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The power of momentum on firm performance: a myth or a reality?

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Abstract

Purpose – The purpose of this paper is to extend research related to a firm's behavioural momentum and its financial performance and to further examine any moderating effect from various perspectives - how firm-level (firm age and size), industry-level, and country-level factors can interact with the power of momentum to affect a firm's performance.

Design/methodology/approach – Data were collected from the Compustat and Yahoo Finance databases for firms in the USA and the Taiwan Economic Journal (TEJ) for firms in Taiwan. The final sample of US firms is from a panel with 239 unique companies in electronics-related industries across a 22-year time span (1991-2012). The final sample of Taiwanese firms is from a panel with 184 unique companies also in electronics-related industries across a 22-year time span (1991-2012).

Findings – The results show that momentum does not significantly improve firm performance, and thus the power of momentum is a myth. However, the relationship between momentum and firm performance can be moderated by firm age, size, capital intensity, and country of origin, respectively, under some circumstances.

Originality/value – The originality and value are that this is a multiple-perspective study of firm behavioural momentum and firm performance to comprehensively discover each of their respective relationships. This study has further extended the debate over path-dependent perspectives with contingent perspectives across the borders to fill knowledge and theoretical gaps, while the evidence-based findings provide top management with practical know`ledge for strategic planning and execution with another avenue for future research on the momentum effect.

Keywords Firm performance, Contingency theory, Momentum, Path dependence, Routine

Paper type Research paper

The momentum effect has been popularly researched and analyzed in the field of finance (Jegadeesh and Titman, 1993), while increasing attention has been paid to its impact on firm behaviour. In fact, firm behaviour has been researched for decades (Barnard, 1938; Cyert and March, 1963; Mahoney, 2005; March and Simon, 1958; Simon, 1947, 1982), and organizational learning plays an important part in analyzing firm behaviours (Cyert and March, 1963). Organizational learning is affected by a firm's routines (Bent *et al.*, 1999; Ford and Ogilvie, 1996). As routines can be regarded as "a source of consistency" (Essén, 2008, p. 1635) and function as "carriers of knowledge and experience" (Cyert and March, 1963, p. 224), they can determine firm behaviours. Nelson and Winter (1982) further argue that firm capabilities are routine-based and that firm behaviours are path-dependent. Therefore, firms are regarded as history-dependent systems (Cyert and March, 1963; March and Simon, 1958), and firm

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behaviour involves momentous forces that cause firms to maintain the directions and patterns of prior decisions in current behaviours (Miller and Friesen, 1980). That is, the momentum effect on a firm should affect firm behaviour, but whether the power of momentum matters to firm performance requires further evidence. Hence, this paper examines whether a firm's behavioural momentum can affect firm performance, and whether the power of momentum is mythical.

Extended from contingency theory, this study further examines whether the momentum-performance relationship in a firm can be moderated by contingency factors such as firm-level factors (e.g. firm age and size), industry-level factors (e.g. capital-intensive sectors vs labour-intensive sectors), or even country-level factors (e.g. firm origin from the East vs the West). In fact, Isaac Newton proposed the first law of physical motion that states that "all observed changes in the state of motion of bodies are caused by discoverable external actions" (Plaud *et al.*, 1999, p. 165). Thus, originated from physical sciences, momentum has been variously applied in the studies of social science such as finance (Lee and Swaminathan, 2000), politics (Mutz, 1997), etc. However, the studies on the relationship between firm behavioural momentum and firm performance are lacking, and how contingency factors can interact with behavioural momentum to affect firm performance remains a puzzle that requires further evidence.

Thus, this paper aims to solve the following main research questions: How can a firm's behavioural momentum influence firm performance? Can factors from firm, industry, and country levels moderate the impact of firm behavioural momentum on firm performance? This study makes three principal contributions to the literature and business practitioners. First, this study provides evidence to address the momentum effect from a firm's behavioural perspective on firm performance. That is, this study elaborates on behavioural momentum - "the persistence of behaviour under altered environmental contingencies" (Plaud *et al.*, 1999, p. 165) – to seek empirical evidence on whether momentum-powered firms perform better than momentum-deficient firms from multiple strategic dimensions. Second, this study includes contingency-based arguments with the theories of path dependence and routines to examine how factors on firm, industry, and country levels can interact with a firm's behavioural momentum to affect firm performance. Third, the findings provide the top management team (TMT) with evidence regarding its efforts to depend on the path or to break the path for better performance and provide the boards of directors with evidence regarding their knowledge and practices in strategizing a firm's momentum under different firm characteristics, industry effects, and cultures.

This paper contains five sections. The first section addresses-related theories, principally theories of path dependence, routines, and contingency, to further develop the hypotheses. The second section addresses the methodology used and data analyzed from US and Taiwanese firms. The third section explains the results. The fourth section addresses the conclusion and implications based on the empirical findings. The final section addresses limitations for future research.

Literature and hypotheses

A firm can be regarded as a bundle of path-dependent knowledge (Levinthal, 1988) or a history-dependent system (Cyert and March, 1963; March and Simon, 1958), and its behaviours involve organizational learning (Wei *et al.*, 2011). Organizational learning can be "routine-based" or "history-dependent" (Levitt and March, 1988, p. 319), and learning processes may direct the development of routines (Eisenhardt and Martin,

2000). Hence, firm behaviours follow routines. Nelson and Winter (1982) argued that firms' capabilities are embodied in organizational routines and their behaviours are path-dependent. That is, the firms' current activities should be a function of the firms' historical patterns. Thus, firm behaviours involve momentum to move forward based on prior decisions (Miller and Friesen, 1980), and the power of momentum should be evident in the firms' key activities.

The power of momentum

In finance, momentum has been used to observe trends for asset prices such as stock performance (Jegadeesh and Titman, 1993), while increasing attention has been paid to momentum on firm behaviours. Momentum concerns "resistance to disruption" (Porritt *et al.*, 2009, p. 295), and behavioural momentum can be regarded as "the persistence of behaviour under altered environmental contingencies" (Plaud *et al.*, 1999, p. 165) or as habits and routines adhered to behaviours (Li and Wehr, 2007). Chung *et al.* (1987) argue that the momentum effect is a firm's behaviours being a function of its prior behaviours. Liyanage and Barnard (2002, p. 37) also argue that prior knowledge is embedded in a firm's specific routines and can be "cumulative and [follow] a particular path of development". Thus, firm behaviour should be path-dependent and routine-based, and firm behavioural momentum should prevail across time periods. In other words, historical paths play a key role in determining the pace of future activities (Redding, 2002). Therefore, path dependence from historical moments generates the force of movement or momentum to carry on the patterns of activities over time. As momentum is a tendency to maintain existing motion and can refer to the quantity of motion that an object has, things in motion tend to remain so, while things not in motion tend to remain stationary. The same tendency can be evident in firm behaviours in that a firm tends to continue its present course (Chung *et al.*, 1987), or a firm is likely to "balance the tendency toward stability, brought about by prior investments" (Mumford *et al.*, 2000, p. 13). That is, based on prior literature, the force of movement carries on the patterns of a firm's activities over time, and the power of momentum should exist in a firm's activities from period to period. However, in practice, a legacy may continue or even enhance a firm's routine-based behaviours, but a failure may mitigate or even halt these behaviours. That is, the persistence of behaviours may cause rigidity and deteriorate firm performance. However, discussions on the impact of the magnitude of momentum power have received less attention, and the relationship between the moment power and firm performance has been less researched - does such power matter to firm performance?

The power of momentum and firm performance

The momentum effect has been researched in the social sciences from various perspectives. In analyzing momentum on behaviours, Plaud *et al.* (1999, p. 165) apply momentum to the study of human behaviours and define the effect of human behavioural momentum as "the persistence of behaviour under altered environmental contingencies", while Chung *et al.* (1987, p. 328) apply momentum to the study of firm behaviours and define the effect of firm behavioural momentum in regard to firm performance as "a function of its pre-succession performance". That is, momentum has been applied to the study of behaviours. In the theory of path dependence, path dependence can be defined as "a path-dependent sequence of economic changes […] in which important influences upon the eventual outcome can be exerted by temporally remote events, including happenings dominated by chance elements rather than

systematic forces" (David, 1985, p. 332). Apparently, "path dependence must involve some irreversibility of the phenomena under consideration" (Bassanini and Dosi, 2001, p. 46); thus, history matters in the short run or even in the long run (Bassanini and Dosi, 2001), and firm behaviours are routine oriented. That is, the momentum effect is embedded in a firm's functional areas.

However, less attention has been paid to the relationship between firm behavioural momentum and firm performance. History matters in firm behavioural momentum, but does that momentum matter to firm performance? Prior studies find that momentum-powered firms may deliver much more shareholder value than their competitors with less momentum (Larreche, 2008). As is argued, "momentum feeds on itself […] each success provides energy to the next" (The Momentum Effect, n.d.); however, failure may repeat as well in a momentum-deficient firm. We argue that a firm should maintain the momentum with value to perform better. That is, in business, "the momentum approach takes the value-delivery perspective" (Larreche, 2008, p. 135), and firms build a successful wave and ride with it. In other words, a firm depends on its successful path from the historical moments that generate the force of movement or momentum to carry on the patterns of activities over time, and a firm should tend to continue or even enhance its present course if successful. Since the momentum-powered firms emphasize their major stakeholders and manage their valuable resources more effectively and efficiently than the momentum-deficient firms, the power of momentum should increase with firm performance. That is, the more momentum a firm may generate, the less rigidity a firm may face to deliver quality performance. Hence, this paper constructs the first hypothesis to examine the relationship between the power of momentum and firm performance, and proposes that the power of momentum can increase with firm performance:

H1. The momentum power can increase with firm performance.

The moderating effect of firm-level factors

Hannan and Freeman (1984) argue that inertia should increase with firm age. Stinchcombe (1965) also argues that structural stability increases with age. It has been said that "inertia also increases monotonically with age" (Hannan and Freeman, 1984, p. 157). Hence, radical change may become less possible as the firm ages (Cyert and March, 1963).

Hannan and Freeman (1984) further argue that size relates to resistance to change, and Quinn and Cameron (1983) also argue that firm behaviour should become rigid when a firm increases in size. That is, the contingent factor such as firm size may alter the impact of momentum power on firm performance.

Since both age and size may have an impact on firm behaviours, as is supported by Kelly and Amburgey (1991, p. 594), who argued that "structural inertia varies with organizational size and age", this paper tests for any moderating effect of these firm-level factors on the relationship between firm behavioural momentum and firm performance. In particular, this paper focuses on the interactive effect - how firm age and firm size, respectively, interact with the power of momentum in the tested strategic dimensions to affect firm performance. Since all sources of resistance should be removed to keep the momentum moving (Larreche, 2008), but firm age and size may increase with the degree of firm resistance, we argue that firm age can moderate the impact of the momentum power on firm performance. This should be true in that the main effect can be weakened in an older firm. Firm size can also moderate the

impact of the momentum power on firm performance and, as such, the main effect can also be weakened in a larger firm:

H2. Firm age can moderate the impact of the momentum power on firm performance, such that the main effect can be weakened in older firms.

H3. Firm size can moderate the impact of the momentum power on firm performance, such that the main effect can be weakened in larger firms.

The moderating effect of industry-level factors

This study is motivated by the expectation that capital-intensive sectors (e.g. manufacturing) and labour-intensive sectors (e.g. services)[1] are different in ways that may be expected to affect the relationship between firm behavioural momentum and firm performance. Take manufacturing and services as examples. Manufacturing generally involves standardized production with an aim to exploit a technical scale economy to generate storable results (Wilson and Morris, 2000), while services are typically differentiated, perishable, intangible, and inseparable in production and consumption (Oliva and Sterman, 2001; Preece and Male, 1997). Prior studies find that differences are significant between the manufacturing sector and the service sector from such perspectives as earnings (Lorence, 1991) and profitability (Goddard and Wilson, 1996). Hence, we argue that factors from different industry sectors should significantly but differently moderate the effect of behavioural momentum on firm performance because of the different natures of manufacturing and services. In a more standardized environment (i.e. the manufacturing sector), the power of momentum should have more impacts on firm performance than those in less standardized environments (i.e. the service sector). Thus, between the capital-intensive sectors and the labour-intensive sectors, the capital-intensive sectors may moderate the effect of firm behavioural momentum on firm performance more than the labour-intensive sectors, and we establish the hypothesis as follows:

H4. Capital intensity can moderate the impact of the momentum power on firm performance, such that the main effect can be enhanced in the capital-intensive sectors.

The moderating effect of country-level factors

This paper is also motivated by the expectation that Eastern firms and Western firms are different in ways that may be expected to affect the relationship between firm behavioural momentum and firm performance. Unlike Western firms, which are mostly public-owned, more than half of the businesses in East Asia are family-owned and many of them are run by people of Chinese ethnicity (Tan and Fock, 2001). Chinese family businesses, affected by Confucianism, emphasize harmony, collectivism, hierarchy, and authority (Zapalska and Edwards, 2001), and therefore, there is a cultural difference in morality and perspective between firms in the East and firms in the West. Asian cultures have traditionally emphasized the idea that "individual developers or creators are obliged to share their developments" with society (Lai and Zaichkowsky 1999, p. 183), and Asian firms have "emphasized relationships much more strongly than Western firms" (Hitt *et al.*, 2002, p. 353). These differences in awareness and efforts to pursue their businesses exist between Asian firms and Western firms. As Asian firms emphasize harmony and collectivism, these firms may interact with firm behavioural momentum less than Western firms in terms of firm

performance. This paper includes firm origin to examine any country-of-origin differences between Eastern firms and Western firms:

H5. The country of origin of a firm can moderate the impact of the momentum power on firm performance, such that the main effect is weakened in Asian firms.

Methodology

Data and sample

This study emphasizes the main effect - the relationship between firm behavioural momentum and firm performance as well as the moderating effects—how contingent factors such as firm-level (firm age and size), industry-level (capital vs labour-intensive sectors), and country-level (firms from the West vs firms from the East) factors can moderate the relationship between firm behavioural momentum and firm performance.

This paper aims to examine the hypotheses using data collected from the Compustat and Yahoo Finance databases for firms in the USA and the Taiwan Economic Journal (TEJ) for firms in Taiwan. For data collected from the Compustat for firms in the USA, the data include information on firms in electronics-related sectors by the four-digit Standard Industry Classification (SIC) codes. The relevant SIC codes are those from 3,570 to 3,579 and from 3,612 to 3,699. The final sample of US firms is a panel with 239 unique companies across a 22-year time span (1991-2012). For data collected from the TEJ for firms in Taiwan, the data include information on firms in electronic-related sectors classified by codes 15, 16, and 23. The final sample of Taiwanese firms is a panel with 184 unique companies across the same 22-year time span (1991-2012).

Measures

Dependent variables

Firm performance. To calculate firm performance, this study uses the return on assets (ROA). ROA is available in both the Compustat database and the TEJ database.

Independent variables

Momentum power. This study analyzed the power of behavioural momentum from multifaceted perspectives. These perspectives are derived from the multiple strategic dimensions, suggested by Finkelstein and Hambrick (1990), and this study focuses on the following dimensions: plant and equipment (PE) newness, inventory level, non-production overhead, and research and development (R&D) intensity to examine the impact of the momentum power on firm performance[2]. To measure the power of momentum in PE newness, first, net PE is divided by gross PE to obtain PE newness. Next, PE newness is subtracted from the previous year's PE newness to present the mass, while velocity is represented by PE newness divided by the previous year's PE newness. After obtaining the mass and velocity, mass is multiplied by velocity to measure the momentum power in PE newness, which is denoted by MP (PE). To measure the power of momentum in inventory, inventory is divided by sales to obtain inventory levels. Next, inventory levels are subtracted from the previous year's inventory levels to present the mass, while velocity is represented by inventory levels divided by the previous year's inventory levels. After obtaining the mass and velocity, mass is multiplied by velocity to measure the momentum power in inventory levels, which is denoted by MP (INV). Next, to measure the power of momentum in non-production overheads, first, selling, general and administrative (SGA) expenses are

divided by sales to obtain non-production overheads. Next, non-production overheads are subtracted from the previous year's non-production overheads to present the mass, while velocity is represented by non-production overheads divided by the previous year's non-production overheads. After obtaining the mass and velocity, mass is multiplied by velocity to measure the momentum power in non-production overheads, which is denoted by MP (NPO). Finally, to measure the power of momentum in R&D intensity, R&D expenses are divided by sales to obtain R&D intensity. Next, R&D intensity is subtracted from the previous year's R&D intensity to present the mass, while velocity is represented by R&D intensity divided by the previous year's R&D intensity. After obtaining the mass and velocity, mass is multiplied by velocity to measure the momentum power in R&D intensity, which is denoted by MP (RDI).

Firm age. To calculate the age of a firm, this study subtracts the year of founding from the current year. The data for the firms' ages are available in the Hoover and Yahoo Finance search databases. To control for the potential diminishing impact and skewness, this study measures firm age in a logarithmic form.

Firm size. To calculate the size of a firm, this study uses the firm's total assets. Total assets are available in the financial reports and in the Compustat and the TEJ databases. To control for the potential diminishing impact and skewness, this study measures firm size in a logarithmic form.

Capital intensity. To measure capital intensity, revenue is taken and divided by the number of a firm's employees.

Country origin. The country of origin of a firm is determined by using dummy variables to measure country origin. Firms from Taiwan are coded as 1, while firms from the USA are coded as 0.

Lagged firm performance. To calculate lagged firm performance, this study uses the previous year's ROA of a firm. ROA is available in the Compustat and the TEJ databases.

Data analysis

For data collected from the Compustat database for firms in the USA, the data include information on firms in electronics-related sectors designated by four-digit SIC codes. The relevant SIC codes are those from 3,570 to 3,579 and from 3,612 to 3,699. The final sample of US firms is a panel with 239 unique companies across a 22-year time span (1991-2012). For data collected from the TEJ for firms in Taiwan, the data include information on firms in similar sectors and classified by codes 15, 16, and 23. The final sample of Taiwanese firms is a panel with 184 unique companies also across the 22-year time span (1991-2012).

This study conducts the statistical analysis by using time series cross-sectional (TSCS) regression analysis to test the hypotheses. Some scholars supported the use of random effects methods, instead of fixed effects methods when a model aims to estimate a time invariant variable(s) (Baxter *et al.*, 2008; Hussin and Saidin, 2012), but other scholars argued the validity of this reason to use the random effects methods (Cameron and Trivedi, 2005; Schmidheiny, 2014). For the present study, the results of the Hausman test suggest the use of the fixed effects methods to examine the models. Although these models include a time-invariant variable (i.e. country origin), which is not identified in the fixed effects methods, we do not aim to estimate the coefficients of this time-invariant variable, but to control for the impact of this variable. Thus, the present study uses the fixed effects estimators for TSCS data under the present study.

Before conducting the regressions, we examined the data and removed the outliers based on the box plot techniques. To control for concerns on heteroskedasticity and autocorrelation, the use of TSCS models considers robust standard errors.

Results

Table I illustrates the descriptive statistics, variation inflation factors (VIF), and correlation matrix of the variables for models 1-5. The variables presented are as follows: firm performance, MP (PE), MP (INV), MP (NPO), MP (RDI), firm age, firm size, capital intensity, country origin, and lagged firm performance. As Table I shows, multicollinearity between the variables in each tested model was not serious, according to the results of the VIF and Pearson's correlations. Regarding the interaction terms, we followed a common practice to mean-centre explanatory variables that comprise an interaction term before multiplying them to reduce possible multicollinearity. Hence, the concerns over multicollinearity in each tested model for the present study can be eased.

The purpose of *H1* is to examine whether or not momentum can lead to better firm performance. The results from Table II for model 1 reveal that momentum-powered firms fail to positively affect firm performance under tested strategic dimensions (MP (PE): $\beta = -0.001$, $p < 0.05$; MP (INV): $\beta = -0.234$, ns; MP (NPO): $\beta = -0.568$, ns; and MP (RDI): $\beta = -0.028$, ns). Therefore, *H1* is not supported. The empirical evidence shows that firms powered by high momentum may not necessarily be related to increased firm profitability. Furthermore, contrary to our prediction, drastic changes on the investment in capital items may deteriorate firm performance.

H2-H5 are used to examine the moderating effects of contingent factors from the levels of firm, industry, and country on the relationship between firm behavioural momentum and firm performance. From a firm-level perspective, *H2* and *H3* are examined based on firm-level moderators (firm age and firm size). As far as *H2* for model 2 is concerned, the results from Table III show mixed supports: Firm age can moderate the power of momentum in PE newness on firm performance, but its main effect is enhanced in older firms ($\beta = 0.037$, $p < 0.05$). The empirical result further indicates that firm age fails to significantly moderate the power of momentum in inventory on firm performance ($\beta = 4.150$, ns). However, the result supports the prediction and reveals that firm age can moderate the power of momentum in non-production overhead on firm performance, and the main effect can be weakened in older firms ($\beta = -0.050$, $p < 0.01$). Similarly, the result also finds that firm age can negatively moderate the power of momentum in R&D intensity on firm performance, which means the relationship between firm behavioural momentum in R&D intensity and firm performance can be weakened in older firms ($\beta = -0.189$, $p < 0.01$).

Hence, mixed evidence is found for *H2*. Particularly, in contrast with our expectation, the relationship between the power of momentum in PE newness and firm performance can be enhanced in older firms. This finding implies that older firms should be more aware of their capital investment when drastic changes on investment in capital items can deteriorate their performance.

As far as *H3* is concerned, the results from Table IV for model 3 also show mixed supports: Firm size cannot significantly moderate the power of momentum in PE newness on firm performance ($\beta = -0.011$, ns). Similarly, the results fail to prove that firm size can significantly moderate the power of momentum in inventory on firm performance ($\beta = 0.707$, ns), and that firm size matters in moderating the

Table I.
Combined descriptive statistics, VIF, and Pearson correlations

No	Variable	Mean	SD	VIF	1	2	3	4	5	6	7	8	9	10
1	Firm Performance	4.749	8.346	2	1									
2	MP (PE)	0.559	42.259	1.04	−0.008	1								
3	MP (INV)	0.061	0.543	1.41	−0.044**	0.019	1							
4	MP (NPO)	0.876	76.079	1.86	−0.082**	−0.001	0.298**	1						
5	MP (RDI)	0.782	8.513	1.43	−0.053**	−0.001	0.130**	0.236**	1					
6	Firm Age	1.455	0.347	1.42	−0.080**	−0.007	−0.040**	−0.038**	−0.074**	1				
7	Firm Size	2.330	0.978	1.29	0.067**	−0.012	−0.063**	−0.021*	−0.050**	0.439**	1			
8	Capital Intensity	−5.518	391.040	1.55	0.337**	0.000	−0.039**	−0.028*	−0.012	0.011	0.088**	1		
9	Country Origin	0.435	0.496	1.32	0.070**	0.014	0.017	−0.010	0.097**	−0.464**	−0.168**	0.010	1	
10	Lagged Firm Performance	4.841	8.368	1.56	0.593**	−0.006	−0.020	−0.081**	−0.007	−0.081**	0.102**	0.211**	0.080**	1

Notes: *$p < 0.05$;**$p < 0.01$

Variables	Firm performance				
MP (PE)		−0.001*			
MP (INV)			−0.234		
MP (NPO)				−0.568	
MP (RDI)					−0.028
Firm Age	−5.617**	−5.697**	−6.249**	−6.014**	−7.016**
Firm Size	−0.911*	−1.003*	−1.659**	−1.711**	−2.057**
Capital Intensity	0.037	0.044	0.129**	0.128**	0.127**
Country Origin	Omitted	Omitted	Omitted	Omitted	Omitted
Lagged Firm Performance	0.370**	0.362**	0.295**	0.298**	0.275**
Intercept	13.392**	13.711**	15.830**	15.577**	18.249**
F value	143.94**	116.81**	126.40**	126.56**	103.46**
N/*n*	7,070/420	7,027/419	7,014/420	6,988/419	5,917/391

Notes: *$p < 0.05$;**$p < 0.01$. *N*/*n* = number of observations/ number of firms

Table II. Cross-sectional time series regression estimates for Model 1 (*H1*)

Variables	Firm performance			
MP (PE)	−0.007**			
MP (INV)		−0.803		
MP (NPO)			−0.566	
MP (RDI)				−0.046**
Firm Age	−5.581**	−6.316**	−6.033**	−6.920**
Firm Size	−1.039*	−1.639**	−1.709**	−2.094**
Capital Intensity	0.044	0.129**	0.128**	0.127**
Country Origin	Omitted	Omitted	Omitted	Omitted
Lagged Firm Performance	0.362**	0.295**	0.298**	0.275**
Firm Age × MP (PE)	0.037*			
Firm Age × MP (INV)		4.150		
Firm Age × MP (NPO)			−0.050**	
Firm Age × MP (RDI)				−0.189**
Intercept	13.627**	15.911**	15.602**	18.208**
F value	2482.10**	108.10**	248.78**	92.25**
N/*n*	7,027/419	7,014/420	6,988/419	5,917/391

Notes: *$p < 0.05$;**$p < 0.01$. *N*/*n* = number of observations/ number of firms

Table III. Cross-sectional time series regression estimates for Model 2 (*H2*)

relationship between the power of momentum in non-production overhead and firm performance ($\beta = -0.005$, ns). However, the result supports this prediction and indicates that firm size can interact with the power of momentum in R&D intensity to negativelyaffect firm performance ($\beta = -0.102$, $p < 0.01$). That is, firm size can moderate the power of momentum in R&D intensity on firm performance, such that the main effect can be weakened in larger firms. Hence, the findings reveal mixed supports for *H3*.

H4 for model 4 is used to examine the contingent influences from the industry-level perspective – the moderator of capital intensity - and the results from Table V provide mixed evidence. That is, capital intensity fails to significantly moderate the power of momentum in PE newness on firm performance ($\beta = -0.003$, ns). It also fails to significantly interact with the power of momentum in inventory to impact firm

Variables	Firm performance			
MP (PE)	−0.005			
MP (INV)		−0.025		
MP (NPO)			−0.571	
MP (RDI)				−0.091**
Firm Age	−5.655**	−6.225**	−6.014**	−6.971**
Firm Size	−1.016*	−1.671**	−1.711**	−2.093**
Capital Intensity	0.044	0.129**	0.128**	0.127**
Country Origin	Omitted	Omitted	Omitted	Omitted
Lagged Firm Performance	0.362**	0.295**	0.298**	0.275**
Firm Size × MP (PE)	−0.011			
Firm Size × MP (INV)		0.707		
Firm Size × MP (NPO)			−0.005	
Firm Size × MP (RDI)				−0.102**
Intercept	13.682**	15.817**	15.578**	18.299**
F value	490.51**	105.33**	108.24**	96.15**
N/*n*	7,027/419	7,014/420	6,988/419	5,917/391

Table IV.
Cross-sectional time series regression estimates for Model 3 (*H3*)

Notes: *$p < 0.05$;**$p < 0.01$. *N*/*n* = number of observations/ number of firms

Variables	Firm performance			
MP (PE)	−0.001*			
MP (INV)		−0.149		
MP (NPO)			−0.567	
MP (RDI)				−0.028
Firm Age	−5.704**	−6.238**	−6.037**	−7.013**
Firm Size	−1.002*	−1.663**	−1.708**	−2.050**
Capital Intensity	0.044	0.129**	0.128**	0.127**
Country Origin	Omitted	Omitted	Omitted	Omitted
Lagged Firm Performance	0.362**	0.295**	0.298**	0.275**
Capital Intensity × MP (PE)	−0.003			
Capital Intensity × MP (INV)		−0.023		
Capital Intensity × MP (NPO)			0.000**	
Capital Intensity × MP (RDI)				0.006
Intercept	13.720**	15.819**	15.609**	18.227**
F value	97.63**	106.89**	415.63**	86.64**
N/*n*	7,027/419	7,014/420	6,988/419	5,917/391

Table V.
Cross-sectional time series regression estimates for Model 4 (*H4*)

Notes: *$p < 0.05$;**$p < 0.01$. *N*/*n* = number of observations/ number of firms

performance ($\beta = -0.023$, ns). Evidence also indicates that capital intensity cannot significantly moderate the power of momentum in R&D intensity on firm performance ($\beta = 0.006$, ns). However, capital intensity can significantly interact with the power of momentum in non-production overhead to affect firm performance ($\beta = 0.000$, $p < 0.01$). In other words, consistent with our prediction, capital intensity can moderate the power of momentum in non-production overhead on firm performance, such that the main effect can be enhanced in the capital-intensive sectors. Hence, the results from Table V provide mixed support for *H4*, and capital intensity can moderate the relationship between the power of momentum and firm performance under limited circumstances.

From a country-level perspective, *H5* for model 5 is used to examine whether or not country of origin for firms from Asia can negatively moderate the relationship between firm behavioural momentum and firm performance. Based on Table VI, a firm's country of origin cannot significantly moderate the relationship between firm behavioural momentum in PE newness and firm performance ($\beta = -0.520$, ns). Similarly, the country of origin of a firm fails to significantly moderate the relationship between firm behavioural momentum in inventory levels and firm performance ($\beta = -0.196$, ns). As far as firm behavioural momentum in non-production overhead is concerned, the result supports the prediction, and the finding indicates that a firm's country of origin can moderate the power of momentum in non-production overhead on firm performance, such that the main effect is weakened in Asian firms ($\beta = -2.779$, $p < 0.01$). Finally, the evidence indicates that the country of origin of a firm fails to moderate the power of momentum in R&D intensity on firm performance ($\beta = 0.930$, ns). Hence, the results from Table VI provide mixed support for *H5*, and the country of origin can moderate the relationship between the power of momentum and firm performance only under limited circumstances.

Overall, momentum does not increase with firm performance in the electronics-related sectors and so the power of momentum can be mythical in these sectors. However, the relationship between momentum and firm performance can be moderated by firm age, firm size, capital intensity, and country of origin, respectively, under some circumstances. Hence, some contingent factors can interact with a firm's behavioural movement to affect firm performance.

Conclusion and implications

Conventional wisdom and prior literature may support that momentum-powered firms should lead to better firm performance. However, contrary to this conventional wisdom, the evidence-based findings indicate that the power of momentum fails to significantly increase with firm performance under the tested strategic dimensions. Thus, the merit of the momentum power is mythical.

Variables	Firm performance			
MP (PE)	0.519			
MP (INV)		−0.170		
MP (NPO)			−0.233	
MP (RDI)				−0.957
Firm Age	−5.680**	−6.229**	−5.857**	−7.014**
Firm Size	−1.006*	−1.670**	−1.799**	−2.069**
Capital Intensity	0.044	0.129**	0.129**	0.127**
Country Origin	Omitted	Omitted	Omitted	Omitted
Lagged Firm Performance	0.362**	0.295**	0.296**	0.276**
Country Origin × MP (PE)	−0.520			
Country Origin × MP (INV)		−0.196		
Country Origin × MP (NPO)			−2.779**	
Country Origin × MP (RDI)				0.930
Intercept	13.487**	15.823**	15.547**	18.777**
F value	102.78**	106.07**	108.67**	87.13**
N/*n*	7,027/419	7,014/420	6,988/419	5,917/391

Notes: *$p < 0.05$;**$p < 0.01$. *N*/*n* = number of observations/ number of firms

Table VI. Cross-sectional time series regression estimates for Model 5 (*H5*)

Mixed results are found for the moderating roles of firm age and firm size, leading to the conclusion that the respective moderating impacts of firm age and firm size on the relationships between firm momentum and firm performance vary. That is, firm age can significantly moderate the impact of the momentum in PE newness on firm performance in a positive direction, but firm size fails to significantly moderate the impact of the momentum in PE newness on firm performance. In the dimensions of momentum in inventory, firm age and firm size, respectively, fail to significantly moderate the impact of the momentum in inventory on firm performance. While firm age and firm size can each negatively moderate the impact of the momentum in non-production overhead on firm performance, only the impact of the momentum in non-production overhead on firm performance moderated by firm age is significant. Similarly, firm age and firm size can each negatively moderate the relationships between the momentum effect in R&D intensity and firm performance, but both moderators also indicate significant influences in moderating the impact of the power of momentum in R&D intensity on firm performance. Hence, firm-level characteristics (e.g. firm age and firm size) may interact differently with firm behaviour to affect firm performance, and such differences are subject to the types of firm momentum.

The industry-level analysis from the moderating role of capital intensity also finds that the moderating impact of industry differences between capital-intensive sectors and labour-intensive sectors can significantly affect the relationships between firm momentum and firm performance under limited circumstances (e.g. non-production overhead). That is, the empirical evidence weakly supports the conclusion that industry matters in the discussion about firm behavioural momentum and firm performance.

Finally, does a firm's country of origin matter? The empirical evidence weakly supports the influence of the country of origin of a firm, interacted with firm momentum and indicates that the moderating impact of country differences between Western firms and Eastern firms can significantly affect the relationship between firm momentum and firm performance only under limited circumstances (e.g. non-production overhead). The findings weakly support the conclusion that the discussion over firm behavioural momentum and firm performance should include the impacts of country or cultural differences.

Based on the evidence-based findings for the present study, the power of momentum on firm performance can be a myth, contrary to conventional wisdom and prior literature. Furthermore, contingent factors such as firm-level (firm age and size), industry-level (capital vs labour-intensive sectors), and country-level (firms from the West vs firms from the East) factors may be important in affecting firm behaviour and firm performance, but their influences may vary. These findings may further highlight the complexity of and multifaceted perspectives on firm behaviour studies. Therefore, the strategic implications are manifold.

First, the boards and TMT with conventional wisdom may expect that maintaining high momentum can contribute to better firm performance. However, contrary to the conventional wisdom of the boards and TMT, the findings imply that the momentum may present a firm's path-dependent or independent behaviours, but may not necessarily signal value. What should concern the boards and TMT are the efficiency of resource allocation (e.g. investment in capital items) and the flexibility to regard reforms as routines, as is also suggested by Brunsson (2009).

Second, an old firm may not necessarily resist change, but drastic changes on investment in capital items can worsen firm performance. On the other hands, an old firm is more likely to follow it prior paths in non-production overhead and R&D for

better performance. Hence, the findings imply that regardless of firm age, the boards and TMT should carefully address their strategies from hierarchical levels of perspectives (e.g. corporate-level or business-level strategies).

Third, a large firm is more likely to resist change. The findings for the present study imply that a large firm is inclined to demonstrate routine-based behaviours. Furthermore, based on the findings from our firm-level research on firm age and firm size, the theoretical arguments on structural inertia - whether organizational inertia can increase with both firm age and size can be further debated.

Fourth, manufacturing sectors may not necessarily possess higher powers of momentum than service sectors, and this may imply the effect of differences between standardization and creativity. The findings may further imply that highly standardized operations may require less effort to maintain and to push the momentum than service-oriented sectors, which are usually flexible and creative. Thus, regardless of capital-intensive or labour-intensive sectors, TMT should address and strategize its operational plans differently to maintain appropriate momentum in actions for better performance.

Last but not least, Asian firms may generally emphasize harmony and collectivism more than Western firms, but such cultural differences may not necessarily affect their philosophies or beliefs in dealing with business matters. Thus, the interaction terms of cultural differences and firm momentum are found to be weakly associated with firm performance. This finding may further highlight and imply the impact of globalization. That is, globalization may mitigate the actual impacts of a firm's country of origin.

Limitations and directions for future research

This study has some limitations. First, the present study used ROA to measure firm performance. Accounting-based measures of firm performance (e.g. ROA) are not without their problems. Future research can consider incorporating other performance indicators (e.g. EBITDA) to complement as well as to highlight importance of earnings from different perspectives.

Second, to reduce or avoid any possible variances across industries, the current study was based on the electronics-related industry sectors and did not include firms from other industry sectors. The sample may limit the explanatory power of the empirical findings.

Third, the sample was limited to restricted geographical boundaries under a single national culture in one region, which may undermine various discretions; for example, Japanese firms may behave differently from Taiwanese firms, although all of these firms are Asian, and, similarly, firms from the USA and Germany may behave differently, although these firms are Western firms.

Finally, the present study does not particularly aim to explore the differences and implications between positive and negative momentum. However, it would be very instructive to study these differences, antecedents, and consequences of the impacts in such different momentous contexts.

Notes

1. See (yourdictionary.com, n.d.), capital-intensive and labour-intensive definitions at yourdictionary.com. http://www.yourdictionary.com/labor-intensive
2. Finkelstein and Hambrick (1990) suggested six strategic dimensions. Other than the aforementioned dimensions, there are two more dimensions: advertising intensity and financial leverage. Due to a lack of data on a comparative basis and the operational focus on this research, we focused on the aforementioned four dimensions.

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