An Explicit Test for Capital Structure Convergence

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Abstract

We employ the panel convergence methodology developed by Phillips and Sul (2007) to test for leverage convergence across a set of US firms. There is no convergence detected when the whole sample is tested. However, we detect convergence clubs, i.e. subgroups of convergent firms. There is one big club detected, comprising about 70% of the whole sample, and many small ones. The convergence within the big club and most of the small ones happens in rates, i.e. leverage has the same rate of change across the firms of a club. Firms belonging to the big club are bigger, more profitable, have more tangible assets, fewer growth opportunities and higher payout ratios than the rest of the firms. In addition, they exhibit counter-cyclical leverage over the business cycle, while the rest of the firms' leverage is not sensitive to changes in macroeconomic conditions. Given that these are distinctive characteristics of financially unconstrained firms, these results imply that firms belonging to the big club are financially unconstrained, while the rest of the firms are financially constrained. Our contribution to the ongoing debate for the existence of convergence among firms' leverage is twofold: (i) to obtain our results, we do not impose any of the direct or indirect restrictions used in the existing literature and so we avoid all pitfalls associated with them and (ii) we can distinguish constrained from unconstrained firms, without having to employ any of the classification criteria used in the literature.

Keywords: Capital structure; Convergence; Financial constraints

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1. Introduction

Almost fifty years after the seminal paper of Modigliani and Miller (1958), which is considered as the cornerstone of the capital structure literature, many questions concerning capital structure are still not settled. One of these questions, which came up recently, concerns the convergence in capital structure. Does leverage across firms converge over time?

In a recent empirical study, Lemmon et al (2008) are the first to report convergence in firms' capital structures. Their methodology is the following: every year firms are split into four portfolios according to their leverage ratio and the evolution of the portfolios' leverage ratios is calculated for the subsequent 20 years. Results show that the portfolios with the highest and the lowest initial leverage converge to more moderate levels. However, despite the convergence, the initial ranking of portfolios according to their leverage ratio is maintained over time. They also turn to econometric analysis to support their findings. Based on this analysis, they claim that convergence and persistence dominates both statistically and economically previously identified firm-specific leverage determinants. Concerning the explanation of the convergence and the persistence feature, Lemmon et al argue that it is the firms' active management of capital structure that generates the transitory component of leverage (convergence feature), while they leave the exploration of the source of the permanent component (persistent feature) to future research.

In a more recent study, Chen (2010) questions the results of Lemmon et al (2008) concerning convergence. In particular, he argues that the convergence feature of leverage reported by Lemmon et al is due to a statistical accident, called regression fallacy, and is mechanical rather than real.

When he uses the median or the last year of the event period as the portfolio formation year, the convergence feature becomes questionable. The greatest dispersion among portfolios occurs at the formation year and the dispersion decreases as we move away from it, either forward or backward. Hence, portfolios seem to diverge before and converge after the base year. This happens because leverage is stationary and mean-reverting. Chen sorts the firms in terms of the time-series average of leverage instead of

the portfolio formation year leverage and shows that the convergence feature is substantially weaker. On the contrary, the persistence feature remains valid across all tests.

Our contribution to the ongoing debate for the existence of convergence among firms' leverage can be of particular value. Our comparative advantage is the use of the new panel convergence methodology developed by Phillips and Sul (2007) as a tool for testing convergence. We are the first to conduct an explicit convergence test in the capital structure literature. We consider our contribution as an important one, because – in contrast to the existing studies (Lemmon et al, 2008; Chen, 2010) – we let the data guide us, rather than imposing any direct or indirect restrictions to the data and relying on leverage averages to make inferences about convergence. As a consequence, we avoid any kind of misclassification problem, such as the one reported by Chen.

We use three different samples. We find no evidence of full-sample convergence in any of the samples either in rates or in levels[5]. However, we detect convergence clubs, i.e. subgroup of firms whose leverage exhibits convergence. The convergence happens in rates, i.e. leverage has the same rate of change across firms belonging to the same group. In each of the three samples there is one big club detected, comprising 65-75% of the sample tested, and many small ones. In addition, we detect a high degree of heterogeneity across clubs and there are no signs of convergence across clubs. Finally, the divergent firms comprise 5-10% of each sample tested.

In order to identify the factors that qualify firms to be members of the big club, we test several candidates. According to these tests, the industry and the degree of leverage are not relevant. On the contrary, certain firm-specific characteristics and the sensitivity of leverage towards macroeconomic conditions are the two factors that determine the membership of a firm in the big club. In particular, firms belonging to the big club are bigger, more profitable, have more tangible assets and fewer growth opportunities than the rest of the firms. In addition, firms belonging to the big club exhibit counter-cyclical leverage over the business cycle, while the leverage of the rest of the firms is not affected by changes in macroeconomic conditions.

[5] Convergence in rates means that the variable of interest has the same rate of change across different cross sectional units, while convergence in levels means that the variable of interest converges to the same value.

It is striking that the factors identified as determining membership in the big club are also the factors that have been documented in the literature to distinguish financially constrained from financially unconstrained firms[6]. Korajczyk and Levy (2003) show that unconstrained firms are larger, more profitable, have lower market-to-book ratios and more tangible assets than constrained firms. Furthermore, they show that leverage is counter-cyclical for financially unconstrained firms, while financially constrained firms' leverage is less sensitive to changes in macroeconomic conditions.

Motivated by the above findings, we test whether our partition is in fact dividing firms into constrained and unconstrained ones. We employ two alternative criteria that have been widely used in the literature to assign firms into constrained and unconstrained groups, namely size (e.g. Gertler and Gilchrist, 1994; Almeida et al, 2004; and Campello and Chen, 2010) and payout ratio (e.g. Fazzari et al, 1988; Hahn and Lee, 2009; Hovakimian, 2010). The results corroborate our previous findings. Firms belonging to the big group are bigger and have higher payout ratios compared to the firms belonging to the residual group across all three samples. This suggests that the partition achieved through our approach is very close to the one we would have obtained should we separate firms according to the traditional criteria used in the literature to distinguish constrained from unconstrained firms.[7]

Our results are consistent with several empirical and theoretical studies stemming from a variety of literature strands.

Concerning the credit channel literature, Gertler and Gilchrist (1993) find that aggregate debt issues increase for large firms but remain flat for small firms in the aftermath of economic recessions accompanied by monetary contractions. In addition, Gertler and Gilchrist (1994) show that small firms have more stable short-term debt over the business cycle than large firms. These findings are consistent with the idea that small firms, facing more binding financial constraints due to a higher degree of informational asymmetries and lower collateral value, find it more difficult to borrow to smooth cash flows during economic downturns or during periods following a shock in the economy.

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[6] In the literature, the term financially constrained firms does not pertain to firms that are about to default or are completely shut out of capital markets. It is rather a relative term, e.g. financially constrained firms have a lower degree of capital market access and/or face higher costs when accessing them compared to their unconstrained counterparts.

[7] Although our approach does not impose any restriction to the data.

In an empirical paper examining the impact of macroeconomic conditions on capital structure, Korajczyk and Levy (2003) find evidence consistent with the idea that unconstrained firms are able to exploit good macroeconomic/market conditions. Specifically, they time their issues to coincide with periods where, for example the price of equity relative to the bond of the same firm is favorable (e.g. when the equity market is booming), while constrained firms do not. In another empirical paper, belonging to the security issuance literature, Choe et al (1993) document that equity issues are pro-cyclical.

Finally, our results are consistent with theoretical papers studying the effect of various frictions on issue choice over the business cycle. Eisdfeldt (2004) constructs a model in which adverse selection costs vary counter-cyclically over the business cycle. Levy and Hennessy (2007) provide a model where the agency conflicts between managers and outside shareholders are exacerbated in recessions and mitigated in expansions. This results in counter-cyclical leverage for unconstrained firms.

The paper is organized as follows. Section 2 illustrates briefly the panel convergence methodology developed by Phillips and Sul (2007). Section 3 presents the dataset that is used. Section 4 presents and discusses the results and Section 5 concludes.

2. Methodology

We employ the methodology proposed by Phillips and Sul (2007) to test for leverage convergence in a panel of US firms. In essence, this methodology tests whether the dispersion across cross-sectional units of the variable of interest declines over time. Compared to other convergence tests, such as sigma or beta convergence tests, this one has the advantage of being more general in some aspects. No specific assumptions concerning the stationarity of the variable of interest or the existence of common factors are needed, while the methodology relies on a rather general form of a nonlinear time varying factor model.

To the best of our knowledge, it is the first time that an explicit convergence test is used in the capital structure literature. We consider the introduction of such a tool as

very important. The reason is that – in contrast to the existing papers (Lemmon et al 2008, Chen 2010) – we let the data guide us, rather than imposing any direct or indirect restrictions to the data and relying on leverage averages to make inferences about convergence. A short description of the Phillips Sul methodology follows.

Suppose we have a panel dataset and X_{it} is the parameter of interest, with $i=1,2,..N$ and $t=1,2,...T$ denoting cross-sectional units and time periods respectively. The variable of interest is decomposed into a common component and an idiosyncratic component. Both of them are time varying. In the frame of this test, convergence occurs when the idiosyncratic components across the cross-sectional units converge over time. The idiosyncratic/transitory component is estimated as:

$$(1) \qquad \hat{h}_{it} = \frac{X_{it}}{\frac{1}{N}\sum_{i=1}^{N} X_{it}}$$

This estimated transition parameter for a specific cross-sectional unit at a specific time period is essentially the ratio of the variable value for the cross-sectional unit to the value of the cross-sectional average at the specific period. For example, suppose that $\hat{h}_{it} = 1.2$; this implies that the variable value for the i_{th} cross-sectional unit at the t_{th} time period is 20% higher than the value of the cross-sectional average at that period. By plotting the transition parameters over time we get the transition curves, which allow us visual inspection of the convergence process. In particular, we have convergence when the transition curves move towards one. Transition parameters can be calculated for groups of cross-sectional units as well. The only difference is that the denominator is the average of the variable values of the cross-sectional units that comprise the group.

The next step of the methodology is to calculate the time-varying variance H_t of the transition parameter:

$$(2) \qquad H_t = \frac{1}{N}\sum_{i=1}^{N}(\hat{h}_{it} - 1)^2$$

As shown by Phillips and Sul, this has a limiting form of

$$(3) \qquad H_t \sim \frac{A}{L(t)^2 t^{2\alpha}} \text{ as } t \to \infty$$

where A is a positive constant, *L(t)* is a slowly varying function like *log(t+1)*, and α denotes the speed of convergence. It distinguishes between two convergence types. In particular, when $0 \leq \alpha < 1$, we have convergence in rates and when $\alpha \geq 1$, we have convergence in levels. The former means that the variable of interest has the same rate of change across different cross-sectional units, while the latter means that the variable of interest converges to the same value. The null hypothesis for the convergence in rates (level) is that $\alpha \geq 0$ ($\alpha \geq 1$), against the alternative that $\alpha < 0$ ($\alpha < 1$). Phillips and Sul test the null hypothesis through the following log*t* regression:

$$(4) \qquad \log\left(H_1 / H_t\right) - 2\log(t+1) = \hat{c} + \hat{b}\log t + u_t$$

The null hypothesis of convergence is rejected if $t_b < -1.65$, where t_b is the t-statistic of the estimated $\hat{b}$ coefficient. The fitted coefficient of *logt* is $\hat{b} = 2\hat{\alpha}$, where $\hat{\alpha}$ is the estimate of α in the null hypothesis. Put simply, given statistical significance, values of $\hat{b}$ between 0 (included) and 2 imply convergence in rates, while values of $\hat{b}$ equal to or greater than 2 imply convergence in levels. Standard errors are heteroskedasticity and autocorrelation consistent (HAC)[8]. The data for this regression start at $t = [rT]$, where $[rT]$ is the integer part of rT and $r=0.3$, as suggested by Phillips and Sul.

Rejection of the null hypothesis of convergence for the full sample does not imply that there is no evidence of convergence in subgroups of the panel. Phillips and Sul extend their methodology, in order to test for club convergence. They develop a four-step procedure. First, cross-sectional units are ordered according to their last observation in the panel. In the second step, the core convergent group is formed. To do so, we take the

[8]The Quadratic spectral kernel is employed and the bandwidth is determined by means of the Andrews (1991) data-dependent procedure.

cross-sectional unit that was ranked first in Step 1 and run sequential log*t* regressions by adding further units one by one, based on the Step 1 ranking. The core convergent group is the one with the maximum t-statistic, given of course that it is statistically significant, i.e. $t_b > -1.65$. In the third step, cross-sectional units not included in the core group are evaluated for membership in it. One unit at a time is added to the core group and the t-statistic from the log*t* regression is calculated. A new unit is qualified for membership if the t-statistic of the associated log*t* regression is positive. In the end, we also check if the newly formed group – initial group plus the units that qualified – still satisfies the log*t* regression criterion for convergence. In the fourth step, all units that have not been included in the group identified in the previous steps are tested for forming a convergent group. If so, we conclude that our sample consists of two convergent subgroups/clubs. If not, we repeat Steps 1 to 3 on the units not included in the core group to determine whether there is a smaller group of convergent units. If no new group is detected, we conclude that the remaining units are divergent.

3. Data

We use annual accounting data drawn from the Compustat North America database over the period 1970-2007. Depending on the required data for different types of analysis in the course of our study, the number of usable firm-year observations will vary accordingly. Following previous research, financial firms (SIC 6000-6999) and utilities (SIC 4800-4999) are excluded. Firm-years with firms having nonpositive total assets, book or market value of equity are excluded, as these variables are used to standardize other variables and thus cannot be zero or negative. Also excluded are firm-years with missing observations. The ten-year government bond rate and the three-month Treasury bill rates are obtained from the Federal Reserve Board's webpage[9]. The one-year equity market return is calculated using data from the CRSP value-weighted index of stocks traded on NYSE, AMEX and NASDAQ, extracted form CRSP.

[9] http://www.federalreserve.gov/releases

Variables are measured in constant 1983 dollars using the US CPI as a deflator. We winsorize all (final) accounting variables at the 1st and the 99th percentile to avoid the effect of outliers and misreported data.

4. Results

The variable of interest in our study is leverage. Following previous research, our measurement for leverage is financial debt, i.e. interest bearing liabilities over total assets[10]. Using the Phillips Sul methodology, we test for leverage convergence over time across a set of US firms.

We cover three different periods, i.e. 1970-2007, 1980-2007 and 1985-2007. As the time horizon diminishes, the number of firms grows. This happens because the Phillips-Sul methodology requires a balanced panel, so shorter time horizons imply more firms with no missing observations.

Our analysis generated an array of results, which are presented in Table 1. First of all, there is no full-sample convergence in any of the three samples. However, there are convergence clubs detected. There is one big club comprising 65-75% of the sample tested and many small ones. The convergence within all the big clubs and most of the small ones happens in rates, i.e. leverage has the same rate of change across the firms belonging to a club. The divergent firms comprise 5-10% of each sample tested.

There are also some interesting results concerning the relationship between the clubs detected. The leverage transition curves of the convergent clubs indicate that the clubs have not shown any clear signs of convergence (see Figure 1). If they did, the curves would tend towards 1 or the distance between them would decrease. Moreover, the distance between the transition curves of the clubs is very volatile and not decreasing over time, indicating heterogeneity between clubs (see Figure 1).

Given the similar structure of the clubs detected across the samples – one big converging in rates, consisting of the majority of the firms and many small ones – we try

[10] See Appendix for the descriptions of the variables used.

to detect any characteristics that would distinguish the firms belonging to the big clubs from the rest of each sample. Put simply, in what terms do the big club firms differ from the remaining firms in each sample? Is it the industry? No, none of the big clubs is biased towards any industry. Each big club has almost the same analogy of industries as the corresponding full sample, across all samples (see Table 2). Is it a matter of leverage? No, it is not the leverage either. In none of the three samples is the leverage transition curve of the big club below or above the full sample cross-section average – which is 1 – during the whole sample period. This means that none of the big groups consists of constantly under- or over-levered firms. (see Figures 2,3 and 4)[11]. In contrast, it seems that it is a matter of certain general firm characteristics. Our probit regressions indicate that firms belonging to the big clubs are more likely to be bigger, more profitable, to have more tangible assets and fewer growth opportunities (see Table 4). The visual inspection of the big club transition curves points to the same direction, as profitability, assets, and tangibility curves remain for most of the sample periods above 1 (see Figures 2,3 and 4)[7].

Our next test, concerning the identification of differences between big club firms and the others, is about the sensitivity of leverage towards certain firm-specific and macroeconomic variables, which have been documented in the literature as leverage determinants. Following Rajan and Zingales (1995), Frank and Goyal (2003), Lemmon et al (2008) and numerous other studies in the empirical capital structure literature, the firm-specific factors that we employ are size, market-to-book, profitability and tangibility of assets. We also use two macroeconomic factors, namely (a) the spread between the ten-year government bond yield series and the three-month Treasury-bill rate series and (b) the one-year value-weighted market return of all stocks traded on the NYSE/AMEX/NASDAQ. The term spread (Estrella and Hardouvelis, 1991) and the equity market run-up, being credible indicators for economic activity, are used to capture leverage variation over the business cycle. We also rely on both theoretical arguments

[11] For each sample, we plotted the leverage transition curve of the big club together with the transition curves for the four firm characteristics. If these curves remained for the whole sample period below or above 1, this would imply a bias of the club towards one of the aforementioned characteristics. For example a curve for size being above (below) 1 for the whole sample period would imply a bias towards big (small) firms.

(Eisdfeldt, 2004; Levy and Hennessy 2007)[12] and empirical findings (Choe et al. 1993; Gertler and Gilchrist, 1993; Gertler and Gilchrist, 1994; Korajczyk and Levy, 2003)[13], implying that, for a significant fraction of firms, leverage is affected by changes in macroeconomic conditions. In particular, previous research has documented that leverage is counter-cyclical for financially unconstrained firms, while financially constrained[14] firms' leverage is less sensitive to changes in macroeconomic conditions. The intuition is that constrained firms, having a lower degree of capital market access, find it more difficult to borrow to smooth cash flows during economic downturns or in periods following a shock in the economy. For the same reason, they cannot exploit good macroeconomic/market conditions to time their issues to coincide with periods where the relative price of the security issued (equity) is favorable, e.g. when the equity market is booming.

As we can see in Table 5, we regress leverage on all the aforementioned variables, which are lagged one period. Two regressions are run for each sample, one for the firms comprising the big club and one for the rest of them.

The results concerning the firm-specific variables are not particularly striking. In both groups, all variables are significant and have the same sign as in numerous previous studies, i.e. leverage increases with size and tangibility and decreases with profitability and market-to-book ratio.

On the contrary, the results concerning the macroeconomic variables are of particular interest. For the big club, the term spread has statistical significant and negative coefficients across all three samples, implying that leverage for these firms varies counter-cyclically over the business cycle. In contrast, the residual group has insignificant

[12] Eisdfeldt (2004) develops a model in which adverse selection costs vary counter-cyclically over the business cycle. Levy and Hennessy (2007) develop a model in which the agency conflicts between managers and outside shareholders are exacerbated in recessions and mitigated in expansions. This results in counter-cyclical leverage for unconstrained firms.

[13] Choe et al (1990) document pro-cyclical seasoned equity offerings. Gertler and Gilchrist (1993) find that aggregate debt issues increase for large firms but remain flat for small firms in the aftermath of economic recessions accompanied by monetary contractions. Gertler and Gilchrist (1994) show that small firms have more stable short-term debt over the business cycle than large firms. Korajczyk and Levy (2003) examine the impact of macroeconomic conditions on capital structure and find that macroeconomic conditions are significant for issue choice for unconstrained firms but less so for constrained firms.

[14] In the literature, the term "financially constrained firms" does not pertain to firms that are about to default or are completely shut out of capital markets. It is rather a relative term, e.g. financially constrained firms have a lower degree of capital market access and/or face higher costs when accessing them compared to their unconstrained counterparts.

coefficients for both macroeconomic variables across all samples, implying that leverage for these firms is not sensitive to macroeconomic fluctuations.

Our results so far indicate that the separation of firms between those that belong to the big group and those that do not proxies for a separation between financially unconstrained and constrained firms respectively. The first indication is that the big club firms are found to have counter-cyclical leverage, while the residual group firms' leverage does not vary over the business cycle. Furthermore, the results from our probit regression point to the same direction, i.e. that our partition divides firms into constrained and unconstrained ones. Prior research (Korajczyk and Levy, 2003) has documented that unconstrained firms are larger, more profitable, have lower market-to-book ratios and more tangible assets than constrained firms. This is exactly what our probit regression suggests for the firms belonging to the big club compared to the firms belonging to the residual group.

Motivated by these results, we run an explicit test in order to examine whether our partition divides firms into constrained and unconstrained ones. Prior research has used many alternative criteria to assign firms into constrained and unconstrained groups. However, the validity of some of these criteria has been debated in the literature. Therefore, we employ the two most widely used and less debatable criteria, namely size and payout ratio. Small firms are more likely to be financially constrained due to higher degree of informational asymmetries and lower degree of collateral value. Gertler and Gilchrist (1994), Almeida et al (2004) and Campello and Chen (2010) are just a few of the studies that have used size to categorize firms into constrained and unconstrained ones. Payout ratio was introduced as a classification criterion by Fazzari et al (1988) and subsequently used in many studies (e.g., Hahn and Lee, 2009; Hovakimian, 2010). The intuition is that since dividends plus equity repurchases and investment are competing uses of funds, firms that have a lower degree of access to capital markets will also have lower payout ratios.

The results corroborate our previous findings. As we can see in Table 6, the firms belonging to the big group are bigger and have higher payout ratios compared to the firms belonging to the residual group across all three samples. This suggests that our partition

does in fact proxy for a separation between firms facing different degrees of financial constraints.

5. Conclusions

In this study we test for leverage convergence across a panel of US firms. We employ the new panel convergence methodology, developed by Phillips and Sul (2007).

We use three different samples. We find no evidence of full-sample convergence in any of the samples either in rates or in levels[15]. However, we detect convergence clubs, i.e. subgroup of firms whose leverage exhibits convergence. The convergence happens in rates, i.e. leverage has the same rate of change across firms belonging to the same group. In each of the three samples there is one big club detected, comprising 65-75% of the sample tested, and many small ones. In addition, we detect a high degree of heterogeneity across clubs and there are no signs of convergence across clubs. Finally, the divergent firms comprise 5-10% of each sample tested.

The factors that qualify firms to be members of the big club are certain firm-specific characteristics and the sensitivity of leverage to macroeconomic conditions. In particular, firms belonging to the big club are bigger, more profitable, have more tangible assets and fewer growth opportunities than the rest of the firms. In addition, firms belonging to the big club exhibit counter-cyclical leverage over the business cycle. On the contrary, the leverage of the firms comprising the residual group is not sensitive to macroeconomic fluctuations.

The factors identified as determining membership in the big club are also the factors that have been documented in the literature to distinguish financially constrained from financially unconstrained firms. In particular, both the capital structure[16] and the credit channel literature[17] have documented that leverage is counter-cyclical for financially unconstrained firms, while financially constrained firms' leverage is less

[15] Convergence in rates means that the variable of interest has the same rate of change across different cross sectional units, while convergence in levels means that the variable of interest converges to the same value.
[16] Korajczyk and Levy (2003)
[17] Gertler and Gilchrist (1993), Gertler and Gilchrist (1994).

sensitive to changes in macroeconomic conditions. There are also strong theoretical arguments that predict this relationship[18]. In addition, prior research has documented[19] that unconstrained firms are larger, more profitable, have lower market-to-book ratios and more tangible assets than constrained firms, just like the firms in the big club. Finally, we employ two alternative criteria that have been widely used in the literature to assign firms into constrained and unconstrained groups, namely size and payout ratio. Our results, big club firms being bigger and having higher payout ratios than the rest of the firms, imply that the partition achieved through our approach is very close to the one we would have obtained should we separate firms according to the traditional criteria used in the literature to distinguish constrained from unconstrained firms.

In summary, our contribution to the ongoing debate for the existence of convergence among firms' leverage is twofold: (i) to obtain our results, we do not impose any of the direct or indirect restrictions used in the existing literature and so we avoid all pitfalls associated with them and (ii) we can distinguish constrained from unconstrained firms, without having to employ any of the classification criteria used in the literature

[18] Eisdfeldt (2004), Levy and Hennessy (2007)
[19] Korajczyk and Levy (2003)

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Appendix – Definition of variables used

SYMBOL	DESCRIPTION	COMPUSTAT ACCOUNTS
LEV	Long-term debt plus debt in current liabilities to book assets	(data9+data34)/data6
PROF	Earnings before interest and taxes to book assets	data13/data6
MB	Market value of assets to book assets	mv_a/data6
mv_a	Market value of assets = Book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity (market equity = stock market price times shares outstanding)	data6-data216+data10-data35+(data25 *data199)
ASSETS	Natural logarithm of real book assets expressed in 1983 US dollars	ln of data6
TANG	Fixed assets to book assets	data8/data6
PAYOUT RATIO	Common dividends plus preferred dividends plus purchase of common and preferred stock to income before extraordinary items	(data21+data19+data115)/data18

Table 1. Convergence Clubs

Samples	Number of firms	Full sample convergence	Number of clubs	Big club as % of total*	Convergence of the big club in…	Other clubs as %of total*	Divergent*
1970 - 2007	236	NO	10	76.7% (181)	Rates	0.8%-3.4% (2-8)	5.5% (13)
1980 - 2007	396	NO	13	72.5% (287)	Rates	0.5%-4.5% (2-18)	9.6% (38)
1985 - 2007	611	NO	37	65.6% (401)	Rates	0.3%-3.9% (2-24)	8.7% (53)

*Number of firms in parenthesis

Table 2. Sector composition of big convergence clubs

	Full sample 1970-2007	Big club 1970-2007	Full sample 1980-2007	Big club 1980-2007	Full sample 1985-2007	Big club 1985-2007
Number of firms	236	168	401	292	611	401
Composition of clubs:						
Energy	6.8%	5.0%	7.0%	6.2%	7.7%	8.0%
Materials	11.0%	13.3%	10.2%	12.0%	9.5%	10.5%
Industrials	33.1%	32.6%	31.7%	31.8%	27.0%	25.9%
Consumer Discretionary	22.9%	23.8%	21.4%	22.9%	19.6%	21.9%
Consumer Staples	13.1%	14.4%	11.5%	13.0%	10.5%	10.2%
Health Care	5.9%	6.1%	6.5%	5.5%	9.0%	7.7%
Information Technology	7.2%	5.0%	11.7%	8.6%	16.7%	15.7%

Table 3. Summary statistics for the three samples

	1970-2007	1980-2007	1985-2007
LEV	0.2036	0.2024	0.1976
ASSETS	473.26	279.44	201.44
MB	1.5396	1.6203	1.6946
PROF	0.1604	0.1442	0.1305
TANG	0.3486	0.3337	0.3238
Sample size	8,968	11,088	14,053

Table 3 reports the means of firm characteristic variables across the three samples. Assets are measured in $millions. Sample size is in firm-years.

Table 4. Probit regression

Equation (1): $Y_{it} = c + \beta X_{it} + \varepsilon_{it}$

	1970-2007	1980-2007	1985-2007
c	-0.119	-0.034	-0.006
	0.04	*0.45*	*0.87*
ASSETS	0.101	0.097	0.073
	0.00	*0.00*	*0.00*
MB	0.024	-0.062	-0.021
	0.18	*0.00*	*0.03*
PROF	0.121	0.844	0.584
	0.54	*0.00*	*0.00*
TANG	0.558	0.249	-0.046
	0.00	*0.00*	*0.38*
Sample size	8,968	11,088	14,053

Table 4 reports the results from estimating equation (1) via Probit regressions. Y is a binary variable taking the value 1 if the firm belongs to the big club and 0 otherwise. X is a vector of firm characteristic variables, namely assets, market-to-book ratio, profitability and tangibility of assets. Standard errors are robust to heteroscedasticity using the Huber/White estimator. Sample size is in firm-years. Numbers in italics are p-values.

Table 5. Leverage regressions on firm-specific and macroeconomic factors

Equation (2): $LEV_{it} = c + \beta X_{it-1} + \gamma Macro_{it-1} + \varepsilon_{it}$

	1970-2007		1980-2007		1985-2007	
	Big Club	Rest of the firms	Big Club	Rest of the firms	Big Club	Rest of the firms
c	0.141	0.189	0.175	0.153	0.116	0.143
	5.51	*4.94*	*7.69*	*5.45*	*6.77*	*4.86*
ASSETS	0.020	0.001	0.018	-0.004	0.017	0.014
	5.56	*0.26*	*5.48*	*-1.36*	*6.99*	*3.50*
MB	-0.015	-0.024	-0.016	-0.015	-0.019	-0.024
	-3.33	*-2.62*	*-3.53*	*-3.46*	*-6.40*	*-6.17*
PROF	-0.404	-0.137	-0.390	-0.116	-0.135	-0.141
	-5.81	*-1.58*	*-6.21*	*-2.46*	*-3.78*	*-2.99*
TANG	0.124	0.182	0.106	0.249	0.130	0.150
	3.30	*4.88*	*3.44*	*6.51*	*5.26*	*3.93*
STOCK_RET	-0.006	0.008	-0.007	0.036	-0.018	0.061
	-0.27	*0.17*	*-0.27*	*0.52*	*-0.92*	*0.96*
TERM_SPR	-0.765	-0.773	-0.730	-0.403	-0.619	0.133
	-2.49	*-1.06*	*-3.13*	*-0.47*	*-2.30*	*0.15*
Sample size	6,878	2,090	8,036	3,052	9,223	4,830

Table 5 reports the results from estimating equation (2). LEV is leverage. X is a vector of firm characteristic variables, namely assets, market-to-book ratio, profitability and tangibility of assets. Macro is a vector of macroeconomic variables, namely the one-year value-weighted market return of all stocks traded on the NYSE/AMEX/NASDAQ and the spread between the ten-year government bond yield series and the three-month Treasury-bill rate series. Numbers in italics are t-statistics. Standard errors (White standard errors clustered by firm and year) are robust to heteroscedasticity and to residual dependence across firms and across time. Sample size is in firm-years.

Table 6. Variables used to distinguish constrained from unconstrained firms

	1970-2007	1980-2007	1985-2007
ASSETS			
Mean of the big club firms	571.17	355.03	253.76
Mean of the rest of the firms	254.88	148.77	129.61
p-value for mean	0.000	0.000	0.000
p-value for distribution	0.000	0.000	0.000
PAYOUT RATIO			
Mean of the big club firms	0.577	0.564	0.522
Mean of the rest of the firms	0.480	0.439	0.414
p-value for mean	0.000	0.000	0.000
p-value for distribution	0.000	0.000	0.000
Sample size	8,968	11,088	14,053

Table 6 reports the mean of total assets and payout ratios for firms comprising the big club and for the rest of them within each sample. It also reports p-values for the null hypotheses of mean and distribution equality across the two groups within each sample. The test of distribution equality is a Kolmogorov-Smirnov nonparametric test. Assets are measured in $millions. Sample size is in firm-years.

Figure 1. Transition curves of convergence clubs in 7007 sample

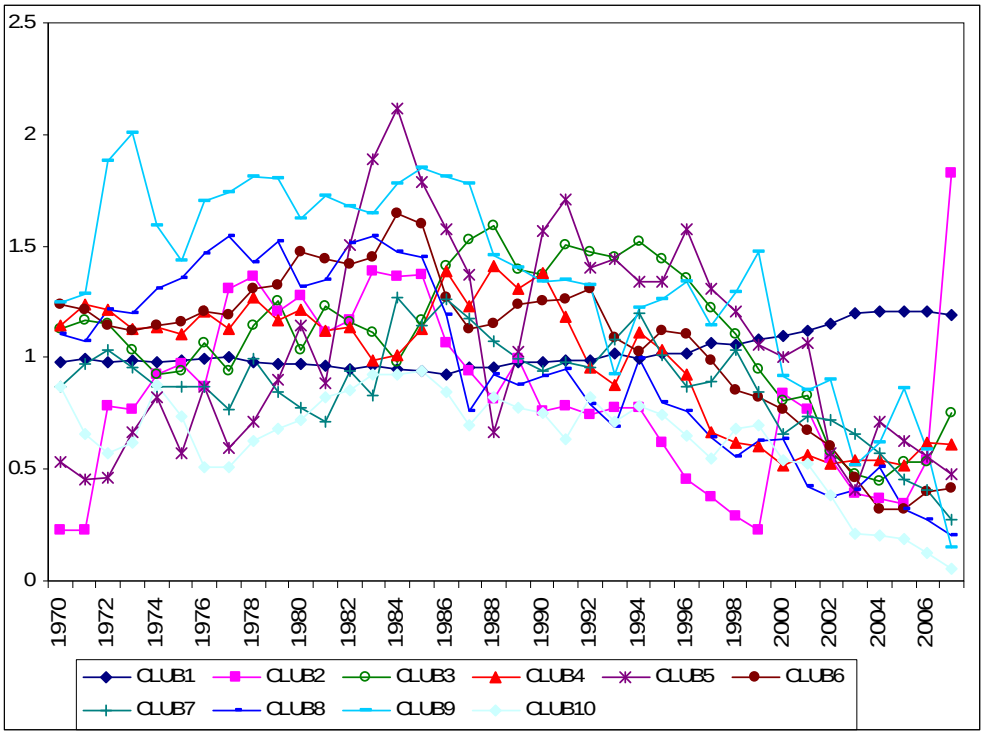

Figure 2
Big Club 7007: Transition curves of leverage, assets, market-to-book ratio, profitability and tangibility

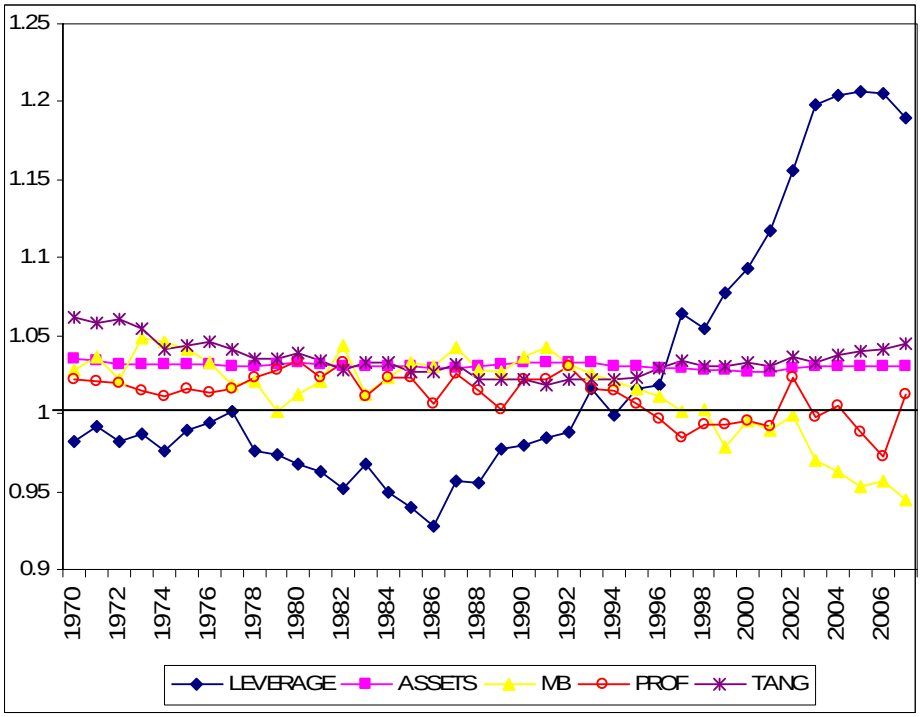

Figure 3
Big Club 8007: Transition curves of leverage, assets, market-to-book ratio, profitability and tangibility

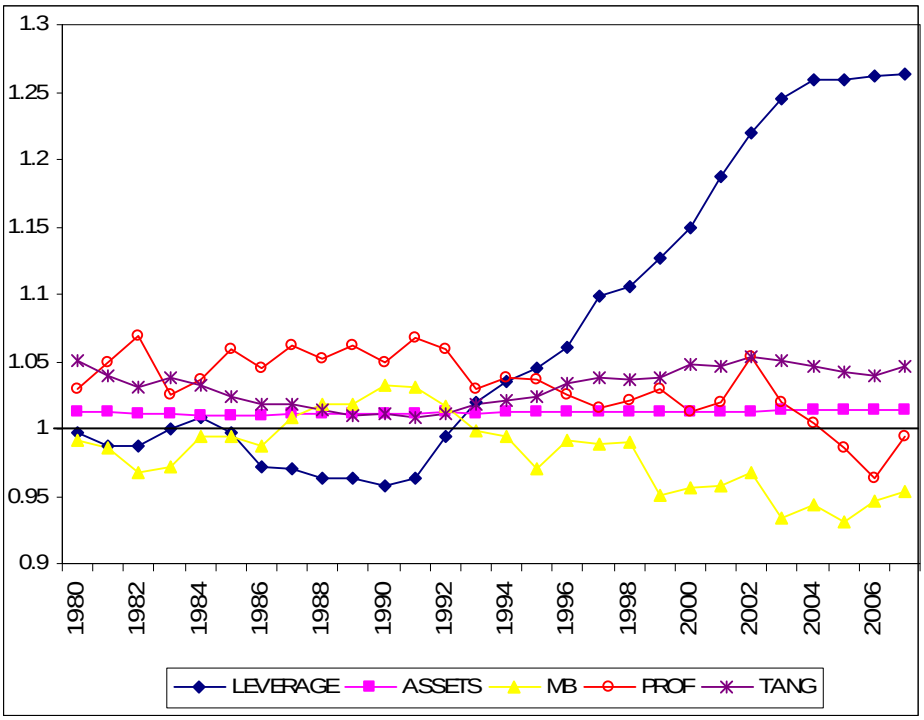

Figure 4
Big Club 8507: Transition curves of leverage, assets, market-to-book ratio, profitability and tangibility