CAPITAL STRUCTURE TIMING IN MARKETS WITH DIFFERENT CHARACTERISTICS

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ABSTRACT

Considerable empirical evidence suggests that firm's time equity issues to market movements and that this behavior impacts capital structures. Based on a survey of investigations of this phenomenon, this study observes capital structures in different financial markets and identifies different situations related to the effect of timing on leverage. This study also explains optimal leverage with a simplified dynamic adjusted model. Firms facing financial constraints in debt financing may increase equity issues resulting in considerable leverage variance. On the other hand, firms with fewer financial constraints can time the market when issuing equity. This study takes regional samples from the United Kingdom and Japan, to summarize circumstances involving partial financial constraints and no financial constraints. The market timing effects tests in the United Kingdom are insignificant but the results for Japan are significant. This phenomenon improves understanding of the market timing model under different circumstances.

JEL: G30; G31

KEYWORDS: Market Timing, Capital Structure.

INTRODUCTION

International capital structure is seldom examined, perhaps because of data limitations and insufficient methods for comparing different markets. This study investigates differences in financial market leverage and the impact of market timing on capital structure in markets with different characteristics. Pecking order and tradeoff theories are applied at static points and may lead to misleading leverage information. Consequently, some studies investigate capital structure also across different time periods. Opler and Titman (2001) stated that financial decisions include an optimal target debt ratio. Hovakimian and Titman (2001) used two stage regressions to conclude that firms adjust to an optimal target debt ratio that may change over time and be related to profitability and stock price. Baker and Wurgler (2002) used weighted market-to-book ratios as a proxy for the past impact of equity issuance on capital structure and declared that the market-to-book effect exerts a persistent and long lasting influence on capital structure.

The market timing effect on capital structures under different market characteristics reveals countries with similar characteristics but different financing patterns. This phenomenon can supply data for investigating whether weighted market-to-book ratios represent a good proxy for deviation between current and target debt ratios (Baker and Wurgler, 2002). The United Kingdon (UK) and Japan are chosen for examination in this study. Both countries belong to the G-7 and have similar market capitalization percentages, at around 80% (Rajan and Zingales, 1995). Firms from these countries have more financing via banks, meaning external financing is not fully reflected in their capital structure, or perhaps leverage can be adjusted to reach the target. This study proposes a simplified dynamic adjustment model, similar to that of Banrjee et al. (2000) to explain how leverage effects vary among markets.

The remainder of this paper is organizes as follows. The following section reviews the relevant literature. Next, the theory is presented. A discussion of the data and methodology and presentation of test results follows. The paper closes with some concluding comments.

LITERATURE REVIEW AND BACKGROUND

Modigliani and Miller (1958) showed that in an idealized world without taxes, firm value is independent of the debt-equity mix. In short capital structure is irrelevant to firm value. Other researchers, such as Hamada (1969) and Stiglitz (1974), support the perspective of Modigliani and Miller. However, these conclusions do not match observations of the real world, in which capital structure matters and banks are extremely unwilling to finance projects entirely using debt capital. The main theories explaining capital structure are the pecking order and tradeoff theories. Extensive empirical tests have been completed in relation to these theories, but their robustness and the situations in which they can be applied remain unclear. Smith and Watts (1992) obtained contradictory evidence from testing implication of the pecking order theory, finding that high-growth firms with high financial needs also have high debt ratio.

The most widespread theories explaining capital structure are pecking order theory and tradeoff theory. According to pecking order theory, information asymmetry makes equity financing more expensive than debt financing (Myers and Majluf, 1958).Opler and Titman (2001) identified optimal target debt ratios in market timing. Hovakimian and Titman (2001) used two stage regressions to conclude that firms adjust to an optimal target debt ratio that changes over time and is related to profitability and stock price. Korajczyk and Levy (2002) examined the effect of macroeconomic conditions on debt or equity choice. Furthermore, Baker and Wurgler (2002) used weighted market-to-book ratios as a proxy for the past impact of equity issuance on capital structure and identified the effect of market-to-book on capital structure as persistent and long-lasting. Frank and Goyal (2003) tested the pecking order theory for different firm size. The pecking order and tradeoff theories are only applied at static points and may result in misleading leverage information. Consequently, some recent studies investigate capital structure not only for certain static points, but also across different periods using panel data.

Urbonavičius *et al.* (2006) concentrated on measuring of company's marketing orientation and its relationship with manager-related factors. Specifically, Urbonavičius *et al.* analyzed such factors as personality traits; manager work needs motivation, leadership style, conflict-solving style and source of power. Analysis is performed using interdisciplinary methodology that permits broad discussion of firm market orientation and factors that influence it. The findings suggest that companies with similarly high market orientation are also similar in management-related factors, namely these factors exist in a favorable combination that closely matches high market orientation. Empirical data is obtained by surveying the management of Lithuanian furniture companies, and reflects the specific circumstances of transitional economies.

Henderson *et al.* (2006) presented a sample of firms raising approximately $25.3 trillion of new capital, including $4.9 trillion from overseas during 1990-2001. International debt issuances are more common than equity issuances, accounting for 87% of all securities issued internationally, and approximately 20% of all public debt issuances. In contrast, international equity issues account for approximately 9% of all international security issues, and 12% of all equity issues during the sample period. Market timing considerations appear very important in security issuance decisions. International firms are more likely to issue equity before periods of low market returns. Most cross-border equity is issued in the U.S. and the U.K., and these issues tend to occur in 'hot' markets and before several periods of relatively low market returns. Finally, firms issue more debt when interest rates are lower, and before they increase.

Firms may borrow money or issue equity to raise funds. Debt and equity are the two key items of external financing in the capital structure. In an extreme example, if a firm faces large financial constraints restricting its ability to borrow, that firm may issue as much equity as it can, even to the point of exceeding its immediate future needs. External financing is consistent with tradeoff theory, but not with pecking order theory that debt is always preferred to equity. Conversely, a firm facing no financial constraints can optimize its capital structure. A firm may issue equity only when the market timing is

favorable. That is, firms raise capital through markets depending on the relative cost of debt and equity, consistent with the tradeoff theory. Debt is much more expensive than equity for firms with constrained access to debt financing. These firms issue equity more frequently, potentially causing larger variance of leverage ratio. Firms with fewer financial constraints can obtain debt financing more easily, and may have higher debt ratio and can time the market (until the costs of issuing equity become advantageous to raise equity on the most advantageous terms). Therefore, capital markets strongly affect capital structure.

According to the tradeoff theory, the cost of debt financing versus equity financing is the most important determinant of capital structure. This study examines the financial constraints that can influence the costs of equity and debt. This study defines a firm as facing financial constraints when the sum of the market value of equity and the book value of debt, divided by total assets, exceeds one. A ratio exceeding one means the firm depends heavily on financial markets, and raises as much finance as possible. Two main sources determine the ratio, equity and debt. Firms facing large constraints in financial markets face higher borrowing costs regardless of their internal financial condition, and may issue as much equity as they can, even exceeding their likely near future needs. However, while such firms are heavily dependent on financial markets, they do not necessary have high leverage ratio. Consider the following example: a newly established enterprise may find itself unable to borrow sufficiently to meet its needs, and thus may issue equity. For such growth firms, equity represents an important means of financing. On the other hand, firms facing fewer conflicts in financial markets can time the market in issuing equity. Such firms may extensively use debt leverage, because of their ability to acquire funds on financial markets.

THEORY

Before testing the experimental model of market timing, we discuss the theory. Baker and Wurgler (2002) declared that firms issue equity in a way that times the market. Firm leverage ratio thus does not fully reflect the ideal debt ratio. Firms can gradually optimize their leverage. Although the model does not assume optimal leverage, it declares that the gap between real and target debt ratios is largely explainable by the weighted market-to-book, *wmb,* ratio. The model provides extensive empirical testing and comparison of the coefficients of the following three equations. The model is as follows:

$$\left(\frac{D}{A}\right)_{t+1} = a_1 + b_1\left(\frac{M}{B}\right)_{efwa,t} + c_1\left(\frac{M}{B}\right)_t + d_1\left(\frac{PPE}{A}\right)_t + e_1\left(\frac{EBITDA}{A}\right)_t + f_1 \log(S)_t + u_{1,t+1} \quad (1)$$

$$\left(\frac{D}{A}\right)_{t+\tau} = a_2 + b_2\left(\frac{M}{B}\right)_{efwa,t} + c_2\left(\frac{M}{B}\right)_t + d_2\left(\frac{PPE}{A}\right)_t + e_2\left(\frac{EBITDA}{A}\right)_t + f_2 \log(S)_t + u_{2,t+1} \quad (2)$$

$$\left(\frac{D}{A}\right)_{t+\tau} = a_3 + b_3\left(\frac{M}{B}\right)_{efwa,t} + c_3\left(\frac{M}{B}\right)_{t+\tau-1} + d_3\left(\frac{PPE}{A}\right)_{t+\tau-1} + e_3\left(\frac{EBITDA}{A}\right)_{t+\tau-1} + f_3 \log(S)_{t+\tau-1} + u_{3,t+\tau} \quad (3)$$

The first equation investigates the *wmb* effect for the current state. We let *wmb*substitute for $\left(\frac{M}{B}\right)_{efwa,t}$.

$\left(\frac{M}{B}\right)_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} e_r + d_r} \bullet \left(\frac{M}{B}\right)_s$). Weighted market-to-book helps explain the unrebalanced target debt ratio. The second equation replaces leverage at time t with (t+τ) leverage. The third equation uses (t+τ -1) as an explaining variable to control the future condition. If leverage is adjusted to the target level, past *wmb* no longer impacts leverage, and thus the b2 and b3 coefficients should be close to zero. If this is not the case, *wmb* still has power to explain future leverage, and the b2 and b3 reflect the influence strength.
Capital structure theory comprises two main strands, based on static and dynamic models. In static

models, the pecking order and tradeoff theory are well known. Empirical models also exist for identifying the determinants of an optimal debt ratio. The dynamic models assume an optimal debt ratio (Fischer, Heinkel, and Zechner, 1989), but this may be achieved within j periods. (Hovakimian, Opler, Titman, 2001 and Banrjee *et el.*, 2000). This study discusses the market timing model of Baker and Wurgler (2002) from the perspective of dynamic optimal capital structure.

This study uses the following algorithm. Similar to the dynamic adjustment model, the debt ratio can be optimized over j periods. Market-to-book ratios can largely explain the difference between optimal and true value (Baker and Wurgler, 2002). Hence, this study obtains the optimal debt leverage at time t.

$$\left(\frac{D}{A}\right)_{t+1} - \left(\frac{D}{A}\right)_{t} = d_{t+1} - d_t + v_{t+1} = c_t \times (M/B)_t + v_{t+1}, \qquad d_t = \left(\frac{D}{A}\right)_t, \quad v_t \sim IID\ (0, \sigma_v^2)$$

$$\left(\frac{\hat{D}}{A}\right)_{t+1} = X_t\beta + \sum_{n=0}^{j-1}(d_{t+1-n} - d_{t-n}) + u_{t+1} = X_t\beta + p_1 \sum_{n=0}^{j-1} W_{t-n} \times (M/B)_{t-n} + u_{t+1} = p_1\ wmb_t + X_t\beta + u_{t+1} \tag{4}$$

Equation (4) resembles Eqn. (1) of Baker and Wurgler (2002), but differs in that the model emphasizes that the *wmb* effect decreases over time without the assumption of optimal leverage. If the optimal leverage is achieved at time t, and can be estimated using factors X_{t-1}. Optimal leverage estimation is reduced to Eq. (5). This equation closely resembles Eq. 3.

$$\left(\frac{\hat{D}}{A}\right)_{t+\tau+1} = X_{t+\tau}\beta + \sum_{n=0}^{j-1}(d_{t+1-n} - d_{t-n}) + u_{t+\tau+1} = X_{t+\tau}\beta + p_3 \sum_{n=0}^{j-1} W_{t-n} \times (M/B)_{t-n} + u_{t+\tau+1} = p_3\ wmb_t + X_{t+\tau}\beta + u_{t+\tau+1} \tag{5}$$

If leverage is optimized at time t, and leverage holds at the steady state, then Eq. 6 is obtained, which resembles Eq. (2).

$$\left(\frac{\hat{D}}{A}\right)_{t+\tau+1} = \left(\frac{\hat{D}}{A}\right)_{t+1} = X_t\beta + \sum_{n=0}^{j-1}(d_{t+1-n} - d_{t-n}) + u_{t+1} = X_t\beta + p_2 \sum_{n=0}^{j-1} W_{t-n} \times (M/B)_{t-n} + u_{t+1} = p_2\ wmb_t + X_t\beta + u_{t+1} \tag{6}$$

Based on the dynamic adjustment model and empirical evidence of Baker *et al.* (2002), this study obtains Eq. (4) (6) (5), which resemble Eqs. (1) (2) (3). However, the two equation sets have different basic assumptions and testing purposes. The *wmb* coefficient ratios of (6) to (4), p2/p1, and (5) to (4), p3/p1 resemble the implication of *b2/b1*, *b3/b1*. Given an optimal capital structure, the coefficient of *wmb* indicates the leverage adjustment. The influence of *wmb* decreases over time, as do p2/p1 and p3/p1. The change in the ratio reveals whether *wmb* exerts a persisting effect.

This study compares the adjustments for j periods to weighted time periods. In Baker (2002), periods start from either the start of the data or the IPO time, meaning j starts somewhere between time 0 and t. For financially unconstrained firms, *wmb,* is an important factor in adjusting debt ratio. If firms rapidly adjust their debt ratio, leverage is optimized within i periods; i < j, and *wmb* number reveals (j-i) surplus weighted market-to-book ratios. Coefficients of *wmb* are smaller than the values at optimal adjustment. The *wmb* variable disturbs the debt leverage explanation because of excessive numbers of explanatory variables. In this condition where leverage is assumed to be optimized, p2/p1 and p3/p1 are ambiguous.

If the adjustment is still ongoing, leverage remains sub-optimal at time t. That is, the firm takes a long time to optimize leverage; i periods, i > j, and the optimal leverage requires future explainatory variables. There are (i-j) weighted market-to-book ratios not in the *wmb* number. However, further explanation is

required for the optimal leverage at time t in Eq. (4). Equation (6) uses the same explanatory variables as Eq. (4), but explains leverage at time $t + \tau$. Coefficients are insignificant in *wmb* because of insufficient explanatory variables. Comparisons of the *wmb* effect between Eq. (4) to (6) are dubious owing to the assumption of optimal leverage and a long adjustment period.

If τ > (i-j), the leverage is optimized, although *wmb* lacks an adequate adjustment period, improving the explanatory power in Eqn. (5) over time. The same phenomenon may also explain why the *wmb* factor increases over time in Eq. (3) of Baker *et al.* (2002). This phenomenon also re-emphasizes the importance of the market timing test proposed by Baker *et al.* (2002). The test is dynamic, and leverage is not optimized as expressed in the assumption of this study, given optimal leverage and an adjustment time of j, the *wmb* coefficient is meaningful and the comparison of , p2/p1 and p3/p1 is identical to the market timing model of Baker and Wurgler (2002). This study thus proposes that the dynamic adjustment assumption model is simply a special case of the general market timing model (Baker and Wurgler, 2002).

DATA AND METHODOLOGY

Firm behavior varies by market. This study focuses on financial market characteristics that impact capital structure. To facilitate comparison, this study provides an averaged aggregate firm sample representing the overall market. Concentrating on financial constraints, this study roughly divides firms into financially constrained and unconstrained categories using aggregate financial market data. Financially constrained firms are defined as those with a ratio of aggregate market value of equity plus book value of debt, divided by total assets, exceeding one, similar to Tobin's Q.

The evidence suggests that capital structure is affected by different firm characteristics, methods of external financing and different time periods. This study investigates leverage in different types of financial markets using aggregate data. To compare capital structure among different markets, this study collects data from a worldwide database, DataStream. National data for the UK and Japan are collected to provide a sample from outside the US. This study collects data for all firms listed on DataStream from 1985 to 2001. It investigates firm leverage and tests the effect of market timing on capital structure for markets with different characteristics. Similar to Rajan and Zingales (1995), this study begins from a partial balance sheet of averaged annual firm data. Following the approach of Baker and Wurgler (2002), which used U.S. COMPUSTAT data, this study uses DataStream data which closely approximates COMPUSTAT's accounting definitions, thereby allowing a meaningful comparison.

Book equity, *BE,* is measured as Total Asset - Total Liabilities - Preference capital + Total Deferred Taxes + Convertible debt. Book Leverage is the percentage of Book Debt to Total Asset. We drop firms with Book Leverage above one from the sample because of the extreme value. Market Leverage, is the percentage of Book Debt. In Table 1, Japan's Book Leverage% is higher than that of UK, which is consistent with the G7 Balance Sheets result (Rajan and Zingales, 1995). The Market to Book ratio, *MB*, is defined as Total Assets minus Book Equity plus Market equity all divided by Total Assets. A higher MB ratio represents a higher growth firm.

Table 1 lists averaged balance sheet items for UK firms from 1985 to 2001. The table averages firms meeting certain requirements involving fixed assets (DataStream Item 339), total assets (Item 392), total capital employed (Item 322),total current liabilities (Item 389), convertible loans (Item 320), total deferred taxes (Item 312), preferred stock (Item 306), common equity (Item 305), total stockholder equity (Item 307), and ordinary dividend-net (Item 187). Item 628 is substituted for item 187 when the latter is unavailable. The table reports balance sheet data for UK firms from 1985 to 2001. The figure in each cell is the individual item divided by total assets and averaged across firms reported on DataStream during the year. The table lists data for odd numbered years to reveal trends.

Table 1: Balance Sheet Format Report for Kingdom Firms

Year	1985	1987	1989	1991	1993	1995	1997	1999	2001
Number of Observations	263	369	282	364	608	718	915	1,057	1,303
Assets									
current assets									
+Fixed assets(#339)	0.4567	0.4489	0.4738	0.4125	0.4617	0.4593	0.4599	0.4818	0.3729
Total assets(#392)	1	1	1	1	1	1	1	1	1
Liabilities:									
+Total capital employed(#322)	0.4759	0.4529	0.4691	0.5011	0.5030	0.4949	0.4871	0.4770	0.4907
+Total current liabilities(#389)	0.2468	0.2395	0.2264	0.2175	0.2057	0.2167	0.2253	0.2367	0.1924
=liabilities-total	0.7228	0.6924	0.6995	0.7186	0.7088	0.7117	0.7124	0.7137	0.6831
*convertible debt, convertible loans(#320)	0.0036	0.0045	0.0029	0.0028	0.0037	0.0041	0.0027	0.0039	0.0031
*Total Deferred Taxes(#312)	0.0117	0.0076	0.0077	0.0109	0.0067	0.0056	0.0050	0.0079	0.0065
+Preferred stock(#306)	0.0028	0.0047	0.0084	0.0076	0.0057	0.0051	0.0058	0.0063	0.0030
+Common equity(#305)	0.2743	0.3027	0.2959	0.2736	0.2853	0.2830	0.2817	0.2798	0.3137
=Total Stockholders' equity(#307=#305+#30x)	0.2771	0.3075	0.3044	0.2813	0.2911	0.2882	0.2875	0.2862	0.3168
=Total liabilities& Stockholders' equity	40,829	418,816	525,890	968,576	1,064,347	1,076,081	955,145	950,015	1,285,411
Ordinary dividend-net(#187, or #628)	0.0141	0.0178	0.0186	0.0191	0.0199	0.0231	0.0289	0.0254	0.0163

This table shows balance sheet data for UK Firms

Table 2 lists averaged Balance Sheet items for Japanese firms from 1985 to 2001. The table lists firms meeting certain requirements involving fixed assets (Item 339),total assets (Item 392),total capital employed (Item 322),total current liabilities (Item 389),convertible loans (Item 320),total deferred taxes(Item 312),preferred stock(Item 306),common equity (Item 305),total stockholder equity (Item 307), and ordinary dividend-net (Item 187,if unavailable, item 628 is selected instead). The table lists a balance sheet format report for Japanese firms from 1985 to 2001. The figure in each cell is the individual item divided by total assets and averaged across all firms included in the DataStream for that year. Table 2 only lists data for odd number years to make it easier to reveal trends more clearly.

Table 2: Balance Sheet Format Report for Japanese firms

Year	1985	1987	1989	1991	1993	1995	1997	1999	2001
Number of Observations	723	818	1236	1302	1326	1372	1548	1710	1859
Assets									
current assets									
+Fixed assets(#339)	0.2508	0.2620	0.2486	0.2598	0.2918	0.3004	0.3019	0.3188	0.3177
Total assets(#392)	1	1	1	1	1	1	1	1	1
Liabilities:									
+Total capital employed(#322)	0.3917	0.4308	0.4249	0.4268	0.4433	0.4625	0.4525	0.4766	0.4632
+Total current liabilities(#389)	0.4271	0.3756	0.3700	0.3681	0.3488	0.3282	0.3337	0.3055	0.2680
=liabilities-total	0.8188	0.8065	0.7950	0.7949	0.7922	0.7908	0.7863	0.7821	0.7313
*convertible debt, convertible loans(#320)	0.0087	0.0141	0.0177	0.0151	0.0155	0.0177	0.0157	0.0117	0.0051
*Total Deferred Taxes(#312)	0.0002	0.0002	0.0001	0.0003	0.0003	0.0013	0.0012	0.0003	0.0001
+Preferred stock(#306)	0	0	0	0	0	0	0	0	0
+Common equity(#305)	0.1811	0.1934	0.2049	0.2050	0.2077	0.2091	0.2136	0.2178	0.2686
=Total Stockholders' equity(#307=#305+#30x)	0.1811	0.1934	0.2049	0.2050	0.2077	0.2091	0.2136	0.2178	0.2686
=Total liabilities& Stockholders' equity	1	1	1	1	1	1	1	1	1
* Ordinary dividend-net (#187, or #628)	0.0046	0.0045	#N/A	#N/A	0.00390	#N/A	0.0035	0.0034	0.0035

This table shows balance sheet data for UK Firms

Comparison of different financial market characteristics, this study gathered international firm data from

1985 to 2001. As Tables 1 and 2 show, aggregated leverage during the year is defined as the average of total liabilities divided by total liabilities and shareholder equity. The leverage for Japanese firms is near 0.8, and decreases slightly from 1985 to 2001. Furthermore, the average ratio of current liabilities to total liabilities and shareholder equity ranges between 0.26 and 0.42 for Japanese firms. UK firms displayed lower aggregated average leverage than Japanese firms, at around 0.7, and current liabilities to total liabilities and shareholder equity for UK firms ranged between 0.19 and 0.24. Japanese firms thus have current and total leverage ratios nearly 10 % higher than UK firms.

The ratio of stockholder equity to total liabilities and shareholder equity for Japanese firms lies between 0.18 and 0.27. The same ratio for UK firms is between 0.28 and 0.33. Although liability leverage is lower for UK firms, the equity ratio is 5% to 10% higher than in Japan. The ratio of fixed assets to total assets for UK firm's ranges from 0.37 to 0.46 and ranges from 0.24 to 0.31 for Japanese firms. This indicates that the current ratio to total assets is higher for Japanese firms. On average, Japanese firms appear to adopt more relaxed asset investment policies than UK firms. Systematic differences also exist in averaged financial ratios between these two markets. Using the definition of financially constrained and financially unconstrained firms used in this study, (ME+BD)/TA ratio, market value of equity and book value of debt over total assets are added, and then averaged by the total number of firms in the market during the year. This yields a time series of aggregated average (ME+BD)/TA ratio, as listed in Table 2.

Table 3 lists the average (ME+BD)/TA ratio of the UK and Japan. The table compares data for the years (1985-2001). The figure in panel A lists the results for the sample of UK firms. Meanwhile, panel B lists the computational results for Japanese firms. Numerous factors may influence the target ratio, including firm size, industry category, etc. However, this study averages whole market data that can reduce fluctuations arising from other factors. This approach is mainly focused on investigating the evolution of the target ratio and comparing it with the financial characteristics of different markets. The ratios in the table are averaged by total firm number in the same year for both countries.

Table 3: The Ratio of Market Value of Equity Plus Book Value of Debt Divided by Total Assets

Panel A UK Firms			**Panel B: Japanese Firms**		
Year	**Number**	**(ME+BD)/TA**	**Year**	**Number**	**(ME+BD)/TA**
1985	263	0.949	1985	719	0.7454
1986	346	1.2654	1986	765	1.0113
1987	369	1.2702	1987	813	1.1356
1988	347	1.2043	1988	1166	1.3742
1989	282	1.2394	1989	1229	1.5086
1990	209	1.0553	1990	1272	0.9385
1991	364	1.0358	1991	1296	0.8765
1992	577	1.2399	1992	1310	0.7328
1993	608	1.3916	1993	1321	0.7872
1994	663	1.2977	1994	1344	0.8563
1995	718	1.3676	1995	1361	0.8540
1996	810	1.4579	1996	1400	0.8345
1997	915	1.5870	1997	1535	0.7506
1998	1005	2.5033	1998	1612	0.7246
1999	1057	2.0673	1999	1688	1.0928
2000	1196	1.6973	2000	1726	0.8879
2001	1303	1.4048	2001	1848	0.6521

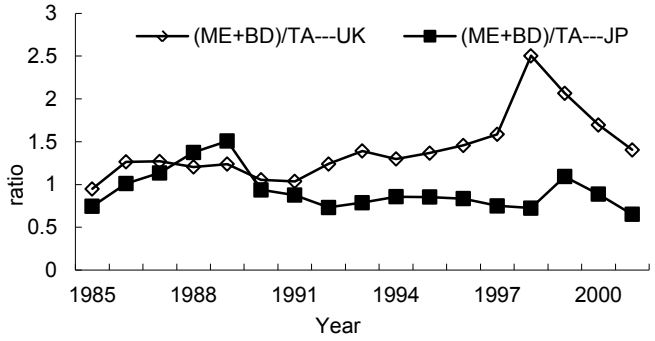
This table shows the average (ME+BD)/TA ratio of the UK and Japan for the years (1985-2001).

The average ratio for the UK firms exceeds one for every year, and sometimes even exceeds two. In contrast, the ratio for Japanese firms is usually below one, and only exceeds one in four years. From 1990, the (ME+BD)/TA ratio of the UK systematically exceeds one, and also exceeds that of Japan, as shown in

Figure 1. Related research by Rajan and Zingales (1995) demonstrated that bank-oriented firms such as those from Japan have better access to finance than market-oriented firms like those from the UK.

Figure 1 reports UK's and Japan's average (ME+BD)/TA ratio for the years 1985-2001. The figure shows the number and (ME+BD)/TA ratio for UK and Japan. We can not explain why the (ME+BD)/TA ratio of Japan is exceptionally high, even higher than UK in 1988 and 1989.

Figure 1: (ME+BD)/TA between UK and JP



This figure reports UK's and Japan's average (ME+BD)/TA ratio for the years 1985-2001.

The (ME+BD)/TA ratio is defined as the sum of the market value of equity and book value of debt divided by total assets. A ratio exceeding one means a firm is using finance that exceeds its real investment. Such a level also implies that the firm lacks sufficient financial capital reserves to exploit investment opportunities. Such firms rely on financial markets. Firms with (ME+BD)/TA ratios below one may be under-investing. Firms which have sufficient free cash can take investment opportunities.

According to the previously used (ME+BD)/TA ratio, UK firms resemble financially constrained firms, displaying high fixed asset ratio, high ratio of equity to total liabilities and shareholder equity, but low debt leverage. Meanwhile, Japanese firms typically display a lack of financial constraints, including low ratio of fixed to total assets, relatively low equity leverage, and high leverage ratio, but these characteristics necessarily indicate financially unconstrained firms. The criteria for a firm being financially constrained requires explicit definition, which this study defines as an (ME+BD)/TA ratio exceeding one. Since the (ME+BD)/TA ratio changes over time the analysis is time-dependent.

Change in debt to Assets Δ D/A is the difference of book value of debt between the t and t-1 periods divided by total assets for the period t is the change in book debt relative to total assets between t and t-1, which can explain fluctuation of debt. Δ D/A in Japan is relatively small and the standard deviation is about 10% for both small and large firms. Δ D/A in the UK has relatively large standard deviation, but the standard deviation is steady in large firms ranging from 20 to 40 percent. Small firm size may cause larger variation in book debt. Δ E/A (the difference of book equity between t and t-1 periods divided by total assets in period t). denotes the change of book equity, and is similar for firms from both countries. However, the standard deviation in the UK Significantly exceeds that in Japan. This finding is consistent with the above argument that firms facing financial constraints lack sufficient cash, causing large variation in equity and debt.

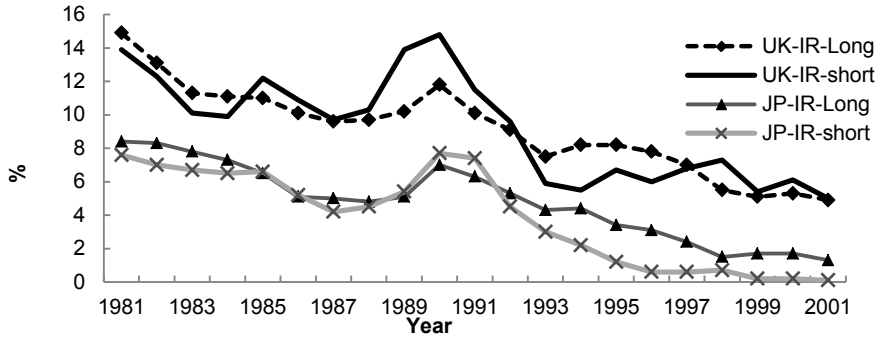
$$\Delta \text{ D/ A}_\text{t} + \Delta \text{ E/A}_\text{t} + \Delta \text{ RE/A}_\text{t} = \frac{D_t - D_{t-1}}{A_t} + \frac{E_t - E_{t-1}}{A_t} + \frac{RE_t - RE_{t-1}}{A_t} = \frac{A_t - A_{t-1}}{A_t}$$

The sum of $\Delta \text{ D/A}_\text{t} + \Delta \text{ E/A}_\text{t} + \Delta \text{ RE/A}_\text{t}$ equals the change of assets at time t. Asset change in Japan is

minimal compared with the UK, and is even negative during some periods during the 1990's because of the economic recession.

Figure 2 shows long-term and short-term interest rates from 1980 to 2001. Short term interest rates in Japan were near zero during the late 1990s. Leverage ratios steadily decreased during this period, partly explaining why the Δ D/A is small and changes only slightly during the 1990s. When market equity exceeds book equity, Market Leverage exceeds Book Leverage. Market leverage reduces with increasing market prices. The figure shows that interest rates change between the short and long-term.

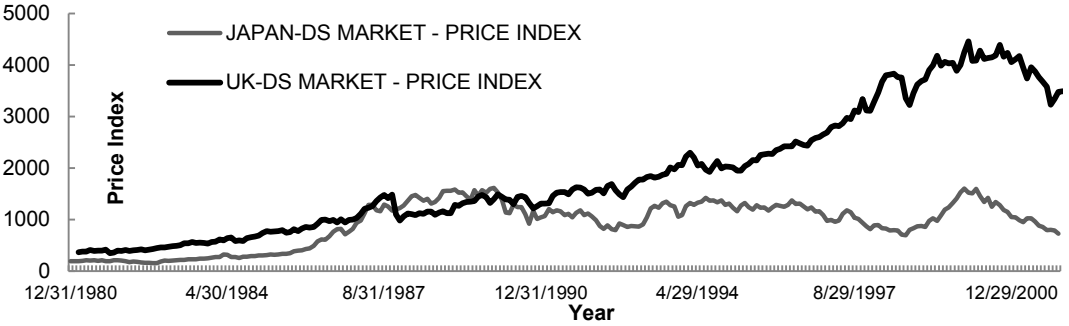
Figure 2: Long-term and Short-term Interest Rate



This figure shows long and short term interest rates from 1980 to 2001 in Japan and the UK

Market Price Indexes of Japan and UK, priced in Dollars were collected from DataStream, Item (TOTMJP$) and Item (TOTMKUK). Figure 3, shows the aggregated market price index. The UK market grew from the 1980s, and then declined during the late 1990s, possibly because of the bursting of the Internet Bubble. Market Leverage thus was much lower than Book Leverage during the 1990s. However, the situation in Japan was quite different, with a short period of growth in market price indexes during the late 1980s, followed by a slight decrease during the 1990s. Market price indexes suddenly climbed at end of the 1990s, before crashing in the early 2000s. Thus in Japan, just as in the UK, Market leverage was much lower than book leverage before 1990. Subsequently, the two leverage ratios drew closer together as a result of the low market price index.

Figure 3: Market Price Index



This figure shows the aggregated market price index for the UK and Japan.

RESULTS

This study tested the market timing effect using UK and Japanese firms. The results are shown in Tables 4, 5, 6 and 7. The market timing test sample of Baker *et el.* (2002) covered 20 years of UK data, but the

timing effect was investigated only for ten years. The international firm sample used in this study runs only from 1985 to 2001. Thus *wmb* persistent effects are tested for only five years.

Table 4 lists the book leverage for UK firms. The first figure in each cell is the regression coefficient. Meanwhile, the second figure is the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent levels, respectively. Furthermore, for the Book Leverage regression, the b2/b1 ratio and b3/b1 ratio are increasing with time, partly consistent with *wmb* persistently explaining power on leverage. Several reasons must exist for the clear difference between Book Leverage and Market Leverage. Each cell shows the t-statistic.

Table 4: UK Leverage of Book Leverage

Year	b1	t(b1)	b2	t(b2)	b3	t(b3)	c3	t(c3)	b2/b1	b3/b1
t+1	0.2585	0.5807	0.2584	0.5807	0.2585	0.5807			1	1
t+2	0.3091	0.6666	0.0310	0.0949	-0.3157	-1.1295	0.4350	1.1640	0.1023	-1.0215
t+3	0.4529	0.9149	0.2072	0.5255	-0.1054	-0.3232	0.5846	1.4276	0.4577	-0.1227
t+4	0.4939	0.9323	0.5783	1.8943 *	-0.1274	-0.5439	0.7333	1.5011	1.1708	-0.2579
t+5	0.6782	1.1894	0.6041	1.8265 *	-0.0844	-0.2939	0.9985	2.0510 **	0.8908	-0.1243
t+6	0.6782	1.4926	0.5818	0.7714	-0.5540	-2.3120 **	1.2011	3.2335 ***	0.6177	-0.5882
t+7	1.0411	1.6271	0.2404	0.4368	-0.3328	-1.1967	1.3722	2.3621 **	0.2309	-0.3196
t+8	1.0861	1.5229	-0.2110	-0.5608	-0.6834	-2.4406 ***	1.0912	3.8267 ***	-0.1945	-0.6292
t+9	1.4132	1.8088 *	0.1549	0.5982	-0.2344	-0.5842	1.1142	2.8413 ***	0.1096	-0.1658
t+10	0.8666	1.0054	-0.1980	-0.4633	-0.4186	-1.4938	1.1602	3.1703 ***	-0.2291	-0.4830

*This table shows book leverage for UK firms. The first figure in each cell is the regression coefficient. Each cell shows the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

In Table 5, the sample of UK firms displays a significant time effect in *wmb*. The coefficients of b1, b2 and b3 are negative and significant in the market leverage regressions. Furthermore, the b2/b1 ratio decreases over time, indicating that the *wmb* effect exits and reduces over time. The b3/b1 ratio is near one, and increases slightly over time, demonstrating the importance of *wmb* in explaining leverage. The result is consistent with previous empirical evidence that firms time the market and adjust their leverage over periods of many years, and *wmb* can describe the discrepancies with target leverage. In contrast, the empirical evidence from the UK is quite different.

Table 5: UK Leverage of Market Leverage

Year	b1	t(b1)	b2	t(b2)	b3	t(b3)	c3	t(c3)	b2/b1	b3/b1
t+1	-0.9281	-2.4420 ***	-0.9281	-2.4421 ***	-0.9281	-2.4420 ***			1	1
t+2	-1.3783	-3.8543 ***	-1.8166	-5.1565 ***	-1.8277	-7.1723 ***	-7.3545	-13.3103 ***	1.3179	1.3259
t+3	-1.3118	-3.1648 ***	-2.1287	-6.4983 ***	-2.2872	-9.0572 ***	-7.9072	-9.6788 ***	1.6227	1.7435
t+4	-1.1608	-2.8156 ***	-2.0332	-9.0292 ***	-1.7325	-4.7255 ***	-8.9283	-7.8419 ***	1.7515	1.4924
t+5	-1.1456	-2.6809 ***	-2.3423	-8.2389 ***	-1.8520	-4.7343 ***	-9.2079	-10.385 ***	2.045	1.6166
t+6	-1.1067	-2.2625 **	-2.0164	-4.0156 ***	-1.8926	-4.0626 ***	-9.4914	-8.0524 ***	1.8219	1.7101
t+7	-1.2084	-2.5486 ***	-2.5764	-4.7435 ***	-2.1484	-5.2253 ***	-9.2644	-6.7935 ***	2.1319	1.7778
t+8	-1.2576	-2.1712 **	-2.3725	-2.6621 ***	-2.1363	-3.6683 ***	-9.2526	-6.3724 ***	1.8865	1.6987
t+9	-1.234	-1.7293 *	-2.0744	-1.9299 *	-1.6856	-2.7958 ***	-9.4138	-6.8834 ***	1.6809	1.3659
t+10	-1.656	-3.2305 ***	-1.6496	-1.678 **	-1.5588	-3.9408 ***	-8.6069	-7.5298 ***	0.9961	0.9473

*This table shows book leverage of market leverage for UK firms. The first figure in each cell is the regression coefficient. Each cell shows the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

First, the difference between Book Leverage and Market Leverage caused significant difference in their

regressions. Figure 3 reveals that the UK market index rapidly climbed from the beginning of the 1990s, increasing variation between market leverage and book leverage for both small and large firms. However, these two forms of leverage drew close together for Japanese firms.

Second, an important question is why *wmb* significantly influences market leverage but not book leverage. We offer the following explanation. The *wmb* factor is closely related to market leverage and thus can effectively explain unadjusted leverage. Because *wmb* is the weighted average of market equity to book equity, and because market leverage is the ratio of book debt divided by total assets minus book equity plus market equity. Assuming firm retained earnings are zero, the first difference of Market Leverage to market-to-book ratio are clearly correlated. The *wmb* is the weighted average of several market-to-book ratios, and a complex relation appears to exist between them. However, further investigation is necessary to identify empirical evidence of this relation.

Table 6 lists the Japanese leverage of book leverage. The first figure in each cell is the regression coefficient, while the second figure is the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively. Meanwhile, in the regression of book leverage, the b2/b1and b3/b1 ratios increase with time which is partly consistent with the persistent ability of *wmb* to explain leverage. The clear difference between these two kinds leverage may have several causes.

Table 6: Japan Firms Leverage of Book Leverage

Year	b1	t(b1)		b2	t(b2)		b3	t(b3)		c3	t(c3)		b2/b1	b3/b1
t+1	-2.7981	-6.167	***	-2.7980	-6.167	***	-2.7980	-6.167	***				1	1
t+2	-2.9212	-6.121	***	-2.6295	-5.709	***	-3.080	-7.947	***	4.1679	4.7973	***	0.9001	1.0545
t+3	-2.9249	-5.78	***	-2.4206	-5.157	***	-3.3463	-9.546	***	4.7506	5.8081	***	0.8275	1.1440
t+4	-2.976	-5.433	***	-2.2688	-4.713	***	-3.5209	-10.57	***	5.3281	7.3501	***	0.7623	1.1831
t+5	-2.831	-4.803	***	-2.0487	-3.976	***	-3.3841	-10.75	***	5.5506	7.1362	***	0.7236	1.1953
t+6	-2.553	-4.262	***	-1.8060	-3.874	***	-3.3845	-9.214	***	5.8514	6.4504	***	0.7073	1.3257
t+7	-2.2801	-3.885	***	-1.5088	-3.427	***	-0.2575	-6.996	***	6.3417	6.2706	***	0.6617	1.4286
t+8	-1.9818	-3.662	***	-1.0804	-2.254	***	-3.258	-7.105	***	6.4769	6.4544	***	0.5452	1.6439
t+9	-1.7026	-3.356	***	-0.8864	-1.559	***	-3.1593	-8.026	***	6.9193	6.9424	***	0.8206	1.8556
t+10	-1.7288	-3.062	***	-1.05832	-1.474	***	-3.0509	-7.727	***	6.2860	4.8067	***	0.6121	1.7647

*This table shows leverage of book leverage for Japanese firms. The first figure in each cell is the regression coefficient. Each cell shows the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Table 7 lists the JP leverage of Market leverage. The first figure in each cell is the regression coefficient. The second figure in each cell is the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively. While in book leverage regression, the b2/b1 ratio and b3/b1 ratio are increasing with time, which is partially consistent with the persistent power of *wmb* to explain leverage. The clear difference between these two may have several causes.

Figure 4 shows the market-to-book ratio for UK and Japanese firms from 1985-2001. The figure shows the UK MB-ratio exceeds the Japanese MB-ratio between 1985 and 2001. Figure 4 shows that the trend of market-to-book ratio in the UK is stronger than in Japan. Figure 3 reveals that Market Price Index and average market-to-book ratio exhibit similar trends in both the UK and Japan.

Firms facing financial constraints often rely on raising equity. Hence, the leverage of such firms varies considerably, and is difficult to capture using the market timing testing equation. This phenomenon may contradict the argument regarding how *wmb* explains capital structure (Baker *et al.*, 2002). However, it is important to exclude other influences on leverage degree in further studies.

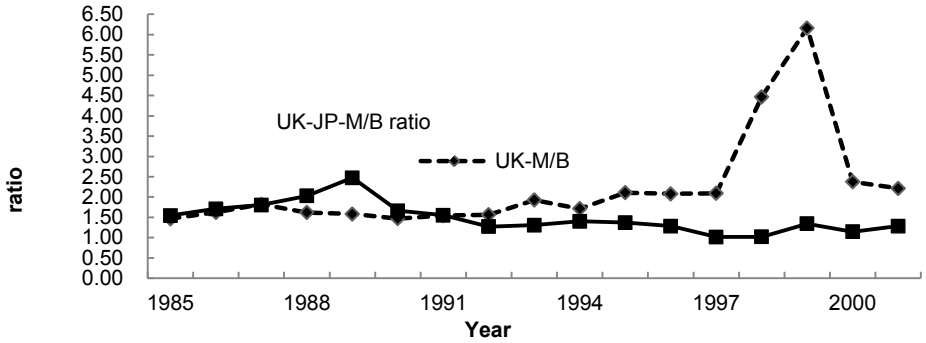
Table 7: Japan Leverage of Market Leverage

Market Leverage%												
Year	**b1**	**t(b1)**		**b2**	**t(b2)**		**b3**	**t(b3)**		**c3**	**t(c3)**		**b2/b1**	**b3/b1**
t+1	-3.0378	-5.7617	***	-3.0378	-5.7617	***	-3.0378	-5.76	***				1	1
t+2	-3.0169	-5.258	***	-2.8108	-4.55	***	-3.1801	-6.598	***	-12.6818	-15.8283	***	0.9316	1.0540
t+3	-3.1077	-5.049	***	-2.8863	-4.602	***	-3.5306	-8.037	***	-12.6722	-16.2739	***	0.9287	1.1361
t+4	-3.1204	-4.801	***	-2.8985	-4.521	***	-3.6779	-8.285	***	-12.8633	-15.2717	***	0.928	1.1789
t+5	-2.9997	-4.2954	***	-2.6884	-3696	***	-3.5847	-6.423	***	-13.2616	-14.5537	***	0.8962	1.1950
t+6	-2.7194	-3.762	***	-2.5278	-3.163	***	-3.6088	-6.232	***	-13.5667	-13.976	***	0.9295	1.3270
t+7	-2.3966	-3.378	***	-2.3735	-2.593	***	-3.4764	-5.074	***	-14.135	-13.2897	***	0.9903	1.4505
t+8	-1928	-3.232	***	-2.2182	-2.731	***	-3.5376	-7.778	***	-14.8987	-14.6943	***	1.1505	1.8348
t+9	-1.4789	-3.4133	***	-2.0463	-3.226	***	-3.4154	-15.33	***	-15.2487	-15.4939	***	1.3836	2.3094
t+10	-1.3454	-3.083	***	-2.4085	-2.681	***	-3.5446	-10.43	***	-16.3309	-22.7822	***	1.7902	2.6346

*This table shows leverage of market leverage for Japanese firms. The first figure in each cell is the regression coefficient. The second figure is the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

From the perspective of optimal dynamic argumentations, when firm leverage is homogeneously optimized, comparison of *wmb* coefficients between the equations is meaningful. The example involving Japanese firms lacks the timing effect and can be largely explained by the *wmb* factor in. However, if the leverage is not well-explained in Eq. 4 the same factors also cannot explain better in Eq. 6. Any comparison then becomes too weak. Only when b1 is significant does comparison with b2 and , b2/b1become meaningful. However, b3 in Eq. 3 does not represent the same case, and the *wmb* effect intensifies with time. Once leverage has been optimized, although the real adjustments are not entirely in *wmb*, it retains significant explanatory power.

Figure 4: United Kingdom and Japan Market to Book Ratio



This figure shows the United Kingdom and Japan Market to Book ratio.

CONCLUSIONS

This study used international data to investigate the impact of different financial market characteristics on firm leverage. The Tobin Q regression methodology was used in this study. This study divided the firm sample using the (ME+BD)/TA definition, and classified firms in the UK as financially constrained, and those in Japan as financially unconstrained. This investigation also investigated the characteristics of these two types of firms. Firms in the UK behave similarly to financial constrained firms, with high fixed asset ratio, high equity ratio and large variation of leverage, even excluding size factor. Firms in Japan exhibit low fixed assets and low rate of change of debt ratio, but high leverage.

This study concludes that more evidence using internal samples is required before concluding the findings apply elsewhere. Second this study finds that *wmb* is related to market leverage both by difference and by displaying similar trends over many years. The study shows that *wmb* can be influenced by unexplained market leverage, but not book leverage. On the other hand, book leverage may be more closely related to true debt value, which is little affected by market timing. Third, leverage in Japanese firms is relatively steady, and the timing effects remain significant even after many years. From the perspective of dynamic adjustment leverage, when leverage is optimized the degree of previous adjustments are largely explained in *wmb*.

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