimed to create maximum profits for shareholders at the expense of ignoring consumers' health. Therefore, consumers have lost their trust in many firms' food products.

Firms that invest in CSR, from raw materials to production, hope to take into account the rights and interests of consumers and transparent food safety information so that consumers can regain food safety confidence. In addition, investment in firms with high CSR offers many contributions to external environmental protection and public welfare activities. Therefore, promoting CSR is an important process to change the image of business operations.

By comparing EU countries, Knowles et al. (2007) showed that food scares had dominated media reports over the last two decades. Their study further revealed the increasing emergence of foodborne pathogens, as well as the rising trend of EU-wide contaminant and animal disease-related food scares. Dellios et al. (2009) showed that the lesson from the EU on government strategies for CSR in the food safety arena is that a combination of the top tier and bottom tier works best.

Taiwan has also experienced food scares. Although food regulations result in food safety conditions for managing firms, the firms still have many ways to circumvent them. Therefore, we believe that if firms can implement the process of food raw materials and manufacturing quality control in the spirit of CSR, this approach will bring a positive image of the firms along with stronger consumer food safety and better consumer confidence.

CONCLUSION

This research has used the PSTR model to re-examine the non-linear dynamic relationships between firm growth, CSR, and firm size in Taiwan's food industry. We find strong evidence that their relationships are non-linear and that there is a trade-off

correlation between these values and firm growth. Our empirical results show that the food industry's results are different under the firm size threshold value and the control variables of R&D, risk, and CSR.

As to a firm's CSR, we find that regardless of small-, medium-, or large-scale firms, there is a significant positive relationship between CSR and firm growth. This result reminds the food industry to pay better attention to the promotion of CSR. In sum, CSR is an important index when looking at firm growth.

Business risk has a negative relationship with vendor growth, indicating that business risk affects the growth of manufacturers. However, we use CSR performance as the mediator and find that CSR can improve the relationship between business risk and vendor growth. From the perspective of strategy, if an enterprise can establish a formal implementation system to initiate CSR, then it will be able to enhance the overall competitive advantage of the food industry. As corporate social responsibility is easily overlooked, we recommend that firms pay more attention to it. From the empirical results, we also observe the importance of CSR for the food industry, because food is a significant source of nutrients for the public on a daily basis.

Due to recent food scares in Taiwan, the image of the food industry has been devastated, causing the public to resist buying certain brands in the food industry and causing business risks. Therefore, the main reasons for these business risks in the food industry come from a company's business attitude and its own integrity. Choosing food safety is a consumer's right. The food industry should provide consumers with quality food, have a high-standard attitude in the spirit of CSR, and actively offer relevant food information to help consumers choose the food that suits their needs.

The food industry should also get rid of the past use of low-cost or inferior raw materials. Moreover, the food industry should think more about the health of consumers, produce high-quality food, and establish a high degree of consumer confidence. This is the spirit of CSR and the attitude of sustainable management.

In the future, this paper will broaden out and investigate the relation between CSR and investment policy. According to the stakeholder theory, CSR draws its philosophy from ethics, by declaring that companies are morally responsible for looking after the concerns of a larger group of stakeholders. As a consequence, we shall infer managers' beliefs by observing their decision-making and thus be able to predict their behaviour.

<https://doi.org/10.17221/339/2018-AGRICECON>

REFERENCES

- Assiouras I., Ozgen O., Skourtis G. (2013): The impact of corporate social responsibility in food industry in product-harm crises. *British Food Journal*, 115: 108–123.
- Audretsch D.B., Mahmood T. (1995): New firm survival: New results using a hazard function. *Review of Economics and Statistics*, 77: 97–103.
- Barrage L., Chyn E., Hastings J. (2014): Advertising as Insurance or Commitment? Evidence from the BP Oil Spill (No. w19838). National Bureau of Economic Research.
- Beck T., Levine R. (2002): Industry growth and capital allocation: does having a market-or bank-based system matter?. *Journal of Financial Economics*, 64: 147–180.
- Bettis R.A., Mahajan V. (1985): Risk return performance of diversified firms. *Management Science*, 31: 785–799.
- CSR Corporate Citizen Awards of Common Wealth Magazine (2018): CSR Corporate Citizen Awards. Available at <https://www.gvm.com.tw/CSR/>
- Dellios R., Yang X.H., Yilmaz N.K. (2009): Food safety and the role of the government implications for CSR policies in China. *I-Business*, 1: 75–84.
- Evans D.S. (1987a): The relationship between firm growth, size and age: Estimates for 100 manufacturing industries. *Journal of Industrial Economics*, 35: 567–581.
- Evans D.S. (1987b): Tests of alternative theories of firm growth. *Journal of Political Economy*, 95: 657–674.
- Emirmahmutoğlu F., Omay T. (2014): Reexamining the PPP hypothesis: A nonlinear asymmetric heterogeneous panel unit root test. *Economic Modelling*, 40: 184–190.
- Fama E.F., MacBeth J.D. (1973): Risk, return and equilibrium: empirical tests. *Journal of Political Economy*, 81: 607–636.
- Fama E., French K. (1995): Size and book-to-market factors in earnings and returns. *Journal of Finance*, 50: 131–55.
- Gibrat R. (1931): *Les Inégalités Économiques*. Paris: Librairie du Recueil Sirey.
- Hall G., Hutchinson P., Michaelas N. (2004): Determinants of the capital structures of European SMEs. *Journal of Business Finance and Accounting*, 31: 711–728.
- Huda M., Mulyadi D., Hananto A.L., Nor Muhamad N.H., Mat Teh K.S., Don A.G. (2018): Empowering corporate social responsibility (CSR): insights from service learning. *Social Responsibility Journal*, 14: 875–894.
- Im K.S., Pesaran M.H., Shin Y. (2003): Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115: 53–74.
- Jovanovic B. (1982): Selection and the evolution of industry. *Econometrica*, 50: 649–670.
- Knowles T., Moody R., McEachern M.G. (2007): European food scares and their impact on EU food policy. *British Food Journal*, 109: 43–67.
- Kong D. (2012): Does corporate social responsibility matter in the food industry? Evidence from a nature experiment in China. *Food Policy*, 37: 323–334.
- List J.A., Momeni F. (2017): When Corporate Social Responsibility Backfires: Theory and Evidence from a Natural Field Experiment (No. w24169). National Bureau of Economic Research.
- Manning L. (2018): Corporate Social Responsibility. Food Ethics Education. Springer, Cham: 121–146.
- Maloni M.J., Brown M.E. (2006): Corporate social responsibility in the supply chain: an application in the food industry. *Journal of Business Ethics*, 68: 35–52.
- Omay T., Kan E.Ö. (2010): Re-examining the threshold effects in the inflation – growth nexus with cross-sectionally dependent non-linear panel: Evidence from six industrialized economies. *Economic Modelling*, 27: 996–1005.
- Pesaran M.H., Schuermann T., Weiner S.M. (2004): Modeling regional interdependencies using a global error-correcting macroeconomic model. *Journal of Business & Economic Statistics*, 22: 129–162.
- Smith A.C., Westerbeek H.M. (2007): Sport as a vehicle for deploying corporate social responsibility. *Journal of Corporate Citizenship*, 25: 43–54.
- Smith N.C., Read D., Lopez S. (2018): CSR halo: The gift that keeps on giving? INSEAD Working Paper No. 2018/07/ATL. Social Innovation Centre.
- Ucar N., Omay T. (2009): Testing for unit root in nonlinear heterogeneous panels. *Economics Letters*, 104: 5–8.
- Taiwan Economic Journal (TEJ) (2018): Taiwan Economic Journal database. Taiwan Economic Journal Co. Ltd. Available at <http://www.finasia.biz/ensite/Database/tabid/92/language/en-US/Default.aspx>

Received November 11, 2018

Accepted February 23, 2019