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Supply of Capital and Capital Structure:

The Role of Financial Development

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Abstract

We explore the effect of financial development on corporate capital structure and the tightness of financial constraints that firms face. We employ an econometric technique which allows us to explicitly test for convergence in capital structure. This technique increases the power of our statistical tests. In doing so, we identify a group of convergent firms. The driving force of convergence is financial development, which positively affects the firms' leverage ratio. We also identify a group of firms, whose leverage is not affected by financial development, because they are financially constrained.

JEL Classification: G30; G32

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1. Introduction

The prevailing theories of capital structure, i.e., the trade-off theory and the pecking order theory, rely on the assumption that the supply of capital is perfectly elastic. This implies that corporate leverage is solely determined by a firm's demand for debt. Yet, there is empirical evidence indicating that supply-side conditions matter for corporate financing decisions (e.g., Graham and Harvey, 2001; Faulkender and Petersen, 2006; Leary, 2009; Lemmon and Roberts, 2010). Furthermore, Graham et al. (2015) find that a supply-side force, namely financial development, is among the most robust determinants of corporate leverage and suggest that the relation between the two and the precise channels through which this relation occurs is one of the most promising areas for future research. Holmstrom and Tirole (1997) suggest such a channel. They consider a moral hazard model and show that (i) financial development has a positive effect on leverage for firms with sufficient amount of own capital and (ii) firms become less financially constrained with higher financial development.

In this paper, we explore the influence of supply-side factors on corporate financing by testing the two aforementioned predictions. A conventional empirical methodology would use all sample firms to run a regression of leverage ratios on a financial development proxy. Instead, we are following a novel empirical approach which consists of two steps. In the first step, we test for convergence in corporate leverage ratios, in order to identify the firms whose financing decisions are most likely affected by financial development. In the second step, we regress leverage on financial development using the firms that have been identified in the first step. The advantages of our methodology over the conventional one are: (i) the exploration of the concept of convergence in capital structure (Lemmon et al. 2008) which, despite its profound implications for capital structure dynamics, has been barely explored so far and (ii) the identification of firms that are not affected by financial development. Moreover, this methodology allows us to increase the power of the statistical test in the second step. Our paper is the first to use a formal econometric tool to test for convergence in capital structure.

In the first step, we use the Philips and Sul (2007a) algorithm to test for convergence. This algorithm allows us to test whether convergence is in levels, i.e., the leverage ratios of firms tend to converge over time to the same level, or in rates, i.e., the leverage ratios of firms tend to move in parallel over time.[2] Furthermore, this algorithm tests whether convergence applies to all sample firms or to subsets of them. In the second case, there will be one or more convergent clubs.

The logical underpinnings of our empirical approach are as follows. Testing for convergence allows us to evaluate the comparative strength of the three groups of leverage determinants: firm-specific, industry-specific and economy-wide[3]. The firm-specific determinants point to divergence, the other two groups to convergence. Specifically, if only the firm-specific determinants are significant, there can be no-convergence in levels: each firm has its own leverage ratio, either fixed or time-varying. Yet, there can be convergence in rates, if there are common determinants of leverage. Intuitively, the leverage of convergent firms would tend to move in parallel, their 'distance' being driven by the firm-specific factors. If the common factors are primarily industry-specific, the convergent clubs will be dominated by firms in particular industries. If they are primarily economy-wide or supply-side, which are also economy-wide, there will be a convergent club whose composition will not be dominated by firms in any industry. Conversely, if the firm-specific factors are not significant, there can be convergence in levels –either fixed or time-varying– with each convergent group dominated by firms in specific industries, or with only one group.

The main part of our analysis concerns US firms over the period 1970-2007. Our results indicate that the economy-wide factors are a significant determinant of capital structure. Specifically, we find a large convergent club, with convergence in rates, which

[2] These concepts of convergence are wider than mean-reversion. The empirical literature has documented the existence of mean-reversion in corporate leverage ratios. Specifically, there is evidence that firms have either time-varying (e.g., Hovakimian et al., 2001; Flannery and Rangan 2006, Byoun 2008) or fixed (Lemmon et al. 2008) target leverage ratios and gradually readjust their capital structure, when shocks drive them away from the target. Accordingly, Lemmon et al. (2008) show that a firm's leverage ratio has two components, one permanent which is the firm's target ratio and leads to persistent cross-sectional differences in leverage, and one transitory which is the deviation of the actual ratio from the target and which the firm tries to eliminate through the active management of its capital structure. As elaborated in the next section, mean-reversion, though not inconsistent with convergence, is a narrower concept.

[3] The existing empirical literature has indeed identified three groups of time-varying factors that may affect leverage: firm-specific, such as, size and profitability; industry-specific, such as, industry-specific regulation and business risk; and economy-wide which are associated with the economic and financial environment within which firms operate, such as, the phase of the business cycle and the financial market conditions. See, among others, Rajan and Zingales, 1995; Hovakimian et al., 2001; Korajczyk and Levy, 2003; Flannery and Rangan, 2006; Frank and Goyal, 2009; Huang and Ritter, 2009.

comprises of more than 75% of the sample firms.[4] The remaining firms either form small convergent clubs with a few firms each, or do not belong to any club. Moreover, the industry composition of the large convergent club is similar to that of the whole sample, which indicates that industry-specific factors are not the main drivers behind convergence. All in all, the convergence in rates for the large club indicates that, besides the economy-wide common factors driving the detected convergence, there are also (time-varying and/or time-invariant) firm-specific factors at work which sustain the distance between firms as time goes by.[5]

This finding is robust to several alternative samples with which we try to detect a) whether convergence is a recent phenomenon – which is not, for convergence was evident since the mid 1990s; b) whether it is driven by some survivorship bias – which is not; and c) whether it is affected by the inclusion of newer firms, listed after 1970 – which is not. Despite the significant differences in the characteristics of the firms in these samples (e.g., size, profitability, tangibility), in each sample, there is a big convergent club which includes more than 65% of firms and in some cases more than 80%.

The analysis of the time evolution of leverage reveals two interesting patterns, common to all samples, which help to identify the economy-wide factors which are likely to be behind convergence. First, the leverage of the firms in the big club increased over the sample period, while that of the remaining firms decreased. This trend does not seem to be related to the phase of the business cycle. On the contrary, it seems to be related to secular trends associated with financial development. In particular, the big-club firms started increasing their leverage relative to the rest of the firms soon after the capital markets started expanding in the mid-80s, and kept increasing it, as the capital markets continued to expand until the mid-00s. Second, and consistent with the growing over time financial development, convergence tends to get stronger as time goes by, in the sense that the percentage of the firms in the big convergent club tends to increase as the end of the sample moves from the early 1990s to 2007.

[4] The sample contains all firms that were continuously listed between 1970 and 2007. 2007 is the last year before the eruption of the global financial crisis affected both the demand and the supply-side for external finance.

[5] This is consistent with the results of Lemmon et al. (2008), which indicate the existence of unobserved firm-specific time-invariant effects that exert significant influence on leverage and drive cross-sectional differences for long periods of time. Incidentally, Lemmon et al. (2008) were the first to introduce the concept of convergence in capital structure.

This analysis suggests that financial development is the most likely driver of convergence. To further explore this conjecture, we conduct two types of tests, both of which confirm it with all samples. First, we regress the leverage ratio on financial development indices and traditional capital structure determinants. We find that leverage is positively related to financial market development for the big-club firms and insignificant for the remaining. This result is robust across the alternative samples. Moreover, the IV estimation provides evidence of causality from financial development to leverage. The positive relation between leverage and financial development for the big-club firms is consistent with the prediction derived from the Holmstrom and Tirole (1997) model that leverage is increasing in financial development.

Second, we conduct probit analysis to find out which firm characteristics explain a firm's inclusion in the big convergent club. As it turns out, the firms in the big club are bigger, more profitable and have more tangible assets than the remaining firms. Hence, they had relatively easier access to capital markets, which explains why they were affected more than the rest of the firms by the development of the capital markets. In fact, we find evidence that the firms in the big convergent club increase their debt as financial development gather pace. In contrast, the remaining firms, which are not affected by financial development because they are financially constrained, do not increase their debt and increasingly cover their financial needs with trade credit and retained earnings. This explains why the leverage of the firms affected by financial development (big-club firms) increases, while that of the firms not affected by financial development (rest of the firms) decreases.

Furthermore, the comparison of the results of the probit analysis across the alternative samples indicates that, as time was going by, and financial development was gathering pace, newer and smaller firms were joining the big club in each sample and increasing their leverage. This finding is consistent with the second implication of Holmstrom and Tirole (1997) that financial development alleviates financial constraints for firms.

We also expand our analysis to two other countries, namely UK and Japan.[6] The results for the UK firms closely resemble those for the US firms. This is not surprising, given

[6] We also tried to consider firms from the remaining G7 countries, i.e., Canada, Germany, France, and Italy, but the number of usable observations was insufficient.

that the structure of the financial system and the timing of the financial development process in the two countries are very similar. In contrast, in Japan we fail to find a big convergent club whose firms are affected by financial development. A plausible explanation is the particularly strong ties between banks and non-financial firms (which may be even stronger within a keiretsu). These close ties distort financing decisions, which may not be taken on purely economic grounds.

In sum, this paper makes two main contributions. First, this paper is the first to provide evidence of convergence in capital structure using formal econometric techniques. The results of the convergence tests allow us to evaluate the relative importance of the three groups of leverage determinants: firm-specific, industry-specific and economy-wide. Second, this paper contributes to the research strand that examines the influence of financial development on capital structure (e.g., Demirgüç-Kunt and Maksimovic, 1999; De Jong et al., 2008; Leary 2009; Fan et al. 2012). Its distinguishing feature is that it identifies – without imposing any a priori restriction – a group of firms whose leverage is not affected by financial development. The common characteristic of the firms belonging to this group is that they are financially constrained, which means that they have limited access to financial markets and explains why they are not affected by financial development. The latter result complements the findings in Lemmon and Roberts (2010) who demonstrate that there is no relation between the supply of credit and leverage ratios for below-investment grade firms.

Another contribution of this paper is that it the first to provide evidence of how the effect of financial development on leverage evolves over time. Finally, the paper contributes to the literature that explores leverage determinants by proposing a new empirical approach that increases the statistical power of the relevant tests. It is highlighted by the comparison of the regression results with two groups of firms: (i) all firms and (ii) convergent firms only. In the former case, the coefficient for the financial development is either insignificant or marginally significant in some sample periods. In the latter case, it is highly significant across all sample periods.

The remainder of the paper is organized as follows. Section 2 presents the conceptual framework and the empirical strategy. Section 3 presents the panel convergence methodology developed by Phillips and Sul (2007a). Section 4 discusses the data. Sections 5 and 6 analyze the results that concern convergence tests and the drivers of convergence, respectively, for the US sample. Section 7 analyses the results that concern convergence tests and the drivers of convergence for the UK and Japan samples. Section 8 concludes.

2. Conceptual framework and empirical strategy

2.1. Supply-side factors: theoretical underpinnings

Holmstrom and Tirole (1997) consider a model with three types of agents: borrowers, informed lenders and uninformed lenders. The borrowers are firms that have an initial amount of capital and want to invest. Since their own capital is not sufficient to make the investment, firms have to borrow. There is a moral hazard problem, in the sense that the managers/owners of firms can choose an investment that gives them the opportunity to extract private benefits. The monitoring of the firms by informed lenders, i.e., financial intermediaries, can prevent firms from taking on such investments. However, given that this monitoring is costly for the informed lender and unobservable, a second moral hazard issue arises, as a result of which the monitoring is credible only if the informed lender commits some of its own capital to the borrower's investment. An uninformed investor will provide credit to a firm only after an informed investor has already provided credit. Informed lenders can be thought of as banks or any other sophisticated investor.

One implication of this model is that a reduction in the cost of monitoring will cause an increase in the leverage of the firms. Briefly, informed capital is more expensive than uninformed capital for the borrower, because the former involves monitoring costs. However, it is necessary for the borrower, because it gives him the opportunity to access cheaper uninformed capital. Therefore, firms minimize their exposure to informed capital by borrowing the minimum level that will certify that incentives are not distorted. This minimum level is increasing in the monitoring cost and so as monitoring cost decreases firms rely less on informed capital and more on uninformed capital. Given that the latter is cheaper than the former, a firm will be granted a larger amount of credit from the uninformed lender than from the informed lender for the same amount of pledged income. Hence, for a given amount of a firm's capital and the aggregate amount of capital held by banks, as monitoring cost decreases, the firm will increase its total borrowings, which implies higher leverage.

Another pertinent implication of the model is that firms with small amounts of own capital could be financially constrained, i.e., they could be denied credit. Also, the minimum level of own capital required to obtain credit increases with the monitoring cost. Thus a reduction in monitoring costs relaxes the firms' financial constraints, and so fewer firms are constrained.

In sum, the Holmstrom-Tirole model has the following two implications: i) Lower monitoring costs are associated with higher leverage, ii) Lower monitoring costs imply that firms become less financially constrained.

Moreover, monitoring costs are related to financial development. As Levine (1996) argues, the cost of monitoring decreases with the development of the financial system, as financial intermediaries apply enhanced techniques for gathering and processing information on potential borrowers and develop improved mechanisms for monitoring firm and manager performance. Furthermore, the emergence and development of rating agencies that accompanies financial system development may also lower monitoring costs for the borrowers, because rating firms can certify borrowers at a lower cost than financial intermediaries. The findings of Faulkender and Petersen (2006) and Sufi (2007), who show that firms that obtain a credit rating experience an increase in their leverage ratios, are consistent with this view.

2.2. Hypotheses and empirical strategy

The discussion in the previous sub-section leads to two testable empirical implications:

H1: Financial development is associated with higher leverage for firms with sufficient amount of own capital

H2: Financial development implies that firms become less financially constrained.

By testing the effect of financial development on leverage, we test for supply-side effects on corporate capital structure over an extended period of time. Thus, we complement previous studies, which have focused on restricted time periods. Leary (2009) and Lemmon and Roberts (2010) find that shocks in the bank loan and the corporate bond markets, respectively, affect corporate financing, while Faulkender and Petersen (2006) and Sufi (2007) find that firms increase their leverage when they obtain a credit rating.

However, instead of testing directly these two hypotheses, e.g., by regressing leverage on a financial development proxy, we follow a novel empirical approach. This approach has important advantages over the conventional approach, which will be presented after the description of the approach.

More specifically, we test for convergence in corporate leverage ratios by using the Philips and Sul (2007) algorithm. This algorithm allows testing for two things. First, provided that convergence is detected, it tests whether convergence is in levels, which means that the variable of interest (here, leverage) tends to converge over time to the same level for all cross-sectional units (here, firms); or in rates, which means that leverage tends to move in parallel as time goes by, i.e., the rate of change of leverage across the firms tends to converge over time.

Second, it tests whether convergence applies to all sample firms or to subsets of them. In the first case, there will be one convergent club, comprising of all sample firms. In the second, there will be more than one convergent clubs.

The test for convergence allows us to evaluate the comparative strength of three groups of leverage determinants: firm-specific, industry-specific and economy-wide. The firm-specific determinants point to divergence, the other two groups convergence. Specifically, if the firm-specific determinants are significant, there can be no-convergence in levels: each firm has its own leverage ratio, either fixed or time-varying. Yet, there can be convergence in rates, if there are common determinants of leverage. Intuitively, the leverage of convergent firms would tend to move in parallel, their 'distance' being driven by the firm-specific factors. If the common factors are primarily industry-specific, the convergent clubs will be dominated by firms in particular industries; if they are primarily economy-wide, there will be a convergent club whose composition will not be dominated by firms in any industry. Conversely, if the firm-specific factors are not significant, there can be convergence in levels –either fixed or time-varying— with each convergent group dominated by firms in specific industries, or with only one group.

Given that the existing literature has documented the significance of firm-specific factors (e.g., Rajan and Zingales, 1995; Frank and Goyal, 2009), we expect to find convergence in rates, rather than in levels. Hence, the question is whether convergence is driven primarily by industry-specific or economy-wide factors. Next, if it is driven by the latter, to test which they might be. Our testable hypotheses suggest that one such potential factor is financial development.

Putting everything together, provided that the PS algorithm has identified some convergent club(s), we explore their industry composition to test whether convergence is driven by industry-specific factors. If not, in which case there would be one convergent club, we next explore which economy-wide factors are the main drivers of convergence, focusing on business cycle effects and financial development. To do so, we split the sample into two groups of firms: those in the convergent club, and all the other. First, we examine the evolution over the business cycle of the leverage of the two groups of firms. Second, we regress leverage on financial development proxies separately for the two groups. If financial development drives convergence, it should affect only the leverage of the convergent firms and not that of the non-convergent firms. The regression that involves the convergent firms allows us to test Hypothesis 1, i.e., that leverage is increasing in financial development. Moreover, we explore the degree of financial constraints across the convergent and non-convergent firms. If financial development drives convergence, the convergent firms should have a relatively higher degree of access to external finance relative to non-convergent firms. Otherwise they would not have been affected.

In order to test Hypothesis 2, whether financial development alleviates financial constraints, we repeat the convergence test in several alternative sample periods. Specifically, we explore if the potential difference in the degree of financial constrains between convergent and non-convergent firms becomes smaller in periods of higher financial development.

One may argue that we could test directly for the effect of financial development on corporate leverage (Hypothesis 1) by simply regressing leverage on financial development and control variables using the whole sample, instead of testing for the existence of convergent clubs first. However, our methodology has an important advantage. Without imposing any a priori criterion, it allows the identification of the firms whose financing decisions are most likely affected by financial development, hence increasing the power of the statistical tests. Furthermore, regarding the second hypothesis, it provides evidence of how the degree of financial constraints evolves over time.

Finally, we should note that convergence is not the same as mean reversion (e.g., Flannery and Rangan 2006, Byoun 2008, Lemmon et al. 2008). Each firm's leverage ratio may exhibit mean reversion towards its (either fixed or time-varying) target, but this does not mean that the target is the same, which corresponds to convergence in levels, or that the change in the leverage is the same, which corresponds to convergence in rates. In other words, mean-reversion, though not inconsistent with convergence, is a narrower concept.

3. Phillips and Sul methodology

The methodology to test for convergence was developed by Phillips and Sul (2007a) − henceforth PS − and used in PS (2007b, 2009). In essence, it tests whether the dispersion of the variable of interest across cross-sectional units declines over time. To do so, it relies on a rather general form of a nonlinear time-varying factor model without any specific assumptions about the stationarity of the variable of interest.

In greater detail, suppose X_{it} is the variable of interest, with $i = 1, 2, \ldots, \mathrm{N}$ and $t = 1, 2, \ldots, \mathrm{T}$ denoting respectively the cross-sectional units and the time periods. X_{it} is deconstructed into a common, g_{it}, and an idiosyncratic, a_{it}, component. In the context of this test, convergence occurs when the idiosyncratic components across the cross-sectional units converge over time.

$$X_{it} = g_{it} + a_{it} \tag{1}$$

Philips and Sul transform (1) in a way that the variable of interest is decomposed in two time-varying components, one common, μ_t, and one idiosyncratic, δ_{it}, i.e.,

$$X_{it} = \left(\frac{g_{it} + a_{it}}{\mu_t}\right)\mu_t = \delta_{it}\mu_t, \ \text{ for all } i, t \tag{2}$$

In this way, testing for convergence is equivalent to testing whether the components δ_{it} converge. To this end, PS define the relative transition parameter h_{it} that measures the idiosyncratic component δ_{it} in relation to the panel average, $\frac{1}{N}\sum_{i=1}^{N}\delta_{it}$.

$$h_{it} = \frac{X_{it}}{\frac{1}{N}\sum_{i=1}^{N} X_{it}} = \frac{\delta_{it}\mu_t}{\frac{1}{N}\sum_{i=1}^{N} \delta_{it}\mu_t} = \frac{\delta_{it}}{\frac{1}{N}\sum_{i=1}^{N} \delta_{it}} \quad (3)$$

For example, $h_{it} = 1.2$ implies that the value for the i^{th} cross-sectional unit in the t^{th} time period is 20% higher than the cross-sectional average in that period. Plotting h_{it} over time gives the relative transition curves, which allow a visual inspection of the convergence process. Briefly, when there is convergence in levels, these curves will converge to the value of 1.

Noting that the mean of h_{it} is equal to 1 for all t, its time-varying cross-sectional variance, H_t, is

$$H_t = \frac{1}{N}\sum_{i=1}^{N}(h_{it} - 1)^2 \quad (4)$$

Under convergence, this variance declines over time. PS developed a formal econometric procedure to test for the time evolution of H_t. In particular, they showed that H_t has a limiting form of

$$H_t \sim \frac{A}{L(t)^2 t^{2\alpha}} \; as \; t \to \infty \quad (5)$$

where A is a positive constant, $L(t)$ is a slowly varying function like $\log t$, and α denotes the speed of convergence.

Depending on the estimated value of α, the methodology distinguishes two types of convergence; convergence in levels, when $\alpha \geq 1$, and in rates, when $0 \leq \alpha < 1$. The former means that the variable of interest across different cross-sectional units converges to the same value over time, hence, h_{it}, and the transition curves move towards one. The latter means that the growth rate of the variable of interest across different cross-sectional units converges, hence the transition curves will tend to move in parallel as time goes by.

Technically, the null hypothesis of convergence in rates (levels) is that $\alpha \geq 0$ $(\alpha \geq 1)$, against the alternative that $\alpha < 0$ $(\alpha < 1)$. PS test the null hypothesis using the following $\log t$ regression:

$$\log \frac{H_1}{H_t} - 2\log(\log t) = c + b \log t + u_t \tag{6}$$

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 $\log t$ is $\hat{b} = 2\hat{\alpha}$, where $\hat{\alpha}$ is the estimate of α in the null hypothesis. Put simply, $0 \leq \hat{b} < 2$ implies convergence in rates, while $\hat{b} \geq 2$ implies convergence in levels. Standard errors are heteroskedasticity and autocorrelation consistent (HAC)[7]. The data for this regression start at $T_0 = [rT]$, where $[rT]$ is the integer part of rT and $r = 1/3$, as suggested by PS.

Rejection of the null hypothesis of convergence for the full sample does not imply that there is no evidence of convergence in subgroups in the panel. PS extend their methodology in order to test for club convergence. They develop a four-step procedure. First, the 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, the algorithm takes the 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, provided of course that it is statistically significant, i.e., $t_b > -1.65$. In the third step, the cross-sectional units not included in the core group are evaluated for membership in that group. 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 qualifies for membership if the *t*-statistic of the associated $\log t$ regression is positive. In the end, it is also checked 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 to see whether they form another convergent group. If so, the sample consists of two convergent subgroups/clubs. If not, the Steps 1 to 3 are repeated with the units not included in the core group to determine whether

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

there is a smaller group of convergent units. This process is repeated until all the convergence clubs have been identified. The cross-sectional units not belonging to any club are characterized as divergent.

Focusing on the subject of this paper, the idiosyncratic component corresponds to the firm-specific factors affecting capital structure, while the common component corresponds to the industry-specific and/or the economy-wide factors. If, as noted in the introduction, the firm-specific factors are significant, there should be no convergence in levels. If, additionally, the industry-specific and/or the economy-wide factors are significant, there should be convergence in rates. In this case, if the industry-specific factors are the prevalent common force, the composition of the convergent clubs will be dominated by firms in one or more industries. The term 'dominated' means that these clubs will have a higher proportion of firms from these industries than the whole sample. By the same logic, if the economy-wide factors are the prevalent common force, the industry-composition of the convergent club will be similar to that of a whole sample. Conversely, if the firm-specific factors are not significant, there should be convergence in levels.

4. Data

4.1. Accounting data

We use annual accounting data drawn from the Compustat North America database over the period 1970 – 2007. Our sample consists of US firms. Depending on data availability, the number of usable firm-year observations varies across specifications and tests. Following the approach taken in previous research, financial firms (SIC 6000-6999) and utilities (SIC 4800-4999) are excluded. Firm-years with firms that have non-positive 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. We also exclude firm-years with missing observations. We winsorize all (final) accounting variables at the 1st and the 99th percentile to avoid the effect of outliers and misreported data.

Constrained by data availability and the technical requirement of the Phillips-Sul methodology that the panel must be balanced, the main sample – referred to as sample #1 – contains all firms that have no missing values throughout the 1970 – 2007 period. The sample ends in 2007 in order to avoid the distortions on firms' optimal capital structure decisions caused by the global financial crisis. Firms that were delisted before 2007 or were listed after 1970 are excluded.

Yet, in our extensive sensitivity analysis we use six more samples, referred to by the numbers #2 to #7. They are briefly described in appendix Table A2. With the first two we explore whether convergence is a more recent phenomenon, i.e., whether it can be detected back in the 1990s. Thus, samples #2 and #3 contain the same firms as the main sample, but the analysis ends respectively in 1995 and 2000. With the next two, samples #4 and #5, which also end in 1995 and 2000, but, compared to the previous two, contain the firms delisted after the end of the sample period, we test whether the results are driven by some survivorship bias. Consider, for example, a firm that was delisted in 1996. This firm will not be in the main sample, nor in samples #2, #3 and #5. But it will be contained in sample #4. By construction, sample #4 contains more firms than sample #2; likewise sample #5 relative to sample #4. Lastly, samples #6 and #7, which cover the periods 1980 – 2007 and 1985 – 2007, allow testing the effect of newer firms. Compared to the main sample, sample #6 additionally contains the firms that were listed between 1971 and 1980, while sample #7 those listed between 1971 and 1985.

The variable of interest is the leverage ratio. Following the approach taken in previous research, the leverage ratio is defined as financial debt, i.e., interest bearing liabilities, over total assets. For more details, see appendix Table A1.

4.2. Macroeconomic and financial development data

We also use variables characterizing the macroeconomic environment and the financial development of the US during the sample period. INFLATION is the expected annual percentage change in the US CPI over the coming year, using data from the Livingston Survey, published by the Federal Reserve Bank of Philadelphia. In order to measure the financial development in the US, we construct an index (FIN_DEV_US), which is calculated as the sum of (i) credit provided by banks and other financial institutions as a share of GDP, (ii) bond market capitalization as a share of GDP and (iii) stock market capitalization as a share of GDP. The first two variables proxy for credit market development, the third for stock market development.

Data on credit provided by banks and other financial institutions are collected from the World Bank Financial Structure Database. Data on stock and corporate bond market development in World Bank Database are available from 1989 and 1990 onwards, respectively. Since we needed data starting from 1970, we collected data from the US Flow of Funds Account. Details on the calculation of the indices for stock and bond market development indices can be found in appendix Table A1. The correlation of these indices with those from the World Bank Database during the overlapping period is 0.99.

5. Testing for convergence

The results suggest that there is convergence in rates, driven by economy-wide factors. Specifically, a very high proportion of the firms, in all samples, form a big club with convergence in rates. The industry composition of this club is very similar to that of the whole sample, an indication that convergence is primarily driven by economy-wide factors. The firms that do not belong to this club form several small clubs, while some do not belong to any club – they are divergent. Moreover, the relative transition curves of the convergent clubs indicate that the firms in the big club increased their leverage relative to the remaining firms. On closer inspection, the actual leverage (as opposed to the relative one) of the firms in the big club also increased over the sample period, while that of the remaining firms decreased.

The results for all samples are summarized in Table 1 and Table 2. Table 1 reports the results of the convergence tests, while Table 2 the industry composition of the big convergent clubs. In both tables, panel A reports the results for sample #1, the main sample, while panel B reports the results for the alternative samples in the robustness checks.

5.1. Main results

Panel A in Table 1 presents the results for convergence for the main sample, sample #1. The t_b statistic in column (3a), -9.93, is below the critical value of -1.65, indicating that there is no convergence in the leverage ratio of the firms in the sample (column 3b).

Insert Table 1 here

Given the absence of full-sample convergence, we proceed with the four-step procedure suggested by Phillips and Sul (2007), to identify convergent clubs. There are 10 convergent clubs (column 4), one of which contains 76.7% of the firms, 181 out of 236 (column 5). The remaining clubs are very small, containing between 0.8% - 3.4% of the firms, which means between 2 and 8 firms (column 7), while 5.5% of firms − 13 in total − are divergent, that is, they do not form any club (column 8).

Moreover, as column 6 indicates, the convergence of the big club is in rates, indicating that the leverage of these firms is affected by a common force, while firm-specific factors are important as well. Technically speaking, the estimated $\hat{b}$ coefficients are less than two. This is the case for most of the small ones, as well. Details about the convergent clubs are provided in appendix Table A3.

Insert Figure 1 here

Panel A in Figure 1 gives a visual indication of convergence by portraying the evolution of the time-varying cross-sectional variance (H_t) of the relative transition parameter (h_{it}) for leverage. The graph under the heading "All Firms" depicts the evolution of H_t when all firms are included in the calculations, while the graph under the heading "Big-club Firms" shows the evolution of H_t when only the firms of the big club are included. By construction, when H_t declines over time this is a sign that the cross-sectional units of the group converge. So, the "All Firms" H_t, having a slightly upward trend, shows no signs of convergence, the opposite from the big-club H_t that has a clear downward trend.

Insert Table 2 here

Panel A in Table 2 suggests that industry characteristics did not exert strong influence on leverage, hence, convergence was primarily driven by economy-wide factors. Specifically, columns (1) and (2) indicate that the industry composition of the whole sample and the big convergent club is essentially the same.

Insert Figure 2 here

The relative transitions curves of the big club (thick solid line, marked as club 1) and of the other convergent clubs, in Figure 2, provide several interesting insights. Focusing on the curve of the big club, it exhibits three distinct stages which are not likely related to the stage of the business cycle. First, it was relatively stable and about one until 1977, an indication that the firms in the club had on the average the same leverage as all the firms in the sample. Subsequently, the curve declined almost monotonically until 1986, an indication that the said firms were reducing their leverage relative to the rest of the sample. Lastly, the curve started an almost monotonic increase, which accelerated between 1995 and 2003, crossing the value of 1 in 1993 and peaking in 2005 at the value of 1.21, before declining slightly in 2006 and 2007 – the last years of the sample. Thus, the firms in the big club ended up with higher leverage than the remaining firms in the sample. As for the transition curves of the remaining firms, they followed the 'mirror' path of that of the big-club curve. These stages seemingly do not correspond with the US business cycle, as a comparison with the NBER dating in appendix Table A5 indicates.

It is interesting to note that the evolution of the relative transition curves is similar to the evolution of the actual (average) leverage of the big-club firms (Figure 3). Moreover, as the shaded areas in Figure 3 indicate, the leverage of the big-club firms is not related to the phase of the business cycle. Hence, cyclical economic fluctuations are unlikely to be the economy-wide factor that drives convergence.

Insert Figure 3 here

One potential concern with our results is that the leverage ratio is by definition bounded by one. This means that our convergence test might pick up a natural tendency of leverage ratios to move away from the extreme value of one. To test this possibility, we repeat our convergence test in the main sample (sample #1) by using a transformed leverage measure, i.e. debt over equity, which is not bounded by one. The results closely resemble those of our original measure, indicating that the detected convergence patterns are not driven by mechanical changes in leverage. In greater detail, we find one big club converging in rates and comprising of 77.1% of the sample firms. In addition, these firms overlap by 93.4% with those of the big club based on our original leverage measure.[8]

Another potential concern with our results is the existence of zero leverage firms in the sample. Since the financing behavior of zero debt firms can be quite different than the

[8] The results of the convergence tests based on the debt to equity ratio are not presented in detail, but are available upon request. The same applies for the results for the market leverage and non-zero leverage firms.

rest of the firms, the detected convergence might be partially driven by this effect. To address this issue, we exclude from the main sample all firms that have at least one year zero leverage throughout the sample period (26.3% of total firms in the main sample) and repeat the convergence test. The results indicate that the detected convergence patterns are robust to the exclusion of zero leverage firms. In particular, we detect one big club converging in rates and consisting of 78.2% of the firms in the truncated sample. Furthermore, the relative transition curve of the big club closely resembles that of the big club in the original non-truncated sample.

Throughout our analysis we use book leverage, defined as book value of debt over book value of total assets. We consider book leverage to be more appropriate than market leverage for testing for leverage convergence. The reason is that market leverage, defined as book value of debt over the sum of book value of debt and market value of equity, is affected by changes in the market value of equity. Hence, it would be difficult to disentangle the part of the potentially detected convergence that is due to changes in the financing policy of the firms from the part that is due to mechanical changes induced by the cyclical fluctuations of the stock market. Nevertheless, we repeat our convergence test for our main sample using market leverage. The results are qualitatively the same. Specifically, we detect one big club converging in rates and consisting of 70.8% of the firms. In addition, these firms overlap by 87.8% with those of the big club based on book leverage.

5.2. Robustness checks

The results of the extensive robustness checks, with the six alternative samples, are essentially the same with those of the main sample. They also indicate that the forces of convergence were exerting more influence on the capital structure decisions of firms as time was going by. These results come under three self-explanatory headings: a) *Is convergence a recent phenomenon?* b) *Controlling for survivorship bias*, and c) *Exploring the effect of new firms*. The pertinent samples, #2 – #7, are described in appendix Table A2.

To begin with, there is no full-sample convergence for any of the samples #2 – #7. Yet, in all samples, there is a big convergent club, with convergence in rates, that comprises of the big majority of the firms (Panel B in Table 1) – between 65.6% and 87%. The other convergent clubs contained few firms (columns (7) and (8) in Table 1 and Table A3). Consistent with these findings, the time-varying cross-sectional variance of leverage moves sideways or follows a slightly upward trend when all firms are considered, and a clear downward trend, when only the big-club firms are considered (Panels B-F in Figure 1). Moreover, the industry composition of the big club does not differ substantially from that of the full sample (Panel B in Table 2). Furthermore, the time evolution of leverage in all samples resembles that of sample #1, both for the big-club firms and the remaining firms.[9]

More interestingly, the results for the samples #2 and #3, which contain the same firms as the main sample #1 but end respectively in 1995 and 2000, indicate that convergence is not a recent phenomenon: it was evident from the mid 1990s already. Strengthening this conclusion, the composition of the big club was relatively constant: 77% of the firms included in the big club of sample #2, and 84.6% of the respective firms of sample #3, were also members of the big club in sample #1.[10] The results for the samples #4 and #5, which contain the firms that were delisted after 1995 and 2000 respectively, indicate that convergence does not likely reflect any survivorship bias. Also, the results for the samples #6 and #7, which contain the firms that were listed between 1971 – 1980 and 1971 – 1985 respectively, indicate that the newer firms followed the same path as the older and more established firms.

We also explore how convergence evolves over time, by using the following strategy. We apply the convergence test on the firms of the main sample but with the sample period ending in 1990. Then, keeping the same firms in the sample, we extend the sample period each time by one year and repeat the convergence test, until the end of sample period reaches 2007. Figure 4, shows the percentage of firms in the main sample that belong to the big convergent club, when the sample period ends in years 1990 through 2007. An interesting pattern arises. As time goes by, convergence seems to get stronger: the big convergent club tends to include a bigger percentage of the sample firms – an indication that the economy-wide factors behind convergence were exerting stronger influence.

Insert Figure 4 here

6. What's behind convergence?

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[9] Graphs are available upon request.

[10] Results are available upon request.

What's behind convergence? The results in Table 2 suggest that industry-specific factors are not the main driving force. This leaves economy-wide factors, i.e., macroeconomic and financial conditions. Yet, the visual evidence in Figure 3 and the comparison of the relative transition curve of the big club with the US business cycle dating (Table A5) suggest that the phase of the business cycle is unlikely to be the economy-wide factor driving convergence. Nor cyclical fluctuations in financial conditions. What about secular trends, like those from the financial development that followed the wave of liberalization that started in the early 1980s? One result of this development was increased access to credit by firms and households alike.

6.1. Convergence and financial development

The financial development index together with the relative transition curve for the big club of sample #1 are plotted in Figure 5. The financial development index exhibits a strong upward trend from the mid-80s onwards. Figure 5 provides favorable visual evidence for our hypothesis that convergence is driven by financial development. The evolution of the relative transition curve indicates that big-club firms started increasing their leverage relative to the rest of the firms soon after the capital markets started expanding in the mid-80s. In addition, both indices followed a parallel upward trend until the mid-00s, indicating that big-club firms kept increasing their leverage relative to the other firms as the capital markets continued to expand.

Insert Figure 5 here

In order to test formally the hypothesis that financial development drives convergence, we regress corporate leverage ratios on the financial development index and on control variables that proxy for demand-side factors affecting leverage. For each sample, i.e., 1970 – 2007 (sample #1), 1980 – 2007 (sample #6) and 1985 – 2007 (sample #7), we estimate separate regressions for the big club firms and the remaining firms. Given that our tests detected convergence in the rate of change and not in levels, we estimate all regressions in first differences.

$$\Delta LEV_{i,t} = \Delta FIN\_DEV_{t-1}\beta + \Delta X_{i,t-1}\delta + \Delta MACRO_{t-1}\theta + \varepsilon_{i,t} \quad (7)$$

We use Δ to denote first difference. $X_{i,t-1}$ and $MACRO_{t-1}$ stand respectively for the firm-specific and macroeconomic variables that have been documented by previous studies as significant determinants of leverage. The variables chosen are the ones identified by the extensive analysis of Frank and Goyal (2009) as the most reliable leverage determinants among the numerous factors that existing empirical papers have used. Combinations of these variables have been used in many existing studies (e.g. Rajan and Zingales, 1995; Frank and Goyal, 2003; Lemmon et al., 2008; Leary, 2009). These variables include size, proxying for default risk and information asymmetry between corporate insiders and outside investors; market-to-book ratio, which proxies for growth opportunities; profitability, which proxies for internal funds availability; tangibility, which proxies for collateral availability and expected distress costs; a dummy for dividend-paying firms, which –in contrast to the other variables– has no clear interpretation from the existing theories; industry median leverage, which proxies for industry-specific factors, such as business risk, technology or regulation; and expected inflation, which is positively related to the real value of tax deductions from debt.

A serious concern that arises when exploring supply effects on leverage is that of endogeneity. As Fan et al. (2012) point out, financial intermediaries and bond and stock markets may develop in ways that satisfy the financing needs of corporations. For example, in countries where firms require significant amounts of external capital, capital markets are likely to grow to satisfy these needs. In that case, the financial development variable in equation (7) would be endogenous.

In order to address this endogeneity issue, we estimate equation (7) via two-stage least squares, using two variables capturing financial development in all OECD countries -but the US- to instrument for the US financial development index. The first variable is total credit provided to the private non-financial sector as a share to GDP, capturing credit market development, and the second is stock market capitalization as a share to GDP, capturing stock market development. For each of the two variables we use the average for all OECD countries -but the US- that were members of the OECD in 1990 and for which data were available (Details are available in the Appendix Table A1). The sample period for the estimation of equation (7) spans from 1991 to 2007, as data for stock market capitalization are available from 1989 onwards. We consider these variables to be adequate instruments for US financial development. Concerning the relevance condition, both variables are likely to be highly correlated with the endogenous variable, as the wave of financial liberalization of the '80s that kicked off financial development occurred in other developed countries as well, not just in the US. Concerning the exogeneity condition, a country's capital markets are likely to be affected from the financing needs of domestic firms, rather than those of firms from abroad. Hence, it is rather unlikely that the development of capital markets in other OECD countries was driven by the financing preferences of the US firms.

The results of the two-stage least squares estimation of equation (7) are presented in Table 3. The estimated coefficients for the first-stage regression show that both instruments are strongly correlated with the endogenous variable. The sign of the coefficient estimates is positive, as expected. Furthermore, the Shea's partial R^2 (Shea 1997), which measures the explanatory power of the two excluded instruments in the first-stage regression, is particularly high (87%), indicating the strength of the instruments. We also conduct an over-identification test. The Hansen's J-statistic shows that the over-identifying restrictions are not rejected at the 5%, implying that the instruments are not correlated with the error term of the leverage equation.

Insert Table 3 here

The control variables have the expected sign, albeit they are not significant across all firm-groups and samples. In line with the results of Leary and Roberts (2014), industry median leverage is the control variable that exhibits the most consistent results, in the sense that it is significant across all but one samples.

Our primary interest though is in the coefficients of the financial development index. Consistently with the implications of Holmstrom and Tirole (1997) and supporting our hypothesis that convergence is driven by financial development, the coefficient for financial development is positive and significant for the big club firms and insignificant for the remaining firms, across all three samples considered. Furthermore, it is the only explanatory variable that remains significant for the big club firms and insignificant for the remaining firms in all three samples. Its positive coefficient implies that the expansion of the capital markets had a positive impact on leverage.

The effect of financial development is also economically significant. Specifically, our financial development index indicates that capital markets grew from 226.7% of GDP in

1991 to 466.6% of GDP in 2007. According to our empirical model estimates for the main sample (sample #1), this change leads to a 8.2% increase in a firm's leverage ratio. This is a significant change, given that the average leverage ratio of the big-club firms for that period is 22.9%.

We also use the dynamic panel GMM estimation, as proposed by Arellano and Bover (1995) and Blundell and Bond (1998), as an alternative way of controlling for potential simultaneity and reverse causality in the relation between capital structure choices and financial development. First, we convert the regression equation (7) into a dynamic model by incorporating lagged leverage as an extra explanatory variable into the equation. Then, we estimate the model by GMM, treating financial development as endogenous. We use the second and subsequent lags of leverage and financial development as instruments for the first lag of these variables and we limit the maximum number of lags to four. Our results remain qualitatively unchanged.[11]

We also estimate two alternative specifications of equation (7) by incorporating additional leverage determinants that have been proposed by the existing empirical literature. In the first specification, we add two firm-specific variables, namely R&D expenditures and depreciation expenses (Flannery and Rangan, 2006; Byoun, 2008; Hovakimian and Li, 2011). In the second specification, we add three economy-wide variables that proxy for business cycle variation (Korajczyk and Levy, 2003), namely the 2-year growth rate of real aggregate domestic nonfinancial corporate profits, the 2-year stock market return and the commercial paper spread. The results from both specification show that our findings for financial development are robust to the inclusion of the extra leverage determinants.[12]

Finally, we estimate equation (7) using all firms in each sample, i.e., both big-club and remaining firms. In doing so, we test if our empirical approach, that is looking for convergent clubs first and then focusing our analysis on convergent firms, does indeed increase the statistical power of the regressions of leverage on financial development. We find that the coefficient for financial development is insignificant in sample #7 and marginally significant at the 10% level in sample #6.[13] These findings indicate that our empirical approach increases the statistical power of the relevant tests.

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[11] Results are available upon request.
[12] Results are available upon request.
[13] Results are available upon request.

6.2. Convergence and financial constraints

The main result of our previous analysis is that the convergence of the leverage ratios of the big-club firms is driven primarily by the development of the capital markets. The question that comes up is why does financial development affect only the firms in the big club and not the remaining firms? An obvious answer is that the firms in the big club may have certain characteristics that allow them to have a relatively higher degree of access to external finance. Such a finding would reinforce our previous result that financial development is the driver of convergence.

In this section, we test whether the firms in the big club are relatively less financially constrained than the remaining firms. As proxies for the degree of financial constraints, we use two firm-specific characteristics identified in the existing literature as being associated with a firm being financially constrained or not, namely size and payout ratio. These are the two most-widely and least-debatable criteria used in the literature[14]. Small firms are more likely to be financially constrained due to the higher degree of informational asymmetries. For the payout ratio, dividends plus equity repurchases and investment are competing uses of funds. Hence, firms that have a lower degree of access to external financing will retain more of their internally generated cash flow for investment and thus will have lower payout ratios.

To enrich our specification, we augment our list of criteria with three more firm-specific characteristics that Korajczyk and Levy (2003) find to be significantly different between constrained and unconstrained firms, that is, market-to-book ratio, profitability and tangibility. Briefly, firms with a lower ratio, with more internally generated funds and more tangible assets are expected to be less constrained due to less severe asymmetric information problems and higher collateral values.

We conduct both univariate and multivariate analysis in each of the three samples: 1970 – 2007 (sample #1), 1980 – 2007 (sample #6) and 1985 – 2007 (sample #7). In the univariate analysis, we are comparing each of the aforementioned firm-specific

[14] There is considerable debate in the empirical literature regarding the observable characteristics of financially (un)constrained firms. Size and payout ratio have been extensively used. 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 was subsequently used in many studies (e.g., Korajczyk and Levy, 2003; Hahn and Lee, 2009; Hovakimian, 2011).

characteristics between the two groups of firms, i.e., the big-club and the remaining firms. In the multivariate analysis, we are conducting probit analysis. The dependent variable is a binary variable taking the value one if the firm belongs to the big club and zero otherwise, and the independent variables are the aforementioned firm-specific characteristics.

The results from the univariate analysis are presented in Table 4. The big-club firms tend to be bigger and more profitable; and to have higher market-to-book values, tangibility and payout ratios. These results hold across all three samples. Most of the variables indicate that the big-club firms have characteristics that are typical for relatively unconstrained firms.

Insert Table 4 here

The results from the probit analysis are shown in Table 5. For robustness, we estimate the probit regressions with the potential independent variables being contemporaneous (in panel A), and lagged one period (panel B) and five periods (panel C). The idea behind the usage of lagged values is that there may be some frictions that prevent firms from adjusting their capital structure instantaneously. Based on likelihood ratio tests, business sector dummies[15] are included in all equations.

The results indicate that, in all samples and specifications, size, as proxied by total assets, is consistently a significant and positive determinant of big-club participation. Yet, its coefficient progressively declines with the inclusion of new firms, which tend to be smaller, (Table A4) in samples #6 and #7. Profitability and the payout ratio are positive and significant in the last two samples. Lastly, the positive effect of tangibility declined progressively and became negative in the third sample. With the exception of tangibility in the third sample, all significant coefficients imply that firms in the big club are less constrained than the remaining firms.

Insert Table 5 here

The variation of coefficients across the three samples indicates a shift in the relative importance of market access criteria. In particular, the progressive decline of size and

[15] The categorization follows the Global Industry Classification Standard (GICS), developed by MSCI and S&P.

tangibility imply that, as time was going by, firms with smaller size and less collateral value were gaining access to capital markets, owing probably to financial development. The idea that financial development drives this pattern is consistent with the second implication of the Holmstrom and Tirole (1997) model, stating that financial development alleviates financial constraints. In addition, the emergence of profitability and payout ratio as significant criteria imply that among the newer and smaller firms, the most likely to tap into capital markets were those with the greatest potential of consistently generating profits.

6.3. Testing the effects of credit and stock market development separately

In our empirical tests thus far, the proxy for financial development consisted of two components, stock market development and credit market development. Next, we examine the effect of stock and credit market development on leverage separately. The effect of credit market development on leverage is expected to be positive. More developed credit markets imply lower monitoring costs for creditors and so higher supply of credit for firms. In contrast, the stock market development has two conflicting effects on leverage and the final outcome is ambiguous. First, the stock market expansion increases the supply of equity for firms and facilitates the substitution of equity for debt financing which has a negative effect on leverage. Second, stock market development facilitates the monitoring of firms and leads to lower monitoring costs. Lower monitoring costs have a positive effect on leverage.

In order to test the effect of stock and credit markets on leverage, we modify equation (7) by replacing the financial development variable with the stock market development variable, calculated as stock market capitalization as a share of GDP, or the credit market development variable, calculated as the sum of credit provided by banks and other financial institutions as a share of GDP and bond market capitalization as a share of GDP.

The results from estimating the modified version of equation (7) for stock and credit market development are presented in Tables 6 and 7, respectively. The coefficient for the credit market development variable is positive and statistical significant for the big club firms and insignificant for the remaining firms across all three samples. These findings indicate that, as expected, the expansion of the credit market increases corporate leverage. The coefficient of the stock market development variable is positive and statistical significant for the big club firms and insignificant for the remaining firms. This implies that stock market development has a positive effect on corporate leverage and thus that the effect of lower monitoring costs dominate. This result is consistent with the findings of Demirgüç-Kunt and Maksimovic (1999), who show that the leverage ratio of big firms is increasing in the stock market development, as proxied by stock market activity, while the leverage ratio of small firms is not correlated with stock market development.

Insert Tables 6 and 7 here

6.4. Leverage ratio dynamics

Figure 3 depicts the evolution of the average leverage ratios of the big club firms and the remaining firms. It is evident that the two groups diverge from 1995 onwards. The leverage ratio of the big club firms follows an upward trend starting from 20% in 1995 and rising to 24% in 2007, while that of the remaining firms follows a downward trend starting from 18.9% in 1995 and falling to 7.6% in 2007.

We conduct a decomposition of leverage changes across both groups from 1995 onwards, in order to explore the driver of the observed divergence. Specifically, for each firm-year we calculate the change in the leverage ratio that is attributable to a change in debt, non-financial liabilities and equity. Equity change is further decomposed into retained earnings and capital change. The formula is the following:

$$\Delta LEV_{i,t} = \Delta LEV\_D_{i,t} + \Delta LEV\_N_{i,t} + \Delta LEV\_E_{i,t}$$

$$= \frac{\delta_{i,t}\left(N_{i,t-1} + E_{i,t-1}\right)}{A_{i,t-1}A_{i,t}} - \frac{\nu_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}} - \frac{\varepsilon_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}} \qquad (8)$$

$where$

$$A_{i,t} = D_{i,t} + N_{i,t} + E_{i,t}$$

$$E_{i,t} = K_{i,t} + R_{i,t}$$

$$\Delta LEV\_E_{i,t} = \Delta LEV\_K_{i,t} + \Delta LEV\_R_{i,t} = \frac{\kappa_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}} - \frac{\rho_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}}$$

$A_{i,t}, D_{i,t}, N_{i,t}, E_{i,t}, K_{i,t}, R_{i,t}$ stand respectively for assets, debt, non-financial liabilities, equity, capital and retained earnings of the i^{th} firm in period t. $\delta_{i,t}, \nu_{i,t}, \varepsilon_{i,t}, \kappa_{i,t}, \rho_{i,t}$ denote respectively change in the level of debt, non-financial liabilities, equity, capital and retained earnings over the interval [*t-1, t*]. $\Delta LEV_{i,t}$ denotes the change in leverage ratio over the interval [*t-1, t*]. $\Delta LEV\_D_{i,t}, \Delta LEV\_N_{i,t}, \Delta LEV\_E_{i,t}, \Delta LEV\_K_{i,t}, \Delta LEV\_R_{i,t}$ stand for the change in leverage ratio due to the change in debt, in non-financial liabilities, equity, capital and retained earnings, respectively. Any increase (decrease) in the debt level will manifest itself in a positive (negative) $\Delta LEV\_D_{i,t}$ and thus will increase (decrease) the leverage ratio. Any increase (decrease) in the non-financial liabilities, equity, capital or retained earnings will respectively manifest itself in a negative (positive) $\Delta LEV\_N_{i,t}, \Delta LEV\_E_{i,t}, \Delta LEV\_K_{i,t}$ or $\Delta LEV\_R_{i,t}$ and thus will decrease (increase) the leverage ratio.

The results are presented in Table 8. The average annual change in the leverage ratio for the big club firms and the remaining firms is 0.37% and -0.89%, respectively. The decomposition of these changes reveals that it is mostly changes in the level of debt that drive the divergence between the two groups. Specifically, the leverage ratio of the big club firms increased by 1.24% per annum on average due to debt changes, implying that big club firms increased their debt levels. On the contrary, the leverage ratio of the remaining firms decreased slightly by 0.09% on average due to debt changes, suggesting that these firms maintained roughly the same levels of debt. The contribution of non-financial liabilities and equity to the change of leverage across the two groups is similar, given that big club firms and remaining firms experienced an increase in these categories that resulted in a leverage ratio decrease of 0.87% and 0.79% on an annual basis, respectively. The bulk of those changes stems from non-financial liabilities and retained earnings.

Insert Table 8 here

These findings provide evidence that big-club firms, being financially unconstrained, were able to take advantage of financial development and borrow more, while the remaining firms were not. The latter relied to a much greater extent on trade credit and retained earnings, which are typical sources of financing for financially constrained firms.

7. The cases of UK and Japan

We expand our analysis to an international level by using two more samples, one consisting of UK firms and one of Japanese firms over the period 1989-2007. Constrained by data availability and the technical requirement of the Phillips-Sul methodology that the panel must be balanced, the sample consisting of UK firms – referred to as sample #8 – and the sample consisting of Japanese firms – referred to as sample #9 – contain only firms that have no missing values over the 1989 – 2007 period. Specifically, samples #8 and #9 consist of 99 and 464 firms, respectively. Firm-level data are drawn from the Compustat Global database and are available from 1987 onwards. We skipped the first two years, as there were too many missing observations. Data on credit and stock market development for UK and Japan are collected from the World Bank Financial Structure Database and are available from 1990 onwards.

We also tried to consider firms from the remaining G7 countries, i.e., Canada, Germany, France, and Italy, but the number of usable observations was insufficient. Specifically, there were only 40 firms in Canada, 25 firms in Germany, 2 firms in France, and none in Italy that had no missing observations throughout the 1989 – 2007 period.

The results for samples #8 and #9 are summarized in Tables 9 to 13. In all tables, panel A reports the results for sample #8, i.e., the UK firms, while panel B reports the results for sample #9, i.e., the Japanese firms.

7.1. UK

The results for convergence for the UK firms are presented in Panel A of Table 9. The t_b statistic in column (3a), being lower than -1.65, indicates that there is no convergence in the leverage ratio of the 99 firms in the sample. However, when testing for the existence of convergent clubs, we identify 5 clubs (column 4), one of which contains 83.8% of the firms, namely 83 out of 99 (column 5). The remaining clubs are very small containing between 2% - 3% of the firms, which means between 2 and 3 firms (column 7), while 7.1% of firms − 7 in total − are divergent, that is, they do not form any club (column 8). Regarding the type of convergence, the firms in the big club are converging in rates. This indicates that the leverage ratio of these firms is affected by a common force, while firm-specific factors appear to matter as well. The convergence in the remaining clubs is also in rates. Technically speaking, the estimated $\hat{b}$ coefficients are less than two (Details on convergent clubs are available upon request).

Insert Table 9 here

Next, we explore the potential driving forces of convergence. Panel A of Table 10 shows that the industry composition of the big convergent club closely resembles that of the whole sample. This suggests that industry-specific factors are not the driving force of convergence, leaving economy-wide factors as the primary candidates.

Insert Table 10 here

The evolution of the average leverage ratio of the big-club firms provides interesting insights regarding the driving force of convergence. As shown in Figure 6, the relative transition curve of the big-club firms was relatively stable until 1995, ranging between 0.95 and 1, indicating that the big club firms had almost the same average leverage as all firms in the sample. Subsequently, the curve followed an upward trend and peaked in 2005 at the value of 1.16, before declining slightly in 2006 and 2007. This implies that the big-club firms increased their leverage ratio relative to the remaining firms. As shown in Figure 7, the evolution of the actual average leverage was similar. Specifically, the average leverage ratio of the big-club firms increased from 0.15 in 1995 to 0.26 in 2007. As indicated by the shaded areas in Figures 6 and 7, the evolution of the leverage ratio of the big-club firms – both in absolute and relative terms – is not related to the phase of the business cycle, suggesting that economic fluctuations are unlikely to be the economy-wide factor driving convergence.

Insert Figures 6 and 7 here

On the contrary, the evolution of the financial development index, plotted in Figure 6, provides favorable visual evidence for the hypothesis that financial development drives convergence. Specifically, the financial development index exhibits an upward trend from 1992 onwards, parallel to that of the leverage ratio of the big-club firms. This implies that big-club firms started increasing their leverage after the capital markets started expanding in the early 90s and kept increasing it as the capital markets continued to expand.

We formally test the hypothesis that financial development drives convergence by employing the empirical model specified by equation (7). We use the same specification and estimation method that we used for the US sample with some slight modifications. First, we exclude expected inflation from the group of control variables due to lack of available data. Second, we use the payout ratio instead of a dummy for dividend-paying firms to capture payout policy. The reason is that the former is likely to be more suitable for capturing variation in payout policy in this particular sample, given that firms paid dividends in 99% of all firm-years during the sample period. The results regarding financial development remain unchanged even when we use the dividend-paying dummy. Third, we use only one variable to instrument for the UK financial development index. Specifically, we use the average stock market capitalization as a share to GDP for all OECD countries -but the UK- that were members of the OECD in 1990 and for which data were available (Details are available in the Appendix Table A1). The second instrument, namely, the average total credit provided to the private non-financial sector as a share to GDP for all OECD countries but the UK, was dropped, because it was uncorrelated with the endogenous variable. The sample period for the estimation of equation (7) spans from 1992 to 2007, as data for the UK financial development index are available from 1990 onwards.

Panel A of Table 11 reports the results from the estimation of equation (7). The highly significant estimated coefficients for the first-stage regression and the particularly high Shea's partial R2 (Shea 1997) indicate that the instrument is strongly correlated with the endogenous variable. The sign of the coefficient is positive as expected. Given that the model is exactly identified, we cannot conduct an over-identification test. However, we conjecture that the instrument satisfies the exclusion criterion, given that a country's capital markets are likely to be affected from the financing needs of domestic firms, rather than those of firms from abroad. Hence, it is rather unlikely that the development of stock markets in other OECD countries was driven by the financing preferences of the UK firms.

The coefficient for financial development is positive and significant for the big-club firms and insignificant for the remaining firms. This finding provides support to the hypothesis that financial development drives convergence. Furthermore, consistent with Holmstrom and Tirole (1997), the positive sign of the coefficient indicates that corporate leverage is increasing in financial development. In terms of economic significance, our estimates suggest that the growth of capital markets from 207.4% of GDP in 1992 to 329.2% of GDP in 2007 leads to a 5.7% increase in a firm's leverage ratio. This is a significant change, given that the average leverage ratio of the big-club firms for that period is 19.9%.

Insert Table 11 here

Next, we explore whether the firms in the big club are relatively less financially constrained than the remaining firms. Such a finding would imply that the former have a higher degree of access to the capital markets and thus are more likely to be affected by financial development. Such a finding would reinforce our previous finding that convergence is driven by financial development. We employ the same analysis that we used for the US sample. The results from the univariate analysis, reported in Panel A of Table 12, indicate that big-club firms tend to be bigger, more profitable and to have higher market-to-book and tangibility ratios compared to the remaining firms. Furthermore, the results from the multivariate analysis, reported in Panel A of Table 13, point out that the most consistent determinants of big-club participation is size and tangibility. Both characteristics are typical for relatively unconstrained firms.

Insert Table 12 and 13 here

7.2. Japan

The results for convergence for the Japanese firms are presented in Panel B of Table 9. The 464 firms in the sample do not converge, as indicated by the t_b statistic (column 3a), which is lower than -1.65. However, there are 36 convergent clubs identified (column 4), one of which contains 24.4% of the firms, 113 out of 464 (column 5). The remaining clubs are relatively smaller, containing between 0.4% - 11.4% of the firms, which means between 2 and 53 firms (column 7), while 5.2% of firms − 24 in total − are divergent (column 8). The convergence in the big club is in rates, indicating that a common force affects the leverage ratio of the constituent firms. The convergence in the remaining clubs is also in rates. (Details on convergent clubs are available upon request).

The industry composition of the big convergent club and the remaining firms is presented in Panel B of Table 10. The similarity across the two groups of firms suggests that industry-specific factors are not the common force driving convergence.

The leverage dynamics of the big-club firms indicate that economic fluctuations are not driving convergence either. The average leverage ratio of the big-club firms is relatively stable until 1998 and then follows a downward trend reaching a trough in 2005 (Figure 8). The relative transition curve of the big club follows a monotonic increase from 1994 onwards (Figure 9), as the average leverage ratio of the remaining firms decreases at a faster pace than that of the big-club firms. The shaded areas in Figures 8 and 9 indicating recessions suggest that the leverage dynamics of the big club are not related to the phase of the business cycle.

Insert Figures 8 and 9 here

The financial development index is also plotted in Figure 9. There is no favorable visual evidence indicating that it is related to the relative transition curve of the big club. Furthermore, we formally test the relation between leverage and financial development by employing the empirical model specified by equation (7). We use the same specification and estimation method that we used for the UK sample. The results are presented in Panel B of Table 11. The coefficient for financial development is insignificant for the big-club firms, suggesting that financial development does not affect the leverage ratio of the firms in the big club and, thus, does not drive convergence.

The findings in the Japanese sample are not surprising, given that the financial system in Japan differs significantly from the ones in western countries such as the US and the UK. The distinguishing feature of the Japanese financial system is the existence of groups of firms known as keiretsu. Lincoln and Shimotani (2010) describe keiretsu member firms as being "linked together by cross-shareholdings, executive transfers, preferential trade and lending, and the regular encounters of chief executives in presidents' councils". Most importantly, the leader of a keiretsu is usually a large commercial bank, which serves as the coordinator of the group and the main financier of its member firms. Moreover, the bank acts as a lender of last resort, in case one of the member firms runs into financial distress (Lincoln and Shimotani, 2010).

This strong affiliation between banks and industrial firms has important implications for the structure of the financial system and the financing policy of the firms. Specifically, Japanese firms rely more heavily on bank financing than those in western economies such as the US and UK (Pinkowitz and Williamson 2001). Moreover, keiretsu firms have higher leverage ratios than non-keiretsu firms, as they are considered to have lower default risk (Hirota 1999).

Next, motivated by the distinguished features of the Japanese financial system, we explore whether keiretsu membership determines membership in the big convergent club and thus drives convergence. Our rationale is as follows. The decline in leverage of both the big-club and the remaining firms from 1998 onwards is most likely driven by the severe banking crisis that unfolded in 1998 and the subsequent credit crunch. However, the decline for the big-club firms is less intense than that of the remaining firms. One potential explanation is that big-club firms are keiretsu firms and, thus, have preferential access to bank credit compared to the remaining firms.

We define firms that participate in presidential councils of any of the big six keiretsu, namely, Mitsui, Mitsubishi, Sumitomo, Fuyo, Sanwa and DKB, as keiretsu firms and the rest of the firms as non-keiretsu firms. The names of the firms in presidential councils are taken from Lincoln and Shimotani (2010) and were originally obtained by the Japan Fair Trade Commission. The results for the probit analysis are reported in Panel B of Table 13. The coefficient for the dummy variable indicating keiretsu membership is positive and significant, indicating that keiretsu membership is a significant determinant of big-club participation. The rest of the explanatory variables are used to control for the degree of financial constraints that firms face.

8. Epilogue

In this paper, we employ an econometric technique which allows us to explicitly test for convergence in capital structure. We identify a group of convergent firms. The detected convergence is driven by financial development, which has a positive impact on the firms' leverage ratio. We also identify another group of firms, whose leverage is not affected by financial development. The capital structure of these firms is not affected by financial development as they have limited access to capital markets.

We see an interesting direction for future research. Specifically, our methodology could be used to explore the determinants of the debt maturity ratio too. Testing for debt maturity convergence, and identifying its most important drivers, either in the current paper's setting or in a cross-country setting, could also be a significant contribution to the literature (Guedes and Opler, 1996, Berger et al. 2005, Lucey and Zhang, 2011).

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Table 1
Convergence Tests – Results

Sample #	Period (1)	# of firms (2)	Full sample convergence (3a)	(3b)	# of clubs (4)	Big club as % of total (5)	Convergence of the big club in… (6)	Other clubs as % of total (7)	Divergent firms as % of total (8)
Panel A. Main Results									
#1:	**1970 – 2007**	236	$\hat{b}$: -0.70 $t_{\hat{b}}$: -9.93	NO	10	76.7% (181)	Rates	0.8%-3.4% (2-8)	5.5% (13)
Panel B. Robustness Checks									
a) *Is convergence a recent phenomenon? Testing with the same firms as in the main sample*									
#2:	**1970 – 1995**	236	$\hat{b}$: -0.73 $t_{\hat{b}}$: -12.66	NO	10	75.4% (178)	Rates	0.8%-4.2% (2-10)	4.7% (11)
#3:	**1970 – 2000**	236	$\hat{b}$: -0.66 $t_{\hat{b}}$: -9.69	NO	13	66.1% (156)	Rates	0.8%-8.9% (2-21)	3.8% (9)
b) *Controlling for survivorship bias: Testing with all firms that had no missing-values during the sample period*									
#4:	**1970 – 1995**	565	$\hat{b}$: -0.78 $t_{\hat{b}}$: -14.54	NO	25	76.5% (432)	Rates	0.4%-1.8% (2-10)	4.2% (24)
#5:	**1970 – 2000**	392	$\hat{b}$: -0.55 $t_{\hat{b}}$: -8.99	NO	13	87.0% (341)	Rates	0.5%-2.0% (2-8)	2.0% (8)
c) *Exploring the effect of new firms*									
#6:	**1980 – 2007**	396	$\hat{b}$: -0.82 $t_{\hat{b}}$: -9.91	NO	13	72.5% (287)	Rates	0.5%-4.5% (2-18)	9.6% (38)
#7:	**1985 – 2007**	611	$\hat{b}$: -0.83 $t_{\hat{b}}$: -12.55	NO	34	65.6% (401)	Rates	0.3%-3.9% (2-24)	9.8% (60)

We test for leverage convergence across firms over time. This table presents the results of Phillips and Sul (2007) convergence tests. Column (2) shows the number of firms. Columns (3a) and (3b) show the results of the tests for full-sample convergence: the estimated *t*-statistic and whether there is convergence. There is convergence when the *t*-statistic exceeds the critical value -1.65. Columns (4) to (8) present results of tests for the existence of convergent clubs, i.e., of sub-groups of convergent firms: Column (4) shows the number of clubs, columns (5) and (7) the relative and absolute size of clubs (the number in parentheses show the number of firms in the convergent clubs); column (6) the type of convergence and column (8) the number of firms that do not belong to any club. Convergence in levels means that the variable of interest across different cross-sectional units converges to the same value over time, while convergence in rates means that the growth rate of the variable of interest across different cross-sectional units converges over time.

Table 2
Sectoral Composition of the Big Convergent Clubs

	Panel A		Panel B. Robustness Checks									
	1970 – 2007		1970 – 1995	1970 – 2000	1970 – 1995		1970 – 2000		1980 – 2007		1985 – 2007	
	All Firms	Big Club	Big Club	Big Club	All Firms	Big Club	All Firms	Big Club	All Firms	Big Club	All Firms	Big Club
Sample #		#1	#2	#3		#4		#5		#6		#7
# of firms	236	181	178	156	565	432	392	341	396	287	611	401
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Energy	6.8%	5.0%	6.2%	6.4%	6.2%	6.3%	6.4%	6.2%	7.1%	6.3%	7.7%	8.0%
Materials	11.0%	13.3%	12.4%	12.2%	14.5%	16.2%	12.0%	12.6%	10.4%	12.2%	9.5%	10.5%
Industrials	33.1%	32.6%	33.7%	32.7%	31.0%	31.9%	31.9%	32.3%	32.1%	32.4%	27.0%	25.9%
Consumer Discretionary	22.9%	23.8%	22.5%	25.0%	23.2%	23.6%	24.2%	24.6%	21.2%	22.6%	19.6%	22.0%
Consumer Staples	13.1%	14.4%	14.0%	14.1%	12.0%	11.6%	12.0%	12.3%	11.4%	12.9%	10.5%	10.2%
Health Care	5.9%	6.1%	4.5%	3.9%	5.5%	4.9%	5.9%	5.9%	6.1%	4.9%	9.0%	7.7%
Information Technology	7.2%	5.0%	6.7%	5.8%	7.6%	5.6%	7.7%	6.2%	11.9%	8.7%	16.7%	15.7%

This table provides information about the sectoral composition of the big convergent clubs. Our categorization follows the Global Industry Classification Standard (GICS), developed by MSCI and S&P. The Sample # is the same as in table 1.

Table 3
Leverage regressions on fin. development indices and traditional leverage determinants

	Sample #1 1970 – 2007		Sample #6 1980 – 2007		Sample #7 1985 – 2007	
	Big Club	Remaining firms	Big Club	Remaining firms	Big Club	Remaining firms
First-stage regression						
Δ CREDIT_OECD_US	1.245***	1.209***	1.240***	1.235***	1.232***	1.241***
	3.44	*3.36*	*3.38*	*3.36*	*3.39*	*3.36*
Δ STOCK_OECD_US	1.912***	1.916***	1.910***	1.920***	1.911***	1.911***
	14.56	*14.09*	*14.55*	*14.55*	*14.62*	*14.69*
Partial R^2	0.87	0.87	0.87	0.87	0.87	0.87
Hansen's J-stat	0.389	3.523	1.105	3.172	2.628	1.397
p-value	0.533	0.061	0.293	0.075	0.105	0.237
Second-stage regression						
Δ FIN_DEV_US	0.034***	0.012	0.035***	-0.011	0.027***	0.001
	4.83	*-0.54*	*3.38*	*-0.69*	*2.66*	*0.04*
Δ ASSETS	0.003	0.007	-0.004	0.015	0.000	0.018**
	0.53	*-0.28*	*-0.83*	*1.64*	*0.10*	*2.19*
Δ MB	-0.002	0.023*	0.002	0.005	-0.001	0.001
	-0.66	*1.93*	*0.64*	*1.43*	*-0.32*	*0.34*
Δ PROF	-0.028	-0.084	-0.063**	-0.026	-0.026	-0.062*
	-0.97	*-0.97*	*-2.56*	*-1.27*	*-1.63*	*-1.87*
Δ TANG	0.055	0.094*	0.066**	0.131***	0.063**	0.060**
	1.59	*1.70*	*2.25*	*3.13*	*2.51*	*2.36*
Δ INFLATION	0.490	1.240	0.209	1.268*	0.278	0.783
	1.15	*1.43*	*0.40*	*1.85*	*0.59*	*1.18*
Δ DIV	0.016	0.004	0.010*	-0.003	0.006	-0.005
	1.23	*0.36*	*1.76*	*-0.46*	*1.15*	*-0.09*
Δ MED_IND	0.085*	0.111	0.071*	0.172**	0.087**	0.120*
	1.74	*1.03*	*1.85*	*2.02*	*2.29*	*1.80*
Adj. R^2	0.02	0.04	0.01	0.02	0.01	0.01
# of observations	3,077	935	4,877	1,852	6,806	3,561
# of firms	181	55	287	109	401	210

This table reports the results from estimating equation (7) via two-stage least squares for the samples #1, #6 and #7. All variables are in first differences. Δ denotes first-difference. The dependent variable is leverage. The endogenous variable is financial development in the US (FIN_DEV_US), calculated as the sum of (i) credit provided by banks and other financial institutions as a share of GDP, (ii) bond market capitalization as a share of GDP and (iii) stock market capitalization as a share of GDP. The excluded instruments are total credit provided to the private non-financial sector as a share to GDP (CREDIT_OECD_US), and stock market capitalization as a share to GDP (STOCK_OECD_US). For each of the two variables we use the average for all OECD countries - but the US- that were members of the OECD in 1990 and for which data were available (See Table A1 of the Appendix for details). The table also reports Shea's (1997) partial R-squared measure for the excluded instruments in the first-stage regression and Hansen's J-stat for the overidentifying restrictions test. ASSETS is the natural log of book assets expressed in 1983 US dollars. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. DIV is a dummy variable that takes the value of 1 for dividend payers and 0 otherwise. MED_IND is the median leverage of the industry group that the firm belongs to. INFLATION is the expected annual percentage change in the US CPI over the coming year, using data from the Livingston Survey available at http://www.phil.frb.org/econ/liv/index.html. Numbers in italics are t-statistics. Standard errors (White standard errors clustered by firm and year) are robust to heteroskedasticity and to residual dependence across firms and time.

Table 4
Differences in firm characteristics between big-club firms and remaining firms

	Sample #1 1970 – 2007			Sample #6 1980 – 2007			Sample #7 1985 – 2007		
	Big-club Firms	Remaining firms	p-value for equality	Big-club Firms	Remaining firms	p-value for equality	Big-club Firms	Remaining firms	p-value for equality
ASSETS									
Mean	571.2	254.9	0.000	355.0	148.8	0.000	253.8	129.6	0.000
Median	556.0	163.4	0.000	383.6	121.1	0.000	251.7	108.0	0.000
MB									
Mean	1.557	1.482	0.002	1.591	1.698	0.000	1.688	1.708	0.339
Median	1.281	1.220	0.000	1.332	1.307	0.037	1.372	1.324	0.000
PROF									
Mean	0.162	0.154	0.000	0.149	0.130	0.000	0.137	0.118	0.000
Median	0.161	0.155	0.008	0.149	0.138	0.000	0.142	0.125	0.000
TANG									
Mean	0.361	0.309	0.000	0.345	0.305	0.000	0.328	0.315	0.001
Median	0.321	0.274	0.000	0.300	0.258	0.000	0.282	0.260	0.000
PAYOUT									
Mean	0.577	0.480	0.001	0.564	0.439	0.000	0.522	0.414	0.000
Median	0.402	0.306	0.000	0.361	0.214	0.000	0.306	0.126	0.000
# of observations	6,878	2,090		8,036	3,052		9,223	4,830	
# of firms	181	55		287	109		401	210	

This table reports the means and medians of firm-level variables for the big club firms and the remaining ones. It also reports the p-values of the standard t-test for equality in the means and the Kruskal-Wallis test for equality in the medians. ASSETS is book assets expressed in 1983 US millions of dollars. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. PAYOUT is common dividends plus preferred dividends plus purchase of common and preferred stock divided by income before extraordinary items.

Table 5
Determinants of participation in the big convergent club

	Sample #1 1970 – 2007	Sample #6 1980 – 2007	Sample #7 1985 – 2007
Panel A: $Y_{i,t} = c_{ind} + \beta X_{i,t} + \varepsilon_{i,t}$			
ASSETS	0.116***	0.092***	0.068***
	13.83	*14.27*	*12.65*
MB	0.036*	-0.015	-0.005
	1.88	*-1.16*	*-0.46*
PROF	-0.138	0.522***	0.561***
	-0.69	*3.55*	*5.07*
TANG	1.140***	0.390***	-0.165***
	12.46	*5.10*	*-2.76*
PAYOUT	0.018	0.018*	0.018**
	1.39	*1.72*	*1.98*
Pseudo R^2	0.095	0.065	0.025
# of observations	8,968	11,088	14,053
# of firms	236	396	611
Panel B: $Y_{i,t} = c_{ind} + \beta X_{i,t-1} + \varepsilon_{i,t}$			
ASSETS	0.115***	0.090***	0.067***
	13.40	*13.90*	*12.35*
MB	0.047**	-0.011	-0.003
	2.39	*-0.82*	*-0.29*
PROF	-0.174	0.592***	0.602***
	-0.82	*3.97*	*5.39*
TANG	1.142***	0.397***	-0.181***
	12.26	*5.16*	*-3.00*
PAYOUT	0.020	0.025**	0.023**
	1.48	*2.31*	*2.55*
Pseudo R^2	0.095	0.065	0.025
# of observations	8,732	11,070	14,019
# of firms	236	396	611
Panel C: $Y_{i,t} = c_{ind} + \beta X_{i,t-5} + \varepsilon_{i,t}$			
ASSETS	0.110***	0.087***	0.065***
	11.75	*12.86*	*11.48*
MB	0.083***	0.017	0.020**
	3.73	*1.35*	*2.05*
PROF	-0.146	0.811***	0.717***
	-0.63	*5.51*	*6.46*
TANG	1.142***	0.439***	-0.209***
	11.39	*5.56*	*-3.36*
PAYOUT	0.023	0.025**	0.020**
	1.53	*2.13*	*2.07*
Pseudo R^2	0.096	0.066	0.026
# of observations	7,788	10,814	13,457
# of firms	236	396	611

All equations are estimated via Probit regressions, with industry dummies. 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-level variables, namely ASSETS, MB, PROF, TANG and PAYOUT. ASSETS is the natural log of book assets expressed in 1983 US dollars. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. PAYOUT is common dividends plus preferred dividends plus purchase of common and preferred stock divided by income before extraordinary items Standard errors are robust to heteroskedasticity using the Huber/White estimator. Numbers in italics are z-statistics. ***, ** and * indicate 1%, 5% and 10% statistical significance levels, respectively.

Table 6
Leverage regressions on credit market development index and traditional leverage determinants

	Sample #1 1970 – 2007		Sample #6 1980 – 2007		Sample #7 1985 – 2007	
	Big Club	Remaining firms	Big Club	Remaining firms	Big Club	Remaining firms
First-stage regression						
Δ CREDIT_OECD_US	1.329***	1.317***	1.330***	1.325***	1.329***	1.330***
	6.91	*6.98*	*6.90*	*6.97*	*6.94*	*6.89*
Δ STOCK_OECD_US	0.424***	0.427***	0.423***	0.430***	0.423***	0.428***
	4.12	*4.19*	*4.11*	*4.25*	*4.14*	*4.18*
Partial R^2	0.83	0.82	0.82	0.83	0.83	0.83
Hansen's J-stat	2.235	2.721	2.342	2.532	3.641	1.216
p-value	0.135	0.099	0.126	0.112	0.056	0.270
Second-stage regression						
Δ CREDIT_US	0.074***	-0.024	0.073**	-0.061	0.050*	-0.021
	3.57	-0.56	2.49	-1.71	1.75	-0.49
Δ ASSETS	0.004	0.014	-0.003	0.018*	0.002	0.019*
	0.60	0.57	-0.54	1.87	0.36	2.11
Δ MB	-0.001	0.024*	0.003	0.005	-0.000	0.001
	-0.44	2.06	0.78	1.41	-0.18	0.37
Δ PROF	-0.020	-0.083	-0.058**	-0.027	-0.024	-0.062*
	-0.69	-0.94	-2.29	-1.37	-1.50	-1.90
Δ TANG	0.058	0.085	0.068**	0.125***	0.063**	0.058**
	1.69	1.57	2.40	2.98	2.53	2.34
Δ INFLATION	0.597	1.158	0.318	1.136*	0.344	0.724
	1.61	1.29	0.59	1.97	0.75	1.06
Δ DIV	0.017	0.004	0.011*	-0.002	0.007	-0.005
	1.32	0.33	1.87	-0.39	1.19	-0.91
Δ MED_IND	0.117**	0.117	0.102**	0.159*	0.108***	0.118*
	2.58	1.00	2.38	1.88	2.94	1.91
Adj. R^2	0.01	0.04	0.01	0.03	0.01	0.01
# of observations	3,077	935	4,877	1,852	6,806	3,561
# of firms	181	55	287	109	401	210

This table reports the results from estimating a modified version of equation (7) via two-stage least squares for the samples #1, #6 and #7. The modification is that the US financial development variable is replaced by the US credit market development variable. All variables are in first differences. Δ denotes first-difference. The dependent variable is leverage. The endogenous variable is credit market development in the US (CREDIT_US), calculated as the sum of (i) credit provided by banks and other financial institutions as a share of GDP and (ii) bond market capitalization as a share of GDP. The excluded instruments are total credit provided to the private non-financial sector as a share to GDP (CREDIT_OECD_US), and stock market capitalization as a share to GDP (STOCK_OECD_US). For each of the two variables we use the average for all OECD countries -but the US- that were members of the OECD in 1990 and for which data were available (See Table A1 of the Appendix for details). The table also reports Shea's (1997) partial R-squared measure for the excluded instruments in the first-stage regression and Hansen's J-stat for the overidentifying restrictions test. ASSETS is the natural log of book assets expressed in 1983 US dollars. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. DIV is a dummy variable that takes the value of 1 for dividend payers and 0 otherwise. MED_IND is the median leverage of the industry group that the firm belongs to. INFLATION is the expected annual percentage change in the US CPI over the coming year, using data from the Livingston Survey available at http://www.phil.frb.org/econ/liv/index.html. Numbers in italics are t-statistics. Standard errors (White standard errors clustered by firm and year) are robust to heteroskedasticity and to residual dependence across firms and time.

Table 7
Leverage regressions on stock market development index and traditional leverage determinants

	Sample #1 1970 – 2007		Sample #6 1980 – 2007		Sample #7 1985 – 2007	
	Big Club	Remaining firms	Big Club	Remaining firms	Big Club	Remaining firms
First-stage regression						
Δ STOCK_OECD_US	1.473***	1.470***	1.472***	1.476***	1.472***	1.469***
	13.37	*12.99*	*13.18*	*13.09*	*12.94*	*13.10*
Partial R^2	0.82	0.81	0.82	0.82	0.82	0.82
Second-stage regression						
Δ STOCK_US	0.050***	0.034	0.053***	-0.005	0.043***	0.008
	4.95	*0.98*	*3.87*	*-0.19*	*3.28*	*0.33*
Δ ASSETS	0.005	0.004	-0.002	0.013	0.001	0.017**
	0.78	*0.16*	*-0.53*	*1.50*	*0.25*	*2.21*
Δ MB	-0.002	0.023*	0.002	0.005	-0.001	0.001
	-0.75	*1.87*	*0.56*	*1.42*	*-0.38*	*0.29*
Δ PROF	-0.032	-0.088	-0.065**	-0.027	-0.028*	-0.063*
	-1.12	*-1.03*	*-2.70*	*-1.28*	*-1.76*	*-1.89*
Δ TANG	0.053	0.095	0.063**	0.133***	0.062**	0.060**
	1.52	*1.71*	*2.16*	*3.08*	*2.46*	*2.30*
Δ INFLATION	0.403	1.198	0.114	1.297*	0.206	0.782
	0.83	*1.50*	*0.21*	*1.83*	*0.42*	*1.23*
Δ DIV	0.015	0.005	0.009	-0.003	0.006	-0.005
	1.15	*0.41*	*1.63*	*-0.50*	*1.10*	*-0.90*
Δ MED_IND	0.069	0.090	0.055	0.169*	0.074*	0.116
	1.41	*0.92*	*1.46*	*2.00*	*1.90*	*1.72*
Adj. R^2	0.02	0.04	0.01	0.02	0.01	0.01
# of observations	3,077	935	4,877	1,852	6,806	3,561
# of firms	181	55	287	109	401	210

This table reports the results from estimating a modified version of equation (7) via two-stage least squares for the samples #1, #6 and #7. The modification is that the US financial development variable is replaced by the US stock market development variable. All variables are in first differences. Δ denotes first-difference. The dependent variable is leverage. The endogenous variable is stock market development in the US (STOCK_US), calculated as stock market capitalization as a share of GDP. The excluded instrument is stock market capitalization as a share to GDP (STOCK_OECD_US), calculated as the average for all OECD countries -but the US- that were members of the OECD in 1990 and for which data were available (See Table A1 of the Appendix for details). The table also reports Shea's (1997) partial R-squared measure for the excluded instrument in the first-stage regression. ASSETS is the natural log of book assets expressed in 1983 US dollars. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. DIV is a dummy variable that takes the value of 1 for dividend payers and 0 otherwise. MED_IND is the median leverage of the industry group that the firm belongs to. INFLATION is the expected annual percentage change in the US CPI over the coming year, using data from the Livingston Survey available at http://www.phil.frb.org/econ/liv/index.html. Numbers in italics are t-statistics. Standard errors (White standard errors clustered by firm and year) are robust to heteroskedasticity and to residual dependence across firms and time.

Table 8
Decomposition of leverage changes

	Big club firms	Remaining firms
ΔLEV: Leverage ratio change	0.37%	-0.89%
ΔLEV_D: Leverage ratio change due to debt change	1.24%	-0.09%
ΔLEV_N: Leverage ratio change due to non-financial liabilities change	-0.37%	-0.21%
ΔLEV_E: Leverage ratio change due to equity change	-0.50%	-0.58%
ΔLEV_K: Leverage ratio change due to capital change	-0.03%	-0.17%
ΔLEV_R: Leverage ratio change due retained earnings change	-0.47%	-0.42%

This table presents the decomposition of leverage ratio changes for big club and remaining firms during the period 1995-2007. The decomposition is based on the following formula: $\Delta LEV_{i,t} = \Delta LEV\_D_{i,t} + \Delta LEV\_N_{i,t} + \Delta LEV\_E_{i,t} = \frac{\delta_{i,t}(N_{i,t-1}+E_{i,t-1})}{A_{i,t-1}A_{i,t}} - \frac{v_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}} - \frac{\varepsilon_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}}$, where $A_{i,t} = D_{i,t} + N_{i,t} + E_{i,t}$ and $E_{i,t} = K_{i,t} + R_{i,t}$ and $\Delta LEV\_E_{i,t} = \Delta LEV\_K_{i,t} + \Delta LEV\_R_{i,t} = \frac{\kappa_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}} - \frac{\rho_{i,t}D_{i,t-1}}{A_{i,t-1}A_{i,t}}$, with i = 1,2,…,N and t = 1,2,…,T denoting firms and years, respectively. $\Delta LEV_{i,t}$ denotes the change in leverage ratio over the interval [*t-1, t*]. All figures in this table are firm-year averages. $A_{i,t}, D_{i,t}, N_{i,t}, E_{i,t}, K_{i,t}, R_{i,t}$ stand respectively for assets, debt, non-financial liabilities, equity, capital and retained earnings. $\delta_{i,t}, v_{i,t}, \varepsilon_{i,t}, \kappa_{i,t}, \rho_{i,t}$ denote respectively change in the level of debt, non-financial liabilities, equity, capital and retained earnings over the interval [*t-1, t*]. See Table A1 of the Appendix for exact variable definitions.

Table 9
Convergence Tests – Results

Sample #	Period	# of firms	Full sample convergence		# of clubs	Biggest club as % of total	Convergence of the big club in…	Other clubs as % of total	Divergent firms as % of total
	(1)	(2)	(3a)	(3b)	(4)	(5)	(6)	(7)	(8)
				Panel A. UK					
#8:	**1989 – 2007**	99	$\hat{b}$: -0.59 $t_{\hat{b}}$: -4.45	NO	5	83.8% (83)	Rates	2%-3% (2-3)	7.1% (7)
				Panel B. Japan					
#9:	**1989 – 2007**	464	$\hat{b}$: -1.58 $t_{\hat{b}}$: -43.03	NO	36	24.4% (113)	Rates	0.4%-11.4% (2-53)	5.2% (24)

We test for leverage convergence across firms over time. This table presents the results of Phillips and Sul (2007) convergence tests. Column (2) shows the number of firms. Columns (3a) and (3b) show the results of the tests for full-sample convergence: the estimated *t*-statistic and whether there is convergence. There is convergence when the *t*-statistic exceeds the critical value -1.65. Columns (4) to (8) present results of tests for the existence of convergent clubs, i.e., of sub-groups of convergent firms: Column (4) shows the number of clubs, columns (5) and (7) the relative and absolute size of clubs (the number in parentheses show the number of firms in the convergent clubs); column (6) the type of convergence and column (8) the number of firms that do not belong to any club. Convergence in levels means that the variable of interest across different cross-sectional units converges to the same value over time, while convergence in rates means that the growth rate of the variable of interest across different cross-sectional units converges over time.

Table 10
Sectoral Composition of the Big Convergent Clubs

	Panel A. UK		**Panel B. Japan**	
	1989 – 2007		**1989 – 2007**	
	All Firms	**Big Club**	**All Firms**	**Big Club**
# of firms	99	83	464	113
Column	(1)	(2)	(3)	(4)
Energy	3.0%	3.6%	1.9%	1.8%
Materials	12.1%	13.3%	17.2%	23.9%
Industrials	26.3%	28.9%	32.1%	35.4%
Consumer Discretionary	33.3%	30.1%	20.3%	12.4%
Consumer Staples	12.1%	9.6%	11.0%	16.8%
Health Care	3.0%	3.6%	4.1%	2.7%
Information Technology	10.1%	10.8%	13.4%	7.1%

This table provides information about the sectoral composition of the big convergent clubs. Our categorization follows the Global Industry Classification Standard (GICS), developed by MSCI and S&P.

Table 11
Leverage regressions on fin. development indices and traditional leverage determinants

	Sample #8 UK, 1989 – 2007		Sample #9 Japan, 1989 – 2007	
	Big Club	Remaining firms	Big Club	Remaining firms
First-stage regression				
Δ STOCK_OECD	1.290***	1.310***	1.391***	1.371***
	12.38	*13.72*	*5.84*	*5.63*
Partial R^2	0.86	0.87	0.62	0.60
Second-stage regression				
Δ FIN_DEV	0.047**	0.006	0.006	-0.007
	2.26	*0.12*	*0.23*	*-0.25*
Δ ASSETS	-0.005	0.031*	0.025*	0.023**
	-0.42	*-0.14*	*1.90*	*2.44*
Δ MB	-0.002	-0.000	-0.001	-0.005
	-0.27	*-0.09*	*-0.14*	*-1.66*
Δ PROF	0.066*	-0.050	-0.041	-0.082
	1.93	*-0.70*	*-0.83*	*-1.52*
Δ TANG	0.066	-0.130*	0.154**	0.088**
	1.11	*-2.11*	*2.88*	*2.58*
Δ PAYOUT	-0.000	0.001	0.001***	-0.000
	-0.16	*0.39*	*2.96*	*-0.20*
Δ MED_IND	-0.004	-0.131	0.119	0.147**
	0.04	*-0.80*	*1.53*	*2.18*
Adj. R^2	0.01	0.00	0.02	0.02
# of observations	1,328	256	1,808	5,616
# of firms	83	19	113	351

This table reports the results from estimating equation (7) via two-stage least squares for the samples #8 and #9. All variables are in first differences. Δ denotes first-difference. The dependent variable is leverage. The endogenous variable is financial development (FIN_DEV_UK for Sample #8 and FIN_DEV_JPN for Sample #9), calculated for each country as the sum of (i) credit provided by banks and other financial institutions as a share of GDP, (ii) bond market capitalization as a share of GDP and (iii) stock market capitalization as a share of GDP. The excluded instrument is stock market capitalization as a share to GDP (STOCK_OECD_UK for Sample #8 and STOCK_OECD_JPN for Sample #9). For each country, we use the average for all other OECD countries that were members of the OECD in 1990 and for which data were available (See Table A1 of the Appendix for details). The table also reports Shea's (1997) partial R-squared measure for the excluded instruments in the first-stage regression. ASSETS is the natural log of book assets. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. PAYOUT is common dividends plus preferred dividends plus purchase of common and preferred stock divided by income before extraordinary items. MED_IND is the median leverage of the industry group that the firm belongs to. Numbers in italics are t-statistics. Standard errors (White standard errors clustered by firm and year) are robust to heteroskedasticity and to residual dependence across firms and time.

Table 12
Differences in firm characteristics between big-club firms and remaining firms

	Panel A. UK 1989 – 2007			**Panel B. Japan 1989 – 2007**		
	Big-club Firms	Remaining firms	p-value for equality	Big-club Firms	Remaining firms	p-value for equality
ASSETS						
Mean	1,352.6	928.0	0.001	530,016	382,681	0.000
Median	421.0	340.1	0.104	187,052	149,588	0.000
MB						
Mean	1.811	1.600	0.005	1.221	1.310	0.000
Median	1.493	1.418	0.046	1.128	1.178	0.000
PROF						
Mean	0.157	0.148	0.046	0.065	0.074	0.000
Median	0.147	0.147	0.331	0.059	0.068	0.000
TANG						
Mean	0.368	0.278	0.000	0.325	0.303	0.000
Median	0.331	0.256	0.000	0.321	0.292	0.000
PAYOUT						
Mean	0.591	0.598	0.907	0.475	0.414	0.004
Median	0.459	0.456	0.071	0.316	0.282	0.000
# of observations	1,577	304		2,147	6,669	
# of firms	83	16		113	351	

This table reports the means of firm-level variables for the big club firms and the remaining ones. It also reports the p-values of the standard t-test for equality in the means. ASSETS is book assets expressed in 2007 millions of British pounds in Panel A and in 2007 millions of Yen in Panel B. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. PAYOUT is common dividends plus preferred dividends plus purchase of common and preferred stock divided by income before extraordinary items.

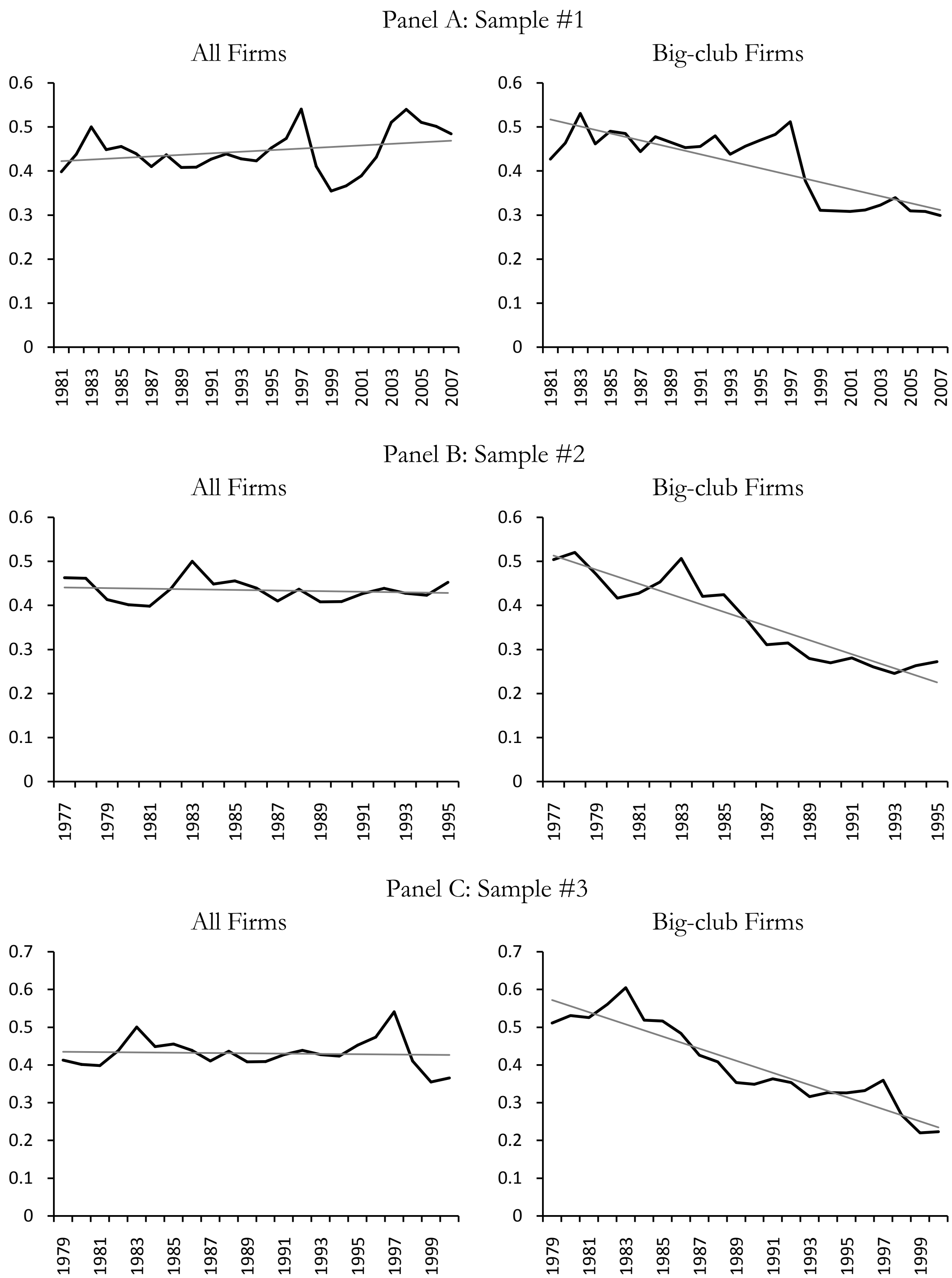
Table 13
Determinants of participation in the big convergent club

	Panel A. UK 1989 – 2007	Panel B. Japan 1989 – 2007
Panel A: $Y_{i,t} = c_{ind} + \beta X_{i,t} + \varepsilon_{i,t}$		
ASSETS	0.168***	0.049***
	8.14	3.73
MB	0.108	-0.103***
	1.59	-2.96
PROF	0.270	-3.012***
	0.35	-7.17
TANG	2.050***	0.470***
	11.21	4.10
PAYOUT	-0.042	0.021
	-1.06	1.20
KEIRETSU		0.278***
		5.86
# of observations	1,881	8,816
# of firms	99	464
Panel B: $Y_{i,t} = c_{ind} + \beta X_{i,t-1} + \varepsilon_{i,t}$		
ASSETS	0.160***	0.048***
	7.57	3.55
MB	0.105	-0.097***
	1.54	-2.74
PROF	0.523	-3.147***
	0.69	-7.10
TANG	2.024***	0.490***
	11.00	4.15
PAYOUT	-0.044	0.030*
	-1.11	1.68
KEIRETSU		0.277***
		5.70
# of observations	1,819	8,352
# of firms	99	464
Panel C: $Y_{i,t} = c_{ind} + \beta X_{i,t-5} + \varepsilon_{i,t}$		
ASSETS	0.127***	0.012***
	5.04	2.76
MB	0.162	-0.017*
	1.53	-1.79
PROF	0.511	-0.932***
	0.52	-6.29
TANG	2.066***	0.134***
	9.66	3.26
PAYOUT	-0.088*	0.010*
	-1.82	1.79
KEIRETSU		0.098***

		5.63
# of observations	1,423	6,496
# of firms	99	464

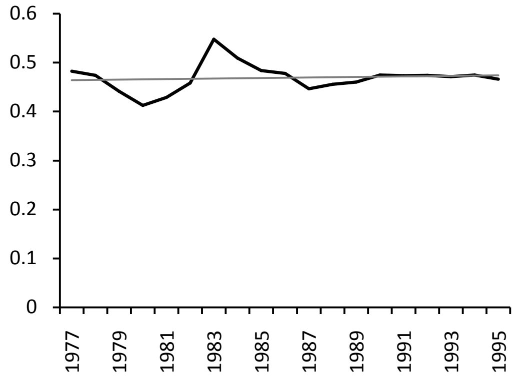
All equations are estimated via Probit regressions, with industry dummies. Y is a binary variable taking the value 1 if the firm belongs to the big club and 0 otherwise. X is a vector of firm-level variables, namely ASSETS, MB, PROF, TANG, PAYOUT, and KEIRETSU. ASSETS is the natural log of book assets. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. PAYOUT is common dividends plus preferred dividends plus purchase of common and preferred stock divided by income before extraordinary items. KEIRETSU is a dummy variable that takes the value of one for keiretsu firms and 0 otherwise. Standard errors are robust to heteroskedasticity using the Huber/White estimator. Numbers in italics are z-statistics. ***, ** and * indicate 1%, 5% and 10% statistical significance levels, respectively.

Figure 1
Cross-sectional variance (H_t) of the relative transition parameter (h_{it}) for leverage

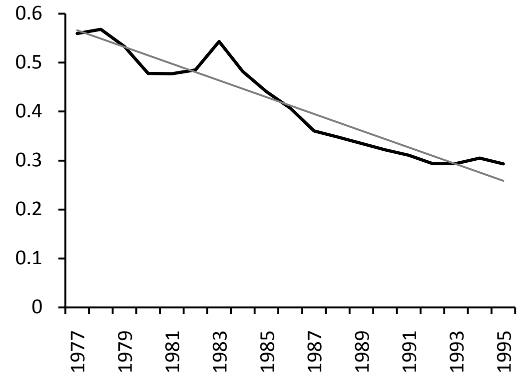


Panel D: Sample #4

All Firms

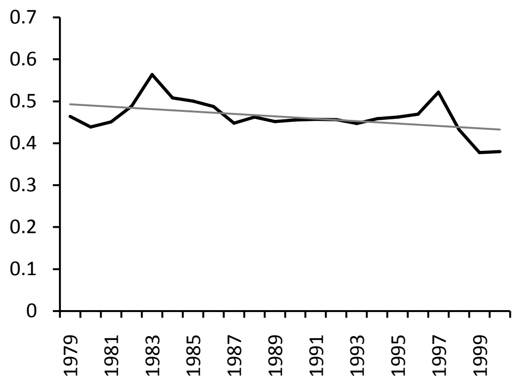


Big-club Firms

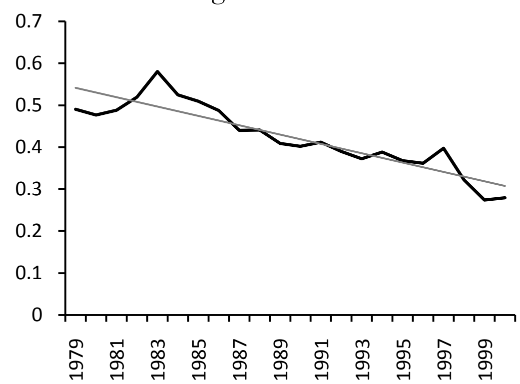


Panel E: Sample #5

All Firms

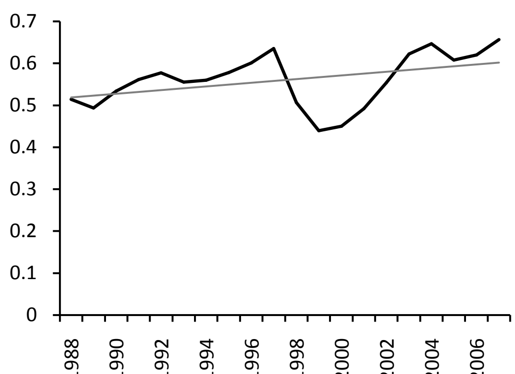


Big-club Firms

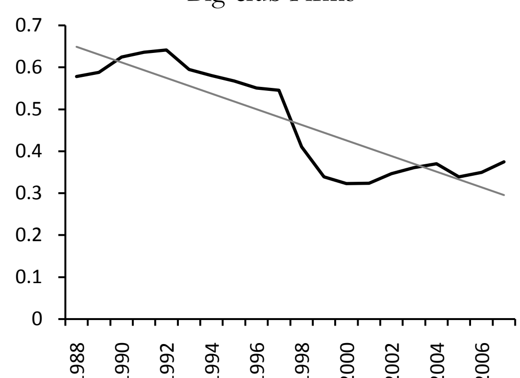


Panel F: Sample #6

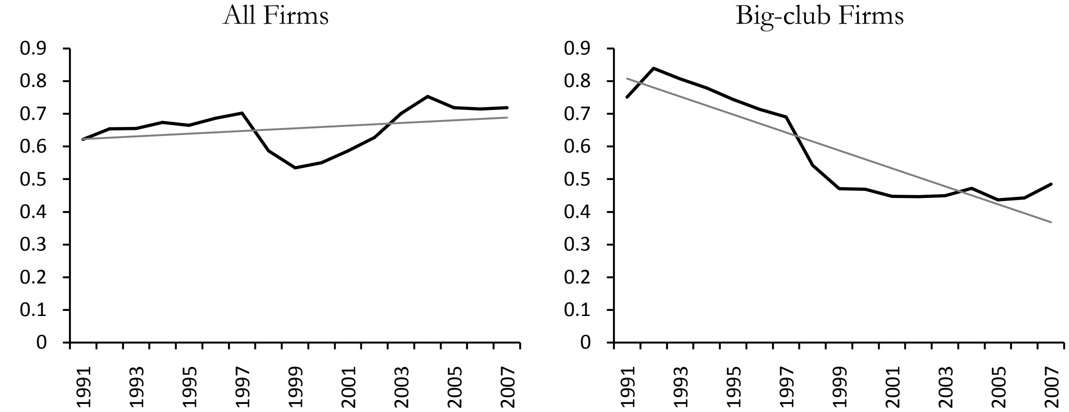
All Firms



Big-club Firms

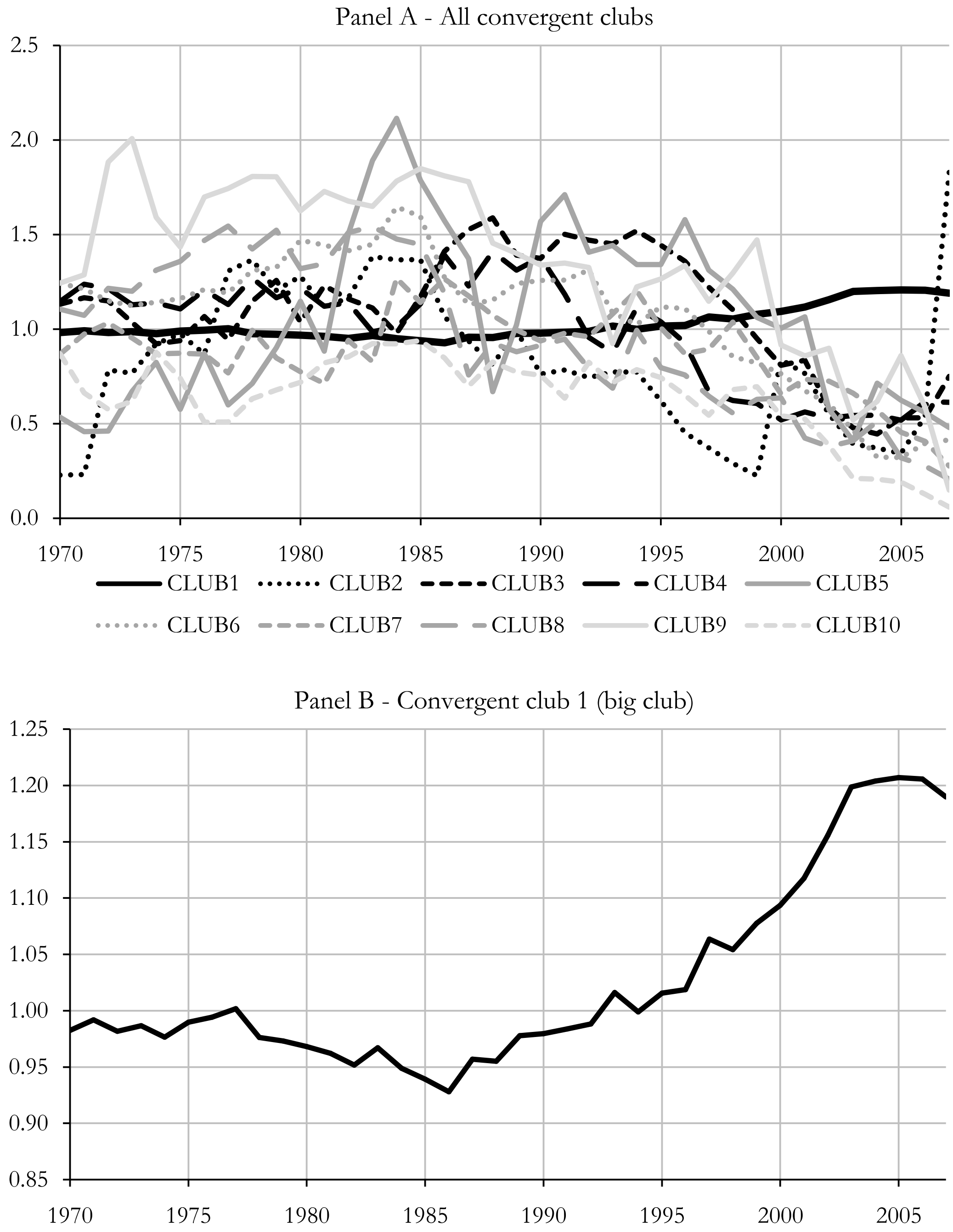


Panel F: Sample #7



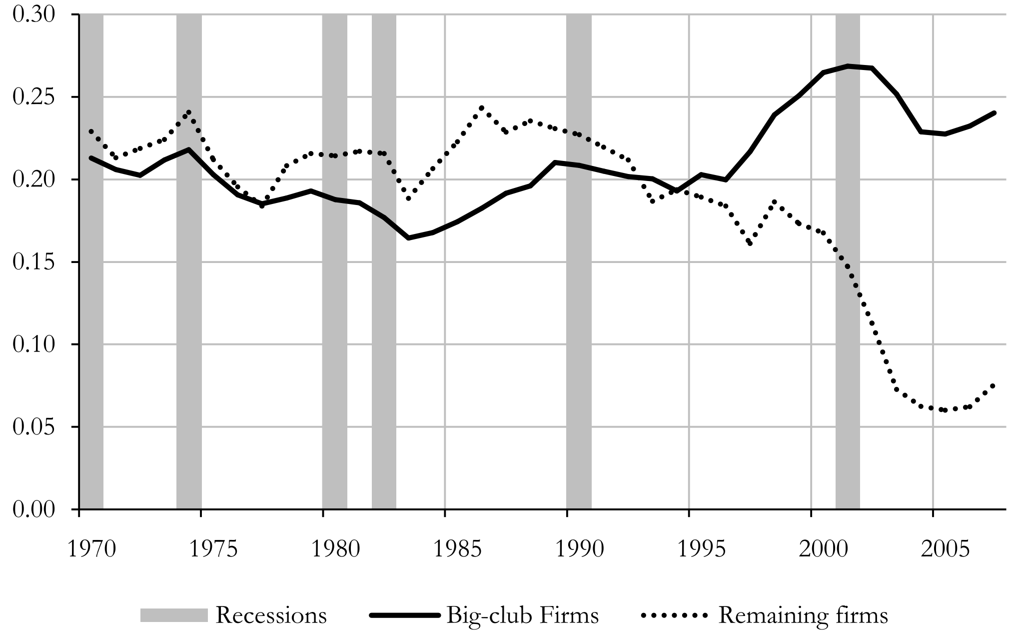
H_t is the time-varying cross-sectional variance of the relative transition parameter h_{it} for leverage, where $H_t = \frac{1}{N}\sum_{i=1}^{N}(h_{it} - 1)^2$ and $h_{it} = \frac{LEV_{it}}{\frac{1}{N}\sum_{i=1}^{N} LEV_{it}}$, with $i = 1, 2, \ldots, \mathrm{N}$ and $t = 1, 2, \ldots, \mathrm{T}$ denoting firms and years, respectively. All graphs under the heading "All Firms" portray the evolution of H_t for all firms in each sample. That is, in the calculation of h_t and H_t, N is the number of all firms in each sample. All graphs under the heading "Big-club Firms" portray the evolution of H_t for only the big-club firms in each sample. That is, in the calculation of h_t and H_t, N is the number of the big-club firms in each sample. The grey line in each graph denotes the trend. As PS suggest, when H_t, calculated for a group of cross-sectional units, declines over time, then this is a sign that the cross-sectional units of the group converge. The time period in each sample starts at $T_0 = [rT]$, with $r = 1/3$, as suggested by PS.

Figure 2
Relative Transition Curves for Leverage – Sample #1 (1970 – 2007)



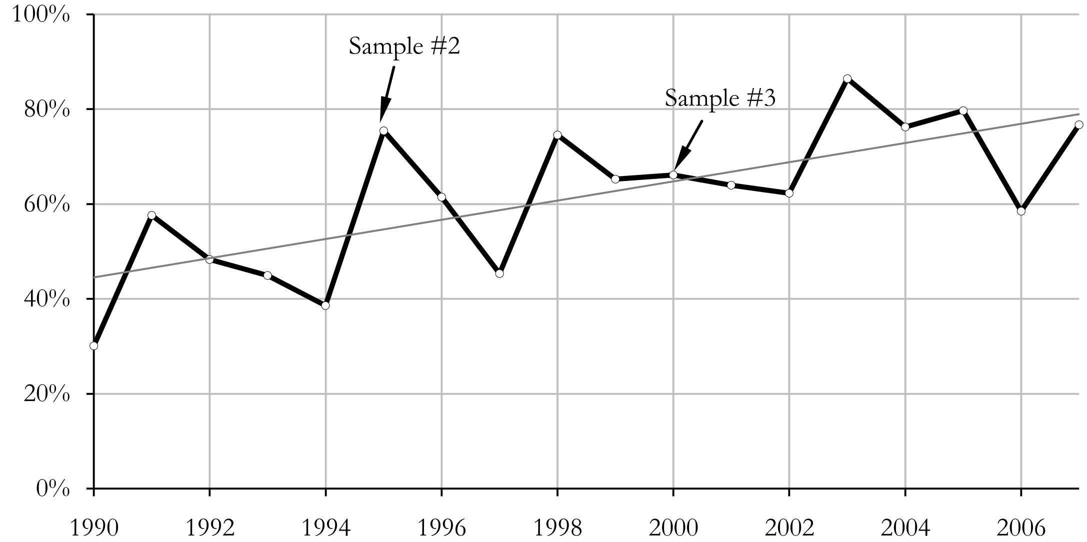
The figures show the relative transition curves for leverage of the convergent clubs in sample #1 (1970-2007). Panel A shows the relative transition curves of all ten convergent clubs. Panel B shows the relative transition curve of the biggest convergent club (club 1) on a different scale, so that its variation is more visible. The relative transition curve of a club is constructed by plotting the relative transition parameter of the club over time. The latter is calculated as the cross-sectional average leverage of the firms that constitute the club over the same value of all firms in the sample. Values greater than 1 indicate that the average value of leverage for the firms in each specific club is higher than the average value of leverage for the remaining firms, e.g. the value of 1.2 means that the average leverage of the firms in a club is 20% higher than the average leverage of all firms in the sample. clear visible

Figure 3
Leverage and Business Cycles – Sample #1 (1970 – 2007)



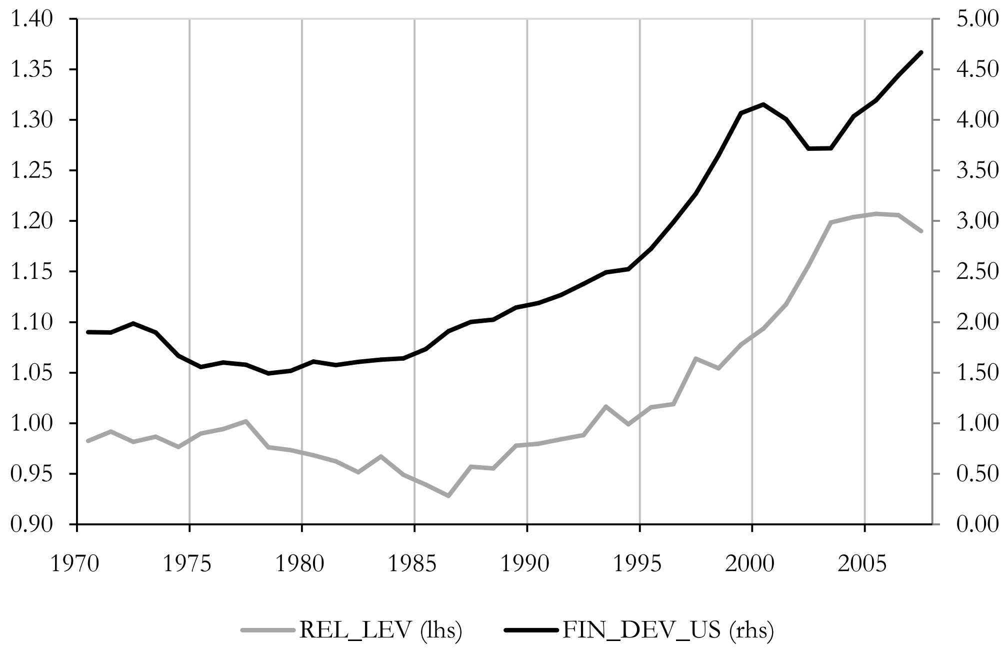
The figure shows the time evolution of the cross-sectional average value of leverage for the firms that constitute the big convergent club and for the remaining firms in Sample #1. The shaded areas denote NBER dated recessions in the US.

Figure 4
Percentage of Firms in the Big Convergent Club – Sample #1



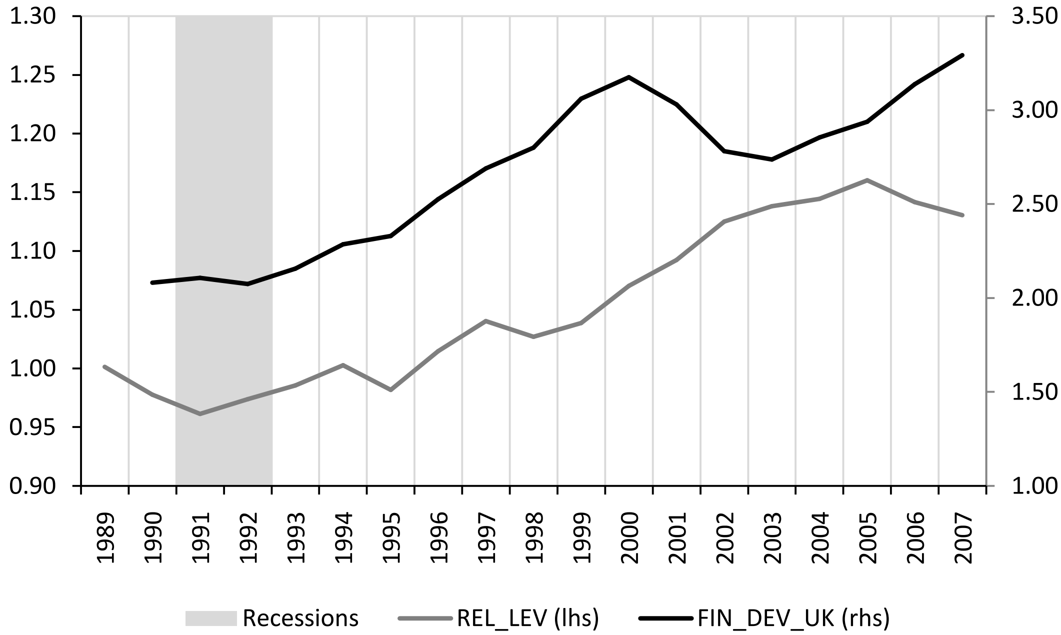
The black line shows the percentage of firms in the main sample (sample #1) that belong to the big convergent club, when the sample ends in years 1990 through 2007. The grey line shows its trend. The picture is similar when all the available firms of the samples ending in 1990 through 2007 are included (the equivalent of samples #4 and #5).

Figure 5
Big-club Relative Transition Curve of Sample #1 (1970 – 2007) and Financial Development Index



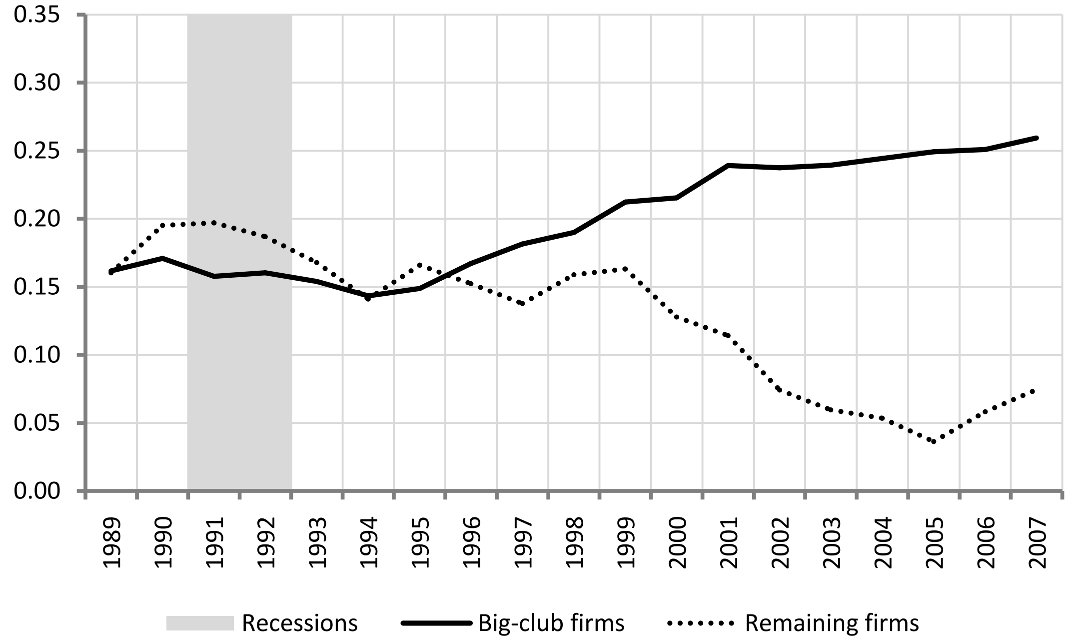
The figure shows the time evolution of the leverage of the big-club firms in sample #1 relative to that of the remaining firms (REL_LEV) along with a financial development index (FIN_DEV_US). REL_LEV is big-club relative transition curve for leverage, calculated as the cross-sectional average leverage of the firms that constitute the big club in sample #1 over the same value of all firms in sample #1. FIN_DEV_US is the sum of credit provided by banks and other financial institutions, bond market capitalization and stock market capitalization as a share of GDP.

Figure 6
Sample #8 (UK)
Big-club Relative Transition Curve and Financial Development Index



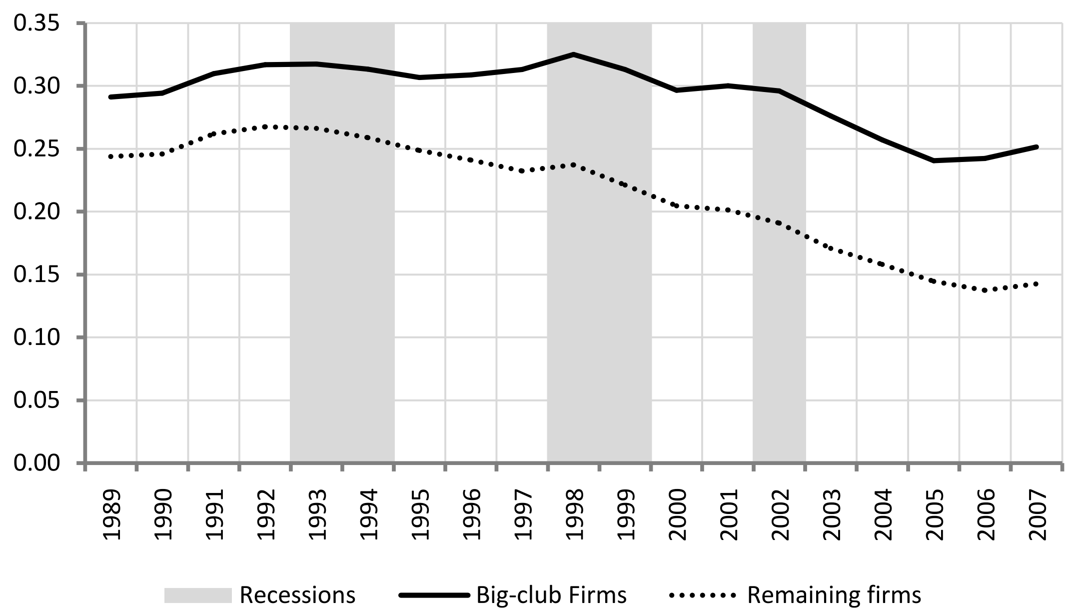
The figure shows the time evolution of the leverage of the big-club firms in sample #8 relative to that of the remaining firms (REL_LEV) along with a financial development index (FIN_DEV_UK). REL_LEV is big-club relative transition curve for leverage, calculated as the cross-sectional average leverage of the firms that constitute the big club in sample #8 over the same value of all firms in sample #8. FIN_DEV_UK is the sum of credit provided by banks and other financial institutions, bond market capitalization and stock market capitalization as a share of GDP for UK.

Figure 7
Leverage – Sample #8 (UK)



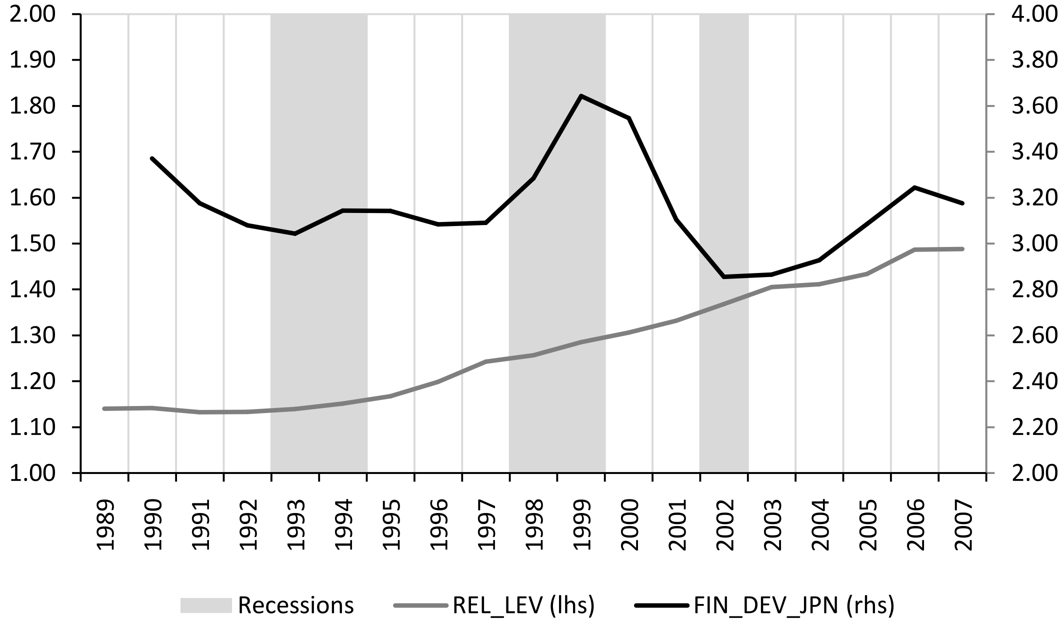
The figure shows the time evolution of the cross-sectional average value of leverage for the firms that constitute the big convergent club and for the remaining firms in Sample #8.

Figure 8
Leverage – Sample #9 (Japan)



The figure shows the time evolution of the cross-sectional average value of leverage for the firms that constitute the big convergent club and for the remaining firms in Sample #9.

Figure 9
Sample #9 (Japan)
Big-club Relative Transition Curve and Financial Development Index



The figure shows the time evolution of the leverage of the big-club firms in sample #9 relative to that of the remaining firms (REL_LEV) along with a financial development index (FIN_DEV_JPN). REL_LEV is big-club relative transition curve for leverage, calculated as the cross-sectional average leverage of the firms that constitute the big club in sample #9 over the same value of all firms in sample #9. FIN_DEV_JPN is the sum of credit provided by banks and other financial institutions, bond market capitalization and stock market capitalization as a share of GDP for Japan.

Appendix

Table A1
Variable Definitions

Firm-specific		
Symbol	Description	COMPUSTAT Accounts
LEV	Long-term debt plus debt in current liabilities to book assets	(DLTT+DLC)/AT
PROF	Earnings before interest and taxes to book assets	OIBDP/AT
MB	Market value of assets to book assets	mv_a/AT
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)	AT-SEQ+PSTKL-TXDITC+ (CSHO*PRCC_F)
ASSETS	Natural logarithm of real book assets expressed in 1983 US dollars	(ln of) AT
TANG	Fixed assets to book assets	PPENT/AT
PAYOUT RATIO	Common dividends plus preferred dividends plus purchase of common and preferred stock to income before extraordinary items	(DVC+DVP+PRSTKC)/IB
D	Debt	DLTT+DLC
N	Non-financial liabilities	LT-DLTT+DLC
E	Stockholders' Equity	SEQ
K	Preferred stock plus common stock plus capital surplus minus treasury stock	PSTK+CSTK+CAPS-TSTK
R	Retained earnings	RE

Economy-wide		
Symbol	Description	Sources
BANKS_US *BANKS_UK* *BANKS_JPN*	Private credit by deposit money banks and other financial institutions to GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is credit to the private sector, P_e is end-of period CPI, and P_a is average annual CPI	World Bank Financial Structure Dataset
BOND_US	Value of private debt securities (issued by financial institutions and corporations) outstanding as a share of GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is value of debt securities outstanding, P_e is end-of period CPI, and P_a is average annual CPI	- Debt securities: US Flow of Funds Accounts, Table L.212 "Corporate and Foreign Bonds", Account "Total Liabilities" and Table L.208 "Open market paper", Account "Total outstanding, All types" - GDP and CPI: Federal Reserve Economic Data, http://research.stlouisfed.org/fred2
STOCK_US	Value of listed shares to GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is stock market capitalization, P_e is	- Shares: US Flow of Funds Accounts, Table L.213 "Corporate Equities", Account "Issues at Market Value"

	end-of period CPI, and P_a is average annual CPI	- GDP and CPI: Federal Reserve Economic Data, http://research.stlouisfed.org/fred2
FIN_DEV_US	*BANKS_US+BOND_US+STOCK_US*	
CREDIT_OECD_US	Total credit provided to the private non-financial sector as a share to GDP. Calculated as the average for all OECD countries -but the US- that were members of the OECD in 1990 and for which data were available (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan S. Korea, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK)	Bank of International Settlements
STOCK_OECD_US	Stock market capitalization as a share to GDP. Calculated as the average for all OECD countries -but the US- that were members of the OECD in 1990 and for which data were available (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan S. Korea, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK)	World Bank Financial Structure Dataset
INFLATION	Expected annual percentage change in the US CPI over the coming year, using data from the Livingston Survey	The Federal Reserve Bank of Philadelphia, http://www.phil.frb.org/econ/liv/index.html
BOND_UK *BOND_JPN*	Value of private debt securities (issued by financial institutions and corporations) outstanding as a share of GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is value of debt securities outstanding, P_e is end-of period CPI, and P_a is average annual CPI	World Bank Financial Structure Dataset
STOCK_UK *STOCK_JPN*	Value of listed shares to GDP, calculated using the following deflation method: {(0.5)*[Ft/P_et + Ft-1/P_et-1]}/[GDPt/P_at] where F is stock market capitalization, P_e is end-of period CPI, and P_a is average annual CPI	World Bank Financial Structure Dataset
FIN_DEV_UK	*BANKS_UK+BOND_UK+STOCK_UK*	
FIN_DEV_JPN	*BANKS_JPN+BOND_JPN+STOCK_JPN*	
STOCK_OECD_UK	Stock market capitalization as a share to GDP. Calculated as the average for all OECD countries -but the UK- that were members of the OECD in 1990 and for which data were available (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan S. Korea, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, US)	World Bank Financial Structure Dataset
STOCK_OECD_JPN	Stock market capitalization as a share to GDP. Calculated as the average for all OECD countries -but Japan- that were members of the OECD in 1990 and for which data were available (Australia, Austria, Belgium, Canada,	World Bank Financial Structure Dataset

	Denmark, Finland, France, Germany, Greece, Ireland, Italy, UK, S. Korea, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, US)	

Table A2
Sample Description

Sample #	Period	# of firms	Description
Main Sample			
#1	1970 – 2007	236	All firms with no-missing values during the period 1970 - 2007.
Robustness Checks			
a) *Is convergence a recent phenomenon? Testing with the same firms as in the main sample*			
#2	1970 – 1995	236	Same firms as in the main sample.
#3	1970 – 2000	236	Same firms as in the main sample.
b) *Controlling for survivorship bias: Testing with all firms that had no missing-values during the sample period*			
#4	1970 – 1995	565	All firms with no missing values during the sample period. Compared to the main sample, it additionally contains firms delisted after 1995.
#5	1970 – 2000	392	All firms with no missing values during the sample period. Compared to the main sample, it additionally contains firms delisted after 2000.
c) *Exploring the effect of new firms*			
#6	1980 – 2007	396	All firms with no-missing values during the sample period. Compared to the main sample, it additionally contains firms that were listed between 1971 and 1980.
#7	1985 – 2007	611	All firms with no-missing values during the sample period. Compared to the main sample, it additionally contains firms that were listed between 1971 and 1985.

Table A3
Convergent Clubs – Summary Statistics

	Main results			*Is convergence a recent phenomenon?*					
	1970 – 2007 Sample #1			**1970 – 1995** Sample #2			**1970 – 2000** Sample #3		
Convergent club (1)	$\hat{b}$ (2)	$t_{\hat{b}}$ (3)	# of firms (4)	$\hat{b}$ (5)	$t_{\hat{b}}$ (6)	# of firms (7)	$\hat{b}$ (8)	$t_{\hat{b}}$ (9)	# of firms (10)
1	-0.138	-0.93	181	-0.002	-0.02	178	0.164	1.86	156
2	-1.765	-1.41	2	-0.744	-1.51	4	-1.368	-1.11	2
3	-0.642	-1.35	8	-1.116	-1.45	8	-1.773	-1.64	3
4	-0.769	-0.75	5	-2.428	-1.39	3	-0.214	-0.49	21
5	3.259	1.96	2	-2.621	-1.50	3	-0.631	-1.06	5
6	-0.889	-1.52	8	0.208	0.20	3	0.163	0.12	3
7	0.900	1.35	4	-0.497	-1.14	10	-1.409	-1.36	2
8	1.233	1.72	3	-1.092	-1.55	10	-0.271	-1.18	14
9	-1.570	-1.18	2	0.148	0.23	4	-1.356	-1.61	5
10	-1.178	-1.33	8	-1.487	-1.19	2	-1.261	-1.51	4
11							-1.507	-1.63	3
12							-1.012	-1.44	7
13							-2.530	-1.61	2
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
Divergent firms			13			11			9
Total			236			236			236

	Controlling for Survivorship Bias						*Exploring the Effect of New Firms*					
	1970 – 1995 Sample #4			**1970 – 2000** Sample #5			**1980 – 2007** Sample #6			**1985 – 2007** Sample #7		
Convergent club (1)	$\hat{b}$ (11)	$t_{\hat{b}}$ (12)	# of firms (13)	$\hat{b}$ (14)	$t_{\hat{b}}$ (15)	# of firms (16)	$\hat{b}$ (17)	$t_{\hat{b}}$ (18)	# of firms (19)	$\hat{b}$ (20)	$t_{\hat{b}}$ (21)	# of firms (22)
1	-0.038	-0.50	432	-0.131	-1.59	341	0.050	0.42	287	-0.051	-0.66	401
2	-4.071	-1.54	2	-0.268	-0.15	2	-0.977	-1.63	9	0.424	3.51	24
3	-1.152	-1.35	6	0.703	0.32	2	-0.630	-1.33	4	2.245	1.30	2
4	-1.278	-1.40	5	-1.099	-1.58	7	-1.591	-1.53	10	3.761	1.38	2
5	-1.655	-0.84	6	0.617	0.51	8	-0.837	-1.01	10	3.114	1.26	2
6	-1.747	-1.26	2	-2.607	-1.57	2	0.599	0.76	4	-0.917	-0.73	8
7	-1.108	-1.40	8	-1.543	-1.22	3	-0.744	-0.61	4	1.574	1.42	2
8	-1.079	-0.93	7	-1.309	-1.36	5	-0.428	-1.38	18	-2.510	-1.11	2
9	1.977	1.96	3	-1.371	-1.23	4	-0.633	-0.43	3	2.597	1.00	2
10	-1.564	-1.53	5	-0.779	-1.06	4	-0.648	-0.58	2	-0.655	-0.43	9
11	0.976	1.24	5	-1.290	-1.00	2	-2.490	-1.50	2	-1.001	-0.50	5
12	-2.463	-1.10	2	-2.024	-1.24	2	-0.666	-0.78	3	-1.718	-1.22	4
13	-1.613	-0.85	2	-1.946	-1.13	2	-2.064	-1.44	2	1.036	0.63	2
14	0.865	1.37	4							0.726	0.45	3
15	-2.258	-1.50	4							-3.262	-1.47	2
16	-1.316	-1.23	3							1.396	0.88	2
17	-1.514	-1.13	5							0.971	0.74	4
18	0.378	0.35	2							2.398	0.78	2
19	-1.278	-1.39	9							-2.466	-0.83	2
20	-0.766	-0.82	8							3.031	1.12	2
21	-0.584	-1.32	10							-1.062	-0.68	2
22	-1.173	-1.61	3							-0.702	-0.56	8
23	-0.705	-1.43	4							-1.712	-0.62	2
24	0.056	0.03	2							-1.272	-1.04	5
25	0.630	0.35	2							2.306	1.70	2
26										-1.985	-1.24	2
27										1.171	1.05	4
28										-1.082	-1.09	10
29										-1.136	-0.71	4
30										1.140	2.17	4
31										-1.225	-1.29	9
32										-2.572	-1.01	2
33										-0.702	-1.22	10
34										-1.051	-1.33	5
Divergent firms			24			8			38			60
Total			565			392			396			611

This table presents the results of Phillips and Sul (2007) convergence test for the existence of convergent clubs, i.e., sub-groups of convergent firms. A *t*-statistic of *b* above the critical value of -1.65 indicates that the club satisfies the convergence criterion. A $\hat{b}$ coefficient below 2, indicates convergence in rates. Specifically, column (1) shows the sequence number of each convergent club, while columns (2) and (3) and (4) report the $\hat{b}$ coefficient, the $t_{\hat{b}}$ statistic and the number of firm in each club. Note that the $t_{\hat{b}}$ statistic of the big club, -0.93, is above the critical value. Likewise for the same statistic of the remaining convergent clubs.

Table A4
Differences in firm characteristics across different samples

	Sample #1 1970 – 2007	Sample #6 1980 – 2007	Sample #7 1985 – 2007	Probability that means/medians across different samples are equal #6 - #1	 #7 - #6
ASSETS					
Mean	473.4	279.5	201.3	0.000	0.000
Median	427.9	254.9	186.8	0.000	0.000
MB					
Mean	1.540	1.620	1.695	0.000	0.000
Median	1.267	1.324	1.356	0.000	0.000
PROF					
Mean	0.160	0.144	0.130	0.000	0.000
Median	0.159	0.147	0.137	0.000	0.000
TANG					
Mean	0.347	0.334	0.324	0.000	0.000
Median	0.309	0.289	0.276	0.000	0.000
PAYOUT					
Mean	0.554	0.530	0.485	0.165	0.007
Median	0.381	0.328	0.245	0.000	0.000
# of observations	8,968	11,088	14,053		
# of firms	236	396	611		

This table reports the means and medians of firm-level variables across the three samples. ASSETS is book assets expressed in 1983 US millions of dollars. PROF is operating income divided by total assets. TANG is net fixed assets divided by total assets. MB is market value of assets divided by total assets. Market value of assets is book assets minus total equity plus preferred stock minus deferred tax and investment tax credit plus market equity. We also test the null hypothesis that the difference between means or medians across different samples is zero. For the means we use the standard t-test, and for the medians the Kruskal-Wallis test. In the last two columns, we report the p-values derived from t-statistics for the difference in means test and p-values derived from χ^2-statistics for the difference in medians test.

Table A5
Big-club Relative Transition Curve (Sample #1) and US Business Cycles

Big-club Relative Transition Curve for Leverage				**NBER's US Business Cycle Dating**
Stage #	Period	Trend of the curve	Explanation	Recession Dates
Stage #1	1970-1977	Relative stable and close to one	Firms in the big club have on average the same leverage as all the firms in the sample	1969 Q4 - 1970 Q4 1973 Q4 - 1975 Q1
Stage #2	1978-1986	Decline	Firms in the big club reduce their leverage relative to the rest of the sample	1980 Q1 - 1980 Q3 1981 Q3 - 1982 Q4
Stage #3	1987-2007	Increase	Firms in the big club increase their leverage relative to the rest of the sample	1990 Q3 - 1991 Q1 2001 Q1 - 2001 Q4

This table compares the time evolution of the relative transition curve of the big club in sample #1 with the US business cycle dating of NBER. The three stages in the evolution of the curve seemingly do not correspond with the US business cycle.