Risk, return, capital-structure and corporate value

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Abstract
This paper explores the influence of company specific and capital market factors on corporate financing decisions and shows how they are related to a company's market value. By using a capital-structure portfolio model, a company specific time-variant optimal capital-structure range is determined for companies in developed and developing countries over the period from 1996 – 2005. Results show that a company's market value significantly increases (decreases) if its capital-structure enters (leaves) its optimal capital-structure range.

1 Introduction

Since the seminal work of Modigliani and Miller (1958) an immense number of studies have been published dealing with the determinants of a company's capital-structure choice. The determinants identified in those studies can be separated in two broad categories: internal or company-specific determinants and external determinants. Company-specific determinants comprise for example a company's current profitability, its growth rate, its financial risk, etc. External determinants include for example the current level of interest rates, tax-rates, the size, volatility and liquidity of capital markets, etc. (Bancel and Mittoo, 2004, Brounen et al., 2004, Graham and Harvey, 2001, Pinegar and Wilbricht, 1989). The existing capital-structure theories focus either on internal factors or on external factors but fail to incorporate both aspects. For example, the classical trade off theory is mainly concerned with internal aspects, i.e. the influence of a company's bankruptcy costs and its tax savings on its financing choice. The pecking order theory on the other hand is mainly concerned with agency conflicts between companies and their shareholders and the influence of those conflicts on a company's financial choice. Thus, the pecking order theory incorporates external capital-structure aspects but mainly ignores internal ones. Similarly, capital-structure signalling theories, agency cost theories and market-timing theories focus mainly only on either internal or external aspects of a company's capital-structure choice and none incorporates both in a unified framework. Due to the different perspectives that the various capital-structure theories have of a company's capital-structure, it is not surprising, that tests of the different capital-structure theories produce different and often conflicting results.

This study aims to overcome some of the shortcomings of the existing capital-structure theories by incorporating both, the internal and external aspects that have been found to be important in corporate financing decisions, in a unified framework. Based on those internal and external factors a company's optimal capital-structure range is firstly determined and then its influence on a company's market value assessed. In a further step, similar to Fama and French (2002) and Flannery and Rangan (2006), the speed at which a company adjusts its capital-structure towards its target capital-structure ratio – defined as the middle of the a company's optimal capital-structure range – is determined.

2 Model

The combination of internal and external factors that influence corporate financing decisions is achieved by using a modification of Markowitz's (1959) portfolio theory, which is fitted into the area of the capital-structure theory. While Markowitz's portfolio theory focuses on investment decisions, the underlying idea of the model used in this paper is to consider a company's capital-structure – the mixture of a company's debt and equity – as a portfolio of different financial sources. Similar to Markowitz, the total risk of the "capital-structure portfolio" is determined by the risks of a company's different financing sources and the total cost of the "capital-structure portfolio" is equal to the sum of the different costs of the company's financing sources.

2.1 Capital-structure risk

A company's capital-structure risk is defined as the risk that the company has to change its capital-structure under unfavourable conditions. This risk measure is modelled by the market price fluctuations of the company's debt and equity and can be regarded as an extension of the ideas that lie beneath the market timing and pecking order theory. Similar to Strebulaev (2003), a company's capital-structure risk is measured as follows:

$$\sigma_{CS} = \sqrt{\left(\frac{\mathrm{D}}{\mathrm{V}}\right)^2 * \sigma^2{}_{\text{debt}} + \left(1 - \frac{D}{V}\right)^2 * \sigma^2{}_{\text{equity}} + 2 * \sigma_{\text{debt}} * \sigma_{\text{equity}} * \frac{D}{V} * \left(1 - \frac{D}{V}\right) * \rho} \quad (1)$$

With:

σ_{CS}	Capital-structure risk
$\frac{D}{V}$	Debt to value ratio
σ_{equity}	Equity market risk
σ_{debt}	Debt market risk
ρ	Correlation coefficient

In order to separate changes in a company's capital-structure that result from decisions to raise new debt and equity finance from so-called automatic changes in a company's capital-structure caused by retained earnings and dividend payments, an adjusted capital-structure ratio is used that takes those automatic changes into account.

A debatable issue is whether book values or market values should be used for the D/V-ratio in the determination of a company's capital-structure risk measure (Rajan and Zingales, 1995). For this study, only book values are used for the capital-structure ratio because market values do not allow the separation of capital-structure changes caused by financing decisions from changes caused by other stock market related effects (e.g. stock market crashes, speculative behaviour, etc.). Also, as two of the three sample countries used in this study faced significant and long-lasting stock market boom and/or crisis periods, the use of book values instead of market values is justified.

The equity market risk-measure ("σ_{equity}") is determined by the annualized standard deviation of a company's weekly stock market returns. Since most companies do not have publicly traded debt, the annualized weekly standard deviation of the benchmark government-bond yields of the country in which a company operates, is used as a proxy for a company's debt market risk-measure ("σ_{debt}") similar to (Strebulaev, 2003, p. 16). Finally, the correlation coefficient ("ρ") is determined by the correlation between a company's weekly stock market returns and the benchmark government bond yields.

2.2 Capital-structure cost

Similar to Markowitz, a company's capital-structure costs are calculated by the weighted average costs of a company's different financial sources ("WACC") as illustrated in the following equation:

$$WACC = \frac{E}{V} * r_{equity} + \frac{D}{V} * r_{debt} * (1 - t) \tag{2}$$

The company's tax-rate ("t") is – similar to Allayannis et al. (2003) and Twite (2001) – calculated by dividing a company's tax payments by its pre-tax income. Graham (2000) and Kemsley and Nissim (2002) found that companies are able to use between 40% - 66% of their debt-tax shields. Based on those results, the model assumes that the sample companies are able to use 50% of their debt finance induced debt-tax shields. The company's cost of debt ("r_{debt}") is calculated by dividing a company's total interest payments by its interest bearing liabilities and the company's cost of equity ("r_{equity}") is determined by using the capital asset pricing model of Sharpe (1964) and Lintner (1965).

2.3 Optimal capital-structure range

A company's optimal capital-structure range is determined by the capital-structure ratios within which the company's capital-structure risk measure and the capital-structure cost measure are the smallest. The capital-structure ratio that is associated with a company's minimum capital-structure risk measure is determined by setting the first deviation of equation (1) equal to zero and solving for the capital-structure ratio (D/V). The second boundary of a company's optimal capital-structure range, given by the capital-structure ratio where the weighted average cost of capital measure is the smallest, is more difficult to determine because both financing cost variables – r_{debt} and r_{equity} – automatically change with changes in the capital-structure ratio. However, there are established procedures available to overcome those problems. Bowman (1979) and Cooper and Nyborg (2006) showed that a company's cost of equity can be adjusted for different capital-structure ratios via the beta factor in the capital asset pricing model. Equation (3) illustrates this adjustment:

$$\beta_{new D/V\, ratio} = \text{current } \beta * \frac{1+(1-t)*D_{new}/E_{new}}{1+(1-t)*D_{actual}/E_{actual}} \tag{3}$$

D_{actual}/E_{actual} represents the current debt-to-equity ratio and D_{new}/E_{new} represents the new debt-to-equity ratio after the capital-structure change. As with the cost of equity, a company's cost of debt also automatically change with changes in the company's capital-structure. To capture these changes in the cost of debt variable, an option-pricing model is used applying the assumption that a higher capital-structure ratio increases the probability that creditors will exercise their option to call their debt contracts, declare the company bankrupt and take their invested money out. Equation (4) illustrates how a company's cost of debt measure is adjusted for different capital-structure ratios:

$$r_{\text{debt at new D/V ratio}} = \text{current } r_{\text{debt}} * \frac{\text{option value at actual D/V level}}{\text{option value at new D/V level}} \tag{4}$$

The option values in equation (4) are calculated by using a standard European call option-pricing model (Hull, 2002). The strike price is the company's current capital-structure ratio and the price of the underlying is the company's current total book value, which is consistent with the bankruptcy procedure in different countries that typically refer to a company's book rather than to its market value. The time variable is set at one to be consistent with annual corporate financial data and the annualized standard deviation of a company's weekly stock returns is used as the risk measure in the option pricing formula.

3 Data

For this study, all companies listed on the stock exchanges in Australia, Germany and Malaysia from 1996 – 2005 were initially selected. However, financial companies (SIC[1] 6000 – 6999), utility companies (SIC 4900 – 4999) as well as companies with incomplete data sets were excluded. Further, all companies with a market value to total asset ratio of greater than the 99% percentile of all sample companies in a country and all sample companies with a debt to total asset ratio of greater than one were excluded in order to avoid that outliers influence the results. After those exclusions the final sample consisted of 390 companies (3900 firm-year observations) representing approximately 32 % of the stock market capitalisation in each country from 1996-2005. All financial data were obtained from Thomson Financial and the World Federation of Exchanges databases. Table 1 details the number of companies identified by country and by industry and the average percentage of the sample companies' stock market capitalisation relative to the total stock market capitalisation in each country.

[1] Standard industry code (SIC).

Table 1

Number of sample companies by country and industry and

average stock market capitalisation

The average percentage of the sample companies' market capitalisation is calculated by dividing the total sum of the sample companies' market capitalisation by the total market capitalisation in each sample country from 1996-2005, as reported by the World Federation of Exchanges.

Industry	Country	Australia	Germany	Malaysia
Agriculture, Forestry		2	1	11
Mining		25	1	4
Construction		1	6	9
Manufacturing		35	97	89
Transport.& Communication		7	7	10
Wholesale Trade		11	13	14
Retail Trade		6	6	4
Services		11	4	16
Total number of companies		98	135	157
Average percentage of total stock market capitalisation 1996 - 2005		33.82%	25.36%	36.67%

Company-specific as well as country-specific factors, such as a country's tax-system, influence corporate financing decisions (Desai et al., 2004, Fan et al., 2003, LaPorta et al., 1998). Australia, Germany and Malaysia were selected as sample countries because their tax-systems were similar until 2000, i.e. they all employed a dividend imputation system. If those imputation systems are fully integrated, corporate tax payments should not have an influence on a company's value because investors receive an equivalent tax credit for taxes paid at the corporate level (Petty et al., 2006). Starting from January 2001, Germany lowered the corporate tax-rate from 30% to 25% and replaced the dividend imputation system by a so-called "half-income system" according to which shareholders have to tax only 50% of the dividends they receive. The downside of the change to the half-income system is that shareholders do not receive tax credits anymore for dividends, which have already been taxed at the corporate level. In other words, the change of the German tax-system has introduced a partial double taxation of corporate profits, which particularly influences the after tax returns of resident shareholders that do not pay taxes respectively that are not in high tax brackets (Bach et al., 2000). With the exception of some minor tax-system adjustments no similar fundamental tax-system change took place in Malaysia from 1996-2005 (Pricewaterhouse-Coopers, 2006). Australia did also not fundamentally change its tax-system over the years from 1996 to 2005. However, from 1999 to 2000 and from 2000 to 2001, the statutory tax-rates on corporate profits were reduced two times from 36% to 34% in 2000 and from 34% to 30% in 2001 (Commonwealth of Australia, 2006).

In summary, the tax-system change and the tax-rate reductions, in Germany and in Australia, offer the opportunity to test whether and to what extent tax-system changes and tax-rate reductions influence the market values and the corporate financing decisions of the sample companies in the different countries.

4 Method

Two regression models are used. The first is to identify the influence of a company's optimal capital-structure range on its market value ("Regression model 1"). The second model is to identify how fast the sample companies adjust their capital-structures towards their capital-structure targets ("Regression model 2").

4.1 Regression model 1:

$$\begin{aligned} MV_{it} = \alpha + \beta_1 INOUT_{it} + \beta_2 EBIT_{it} + \beta_3 \mathrm{DIV}_{it} + \beta_4 DEPR_{it} \\ + \beta_5 EFFTAXRATE_{it} + \beta_6 (INTEXP / EBIT)_{it} \end{aligned} \quad (5)$$

The dependent variable, the market value of a company ("MV_{it}") is determined by the sum of a company's market value of equity and the book value of its debt. The independent variable ("INOUT") takes a value of one, if the company's actual capital-structure is inside of its optimal capital-structure range and zero otherwise. The company's EBIT is used as a proxy for its profitability. Dividend payments ("DIV") are included to identify and test the Miller and Modigliani (1961) dividend irrelevance theorem. The other independent variables – a company's depreciation expenses ("DEPR"), its effective tax-rate ("EFFTAXRATE") and its interest expenses relative to its EBIT ("INTEXP/EBIT") – are included due to their impact on a company's market value as identified in the prior literature (see e.g. Altman, 1984, DeAngelo and Masulis, 1980, Graham, 1996, 2000, Miller, 1977, Myers, 1984, 2001, Warner, 1977). In order to avoid that large corporations with high market values bias the regression results, all variables are scaled by a company's total assets.

4.2 Regression model 2:

Regression model 2, which is detailed in equation (7) uses the standard capital-structure target adjustment model (Fama and French, 2002, Flannery and Rangan, 2006, Wanzenried, 2002), which is illustrated in equation (6).

$$\left(D/V\ adj_{it} - D/V\ adj_{it-1}\right) = \alpha + \beta_1 (D/V^*\ adj_{it} - D/V\ adj_{it-1}) + \varepsilon_{it} \qquad (6)$$

The left-hand side of equation (6) shows the change in a company's capital-structure ratio from one year to the next. The term on the right-hand side of equation (6) explains this change by a partial respectively full adjustment of a company's capital-structure towards its target capital-structure ratio (D/V^* adj $_{it}$). In other words, the model assumes that companies adjust their capital-structures over time towards their target capital-structure ratio at a constant speed determined by the slope coefficient β_1.

By rearranging the target adjustment model illustrated in equation (6) and adding other independent variables, which have been found to be important in corporate financing decisions (Brounen et al., 2004, Graham and Harvey, 2001, Pinegar and Wilbricht, 1989), the following testable regression equation is generated:

$$\begin{aligned} D/V\ adj_{it} &= \alpha + \beta_1\ D/V^{*}\ adj_{it} + (1-\beta_1)\, D/V\ adj_{it-1} + \beta_2 EBIT_{it} \\ &+ \beta_3 \mathrm{DIV}_{it} + \beta_4 DEPR_{it} + \beta_5 EFFTAXRATE_{it} \\ &+ \beta_6 (INTEXP\ /\ EBIT)_{it} + \beta_7 EPS_{it} + \beta_8 FFLEX_{it} \end{aligned} \tag{7}$$

This model differs from the ones used in the prior capital-structure target adjustment literature as the target capital-structure measure (D/V^{*} adj_{it}) is determined by the capital-structure portfolio model. As this is directly observable and does not have to be determined by using a two-step regression procedure (Flannery and Rangan, 2006), it can directly be included in the regression model. In order to avoid a loss of data-points and statistical power and because a company's lagged dependent capital-structure variable (D/V adj_{it-1}) is not necessary for the interpretation of a company's capital-structure adjustment speed, this variable is not included in the regression model. As in the first regression model a company's EBIT is used as a proxy for its profitability. The dividend variable ("DIV") is included in the regression in order to test whether and to what extent agency costs influence corporate financing decisions (Myers, 2001). The company's depreciation expenses ("DEPR"), its effective tax-rate ("EFFTAXRATE") and its interest expenses to EBIT ratio ("INTEXP/EBIT"), the proxy for a company's so-called cost of financial distress, are also included in the regression, based on the findings in the prior capital-structure literature (Altman, 1984, Graham, 2000, Masulis, 1980). In addition, a variable for a company's earnings per share ("EPS") and its financial flexibility ("FFLEX") – defined as a company's short-term financial sources divided by its long-term financial sources – are included in the regression model since both variables have been found to be important in corporate financing decisions (Brounen et al., 2004, Graham and Harvey, 2001).

As discussed earlier, all variables in regression model 2 are scaled by a company's total assets, except the capital-structure ratio variable since it is already scaled by a company's total assets. Similarly, as only financial ratios are used in the regression model, the outcomes will not be influenced by the different currencies in the sample countries, which allows – from this perspective – to analyse the different sample countries together.

Table 2

Fixed effect panel data regression results for the market value regression

The table shows the regression estimators of the first regression by using fixed effect panel-data regressions. The F test and the Hausman test show that the fixed effect panel-data regression model is preferable over OLS and random-effect panel-data regression models. T-statistics are shown in parenthesis.

	All	Australia			Germany			Malaysia		
	1996-2005	1996-2005	1996-2000	2001-2005	1996-2005	1996-2000	2001-2005	1996-2005	1996-2000	2001-2005
Intercept	1.22***	2.59***	2.07***	3.20***	0.81***	0.66***	0.85***	0.98***	1.17***	0.99***
	(7.63)	(11.81)	(7.16)	(11.66)	(8.93)	(5.46)	(8.90)	(6.84)	(4.82)	(11.37)
INOUT/TA	2.62***	5.95***	6.39***	-1.25	0.12	-0.43	-0.61	26.77***	21.61**	38.03***
	(3.89)	(4.36)	(3.90)	(-0.29)	(0.24)	(-0.69)	(-0.74)	(5.67)	(2.05)	(9.79)
EBIT/TA	0.72***	0.51***	0.67**	-0.07	1.16***	1.58***	0.18	0.46***	0.46	0.21*
	(8.42)	(3.69)	(2.50)	(-0.41)	(8.78)	(7.71)	(1.17)	(2.62)	(1.35)	(1.80)
DIV/TA	1.11***	1.25***	1.55**	-0.53	0.79***	1.55***	0.43	1.10**	2.54*	0.62***
	(4.61)	(2.72)	(2.16)	(-0.89)	(3.16)	(3.84)	(1.61)	(2.54)	(1.88)	(2.78)
DEPR/TA	-0.03	-0.56	-2.80**	-0.95**	0.25	0.59	1.54**	3.99***	8.33***	-3.05***
	(-0.10)	(-1.37)	(-2.15)	(-2.02)	(0.69)	(0.93)	(2.21)	(3.39)	(3.21)	(-3.24)
EFFTAXRATE/TA	-2.53*	8.98	-19.46	83.64*	-0.58	-0.20	6.24	93.19***	222.60***	-16.36
	(-1.69)	(0.77)	(-1.35)	(1.92)	(-0.66)	(-0.22)	(1.61)	(4.92)	(6.26)	(-1.31)
(INTEXP/EBIT)/TA	0.04	0.26	0.60	-0.72	0.87	-0.95	0.69	0.02	-2.81**	-0.01
	(0.56)	(0.30)	(0.67)	(-0.21)	(1.18)	(-0.80)	(0.97)	(0.35)	(-1.98)	(-0.39)
R^2	0.60	0.55	0.62	0.70	0.75	0.82	0.87	0.71	0.73	0.89
F test for no fixed effects	10.60	7.96	4.39	8.09	19.56	14.13	21.30	14.20	6.32	21.28
Hausman m-value	82.97	13.24	14.08	16.45	19.30	4.64	66.14	102.60	47.24	33.40

Note: *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

5 Results

Table 2 shows that there is a statistically significant positive relationship between changes in the INOUT capital-structure variable and changes in the market values of the sample companies, except for the German sample companies, where the regression estimator is statistically insignificant[2]. Apart from Germany, these regression results indicate that the market values of the sample companies significantly increase when a company's capital-structure enters its optimal capital-structure range and significantly decrease when a company's capital-structure moves outside of its optimal capital-structure range.

The findings of the regression model provide an explanation of the observations of Leary and Roberts (2005) and Flannery and Rangan (2006) that highly levered companies tend to reduce their capital-structure ratios and that companies with low leverage ratios tend to increase their leverage ratios. That is, regression model 1 has identified that the market values of the sample companies significantly decrease when their capital-structures leave their optimal capital-structure range at the higher or lower end. Thus, it appears that financial managers are adjusting their company's capital-structure in order to stay within its optimal capital-structure range to avoid a drop in its market value.

Separate regressions for the years 1996-2000 and 2001-2005 in Table 2 show that the INOUT variable loses its statistical power completely for the Australian sample companies after the tax-rate reductions came into effect. However, the tax-rate changes do not appear to be the main driver for this outcome. As the regression for the years from 2001-2005 in Table 2 shows, the profitability and the dividend variable also completely lose their statistical significance. This change in the statistical significance of the INOUT, profitability and

[2] The results for the German sample companies are possibly influenced by the aforementioned stock market crisis and stock market boom periods.

dividend variable after 2000 indicates that the "fundamentals" of the Australian sample companies – their capital-structures, profits and dividends – are not able to explain changes in their market value anymore. The disentanglement of the Australian sample companies' market values and their fundamentals indicates some kind of speculative behaviour that influenced the market values of those companies over the years from 2001-2005.

Following from regression model 1 that describes the relationship between a sample company's market value and its optimal capital-structure range, the absolute size of the movement of a company's capital-structure either in or out of the optimal capital-structure range relative to a company's market value has also been examined. To identify the absolute size of a company's capital-structure movement on its market value, the regression estimators of the INOUT-variable were divided by the mean and median market values of the sample companies in each country as detailed in Table 3.

Table 3

Size of the capital-structure INOUT movement effect relative to a company's market value

The implied market value change is calculated by dividing the INOUT regression estimators from regression 1 by the mean and median market value of the sample companies in each country.

	Australia	Germany	Malaysia
Capital-structure movement ("INOUT") regression estimator	5.95	0.12	26.77
Mean (median) market value in million local currency units	3569 (759)	4395 (504)	2109 (570)
Percentage change in implied market value in response to capital-structure movement in or out of the optimal capital-structure range	0.17-0.78 %	0.00-0.02%	1.27-4.70%

Table 3 shows that the size of the change in a company's market value in response to a movement in its capital-structure either in or out of its optimal capital-structure range accounts on average just for slightly more than one percent of a company's total market value change. Thus, despite the fact that a move of a company's capital-structure from the inside to the outside of its optimal capital-structure range is statistically significantly related to the company's market value in all (except the German) sample countries, the absolute effect of this change on the company's market value appears to be relatively small.

In summary, the results from regression model 1 indicate that capital-structure decisions do affect corporate market values, which contradicts the Modigliani and Miller (1958) capital-structure irrelevancy propositions. However, the small size of the implied market value change indicates that capital-structure changes only account for a small percentage of a company's market value change.

The regression estimators of the other independent variables included in regression model 1 mainly show the expected, while predictable outcomes. In all sample countries, a company's profitability and its dividend payments are statistically significant positive related to the market values of the sample companies. However, as mentioned above, for the 2001-2005 period, during which Australia's stock market boomed[3], the profitability proxy variable and the dividend variable lose their statistical significance. Table 2 shows further that both variables – the EBIT and dividend variable – also lose their explanatory power for the German sample companies after 2000. This result appears to be caused by the bust of the German stock market bubble in March 2000 (Nowak, 2001). In the aftermath of that stock market crash, during which the German benchmark index "CDAX" lost more than 70 % of its

[3] From December 2001 until December 2005, the Australian "ASX All Ordinaries" share price index increased by almost 40%.

pre-crisis value[4], other factors, such as "speculative behaviour", "anxiety" or "herd behaviour" possibly became relatively more important for the market values of the German sample companies than changes in their fundamentals. A similar result can be identified for the Malaysian sample companies during the years from 1996 to 2000, when these companies had to deal with the effects of the Asian financial crisis. As the regression results in Table 2 show, the size and statistical significance of the profitability and dividend variable during the 1996-2000 period, is considerably smaller than during the other years. To sum up, the regression results in Table 2 indicate that during crisis and boom periods, the sample companies' profits and their dividend payments lose some or all of their explanatory power and are not able to explain changes in corporate market values anymore.

The pooled and country-based regressions in Table 2 produced mixed results for the relationship between changes in the sample companies' market values and changes in their depreciation expenses. Table 2 shows that the depreciation-expense regression estimators are statistically significant positive related to the market values of the German and Malaysian sample companies in the regressions that include the crisis periods in both countries (2001-2005 for the German sample companies; 1996-2000 for the Malaysian sample companies). This statistically significant positive result indicates that companies, which increase their investments during "difficult" times signal optimism, i.e. better future prospects, to the financial markets, which induces financial investors to purchase the shares of those companies. Table 2 shows further that the regression estimator for the Malaysian sample companies becomes statistically significant negative for the years after 2000, which appears to be caused by the aftermath of the Asian crisis, when the Malaysian sample companies increased their corporate investments again but their market values continued to

[4] From March 2000 until March 2003.

fall. For the Australian sample companies, the regression estimator always shows a negative sign indicating a negative valuation effect of corporate investments respectively non-debt-tax shields. Yet, the industrial structure of the Australian sample companies[5] and the cyclical nature of their investments appear to cause this outcome.

As mentioned above, until 2001 all sample countries employed a dividend imputation system before Germany abandoned this system and introduced its half-income taxation system. Thus, until 2000, corporate tax payments should not have had a statistically significant influence on the market values of the sample companies. Thereafter, i.e. during the years 2001-2005, corporate taxes should not have had an influence on the market values of the Australian and Malaysian sample companies only. However, the regression results in Table 2 show a different outcome. For the Australian sample companies, the effective tax-rate variable ("EFFTAXRATE") becomes statistically significant positive related to changes in the market values of those companies in the regression for the years 2001-2005, which appears to be caused by the aforementioned tax-rate changes in Australia. Everything else equal, those tax-rate changes reduced the tax payments of all Australian companies and only those companies, which increased their profits considerably, had to pay higher taxes than before the tax-rate reductions. Thus, since only highly profitable companies paid higher taxes after the tax-rate reductions came into effect, financial investors could separate "good" from "bad" companies simply by comparing changes in the tax payments of companies, which indicates that higher corporate tax payments proxied for higher corporate profits during the years from 2001-2005. This effect appears to cause the statistically significant positive relationship between the effective corporate tax-rate and the market values of the Australian sample companies during the years 2001-2005.

[5] 26% of the Australian sample companies are from the mining industry.

The tax-rate reductions in Germany should cause a similar outcome as the one, which was identified for the Australian sample companies, i.e. a statistically significant positive relationship between the effective tax-rate variable and the market values of the German sample companies after 2000. However, despite the fact that the regression estimator for the tax variable is considerably larger and positive during the years 2001-2005, it is not statistically significant positive. This outcome is possibly caused by the concurrent tax-system change in Germany, which ceased the distribution of tax credits to shareholders and thereby left the majority of the German resident shareholders worse off.

Table 2 shows further that changes in the effective tax-rates of the Malaysian sample companies are statistically significant positive related to changes in their market values over the whole sample period 1996-2005. This statistically significant positive relationship appears to be caused by the Asian financial crisis, during which the Malaysian sample companies paid considerably lower taxes. As the Malaysian sample companies overcame the effects of the Asian crisis, their market values and their tax payments started to increase again, which caused the statistically significant positive regression result.

In summary, the regression results indicate that even in countries that employ a corporate-finance neutral dividend imputation system, corporate tax payments might influence the market values of companies due to signalling effects caused by tax-rate reductions and tax-system changes, due to crisis period induced tax changes and/or due to an incomplete integration of the imputation system.

Changes in the financial risk variable (“INTEXP/EBIT”) and changes in corporate market values are generally not statistically significant related except for the Malaysian sample companies in the regression for the years 1996-2000. Yet, this result appears to be influenced by the Asian crisis in 1997-1998 and its aftermath. The negative regression estimator during this period indicates that companies, which had insufficient internal funds and required additional external interest-bearing financial means and/or companies, which faced considerable reductions in their profits were severely punished by financial investors in Malaysia. However, the mainly statistically insignificant outcome for the financing risk variable in all other regressions indicates that the absolute size and the influence of the sample companies' "costs of financial distress" on their market values is at best small (Warner, 1977).

Table 4

Capital-structure target adjustment regression results

The table shows the regression estimators of the second regression by using fixed effect panel-data regressions. The F test and the Hausman test show that the fixed effect panel-data regression model is mainly preferable over OLS and random-effect panel-data regression models except for the German sample companies for the years 1996-2005. However, since both regression results do not significantly differ, the fixed-effect panel data regression results are reported. T-statistics are shown in parenthesis.

	All	Australia			Germany			Malaysia		
	1996-2005	1996-2005	1996-2000	2001-2005	1996-2005	1996-2000	2001-2005	1996-2005	1996-2000	2001-2005
Intercept	0.41***	0.35***	0.21***	0.54***	0.30***	0.28***	0.32***	0.42***	0.35***	0.51***
	(13.36)	(8.83)	(3.89)	(11.89)	(11.68)	(8.68)	(11.31)	(10.63)	(8.36)	(10.46)
D/V* (TARGET)	0.23***	0.55***	0.76***	0.30***	0.15***	0.20***	0.08***	0.23***	0.16***	0.25***
	(13.46)	(12.87)	(12.39)	(5.80)	(6.86)	(6.45)	(3.33)	(6.13)	(3.78)	(4.73)
EBIT/TA	0.08***	0.15***	0.17***	0.10***	0.05	-0.02	0.21***	0.10*	0.07	0.18***
	(5.02)	(6.60)	(4.40)	(3.86)	(1.40)	(-0.47)	(4.72)	(1.79)	(1.06)	(2.62)
DIV/TA	-0.46***	-0.25***	-0.22**	-0.09	-0.64***	-0.43***	-0.40***	-0.55***	-0.94***	-0.21**
	(-10.47)	(-3.85)	(-2.48)	(-1.33)	(-9.94)	(-5.09)	(-5.75)	(-5.58)	(-4.84)	(-2.24)
DEPR/TA	0.10**	0.13**	0.12	0.09*	0.15	0.11	0.62***	-0.08	0.41	-0.37
	(2.11)	(2.33)	(0.75)	(1.71)	(1.59)	(0.81)	(3.37)	(-0.29)	(1.09)	(-0.93)
EFFTAXRATE/TA	-0.91***	-9.68***	-7.88***	-3.63	-0.64***	-0.29	-4.43***	-16.76***	-8.57	-3.22
	(-3.35)	(-5.85)	(-4.40)	(-0.69)	(-2.97)	(-1.57)	(-2.85)	(-3.75)	(-1.61)	(-0.63)
(INTEXP/EBIT)/TA	0.00	0.10	0.04	0.60	-0.11	-0.17	0.32*	0.00	0.20	-0.01
	(0.03)	(0.85)	(0.33)	(1.43)	(-0.59)	(-0.69)	(1.69)	(-0.08)	(1.01)	(-0.95)
EPS/TA	0.00	-1.05	-2.85**	1.33	0.01	0.02	0.01	-7.98*	-5.85	-3.58
	(-0.17)	(-1.12)	(-2.23)	(0.90)	(0.61)	(1.15)	(0.59)	(-1.65)	(-1.18)	(-0.54)

Table 4 continued

Capital-structure target adjustment regression results

	All	Australia			Germany			Malaysia		
	1996-2005	1996-2005	1996-2000	2001-2005	1996-2005	1996-2000	2001-2005	1996-2005	1996-2000	2001-2005
FFLEX/TA	2.64***	4.64***	5.78***	4.04***	0.30	1.57**	1.05*	13.67***	15.75***	16.52***
	(7.74)	(8.52)	(6.08)	(7.18)	(0.82)	(2.52)	(1.95)	(9.00)	(6.02)	(6.54)
R^2	0.83	0.77	0.87	0.87	0.80	0.91	0.89	0.79	0.89	0.89
F test for no fixed effects	35.76	20.61	17.32	20.88	23.99	24.55	26.15	24.35	23.46	25.54
Hausman m-value	50.07	25.77	28.82	13.62	0.00	23.38	25.01	20.02	29.01	83.21

Note: *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

The statistically significant positive regression estimators for the capital-structure target variables in Table 4 indicate that all sample companies adjust their capital-structures towards a capital-structure target ratio. The following table compares the so-called implied capital-structure adjustment speeds in the different sample countries and periods.

Table 5

Implied capital-structure target adjustment speed in years

This table shows how many years different groups of sample companies need until they adjust their capital-structures towards their capital-structure target ratios. The implied adjustment speed figures are determined by the reciprocal of the capital-structure target regression estimators in Table 4.

Country/Group	Period	Implied capital-structure target adjustment speed in years
All	1996-2005	4.28
Australia	1996-2005	1.83
	1996-2000	1.32
	2001-2005	3.36
Germany	1996-2005	6.50
	1996-2000	5.11
	2001-2005	12.13
Malaysia	1996-2005	4.30
	1996-2000	6.39
	2001-2005	3.97

Table 5 shows that the Australian sample companies adjust their capital-structures faster towards their capital-structure target ratios then the sample companies in the other countries. Further, Table 5 above indicates that the speed at which companies adjust their capital-structures changes over time. During crisis-periods, companies appear to adjust their capital-structures slower than during non-crisis periods, as the implied adjustment speed figures for the German and Malaysian sample companies during the periods 2001-2005 (Germany) and 1996-2000 (Malaysia) show. In addition, also during boom periods, companies appear to adjust their capital-structures faster towards their capital-structure target ratios, as the result for the German sample companies for the 1996-2000 sample period shows. Overall, the results for the capital-structure target adjustment are in line with the findings of Drobetz and Wanzenried (2006) who found that the capital-structure adjustment speeds of their Swiss sample companies vary with the economic cycle of Switzerland.

Different from the prior cross-country capital-structure literature (Allayannis et al., 2003, Deesomsak et al., 2004, Fan et al., 2003), the profitability proxy variable (EBIT/TA) mainly shows a statistically significant positive regression result indicating that companies with high and/or increasing profits increase their capital-structure ratios in order to shield their profits from taxation. Stated differently, the sample companies appear to align their capital-structure decisions according to the trade-off theory. However, not tabulated regressions show that if the regression is run with a company's unadjusted capital-structure ratio, i.e. no adjustments are made to control for automatic capital-structure changes caused by a company's current profit and its current dividend payments, then the profitability variable shows the often identified negative outcome. This negative relationship is frequently used as a finding that supports the pecking order theory of Myers and Majluf (1984). As a result, whether and to what extent the sample companies follow the implications of the pecking order theory or the trade-off theory in their financing decisions cannot fully be answered by referring the regression results of the EBIT variable alone.

In all regressions, which are illustrated in Table 4, the regression estimators for the dividend variable shows a negative sign, which indicates that the sample companies did in general not use new external borrowings to pay higher dividends to their shareholders. In other words, no opportunistic transfer of wealth between the different financing parties – debt holder and equity holder – took place.

The regression estimators for the depreciation variable do not considerably change over time in the different sample countries. However, in the regression for the German sample companies during the years 2001-2005 the depreciation variable becomes statistically significant positive. This statistically significant positive outcome indicates that the German sample companies had to rely relatively more on external debt finance during those years to finance their long-term investments since the German stock markets were *de facto* inaccessible due to the bust of the stock market bubble. A similar, but statistically not significant change can be identified for the Malaysian sample companies in the regression for the years 1996-2000, where the regression estimator for the depreciation variable becomes positive.

Different from the depreciation variable, the regression estimators for the effective tax-rate variable change considerably over time as Table 4 shows. For the Australian sample companies, the tax-rate regression estimator becomes smaller and statistically insignificant negative during the years from 2001 to 2005. This outcome is in line with the aforementioned tax-rate reductions and shows that the Australian sample companies needed relatively more debt to shield the same amount of profits from taxation than before the tax-rate reductions. In other words, corporate debt-tax shields became less valuable for the Australian sample companies after the tax-rate reductions came into effect.

For the Malaysian sample companies, the relationship between the tax-rate variable and the capital-structure ratio remains statistically insignificant during the years from 2001-2005. However, the absolute size of the regression estimator considerably decreases, which indicates a lower value of corporate debt-tax shields during this period. This outcome is possibly caused by the fact that the Malaysian sample companies had sufficient other non-debt-tax shields, such as tax loss carry-forwards, which originated from the Asian crisis period.

The aforementioned change from the dividend imputation system to the half-income taxation system in Germany implies that companies retained more profits and distributed relatively more funds to their shareholders in other ways than via dividend payments since the after-tax returns of their shareholders decreased after those changes came into effect. The tax-rate reduction implies further that corporate debt-tax shields became less valuable because the German sample companies needed considerably more debt to shield the same amount of profits from taxation than before. Not reported t-tests for the German sample companies' capital-structure ratios confirm the first implication and show that the capital-structure ratios of the German sample companies significantly decreased in the second-half of the investigation period (2001-2005). Since not data about stock repurchases of the German sample companies are available, the second implication cannot be tested but the regression results in Table 4 allow assessing whether the importance of corporate debt-tax shields for the German sample companies changed after the tax-rate reductions and the tax-system change came into effect. From Table 4 it can be seen that the regression estimator for the effective tax-rate variable of the German sample companies becomes smaller and statistically significant negative during the years 2001-2005. This smaller and statistically significant negative regression estimator indicates that debt tax shields did not become less valuable for the German sample companies during the years from 2001 to 2005. On the contrary, the regression results indicate that debt-tax shields became more valuable for the German sample companies over the period from 2001-2005 than during the years 1996-2000 since they needed less debt to shield the same amount of profits from taxation. Not reported t-tests show that the probable reason that causes this outcome, is that the non-debt-tax shields of the

German sample companies – as proxied by the DEPR/TA-variable – statistically significantly decreased. In other words, the German sample companies significantly reduced their investments in long-term depreciable assets during the years 2001-2005, possibly due to the unfavourable economic circumstances after the stock market slump. Due to this reduction in corporate non-debt-tax shields, debt finance induced debt-tax shields became more important for the German sample companies, which caused the statistically significant negative regression result.

In summary, the regression results for the tax-rate variable indicate that tax-rate and tax-system changes have a significant influence on the financing decisions and on the market values[6] of the sample companies in the different countries, which is in line with the findings in the prior capital-structure literature (Graham, 2000, Kemsley and Nissim, 2002).

As in regression 1, the proxy for a company's cost of financial distress (INTEXP/EBIT), mainly shows a statistically insignificant regression outcome, which indicates that financial distress costs do not considerably influence the financing decisions and market values of the sample companies. Similarly, the finding that a company's earnings per share significantly influence a company's financing decisions (Brounen et al., 2004, Graham and Harvey, 2001) are not confirmed by the regression results in Table 4. Only for the Australian sample companies during the years 1996-2000 and for the Malaysian sample companies in the regression for the years 1996-2005, the earnings per share variable shows a statistically significantly negative outcome. Both results are however driven by the high correlation with the EBIT-variable and disappear if the regressions are run without this highly correlated variable. The last independent variable, a company's financial flexibility, is statistically

[6] See the results of regression 1.

significant in almost all regressions for the different sample countries and periods confirming the finding that financial flexibility is an important determinant in corporate financing decisions (Bancel and Mittoo, 2004, Brounen et al., 2004, Graham and Harvey, 2001, Pinegar and Wilbricht, 1989). The fact that the statistical significance and size of this regression estimator does not considerably change over the different periods indicates further that this variable is in general an important factor in corporate financing decisions – not only during times of crises.

6 Conclusions

This study investigates in the relationship between a company's optimal capital-structure range and its market value. The regression results show that a company's market value significantly increases (decreases) when its capital-structure enters (leaves) its optimal capital-structure range. Despite this statistically significant positive relationship, the impact on a company's market value that results from those capital-structure changes is relatively small. The study also shows that the speed at which companies adjust their capital-structures towards their target capital-structure ratios differs between the different sample countries and over time. Finally, the study shows that tax-system and tax-rate changes have a significant influence on corporate financing decisions and the market values of companies.

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