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The empirical examination of changes related to value drivers in the effects of the 2007-2008 crisis

Abstract

This paper focuses on the value creation and the value drivers. The main goal is to categorize the most important value drivers, and their role of the firms' value. Further objective of this paper is to present the effects of the 2007-2008 global financial crisis. This study proceeds as follow. The first section presents the value chain, the primary and the support activities. The second part illustrates the key value drivers. The third part describes the 2007-2008 global economic crisis, introducing its causes, events and financial aspects. The fourth empirical section of the study analyses the database featuring data from 18 European countries, 10 sectors and 1553 firms in the period between 2004 and 2011. Finally, the fifth section includes concluding remarks. Based on the related literature reviewed and in the conducted empirical research it can be assessed that 2008 can be seen unambiguously as the year of the crisis. In this year, all independent variables had a negative effect on the dependent variable.

Keywords: value chain, firm valuation, value drivers, global financial crisis of 2007-2008

1. Literature review

Value creating by the firm

"The process of value creation is the procurement, management and use of resources with the purpose of creating value for the consumer." (Chikán – Demeter 2006 p.3) This definition approaches the concept and process of creating value from the perspective of the literature on management, more specifically production management, marketing and the corporate management; in other words, it defines the firm as an organisation which creates value during its operation, and which has as the main goal of its operation the satisfaction of consumers' demands.

Porter (1998), in his theory of the value chain, focuses on the creation of value. In his opinion all companies carry out their activities in order to create value. These activities can be divided into two large groups; primary and support activities. Primary activities are involved in the physical creation of the product and its sale and transfer to the buyer as well as after-sale assistance. Support activities support the primary activities and each other by providing purchased inputs, technology development, and human resources, and various firmwide functions. The generic value chain is seen in the Figure 1. (Porter, 1998, pp.36-43)
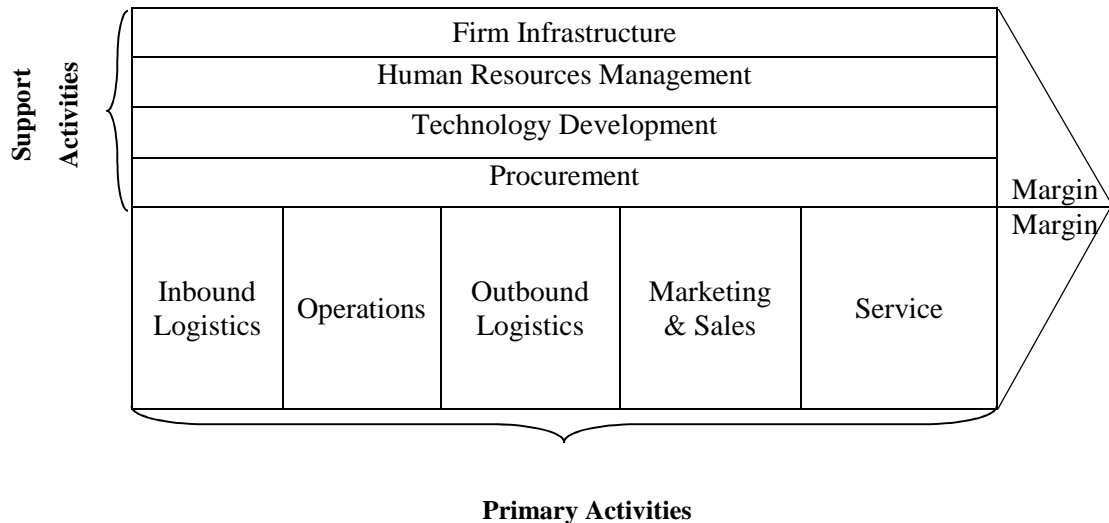
Figure 1. The Generic Value Chain

Source: Porter (1998) p. 37

In the approach followed by the article, however, this must be achieved in such a way as to increase the shareholder value as well; i.e. that value must be created for the shareholders as well as for consumers. This understanding of value creation is also reflected – among other things - in Chikán's (2003) work on the dual value creation.

2. Identifying of value drivers

According to Rappaport (1998), the first task of the leaders of the firm is to grow the shareholder value, which can be achieved by creating a strategy and deciding on operative performance criteria.

The shareholder value approach can be considered universal; it can be used for the analysis of strategies and product lines in private and public limited companies and business units. The direct relationship between the analysis of strategy and shareholder value expresses the idea that the business strategies are "converted" to the amount of finance they create. For the operational managers, one of the most important results of the shareholder value-based analysis is that it helps to decide which activities should receive most attention during the operation of the business. (Tarnóczi et al. 2015 a) The seven value drivers are the macro value drivers according to Rappaport. There are the follows:

1. sales growth rate,
2. operating profit margin,
1. income tax rate,
2. working capital investment,
3. fix capital investment,
4. cost of capital,
5. value growth duration. (Rappaport 1998 pp.55-56)

To achieve this, the main evaluation characteristics of the system used to measure performance are, at the company level, the shareholder return, at the operative level the shareholder value added and the indicators which predict value, and at the lower organisational level, the key value drivers. (Rappaport 1998)

Copeland and co-authors (1999) are of the opinion that the firm's value is determined by its ability to generate cash flow and the return of the invested cash flow, and the determining factors of value are referred to as key value drivers. When comparing the firm's performance indicators they emphasise that there are two methods, the entity DCF-model and the several year economic profit model, which correspond to the achievement of a long term approach and the capital intensive criterion. (Tóth 2014) Damodaran (2006) identifies four valuation models:

1. discounted cash flow valuation,
2. relative valuation,
3. contingent claim valuation,
4. asset-based approach.

Fernandez (2007 p.1) distinguishes the following valuation methods:
1. asset-based methods;
2. income-based methods;
3. goodwill-based methods;
4. discounted cash flow methods;
5. value added methods;
6. options.

Damodaran (2006 pp.406-407) demonstrates two methods of deducing free cash flow. According to one method, we add together all cash flows which belong to the firm's financers, i.e. the free cash flows due to the owners from their own capital, the capital repayments due to creditors, interest expenditure and newly acquired credit, and the preference payments to preference shareholders. With the other method, we add together all cash flows before redistributing them to resource providers. This latter version appears to be easier to use.

$$FCFF = EBIT * (1-T) - Net\ Capital\ Expenditures - Change\ in\ non\ cash\ Working\ Capital$$

Damodaran (2006) considers the discounted cash flow-based analysis to be the basis of all methods of analysis, the one on which all others are built. In order to understand and use both the relative and the option-priced models, we must start with the DCF process.

Summarising what can be learnt both theoretically and practically from the above sections, we can state that there is a logical relationship between these processes, starting from Porter's (1998) value chain theory – i.e. that aim of the firm's operation is to create value, so the source of the firm's value creation is its operation –, through Rappaport's (1998) shareholder value network and the concept of maximizing shareholder value – with the help of which we can identify value creators –, through Copeland and co-authors' (1999) key value drivers – which determine the values which are closely related to the firm's ability to generate cash flow –, to Damodaran's (2006) evaluation models – including discounted cash flow-based, relative and option analysis and the asset-based analysis models. On all of these theoretical bases we can establish the factors which create the firm's value.

I. FCFF (Free Cash Flow to Firm):
$$FCFF = EBIT * (1-T) - Net\ Capital\ Expenditures$$
$$- Change\ in\ non\ cash\ Working\ Capital$$
EBIT (Earnings Before Interest and Taxes)
Tax Rate
Reinvestment= $Net\ Capital\ Expenditures + Change\ in\ non\ cash\ Working\ Capital$

II. Invested Capital=$Net\ Working\ Capital + Net\ Fixed\ Assets + Net\ Other\ Assets$

III. ROIC (Return on Invested Capital)
$$ROIC = \frac{EBIT(1-t)}{Invested\ Capital}$$

IV. Net Margin
$$Net\ Margin = Net\ Income\ /\ Sales$$

V. Cost of Capital

VI. Market ROA:
$$MROA = \frac{Net\ Income}{Market\ Values\ of\ Equity + Market\ Value\ of\ Debt}$$

VII. Sales Growth Rate

3. The global financial crisis of 2007-2008

Given the great impact and complexity of the 2007-2008 financial/economic crisis, prominent economists have varying ideas regarding its causes and varying suggestions for its solution. In his writings, Stiglitz (2009) refers to the 2007-2008 crisis as the greatest since the great world economic crisis, and also as the first global recession in the age of globalisation. Bokros (2009) also refers to the crisis as a global one, and identifies numerous characteristics in which the interconnectedness of the countries and the national economies of the world can be observed. Lámfalussy(2008), in his book about the 2007-2008 crisis, writes of the deep crisis in the world's financial markets, the globalisation of finance and the vulnerability of the financial system, and further analyses previous financial crises and compares them. Bélyácz (2014), in the introduction to his article notes that many authors mention, but rarely emphasise, the similarities, indeed the common origins, of the great economic crisis and the 2007-2008 global financial crisis. The main cause in both crises was the deregulated financial free market. The study goes on to describe the theoretical background to the crisis, discusses the role of random walk in the financial markets, the ergodic axiom, the efficiency of the market, and true weight of uncertainty. His conclusions indicate that the financial crisis does not invalidate the theory of the efficient market, but illuminates its weak points. The problem does not lie in any ability to predict it, but occurs if we do not take uncertainty into account, or if the actions of the actors in the financial markets accentuate the uncertainty. Mellár's (2010) study analyses the possible directions of the future development of macroeconomics, asking whether in the last 10-20 years – as a result of the approaches of the neo-classical and neo-Keynesian schools – a new neo-classical synthesis has come into being, is continuing, or whether a new direction is emerging. Many believe that macroeconomics has not been able, or has not attempted, to answer the basic questions raised by the crisis, and has not been able to offer a theoretically grounded remedy for the imbalances. The greatest lesson of the crisis is that the belief in the theory of the efficiency of the market seems to be wavering. In relation to the market, a middle way must be found; in other words, a coordinating mechanism which is not perfect but which is indispensable, and which cannot be replaced by any other. Hodgson (2009) also believes that the crisis is the most serious global crisis since the world economic crisis of the 1930s. Just like Keynes at that time, mainstream economists are now pondering whether the crisis will renew the science of economics by expanding the frontiers of current economic theory, and economic policy, or not. In his article he evaluates the prospect of such a renewal. To do this he lists the indicating signs which have not yet received sufficient attention. Krugman (2012) criticises the overemphasis on the self-correcting nature of market mechanisms. He believes the remedy for the crisis is a strengthening the demand, which must be achieved by the growth of state demand.

The events leading up to the crisis can be mentioned, events which ensured that the 2007-2008 crisis became a worldwide phenomenon.

The financial crisis primarily affected those markets which were in direct contact with structured financial products, and with the American mortgage market, and consequently, the developing countries were less affected. Those countries, however, which proved to be vulnerable, even if they were on the periphery, felt the full force of the crisis through increasingly serious liquidity stresses, volatile sudden increases and price slumps. (Király – Nagy 2008)

4. Materials and methods

Describing of database

The objective of this article is to answer the question of what changes occurred to drivers related to the value creation of firms in the effects of the 2007-2008 global financial crisis.

With this in mind was analysed a database featuring data from 18 European countries, 10 sectors and 1553 firms in the period between 2004 and 2011, which can be considered a strongly balanced panel, containing few missing observations. The database is found on Aswath Damodaran's website, and several adjustments were made in relation with the database. (http://pages.stern.nyu.edu/~adamodar/, 2014)

The firm value was used for the value of the firm value category, which is the sum of the market capitalization – the best estimate of the market value of equity – and the value of market debt. The factors influencing firm value – as a dependent variable – are those value drivers mentioned above which most determine the value of the firm. Máté et al. (2016) examined the knowledge-intensive business service sectors.

In the case of firm value, EBIT, reinvestment and invested capital, were used natural logarithms of the variables, while the natural logarithms of the revenue difference was used for the sales growth rate, since in this way the distribution of the variables approached a normal distribution.

The applied multivariable panel regression model

As a continuation of the empirical research, the specification of the panel model was carried out. The panel model – also referred to as longitudinal data analysis –, accompanied by the use of time series and cross-sectional data, is the most tried and tested method. With the help of the panel model it becomes possible to observe the development over time (time series) of the same firm characteristics (cross-sectional data), since the panel database contains several time periods and several individual category entries (firm, industrial sector, country) in tabular form. (Ramanathan 2003 pp.498-501)

The next step was to specify the multivariable regression model:

$$LnFV_{i,t} = \alpha + \beta_{lnEBIT}lnEBIT_{i,t} + \beta_{tax}tax_{i,t} + \beta_{lnReinv}lnReinv_{i,t} + \beta_{lnInvC}lnInvC_{i,t} + \beta_{ROIC}ROIC_{i,t} + \beta_{NetM}NetM_{i,t} + \beta_{MROA}MROA_{i,t} + \beta_{dlnRev}dlnRev_{i,t} + u_{i,t} + \varepsilon_i$$

The empirical analysis and its results

The analysis was prepared with the help of the STATA 11 statistics programme, which is able to produce statistical and econometric calculations and graphic presentations of data.

The results of the calculations are prepared in synthesised form, relating to the entire period (2004-2011) and to all the economic sectors (10 sectors).

In my current empirical research I examine how the 2007-2008 financial crisis affected the relationship between firm value and value drivers. To do this I used a random effect panel regression model, in such a form that alongside the predictors, I introduced the effect of the years as a "time dummy" variable into the model, and also inserted the one-year delayed dependent variable into the independent variables, which assisted me in analysing the application. The results of the panel regression are contained the Table 1.

Table 1. Random effect panel regression results between 2004 and 2011 for all sectors

	lnFirm_V		
	Coef.	**z**	**P>|z|**
lnFirm_V L1.	0.5638	17.59	0.000***
lnEBIT	0.3790	17.42	0.000***
Tax_r	-0.2425	-3.82	0.000***
lnReinv	0.0513	8.44	0.000***
lnInv_C	0.1784	12.07	0.000***
ROIC	0.0241	5.08	0.000***
Net_M	0.3400	2.32	0.021**
MROA	-2.2981	-6.84	0.000***
dlnRev	0.3055	14.57	0.000***

Dummy of 2005	0.3830	18.53	0.000***
Dummy of 2006	0.4268	21.04	0.000***
Dummy of 2007	0.1968	10.00	0.000***
Dummy of 2008	**-0.2094**	-10.56	0.000***
Dummy of 2009	0.3080	15.48	0.000***
Dummy of 2010	0.2080	7.82	0.000***
Dummy of 2011	omitted because of collinearity		
cons.	1.4769	19.96	0.000***
R² overall	0.9551		
R² within	0.7439		
R² between	0.9693		
Wald (chí²)	63 206.18***		
Number of observations	5 504		

Source: own calculation
Note: At the levels of significances *** 1 %, ** 5 %, * a 10% respectively

The panel regression model describes the variances of firm value, taking into account the effects of individual years. It can be considered reliable on the basis of the Wald-test, and explains the dependent variable under 5% according to the Wald-test. Moreover, the overall R^2 is being equivalent to 95.51%, and the 16 independent variables are significant at levels of 1% and 5%.
On the basis of the estimated values of the model parameters, it can be stated that no change occurred in the direction of the correlation between the business value and the independent variables. Its correlation with EBIT, Reinvestment, Invested Capital, Return on Invested Capital, Profit Margin, and the Growth in Revenue was positive. There was a negative correlation between the Tax Rate and the Firm Value, and the relationship between the MROA used as a proxy and the dependent variable was still strongly negative. The effect of the year 2004 is built in to the constant member, and functions as a positive co-factor in the model. The years 2005, 2006 and 2007 correlate positively with firm value. In 2008 the effects of the crisis become visible, and this year had a negative effect on firm value. The years 2009 and 2010 also produced changes on the same direction in firm value. 2011 was left out as a result of collinearity.
In the results obtained, the length of the half-life - i.e. the period which corresponds to the time needed to eliminate half of the divergence from the counter-weight of the given variable - was also decisive. This is the speed of adjustment, it is most often measured by the half-life, the time needed in order to eliminate 50% of the deviation. (Földvári 2012)

$$t_{half-life} = \frac{ln2}{variable}$$

This is calculated as follows:

$$t_{half-life} = \frac{ln2}{0.5638} = 1.2294$$

In this case the impact of the crisis eliminates in little more than one year.

In what follows I have arranged my panel model to enable cross-effects to be taken into account during the analysis. The marginal effect of one independent variable can sometimes also depend on other variables. To show this, Ramanathan (2003 pp.264-265) suggests that the mutual effects between the variables should also be understood, in order to show the cross-effects. (Tarnóczi et al. 2015 b)

When examining cross-effects, in cases in which all variables are listed with the time dummy variable for 2008, it is clear that the cross-effect in 2008 of Invested Capital and Return on Invested Capital is positive, while the product of the 2008 time dummy variable for Reinvestment has a negative effect on firm value, while the product of the 2008 time dummy variable with the other variables is not significant. (See Table 2.)

Table 2. Results of cross-effects analysis between 2004 and 2011 for all sectors

	lnFirm_V		
	Coef.	**z**	**P>|z|**
lnFirm_V L1.	0.3646	17.41	0.000***
lnEBIT	0.3760	17.11	0.000***
Tax_r	-0.2601	-4.00	0.000***
lnReinv	0.0587	8.71	0.000***
lnInv_C	0.1698	11.56	0.000***
ROIC	0.0230	4.99	0.000***
Net_M	0.3216	2.23	0.026**
MROA	-2.1419	-6.02	0.000***
dlnRev	0.3043	14.11	0.000***
Dummy of 2005	0.3918	18.47	0.000***
Dummy of 2006	0.4365	20.84	0.000***
Dummy of 2007	0.2040	10.14	0.000***
Dummy of 2008	**-0.7039**	-4.99	0.000***
Dummy of 2009	0.3091	15.53	0.000***
Dummy of 2010	0.2127	7.97	0.000***
Dummy of 2011	omitted because of collinearity		
lnEBIT*2008 dummy	-0.0388	-1.24	0.214 nsz.
Tax_r*2008 dummy	0.0646	0.50	0.619 nsz.
lnReinv*2008 dummy	-0.0676	-6.08	0.000***
lnInv_C*2008 dummy	0.1431	4.45	0.000***
ROIC*2008 dummy	0.0450	2.30	0.021**
Net_M*2008 dummy	0.1847	1.24	0.214 nsz.
MROA*2008 dummy	-0.4706	-0.74	0.461 nsz.
dlnRev*2008 dummy	0.0143	0.68	0.495 nsz.
cons.	1.5054	20.24	0.000***
R² overall	0.9556		
R² within	0.7494		
R² between	0.9694		
Wald (chí²)	71099.30***		
Number of observations	5504		

Source: own calculation
Note: At the levels of significances *** 1 %, ** 5 %, * a 10% respectively

5. Conclusions

The aim of this article is to present the value creation, the value chain and the value drivers. Beyond this the other purpose of this article is to answer the question of what changes occurred to drivers related to the value creation of firms in the effects of the 2007-2008 global financial crisis. This study proceeds as follow. The first section presents the value chain, the primary and the support activities. The second part illustrates the key value drivers. The third part describes the 2007-2008 global economic crisis, introducing its causes, events and financial aspects. The fourth empirical section of the study analyses the database comprising data from 18 European countries, 10 sectors and 1553 firms in the period between 2004 and 2011. Finally, the fifth section concludes what might be learned from this study, summarising the results of the examination above, I formulated the conclusions. An examination of the changes following the 2007-2008 financial crisis and their relationship with the value drivers allows us to conclude, that 2008 can be treated unambiguously as the year of the crisis. The other main finding of this work is that, in the year of 2008, all independent variables had a negative effect on the dependent variable.

This study also concludes that the dependent variable was effected negatively by all independent variables, such as: EBIT, Reinvestment, Invested Capital, Return on Invested Capital, Net Margin, Sales Growth Rate, Tax Rate and Market Value of Return on Asset (MROA).

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