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Dividend policy and the earned/contributed capital mix: a test of the life-cycle theory ☆

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Abstract

Consistent with a life-cycle theory of dividends, the fraction of publicly traded industrial firms that pay dividends is high when retained earnings are a large portion of total equity (and of total assets) and falls to near zero when most equity is contributed rather than earned. We observe a highly significant relation between the decision to pay dividends and the earned/contributed capital mix, controlling for profitability, growth, firm size, total equity, cash balances, and dividend history, a relation that also holds for dividend initiations and omissions. In our regressions, the mix of earned/contributed capital has a quantitatively greater impact than measures of profitability and growth opportunities. We document a massive increase in firms with negative retained earnings (from 11.8% of industrials in 1978 to 50.2% in 2002). Controlling for the earned/contributed capital mix, firms with negative retained earnings show virtually no change in their propensity to pay dividends from the mid-1970s to 2002, while those whose earned equity makes them reasonable candidates to pay dividends have a propensity reduction that is twice the overall reduction in Fama and French [2000, Journal of Financial Economics 76, 549–582]. Finally, our simulations show that, if well-established

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firms had not paid dividends, their cash balances would be enormous and their long-term debt trivial, thus granting extreme discretion to managers of these mature firms.

JEL classifications: G35; G32

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1. Introduction

Dividends tend to be paid by mature, established firms, plausibly reflecting a financial life cycle in which young firms face relatively abundant investment opportunities with limited resources so that retention dominates distribution, whereas mature firms are better candidates to pay dividends because they have higher profitability and fewer attractive investment opportunities. Fama and French (2001), Grullon et al. (2002), and DeAngelo and DeAngelo (2006) all advance life-cycle explanations for dividends that rely, implicitly or explicitly, on the trade-off between the advantages (e.g., flotation cost savings) and the costs of retention (e.g., agency costs of free cash flow). The trade-off between retention and distribution evolves over time as profits accumulate and investment opportunities decline, so that paying dividends becomes increasingly desirable as firms mature. The literature offers only a rough empirical idea of the characteristics that differentiate firms that pay dividends from those that do not. Most notably, Fama and French (2001) find that firms with current high-profitability and low-growth rates tend to pay dividends, while low-profit/high-growth firms tend to retain profits.

We test the life-cycle theory by assessing whether the probability a firm pays dividends is positively related to its mix of earned and contributed capital, i.e., whether firms with relatively high retained earnings as a proportion of total equity (RE/TE) and of total assets (RE/TA) are more likely to pay dividends. The earned/contributed capital mix is a logical proxy for the life-cycle stage at which a firm currently finds itself because it measures the extent to which the firm is self-financing or reliant on external capital. Firms with low RE/TE (RE/TA) tend to be in the capital infusion stage, whereas firms with high RE/TE (RE/TA) tend to be more mature with ample cumulative profits that make them largely self-financing, hence good candidates to pay dividends. The proportion of equity capital that is earned is conceptually distinct from (and in our sample uncorrelated with) current or short-term profitability, which is widely recognized since at least Lintner (1956) to affect dividend decisions. It is also a better measure of a firm's life-cycle stage (hence suitability to pay dividends) than its cash balances, because the *source* of the cash impacts the dividend decision. For example, high cash holdings can reflect the proceeds of a recent equity offering for a firm whose low RE/TE and RE/TA show it to be in the infusion instead of the distribution stage.

Our evidence uniformly and strongly indicates that the probability a firm pays dividends increases with the relative amount of earned equity in its capital structure. For publicly traded industrials over 1973–2002, the proportion of firms that pay dividends is high when the ratio of earned to total common equity (RE/TE) is high and falls with declines in this ratio, reaching near-zero levels for firms with negligible retained earnings. Similarly, the proportion of dividend payers is high when earned equity is a large fraction of total assets

and decreases (eventually approaching zero) as RE/TA declines. We find no such monotonic relation between the proportion of firms that pay dividends and total common equity (TE/TA), indicating that a firm's earned/contributed capital mix (and not its total equity relative to other sources of capital) is a key determinant of its decision to pay or not pay dividends.

We control for firm size, current and lagged profitability, growth, total equity, cash balances, and dividend history using a broad variety of multivariate logit specifications, and we consistently observe a positive and highly significant relation between the probability that a firm pays dividends and its earned/contributed capital mix. The coefficients on RE/TE and RE/TA are of the predicted sign and highly significant in every logit model we run. Our logits also consistently reveal statistically significant relations between the probability a firm pays dividends and its size, profitability, and growth (as in Fama and French, 2001), indicating the earned/contributed capital mix affects the decision to pay dividends in a manner empirically distinct from other factors previously shown to affect the dividend decision.

Our RE/TE and RE/TA measures have a stronger impact on the decision to pay dividends than do profitability and growth, the explanatory variables previously emphasized in the dividend literature. Specifically, the difference between low and high values of RE/TE is associated with a substantial difference in the probability of paying dividends for all but the highest size deciles of NYSE firms, with smaller but nontrivial differences for the largest firms. For firms the size of the median NYSE firm, the probability of paying dividends increases from about 50% to more than 80% as retained earnings increase from 10% to 90% of total equity. For firms at the 90th size percentile, the probability increase, from 80% to 95%, is smaller because the unconditional probability of paying dividends is already high for these large firms. The impact of firm size differences on the probability of paying dividends is also substantial, while profitability and growth differences have a relatively modest impact.

For industrial firms, the incidence of firms with positive retained earnings declines from 88.2% in 1978 to 49.8% in 2002, a downtrend that closely parallels the large decline in dividend paying firms discovered by Fama and French (2001). Because firms with negative retained earnings have an estimated probability of paying dividends that is already close to zero, these firms show virtually no reduction in their propensity to pay dividends. Yet, this group receives roughly half the weight in extant empirical estimates of the recent overall reduction in propensity to pay. The implication is that, among the firms with positive RE/TE (which are those whose fundamentals make them reasonable candidates to pay dividends), the propensity to pay reduction is far greater than Fama and French's overall estimates. We find that, for firms with retained earnings of 30–80% of total equity, the propensity to pay reduction from the mid-1970s to 2002 is roughly 50%, which is about double Fama and French's overall estimates, making the unexplained propensity to pay decline even more puzzling than previously thought.

Consistent with the life-cycle theory, the earned/contributed capital mix has a significant impact on the probability that a firm initiates or omits dividends. For the median firm, RE/TE (RE/TA) trends upward in the five years preceeding dividend initiations and downward in the five years preceeding omissions. These ratios do not change by large amounts over the years before initiation or omission, however, suggesting there is no definitive RE/TE- or RE/TA-based trigger point at which paying dividends becomes de rigueur. The typical dividend initiator and the typical omitter fall in the middle ground between the typical

nonpayer (with relatively low RE/TE and smaller size) and the typical payer (with relatively high RE/TE and larger size). Finally, logit analyses of the initiation and omission decisions that parallel the main tests described above show the earned equity/contributed capital mix to be significant in all specifications, as we observe in cross section for the full sample.

We conservatively estimate that, had the 25 largest long-standing dividend-paying industrial firms in 2002 not paid dividends, their cash balances would total $1.8 trillion (51% of total assets), up from $160 billion (6% of assets) and $1.2 trillion above their collective $600 billion in long-term debt. This exercise offers some indirect evidence supporting the agency cost-inclusive life cycle explanation for dividends since, had these 25 firms not paid dividends and kept their investment outlays unchanged, they would have huge cash balances and little or no leverage, vastly increasing managers' opportunities to adopt policies that benefit themselves at stockholders' expense. Moreover, because these firms systematically paid large dividends over many years, their behavior is inconsistent with a simple flotation cost/pecking order variant of the life-cycle theory in which the absence of agency costs implies that the optimal policy is to retain all earnings until there is zero probability the firm will ever need to incur the costs of raising outside capital.

Section 2 presents our sampling procedure, descriptive statistics, and univariate analyses that relate the proportion of dividend paying firms to the earned/contributed capital mix. Section 3 reports our logit regressions that assess the relation between the probability that a firm pays dividends and its earned/contributed capital mix, controlling for profitability, growth, size, etc. Section 4 compares the quantitative impact on the probability of paying dividends of RE/TE, profitability/growth, and firm size. Section 5 documents the recent dramatic increase in firms with negative retained earnings and develops the implications for the Fama and French (2001) finding of a reduced propensity to pay dividends among industrial firms. Section 6 analyzes the impact of the earned/contributed capital mix on dividend initiations and omissions, while Section 7 examines the hypothetical consequences of a full retention policy for mature firms with long-standing dividend records. Section 8 summarizes our findings.

2. Sampling procedure, descriptive statistics, and univariate analysis

Our sampling procedure parallels those of Fama and French (2001) and DeAngelo et al. (2004). Specifically, we restrict analysis to nonfinancial and nonutility (hereafter, industrial) firms in the Center for Research in Security Prices (CRSP) and Compustat files, defined as firms with Standard Industrial Classification (SIC) codes outside the intervals 4900–4949 and 6000–6999. We consider only NYSE, Nasdaq, and Amex firms that have securities with CRSP share codes 10 or 11 and that are incorporated in the United States according to Compustat. We focus on 1973–2002, given that CRSP expands to include Nasdaq firms in 1972. To be included in our sample for a given year, a firm must have nonmissing values for dividends and earnings before extraordinary items on Compustat. We impose additional Compustat data availability conditions when conducting some of our logit tests and related analyses (details provided where appropriate).

We estimate a firm's stage in its financial life cycle by the amount of its earned equity (retained earnings), both relative to total common equity, RE/TE, and to total assets, RE/TA. The RE/TE formulation assumes that the key determinant of the decision to pay

dividends is the ratio of internally generated to total (earned plus contributed) common equity, while the RE/TA formulation assumes that the key determinant is the extent to which total assets are funded by earned rather than contributed capital of all types.[1] To ensure that our tests do not confound the impact of total equity financing with the effect of the composition of equity financing, many of our logit regressions also include TE/TA, the ratio of total common equity to total assets. We obtain highly significant results for both RE/TE and RE/TA, with or without our TE/TA control.

Our central prediction is that the probability that a firm pays dividends increases with the amount of earned relative to contributed capital, as measured by RE/TE (and RE/TA). We deliberately couch this prediction in probability terms rather than as an exact prediction because the decision to pay dividends also depends on a firm's future investment opportunities, which we can measure only imperfectly. Although our logits include all of the variables typically used to control for investment prospects (market-to-book ratio, sales growth rate, asset growth rate), these variables are rough measures of the scale of profitable investment opportunities for a given firm. Accordingly, our statistical tests implicitly assume that RE/TE (RE/TA) is not positively correlated with investment opportunities that our market-to-book and growth controls fail to capture, i.e., that a high RE/TE (RE/TA) does not identify firms with investment opportunities greater than expected by the market or than implied by current growth rates.

Table 1 presents summary statistics for our various explanatory variables, grouped into those that measure the earned/contributed capital mix (RE/TE and RE/TA); the book value of total common equity to total assets (TE/TA), which can also be interpreted as the complement of total leverage when preferred stock is a fixed charge obligation; profitability, as measured by the current return on assets (ROA); growth, as measured by the sales growth rate (SGR), asset growth rate (AGR), and market-to-book ratio (M/B); size, as measured by the asset (NYA) and equity value (NYE) percentiles for firms listed on the NYSE; and cash plus marketable securities as a fraction of total assets (Cash/TA). For each variable, we first calculate the median value for dividend payers and nonpayers in each year and then calculate the median over 1973–2002 of the time series of annual medians to derive the numbers reported in the table.

Table 1 shows that dividend payers typically have considerably greater amounts of earned equity relative to contributed capital than do nonpayers. For example, 75% of the median dividend payer's total common equity is earned rather than contributed, whereas RE/TE is less than 4% for the median nonpayer. When earned equity is measured as a percent of total assets, it is 34% for the median dividend payer, whereas the median nonpayer has RE/TA of −1.5%. These differences in the earned equity/contributed capital mix are not driven by total equity differences across dividend payers and nonpayers insofar

[1]The accounting treatment of stock repurchases introduces measurement error into RE/TE and RE/TA as measures of the ratio of earned to contributed capital. Specifically, repurchased shares held as treasury stock reduce TE and TA, but not RE, and therefore overstate RE/TE and RE/TA, perhaps substantially if many shares are repurchased and/or if shares are repurchased at prices materially higher than the initial issue price. In extreme cases, stock repurchases can cause negative TE, but this occurs rarely in our sample. In the median year over 1973–2002, 4.6% of sample observations have negative TE, and we exclude all such observations from our empirical work that employs RE/TE. Our inferences remain unchanged when we take into account the possibility of repurchase-induced measurement error. Specifically, our main statistical tests (see Tables 3, 4, and 5) continue to show a highly significant relation between the decision to pay dividends and RE/TE (or RE/TA) during the second half of our sample period, which roughly corresponds to the recent boom in stock repurchases.

Table 1
Median measures of earned equity versus contributed capital and related descriptive statistics for industrial firms in the Center for Research in Security Prices (CRSP)/Compustat files, 1973–2002

For each year over 1973–2002, the sample consists of (U.S.-incorporated and NYSE-, Nasdaq-, and Amex-listed) industrial firms with CRSP share codes 10 or 11 and nonmissing data on Compustat for dividends and earnings before extraordinary items. We first calculate the median value within each year and then take the median across all sample years to obtain the figures reported in the table. The ratio of earned equity to total common equity (RE/TE) is calculated for those firms with positive total equity and equals retained earnings divided by the total book value of common stockholders' equity. Earned equity to total assets (RE/TA) is the ratio of retained earnings to total assets. The asset growth rate (AGR) is the change in total assets divided by the previous year's level, while the sales growth rate (SGR) is defined analogously with respect to revenue. The market value of equity is based on CRSP share prices and quantities closest to year end. The market-to-book ratio equals the market value of equity plus book assets minus book equity, all divided by total assets. Profitability is measured as the return on assets (ROA) and equals earnings before extraordinary items plus interest expense plus deferred taxes from the income statement (if available), all divided by total assets. Our equity value measure (NYE) equals the percentile (expressed in fractional form) in which the firm falls based on the full cross-sectional distribution of the market value of equity for NYSE companies. Our asset size measure (NYA) is defined analogously relative to the full distribution of total assets for NYSE firms.

	Median value	
	Dividend payers	Nonpayers
1. Earned equity to total common equity (RE/TE)	0.748	0.037
2. Earned equity to total assets (RE/TA)	0.341	−0.015
3. Total common equity to total assets (TE/TA)	0.480	0.470
4. Profitability (ROA)	0.086	0.036
5. Sales growth rate (SGR)	0.086	0.134
6. Asset growth rate (AGR)	0.086	0.075
7. Market-to-book ratio (M/B)	1.3	1.4
8. NYSE asset percentile (NYA)	0.302	0.005
9. NYSE equity value percentile (NYE)	0.362	0.026
10. Cash to total assets (Cash/TA)	0.052	0.082
11. Number of firms	1,348	3,015

as TE/TA differs little across the two groups, with the median ratio for payers at 48% versus 47% for nonpayers.

Table 1 also shows that, consistent with Fama and French (2001), dividend payers are more profitable and larger than nonpayers (see ROA, NYA, and NYE in Rows 4, 8, and 9), which typically exhibit greater sales growth (see SGR in Row 5). Nonpayers also tend to have higher market-to-book ratios (see M/B in Row 7), although differences in median M/B ratios are modest. Contrary to expectations, the median asset growth rate of payers is a bit higher than that of nonpayers (see AGR in Row 6). AGR automatically increases with earnings, and higher earnings increase the probability of paying dividends for reasons unrelated to growth prospects, making AGR a less than ideal growth measure. This shortcoming is not important here because we obtain substantively identical logit results using AGR, SGR, or M/B. Finally, Table 1 indicates that dividend payers have lower cash ratios than nonpayers — see Cash/TA in Row 10 and our discussion in Section 1 that explains why high cash balances do not necessarily indicate a high likelihood of paying dividends.

Table 2
The proportion of industrial firms that pay dividends as a function of earned and total equity from the Center for Research in Security Prices (CRSP)/Compustat files, 1973–2002

Panel A reports the proportion of payers for firms sorted by RE/TE, the ratio of earned equity (retained earnings) to total common equity, while Panel B reports the same proportion for firms sorted by the ratio of earned equity to total assets, RE/TA. Panel C reports the proportion of firms that pay dividends for firms sorted by the ratio of total equity divided by total assets, TE/TA. For a given measure (e.g., RE/TE) in a given year, we first allocate firms to categories (columns) based on their levels of that ratio for the year in question. We then calculate the number of dividend-paying firms divided by the total number of firms in each category for that year. We repeat this process for each year over 1973–2002 and take the median of the resultant 30 observations to obtain the proportion of payers reported in the table. The number of firms is the time-series median of the number of observations in a given category over the 30 sample years. Firms with negative total equity are excluded from Panel A, but not from Panels B and C. (In the median year over 1973–2002, 4.6% of sample firms have negative common equity.) Each year's sample consists of U.S.-incorporated industrial firms listed on NYSE, Nasdaq, and Amex with CRSP share codes 10 or 11 and with nonmissing data on Compustat for dividends, earnings, retained earnings, total common equity, and total assets. Industrial firms are those with Standard Industrial Classification codes outside the ranges 4900–4949 and 6000–6999 (financials and utilities).

	Relative weight (RE/TE, RE/TA, or TE/TA)										
	<0.00	0.00–0.10	0.10–0.20	0.20–0.30	0.30–0.40	0.40–0.50	0.50–0.60	0.60–0.70	0.70–0.80	0.80–0.90	0.90+
A. *Earned equity as a fraction of total common equity (RE/TE)*											
Proportion of payers	0.036	0.137	0.181	0.221	0.262	0.335	0.421	0.518	0.651	0.751	0.810
Total number of firms	1,368	163	190	228	244	276	291	293	293	308	395
B. *Earned equity as fraction of total assets (RE/TA)*											
Proportion of payers	0.034	0.207	0.330	0.448	0.574	0.675	0.721	0.766	0.796	0.807	0.705
Total number of firms	1,655	449	560	558	440	313	216	132	65	21	12
C. *Total equity capital as a fraction of total assets (TE/TA)*											
Proportion of payers	0.031	0.118	0.210	0.313	0.384	0.436	0.397	0.332	0.304	0.220	0.095
Total number of firms	235	134	227	397	599	720	631	510	425	308	163

Table 2 reveals a strong monotonic and positive relation between the proportion of firms that pay dividends and their earned/contributed capital mix, as measured by both RE/TE and RE/TA. For RE/TE, RE/TA, and TE/TA, in each year from 1973 to 2002, we calculate the proportion of payers for firms grouped by ratio level, starting with firms that have negative ratios and moving up in increments of 0.10 to firms with ratios of 0.90 or more. The numbers in Panels A, B, and C of the table are the medians of the annual proportions over 1973–2002 (and the median number of firms in each category over the 30-year period) for RE/TE, RE/TA, and TE/TA, respectively. Panel A shows that only 3.6% of firms with negative RE/TE pay dividends. The percent of payers rises to 13.7% for RE/TE between 0.00 and 0.10 and then increases steadily for every subsequent 0.10 increase in RE/TE, reaching 81.0% when RE/TE is 0.90 or greater. Panel B reports a similarly strong monotonic relation for RE/TA. The one exception is that the percent of payers declines when RE/TA is 0.90 or greater, a finding that is easily explained by the small sample size for this category (12 firms for the median year over 1973–2002, per Table 2).

Although Panels A and B show a strong monotonic relation between the fraction of firms that pay dividends and our measures of the earned/contributed capital mix, RE/TE and RE/TA, we find no such relation for total common equity, TE/TA. In fact, Panel C reveals a low proportion of dividend payers among firms with both high and low TE/TA and a substantially higher proportion among firms with intermediate TE/TA. It is easy to see why firms with low TE/TA pay dividends infrequently, since a low TE/TA ratio is often a sign of financial trouble (because total equity is small relative to total liabilities). High TE/TA firms are of two types: those for which the high total equity is primarily earned equity and those for which it is primarily contributed. The former firms are good candidates to pay dividends, while the latter are poor candidates. In our sample, high TE/TA firms are primarily those with high contributed relative to earned equity, and few of these firms pay dividends.

3. The impact of the earned/contributed capital mix on the probability of paying dividends

We apply Fama and French's (2001, Section 3.5) Fama and MacBeth-based (1973) statistical methodology to test whether the probability that a firm pays dividends depends systematically on the mix of internal versus external equity in its capital structure, RE/TE (and alternatively, the mix of internal versus external capital of all types, RE/TA). Specifically, we utilize a multivariate logit model that takes the payment/nonpayment of dividends as the dependent variable, with RE/TE (or RE/TA) and profitability, growth, size, etc., as the explanatory variables. We run separate logit regressions for each of the 30 sample years (1973–2002) to obtain a time series of fitted coefficients, which are inputs to *t*-statistics that gauge the statistical significance of the explanatory variables. Like Fama and French (2001), we report *t*-statistics unadjusted for serial correlation. We also compute, but do not report, *t*-statistics adjusted for serial correlation using the Newey and West (1987) procedure (out to lag 10). While the resultant statistics on RE/TE and RE/TA are reduced (generally by about half) under this approach, the estimated coefficients on these variables remain highly significant in every model specification we run.

Table 3 reports test results for four basic models (denoted A–D) that control for profitability (ROA) and that each employ six alternative combinations of variables to control for growth and size (denoted by the suffix 1–6 in the model identifier (ID) column).

Table 3
Logit analysis of the decision to pay dividends as a function of the ratio of earned equity to total common equity (RE/TE) and other variables, NYSE, Amex, and Nasdaq industrials in the Center for Research in Security Prices (CRSP)/Compustat files over 1973–2002

For each year over 1973–2002, the sample consists of (U.S.-incorporated and NYSE- Nasdaq-, and Amex-listed) industrial firms with CRSP share codes 10 or 11 and nonmissing data on Compustat for dividends and earnings before extraordinary items. We include only firms with positive total equity (TE) and that have data on Compustat to calculate our measures of the proportion of equity that is internally generated (RE/TE), total equity to total assets (TE/TA), profitability (ROA), size, and growth. Models with identity code (ID) ending in 1, 2, and 3 use the NYSE equity percentile (NYE) as the measure of size, while those with ID ending in 4, 5, and 6 use the NYSE total assets percentile (NYA). Models with IDs 1 and 4 use the annual asset growth rate (AGR) as the growth control variable. Models with IDs 2 and 5 use the annual sales growth rate (SGR) as the growth control variable, while those models with IDs 3 and 6 use the standardized market-to-book (M/B) ratio. The average coefficient is the mean value of the fitted coefficients for 30 logit regressions (one for each year over 1973–2002). The *t*-statistics are calculated using the Fama and MacBeth approach from the time series of fitted logit coefficients and assess the hypothesis that the expected coefficient value is zero.

Model	Average coefficient						*t*-statistic						
ID	RE/TE	TE/TA	ROA	Growth	Size	Intercept	RE/TE	TE/TA	ROA	Growth	Size	Intercept	R^2
A1			5.79	−1.04	4.22	−1.51			21.77	−11.55	27.02	−12.71	.257
A2			6.02	−1.15	4.18	−1.52			19.57	−12.70	27.04	−12.93	.258
A3			7.27	−1.10	4.94	−0.82			19.41	−22.53	33.14	−5.41	.284
A4			7.68	−0.80	4.24	−1.57			18.91	−11.29	32.93	−14.49	.265
A5			7.97	−0.96	4.22	−1.57			17.09	−12.14	32.69	−14.95	.267
A6			8.41	−0.45	4.16	−1.28			17.60	−12.00	36.95	−9.71	.265
B1		0.39	5.40	−0.97	4.21	−1.66		1.59	31.17	−10.17	25.74	−27.68	.265
B2		0.30	5.62	−1.10	4.17	−1.62		1.25	28.47	−11.93	25.88	−26.44	.266
B3		1.02	6.73	−1.11	4.96	−1.25		4.90	25.85	−24.26	31.55	15.12	.292
B4		1.73	6.71	−0.73	4.65	−2.42		7.73	27.64	−9.06	29.27	−38.75	.282
B5		1.64	6.98	−0.88	4.62	−2.39		7.39	24.63	−11.15	28.88	−37.27	.284
B6		2.05	7.59	−0.53	4.63	−2.22		9.25	24.05	−14.58	32.14	−29.01	.286
C1	2.30		1.77	−0.74	3.58	−2.20	12.40		8.34	−9.71	24.95	−65.49	.343
C2	2.31		1.93	−0.83	3.56	−2.21	12.34		7.89	−10.66	24.68	−62.84	.344
C3	2.21		3.31	−0.77	4.12	−1.73	12.69		12.00	−22.26	32.63	−35.39	.353
C4	2.31		3.78	−0.57	3.67	−2.30	12.15		12.24	−9.19	35.67	−62.86	.351
C5	2.30		3.99	−0.69	3.67	−2.30	12.16		11.75	−10.46	35.12	−62.18	.352
C6	2.35		4.01	−0.23	3.64	−2.19	12.69		12.80	−8.90	37.60	−50.29	.349
D1	2.29	−0.33	1.70	−0.69	3.53	−1.98	12.91	−1.51	10.03	−8.91	22.72	−18.75	.348
D2	2.29	−0.37	1.86	−0.80	3.51	−1.97	12.77	−1.68	9.20	−10.12	22.65	−18.31	.349
D3	2.17	0.24	3.09	−0.75	4.08	−1.81	13.36	1.22	12.64	−21.23	27.30	−24.01	.357
D4	2.24	0.91	3.24	−0.49	3.89	−2.71	12.75	4.27	15.52	−7.49	27.21	−25.73	.356
D5	2.24	0.87	3.45	−0.62	3.88	−2.69	12.73	4.10	14.61	−9.46	26.86	−25.07	.357
D6	2.24	1.15	3.70	−0.28	3.91	−2.68	13.41	5.49	14.58	−10.67	28.53	−27.22	.355

The suffix 1 denotes the use of the NYE size measure and the AGR growth measure, while suffixes 2–6, respectively, indicate the following size and growth measure combinations: NYE and SGR, NYE and M/B, NYA and AGR, NYA and SGR, and NYA and M/B.[2] Our findings of a systematic link between RE/TE and the probability that a firm pays dividends are robust across these alternative control variable combinations. The same is true of all logit inferences drawn from data reported in subsequent tables. For brevity, we do not report the details for all six combinations in subsequent tables but simply report test results using the annual sales growth rate (SGR) and the equity value-based size measure (NYE).

Models A1–A6 in Table 3 relate the decision to pay dividends to firm profitability, growth, and size, the main determinants of this decision as posited by Fama and French (2001, Table 5), while Models B1–B6 add TE/TA, the proportion of total assets financed by equity, as an explanatory variable. The time-series average of the fitted logit coefficients appears on the left side of the table, with *t*-statistics on the right. The results for Models A1-A6 and B1-B6 are fully consistent with the findings of Fama and French, with all specifications showing that the probability that a firm pays dividends is significantly and positively related to profitability and size, and negatively related to growth. The probability of paying dividends is positively related to TE/TA, but the relation is insignificant at conventional levels in two of the six specifications (B1 and B2). The weak evidence of a systematic TE/TA effect indicates that the strong impact of RE/TE (and RE/TA) on the probability of paying dividends that we document below is not attributable to a firm's use of equity per se, but rather to its mix of internal and external capital.

Specifications C1–C6 in Table 3 add RE/TE, the ratio of earned to total equity, to the basic Fama and French model, while specifications D1–D6 add RE/TE to the TE/TA-inclusive version of their model. All these specifications show a highly significant positive relation between RE/TE and the probability of paying dividends. The coefficients on profitability, growth, and size all remain significant and, although the coefficients on current profitability decrease, the associated *t*-statistics remain high. The *t*-statistics on TE/TA continue to be mixed, with some models showing a significantly positive relation with the probability of paying dividends, and others showing an insignificantly negative relation. In sum, the Table 3 logits consistently exhibit a strong relation between the probability that a firm pays dividends and RE/TE, controlling for the variables that Fama and French show affect the dividend decision.

RE/TE measures the life cycle stage of a given firm as the extent to which that firm's equity is earned or contributed. Of course, a firm cannot have a high RE/TE ratio without substantial prior earnings, and so RE/TE to some degree reflects profitability. However, two firms with identical historical earnings can have markedly different RE/TE ratios because one has sold more equity to fund its (presumably superior) investment program, giving it a lower RE/TE ratio, which indicates it is more likely in the (early) infusion stage of its life cycle rather than the (later) stage when dividends are appropriate. Table 3 shows that the addition of RE/TE to our various regression specifications lowers the estimated

[2]These models include Fama and French's measures of profitability (ROA), growth (AGR or M/B), and size (NYE). Given that market-to-book ratios vary over time with the level of the stock market, we follow Fama and French (2005) and standardize each M/B input to the logits for a given year by the overall M/B ratio for all sample firms in that year. We also employ an asset-based measure of firm size (NYA) in place of the market-based measure (NYE) and the sales growth rate (SGR) in lieu of the asset growth rate or market-to-book ratio (AGR or M/B).

coefficients on ROA and the associated *t*-statistics, suggesting that RE/TE does to some extent capture the impact of current profitability. But any such commonality is limited because the correlation between ROA and RE/TE is only 0.19 (median of annual correlations over 1973–2002) and because ROA and RE/TE each exhibit highly significant coefficients in all regressions that we run.

Table 4 incorporates controls for cash balances, the prior year's dividend, and lagged profitability into our basic logit regressions (whose results are repeated in Columns 1 and 2 for ease of comparison). In all cases, RE/TE continues to have a positive and highly significant impact on the probability of paying dividends, while current profitability, growth, and size also remain highly significant. The expected sign on Cash/TA is ambiguous because larger cash holdings could indicate a build-up of excess funds (best suited for distribution) or of resources to fund an abundance of new investments (best suited for retention). In the Table 4 logits, cash holdings are significantly negatively related to the probability of paying dividends in all but one specification, suggesting that this variable is empirically distinct from RE/TE — a conclusion that is also supported by the zero correlation between Cash/TA and RE/TE.

The highly significant coefficients on lagged dividend status show that whether a firm paid dividends last year is a strong predictor of whether it will do so this year, consistent with the Lintner (1956) finding that managers are reluctant to stop paying dividends once they begin. Fama and French (2001, Section 5) argue that using lagged dividend status as an explanatory variable is problematic because the resultant model seeks to explain a firm's current dividend decision on the basis of the same decision made recently by the same firm, which comes uncomfortably close to regressing the dependent variable on itself. For our sample, the issue is moot given that lagged dividend status clearly does not capture the full effect of the other explanatory variables. RE/TE, profitability, growth, and size all remain significant when lagged dividend status is included in our logit model.

Benartzi et al. (1997) report evidence that dividend changes convey information about profitability in the year before and year of the dividend change, and so we re-run all our tests adding profitability (ROA) in the prior year as an explanatory variable. For brevity, Columns 9 and 10 report the details of just two of these tests, with Column 9 adding lagged ROA to the basic model in Column 2, and Column 10 adding lagged ROA to the broader model in Column 8. Comparison of Columns 2 and 9 (and of Columns 8 and 10) reveals qualitatively identical findings on the impact of RE/TE, with estimated coefficients and *t*-statistics similar across models. We observe the same close correspondence for the other control variables, although the coefficient on current ROA is a bit lower, with the impact of profitability now spread across current and lagged ROA. We do not report details of other regressions that include lagged ROA, which uniformly indicate that profitability and the mix of earned versus contributed capital are two distinct and statistically strong determinants of the decision to pay dividends.

Table 5 reports logit regressions like those in Table 4, except that we replace RE/TE with RE/TA. In every specification, the coefficient on RE/TA remains positive and the associated *t*-statistic is greater than that on RE/TE in Table 4. Profitability, size, growth, and cash holdings all remain highly significant. The *t*-statistics on profitability, while they remain significant, are consistently lower than those in the Table 4 regressions that use RE/TE, perhaps reflecting the higher correlation between ROA and RE/TA (0.63 versus the 0.19 correlation between ROA and RE/TE). The results also differ slightly from those in Table 4 in that the impact of TE/TA is negative throughout Table 5, whereas it was

Table 4
Logit analysis of the decision to pay dividends as a function of the ratio of earned equity to total common equity (RE/TE), total equity, current and lagged profitability, growth, firm size, cash holdings, and whether the firm paid dividends in the prior year, NYSE, Nasdaq, and Amex industrial firms in the Center for Research in Security Prices (CRSP)/Compustat files over 1973–2002

For each year over 1973–2002, the sample consists of (U.S.-incorporated and NYSE-, Nasdaq-, and Amex-listed) industrial firms with CRSP share codes 10 or 11 and nonmissing data on Compustat for dividends and earnings before extraordinary items. As in Table 3, we include only firms with positive total equity (TE) and that have data on Compustat to calculate our measures of the proportion of equity that is internally generated (RE/TE), total equity to total assets (TE/TA), profitability (ROA), profitability in the prior year, growth (SGR), and size (NYE). We include an indicator variable that takes the value one if the firm paid dividends (per Compustat) in the prior year and zero otherwise. The average coefficient is the mean value of the fitted coefficients for 30 logit regressions (one for each year over 1973–2002), and the number in parentheses is the Fama and MacBeth *t*-statistic calculated from the time series of fitted logit coefficients and assesses the hypothesis that the expected coefficient is zero.

	Average coefficient over 1973–2002 (*t*-statistic)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Earned to total equity (RE/TE)	2.31 (12.34)	2.29 (12.77)	2.25 (11.75)	2.23 (12.14)	0.81 (6.37)	0.78 (6.54)	0.80 (6.39)	0.76 (6.39)	2.26 (12.59)	0.73 (6.24)
Total equity to total assets (TE/TA)		−0.37 (−1.68)		0.27 (1.69)		0.37 (2.18)		0.74 (4.91)	−0.40 (−1.86)	0.67 (4.61)
Profitability (ROA)	1.93 (7.89)	1.86 (9.20)	2.19 (9.44)	2.02 (10.13)	5.47 (12.10)	5.29 (13.09)	5.51 (12.89)	5.32 (13.19)	1.07 (5.46)	4.37 (14.07)
Lagged profitability (ROA in prior year)									1.65 (4.98)	2.50 (5.56)
Growth (SGR)	−0.83 (−10.66)	−0.80 (−10.12)	−0.83 (−10.14)	−0.79 (−9.74)	−0.26 (−4.65)	−0.25 (−4.39)	−0.26 (−4.47)	−0.25 (−4.32)	−0.79 (−9.62)	−0.25 (−4.15)
Size (NYE)	3.56 (24.68)	3.51 (22.65)	3.56 (26.23)	3.56 (24.61)	2.36 (20.80)	2.37 (20.55)	2.35 (21.04)	2.39 (20.79)	3.49 (22.58)	2.33 (20.06)
Cash holdings (Cash/TA)			−1.61 (−6.77)	−1.76 (−11.27)			−0.41 (−1.78)	−0.86 (−4.02)		−0.89 (−4.15)
Dividends in prior year (indicator variable)					5.44 (64.61)	5.46 (63.40)	5.42 (67.80)	5.44 (65.00)		5.46 (65.26)
Intercept	−2.21 (−62.84)	−1.97 (−18.31)	−2.00 (−46.87)	−2.09 (−22.11)	−4.24 (−49.24)	−4.40 (−40.20)	−4.16 (−53.96)	−4.47 (−40.79)	−2.01 (−17.89)	−4.54 (−40.49)
Pseudo R^2	34.4%	34.9%	35.2%	35.4%	59.9%	59.9%	59.9%	60.0%	35.1%	60.0%

Table 5
Logit analysis of the decision to pay dividends as a function of the ratio of earned equity to total assets (RE/TA), total equity, current and lagged profitability, growth, firm size, cash holdings, and whether the firm paid dividends in the prior year, NYSE, Amex, and Nasdaq industrial firms in the Center for Research in Security Prices (CRSP)/Compustat files over 1973–2002

For each year over 1973–2002, the sample consists of (U.S.-incorporated and NYSE-, Nasdaq-, and Amex-listed) industrial firms with CRSP share codes 10 or 11 and nonmissing data on Compustat for dividends and earnings before extraordinary items. We work with the same sample as in Table 4 but replace the explanatory variable RE/TE with RE/TA. Other explanatory variables in the table are total equity to total assets (TE/TA), profitability (ROA), profitability in the prior year, growth (SGR), and size (NYE). We include an indicator variable that takes the value one if the firm paid dividends (per Compustat) in the year prior to that under analysis and zero otherwise. The average coefficient is the mean value of the fitted coefficients for 30 logit regressions (one for each year over 1973–2002), and the *t*-statistic is calculated from the time series of fitted logit coefficients and assesses the hypothesis that the expected coefficient is zero.

	Average coefficient over 1973–2002 (*t*-statistic)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Earned equity to total assets (RE/TA)	4.07 (20.34)	5.60 (24.99)	4.37 (23.86)	5.50 (24.01)	2.13 (13.00)	2.39 (13.48)	2.19 (13.69)	2.33 (12.78)	5.57 (25.35)	2.25 (12.34)
Total equity to total assets (TE/TA)		−2.94 (−24.72)		−2.30 (−23.80)		−0.62 (−4.00)		−0.26 (−1.57)	−2.97 (−25.12)	−0.31 (−1.81)
Profitability (ROA)	1.10 (6.15)	1.19 (5.92)	1.38 (7.46)	1.38 (6.87)	4.74 (10.15)	4.81 (10.40)	4.88 (10.65)	4.89 (10.71)	0.54 (3.57)	4.04 (11.59)
Lagged profitability (ROA in prior year)									1.38 (4.09)	2.30 (4.96)
Growth (SGR)	−0.73 (−9.75)	−0.63 (−10.01)	−0.68 (−9.13)	−0.63 (−9.48)	−0.21 (−4.03)	−0.20 (−3.99)	−0.20 (−3.83)	−0.20 (−3.97)	−0.62 (−9.63)	−0.20 (−3.87)
Size (NYE)	3.76 (26.88)	3.50 (23.47)	3.71 (28.54)	3.53 (25.29)	2.34 (22.23)	2.28 (21.19)	2.32 (22.32)	2.31 (21.46)	3.48 (23.53)	2.25 (20.61)
Cash holdings (Cash/TA)			12.96 (−14.71)	−1.85 (−11.23)			−0.93 (−4.86)	−0.81 (−4.01)		−0.85 (−4.17)
Dividends in prior year (indicator variable)					5.39 (65.41)	5.36 (64.58)	5.35 (68.23)	5.36 (65.54)		5.38 (64.72)
Intercept	−2.07 (−31.50)	−0.97 (−17.38)	−1.82 (−37.39)	−1.08 (−18.95)	−4.30 (−44.90)	−4.02 (−34.76)	−4.17 (−48.60)	−4.09 (−34.20)	−1.01 (−17.09)	−4.18 (−34.63)
Pseudo R^2	34.3%	36.4%	36.0%	36.8%	60.0%	60.0%	60.0%	60.1%	36.5%	60.1%

positive in four of six specifications in Table 4. However, instability of the coefficient on TE/TA has no bearing on our main inference. Rather, the important bottom line is that all the logits we run uniformly and strongly support the notion that a firm's decision to pay dividends depends on its mix of internally generated versus contributed capital, whether that mix is measured by RE/TE or RE/TA.

4. The impact of RE/TE versus profitability/growth on the probability of paying dividends

Table 6 provides data to assess the quantitative impact of variation in RE/TE on the probability of paying dividends and to gauge the impact of RE/TE relative to that of profitability/growth and firm size. We obtain the probabilities from Model 4 of Table 4 in which the explanatory variables are RE/TE, profitability, growth, size, cash balances, and total equity. In constructing Table 6, we assume that all firms have reasonably typical values of total equity and cash (TE/TA = 0.50 and Cash/TA = 0.05). Because Fama and French (2001) and others argue that dividends are paid by high-profitability/low-growth firms and are avoided by low-profitability/high-growth firms, Table 6 includes estimates of how the probability of paying dividends changes for three types of firms that differ in their profit and growth characteristics. Panel A reports the estimated probability of paying dividends for low-profit/high-growth firms (ROA = 0.02 and SGR = 0.15), Panel C reports probability estimates for high-profit/low-growth firms (ROA = 0.12 and SGR = 0.05), and Panel B provides estimates for firms with intermediate profitability and growth (ROA = 0.06 and SGR = 0.10).

Table 6 reports the estimated probability that a firm pays dividends as a function of RE/TE and firm size, holding constant TE/TA, Cash/TA, ROA, and SGR at the levels just described. Firm size is measured by the NYSE percentile ranking of its equity market value so that, e.g., the fifth row has NYE = 0.50, indicating a firm whose equity value falls at the median among NYSE industrials. The first column (RE/TE = 0.10) reports the probability of paying dividends for a firm whose equity is 10% earned and 90% contributed, the second column is for a firm with a 20–80% mix of earned and contributed equity, and so on up to a 90–10% mix. The column labeled average change contains the average change in the probability of paying dividends associated with an increase of 0.10 in RE/TE, while the row with the same label reports the average probability change associated with a one decile increase in a firm's size ranking based on equity value.[3]

Table 6 shows that the quantitative impact of variation in profitability and growth is relatively modest, even though both variables are statistically significant in all our logit regressions. To see that the quantitative impact of profitability and growth is modest, compare the probability of paying dividends in any cell in Panel C (which contains data for high-profit/low-growth firms) to the probability in the matching cell in Panel A (which contains data for low-profit/high-growth firms). For example, among the Panel C high-profit/low-growth firms, a firm whose market value is at the median (NYE = 0.50), with an equal split of internal and external equity (RE/TE = 0.50), has a 0.734 probability of paying dividends, which exceeds by just 0.050 the 0.684 probability estimate for an

[3]The former average is the probability of paying dividends implied by RE/TE = 0.90 minus the probability implied by RE/TE = 0.10, divided by 8 (the number of intervals of size 0.10 between the two values). The latter average is the probability of paying dividends implied by NYE = 0.90 minus the probability implied by NYE = 0.10, divided by 8.

Table 6
Probability that a firm pays dividends as a function of earned equity and firm size, with estimates based on median fitted logit model coefficients for industrial firms over 1973–2002

These probability estimates are based on Model 4 of Table 4. The size measure is NYE, the firm's percentile ranking based on the market values of equity for NYSE industrials. In all three panels, we assume that the ratio of total equity to total assets, TE/TA, equals 0.50, and that the ratio of cash to total assets, Cash/TA, equals 0.05. In Panel A, the sales growth rate, SGR, is set equal to 0.15, while profitability, ROA, is set equal to 0.02. In Panel B, SGR = 0.10 and ROA = 0.06. In Panel C, SGR = 0.05 and ROA = 0.12. The column labeled average change gives the change in probability from the first column to the last, divided by 8 (the number of increments of 0.10 between RE/TE = 0.10 and RE/TE = 0.90). The interpretation is that, over the full interval from RE/TE = 0.10 to 0.90, an increment of 0.10 in this ratio translates to the specified average change in the probability that a firm pays dividends. Similarly, each row labeled average change gives the change in probability from the first row to the last, divided by 8.

	Retained earnings to total equity (RE/TE)									
Size percentile (NYE)	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	Average change
A. *Low profitability and high growth (ROA = 0.02 and SGR = 0.15)*										
0.10	0.176	0.211	0.250	0.295	0.343	0.395	0.449	0.505	0.560	0.048
0.20	0.234	0.276	0.323	0.374	0.427	0.482	0.538	0.593	0.645	0.051
0.30	0.304	0.353	0.405	0.460	0.515	0.571	0.624	0.675	0.722	0.052
0.40	0.384	0.438	0.493	0.549	0.603	0.655	0.703	0.748	0.787	0.050
0.50	0.471	0.526	0.581	0.634	0.684	0.730	0.772	0.809	0.841	0.046
0.60	0.559	0.613	0.665	0.712	0.756	0.795	0.829	0.858	0.883	0.040
0.70	0.644	0.694	0.739	0.780	0.815	0.847	0.873	0.896	0.915	0.034
0.80	0.721	0.764	0.802	0.835	0.863	0.887	0.908	0.925	0.939	0.027
0.90	0.787	0.822	0.852	0.878	0.900	0.918	0.934	0.946	0.956	0.021
Average change	0.076	0.076	0.075	0.073	0.070	0.065	0.061	0.055	0.050	—
B. *Average profitability and average growth (ROA = 0.06 and SGR = 0.10)*										
0.10	0.194	0.232	0.274	0.320	0.371	0.424	0.479	0.535	0.590	0.049
0.20	0.256	0.301	0.350	0.402	0.457	0.512	0.568	0.621	0.672	0.052
0.30	0.330	0.381	0.434	0.490	0.545	0.600	0.652	0.701	0.745	0.052
0.40	0.412	0.467	0.523	0.578	0.631	0.682	0.728	0.770	0.807	0.049
0.50	0.501	0.556	0.610	0.662	0.710	0.753	0.793	0.827	0.856	0.044
0.60	0.589	0.641	0.691	0.736	0.777	0.814	0.845	0.872	0.895	0.038
0.70	0.671	0.719	0.761	0.800	0.833	0.862	0.886	0.907	0.924	0.032
0.80	0.745	0.785	0.820	0.851	0.877	0.899	0.917	0.933	0.946	0.025
0.90	0.806	0.839	0.867	0.890	0.910	0.927	0.941	0.952	0.961	0.019
Average change	0.076	0.076	0.074	0.071	0.067	0.063	0.058	0.052	0.046	—
C. *High profitability and low growth (ROA = 0.12 and SGR = 0.05)*										
0.10	0.214	0.254	0.298	0.347	0.399	0.454	0.509	0.565	0.618	0.051
0.20	0.280	0.327	0.378	0.431	0.487	0.542	0.597	0.649	0.698	0.052
0.30	0.357	0.409	0.464	0.520	0.575	0.628	0.679	0.725	0.768	0.051
0.40	0.442	0.497	0.553	0.607	0.659	0.707	0.751	0.790	0.825	0.048
0.50	0.531	0.586	0.638	0.688	0.734	0.775	0.812	0.843	0.871	0.043
0.60	0.617	0.669	0.716	0.759	0.797	0.831	0.860	0.885	0.906	0.036
0.70	0.697	0.742	0.783	0.818	0.849	0.875	0.898	0.916	0.932	0.029
0.80	0.767	0.804	0.837	0.865	0.889	0.909	0.926	0.940	0.951	0.023
0.90	0.824	0.854	0.880	0.902	0.920	0.935	0.947	0.957	0.965	0.018
Average change	0.076	0.075	0.073	0.069	0.065	0.060	0.055	0.049	0.043	—

otherwise identical low-profit/high-growth firm in Panel A. All Panel C versus Panel A comparisons show a similarly modest difference in the probability of paying dividends despite large profit and growth differences.

In contrast, size differences are associated with substantial differences in the probability of paying dividends. Scanning down each column in any given panel of Table 6 shows that a firm at the 10th percentile for equity value (NYE = 0.10) has a much lower probability of paying dividends than a firm at the median, which in turn has a much lower probability than a firm at the 90th percentile. According to the bottom row, which reports the average change from the 10th to 90th percentiles, a relatively modest one decile difference in equity value rank translates to an average difference of as much as 0.076 (when RE/TE is low) to 0.043 (when RE/TE is high) in the probability of paying dividends. These data show that the very largest firms exhibit a substantially higher probability of paying dividends than do firms that rank in the middle or at the low end of the NYSE equity value spectrum, after controlling for profitability, growth, RE/TE, etc.

RE/TE differences are associated with substantial differences in the probability of paying dividends for all but the highest size deciles of NYSE firms, and with smaller yet nontrivial increases for the latter firms. Our finding that the impact of RE/TE is less marked for the largest firms reflects the fact that the unconditional probability of paying dividends is high among this group. For firms with average current profitability and growth (Panel B) whose equity value matches that of the median NYSE firm (NYE = 0.50), an increase from RE/TE = 0.10 to RE/TE = 0.90 increases the probability of paying dividends by 0.355 (0.856–0.501), which translates to an average 0.044 increase for each increment of 0.10 in RE/TE. The 0.355 total probability effect is roughly seven times the size of the 0.050 probability difference between high-profit/low-growth and low-growth/high-profit firms discussed above. For the purpose of explaining whether a firm pays dividends or not, the quantitative impact of the earned/contributed capital mix, like that of its size, is clearly substantial, and the impact of both RE/TE and size is much greater than the impact of profitability and growth.

5. The upsurge in firms with negative RE/TE and the reduced propensity to pay dividends

The mix of earned versus contributed capital is not only an important determinant of the decision to pay dividends, but this variable also helps shed light on Fama and French's (2001) puzzling finding that in recent years firms are much less likely to pay dividends than they were in the mid- to late-1970s. Fama and French document a sharp decline from 1978 to 1998 both in the number of firms that pay dividends, and in firms' propensity to pay dividends, controlling for the (profitability, growth, and size) characteristics that they posit determine the decision to pay. DeAngelo et al. (2004) show that the decline in the number of payers is not accompanied by a decline in aggregate inflation-adjusted dividends, which have actually increased, so that dividends are not disappearing in the aggregate but are simply being paid by fewer firms. In short, the supply of dividends has become increasingly concentrated in a relatively few large payers. Such increased concentration, however, cannot explain the material reduction in the propensity to pay dividends, which remains an important unexplained puzzle in corporate finance.

Given the importance of the earned/contributed capital mix in the decision to pay dividends, one possible (and, to date unexamined) trend that could help explain the secular decline in firms' propensity to pay dividends is a shift in the industrial population toward

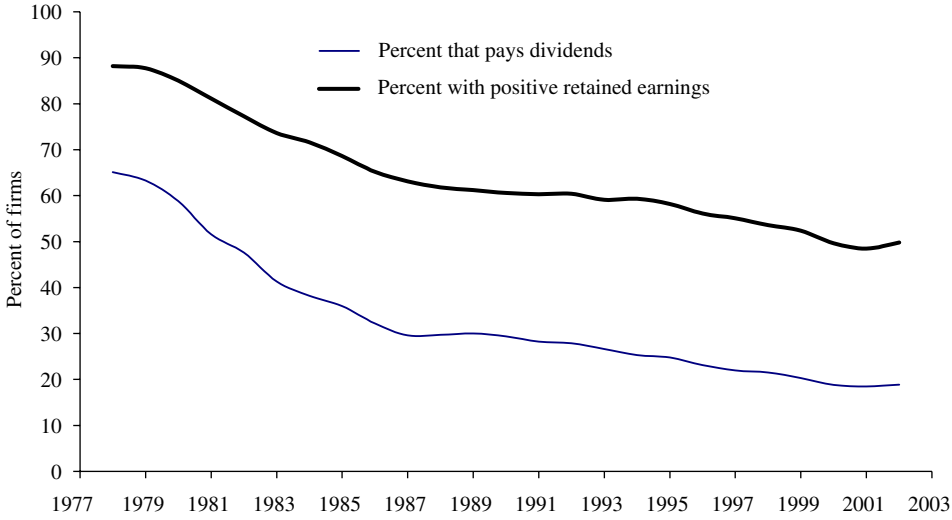

Fig. 1. Percent of industrial firms with positive retained earnings and percent that pays dividends for firms in the Center for Research in Security Prices (CRSP)/Compustat files, 1978–2002. This figure includes all firms that meet our basic sampling criteria and that have nonmissing retained earnings data on Compustat. The first year in the figure is 1978, which is the year that Fama and French (2001) identify as the beginning of the downward trend in the incidence of dividend paying firms among publicly held industrials.

firms with less earned equity. Fig. 1 documents a sharp decline from 1978 to 2002 in the incidence of firms with positive retained earnings and shows that this downtrend matches almost perfectly the contemporaneous decline in the incidence of dividend payers. Specifically, Fig. 1 reports a 38.4% decline (from 88.2% to 49.8%) in the percent of sample firms with positive retained earnings, which roughly matches the 46.2% contemporaneous decline (from 65.1% to 18.9%) in the percent that pay dividends. Strikingly, a full 50.2% of our sample has negative retained earnings in 2002, up from just 11.8% in 1978. The close correspondence in time and magnitude of the declines in firms with positive retained earnings and in those that pay dividends suggests that the secular decline in firms' propensity to pay dividends could simply reflect the contemporaneous massive increase in firms with negative retained earnings.

Not so. Rather, as we next show, the reduction in the propensity to pay dividends is almost entirely concentrated among firms whose positive RE/TE ratios make them good candidates to pay dividends. Among such firms, our best estimate of the magnitude of the propensity to pay reduction is about 50%, or nearly twice the overall magnitude previously estimated by Fama and French. We calculate the overall reduction in firms' propensity to pay dividends as Exp%—Act%, the difference between the expected percent of firms that pay dividends in 2002 (predicted from firms' dividend decisions in the 1970s) and the actual percent that pay them.[4] Controlling for profitability, growth, and size, the overall

[4]To calculate the expected percent of payers in 2002 we first take the characteristics of each firm in our 2002 sample and generate the probability that it will pay dividends based on those characteristics and a given pay/do not pay dividends logit model with coefficients estimated using data for the mid-1970s (1973–1977). We then aggregate the estimated probabilities of all firms to obtain the number of firms expected to pay dividends in 2002,

reduction in the propensity to pay dividends from the mid-1970s to 2002 is 28.6%. When we add RE/TE to the model, our overall estimate is 22.0%. Both figures are in the same ballpark as the Fama and French (2001, Table 6) estimates of the overall propensity reduction from the mid-1970s to 1998 (23.3% or 30.8%, depending on the specific growth controls they use).

Firms whose positive RE/TE levels imply a reasonable ex ante likelihood of paying dividends have a far greater reduction in propensity to pay than indicated by these overall estimates, which are dampened substantially by inclusion of a large number of firms with negative retained earnings that are poor candidates to pay dividends.[5] Fig. 2 shows the reduction in the propensity to pay dividends, Exp%−Act%, for firms grouped by RE/TE level (bottom panel) and the cross-sectional distributions of RE/TE (top panel) for 1978 and 2002. The negative RE/TE group includes roughly half the sample,[6] and these firms' reduction in the propensity to pay dividends is a trivial 1.5% (Exp% = 5.5%, Act% = 4.0%). The intuition for this miniscule propensity reduction is that firms with negative RE/TE have a low ex ante probability of paying dividends (5.5%), and so it is impossible for them to show a reduction in their (essentially nil) propensity to pay that is anywhere close in magnitude to the 22.0% overall propensity reduction for our sample as a whole.

Because firms with negative RE/TE show essentially no reduction in propensity to pay and constitute roughly half the sample, firms with positive RE/TE must exhibit a far greater reduction than the 22.0% reduction for the full sample. The latter fact is evident in the bottom panel of Fig. 2, which shows that, for every RE/TE group except firms with negative RE/TE, the propensity reduction exceeds 22.0% and almost always by a wide margin. For example, for the eight groups with RE/TE between 0.10 and 0.90, the propensity to pay reduction is never less than 34.3% and is around 50.0% for the five groups with RE/TE between 0.30 and 0.80. For firms in the two highest RE/TE groups, the propensity reduction is somewhat lower (although, at 38.8% and 26.0%, still clearly

(*footnote continued*)
based on their current characteristics and firms' tendencies to pay dividends in the mid 1970s, and divide by the total number of firms to get the expected percent of payers. For our RE/TE-inclusive analysis, we use the model in Column 4 of Table 4, and we therefore restrict attention to firms with positive values of TE (so that RE/TE is economically meaningful). The caption to Fig. 2 provides more details on our specific calculations.

[5]The legal ability to pay dividends when the book value of retained earnings is negative depends on the statutes of the firm's state of incorporation and any retained earnings-based constraints embedded in the firm's loan agreements. Roberts et al. (1990) indicate that, over the last 25 years, many states have weakened statutory restrictions that formerly limited distributions to the book value of earned plus contributed capital in excess of par value. Delaware employs a market value test, which limits distributions to those that can be funded out of surplus defined relative to the fair value (as opposed to book value) of assets or out of current period earnings. The 1980 revisions to the Model Business Corporation Act also moved to a fair-value test for allowed distributions. Although some states currently have book equity-based limitations on payouts, these limitations can be avoided by switching incorporation to a state such as Delaware that employs a fair-value test. Fair value-based statutes allow firms to make special payouts that result in negative retained earnings and negative book equity. As Roberts et al. discuss, in numerous leveraged recapitalizations during the 1980s takeover boom, payouts drove book equity negative, but no laws were violated because they left ample assets (assessed on a fair-value basis) inside the firm to protect creditors.

[6]The proportion of industrial firms with negative retained earnings in 2002 exceeds 50.0%, as shown in Fig. 1. The 46.1% incidence in Fig. 2 refers to the percent of firms with negative RE/TE, where TE must be positive for inclusion in this analysis. Because RE/TE is not meaningful when TE is negative, we exclude negative TE firms from Fig. 2 (and from all logit regressions that include RE/TE as an explanatory variable).

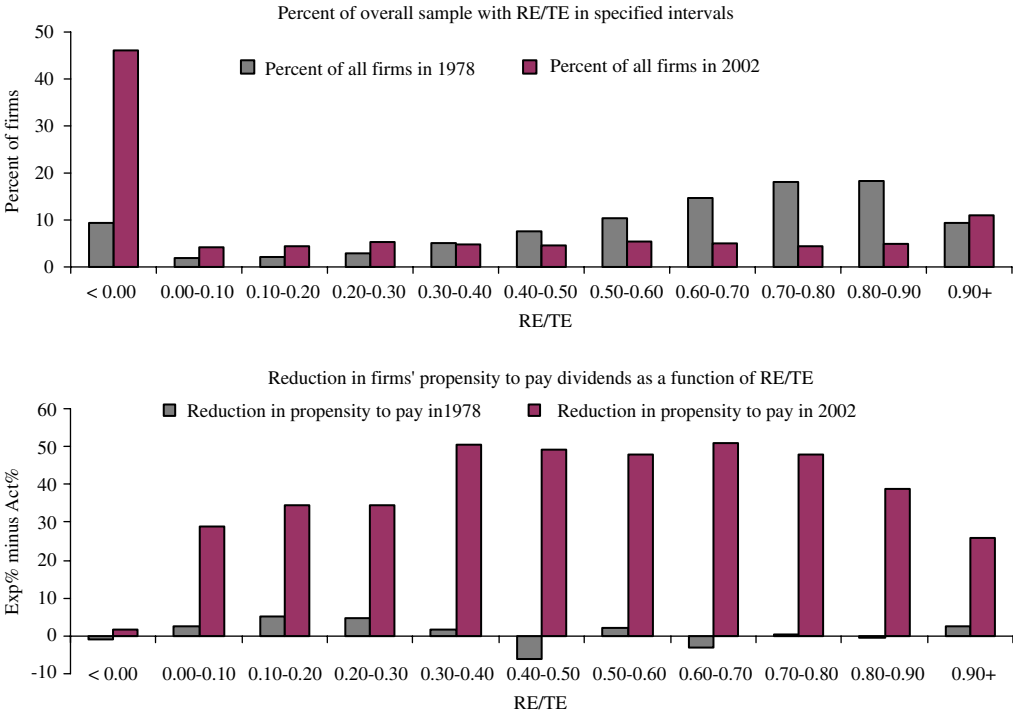

Fig. 2. Distribution of firms and reduction in propensity to pay dividends as a function of retained earnings divided by total equity (RE/TE) for sample of industrial firms in the Center for Research in Security Prices CRSP/Compustat file for 1978 and 2002. The top panel reports the percent of all sample firms that have RE/TE in each specified interval in 1978 and 2002. The bottom panel reports the change in firms' propensity to pay dividends in those years as a function of RE/TE. The change in firms' propensity to pay dividends is measured as the difference between the expected and actual percent of dividend payers (Exp%–Act%), where the expected number of payers in 1978 and 2002 is based on model parameter estimates for 1973–1977 under Model 4 of Table 4. To calculate the expected number and percent of payers, we use the median value over 1973–1977 of the estimated logit model parameters for those years and generate the probability that each sample firm pays dividends by applying those model parameters to the value of that firm's determinants of the decision to pay (profitability, growth, etc.) in 1978 and 2002. The sample consists of the 1978 and 2002 observations for all industrial firms on CRSP and Compustat that enter our RE/TE logit tests, and therefore excludes observations with negative stockholders' equity (TE) or with missing values of the explanatory variables in our logit models. Because of the latter sampling conditions, the 46.2% incidence of firms with negative RE/TE is below the 50.2% incidence of firms with negative retained earnings reported in Fig. 1.

substantial) probably because these two groups contain many prominent old line firms that are unlikely to abandon longstanding policies of paying dividends (see Section 7 for more on such firms). Because firms with positive RE/TE are both natural candidates to pay dividends and exhibit reductions in the propensity to pay that commonly reach 50.0%, the "disappearing dividends" puzzle is an even greater mystery than indicated by Fama and French's estimates, which do not control for the earned/contributed capital mix.

Table 7 shows that virtually all (96.8%) of the anomalous propensity to pay reduction is associated with firms with positive RE/TE. The actual number of 2002 dividend payers falls short of the expected number by 779 firms, but the shortfall in the negative RE/TE group is only 25 firms, or just 3.2% of the total shortfall. All other RE/TE groups have

Table 7
Actual versus expected incidence of dividend paying firms in 2002 as a function of earned to total equity (RE/TE) for industrial firms in the Center for Research in Security Prices (CRSP)/Compustat files

The sample consists of all industrial firms on CRSP and Compustat with sufficient 2002 data to be included in the RE/TE-based logits presented earlier in the paper. Firms are sorted into groups based on their RE/TE in 2002. To calculate the expected number of 2002 payers, we use the median value over 1973–1977 of the estimated logit parameters from Model 4 in Table 4. We generate the probability that each sample firm pays dividends in 2002 by applying those model parameters to the value of that firm's determinants of the decision to pay (RE/TE, profitability, growth, etc.). We aggregate those probabilities to get the expected number of firms that pay dividends in 2002. The shortfall is the difference between the expected and actual number of payers.

	RE/TE in 2002 falls in the range											
	<0.00	0.00–0.10	0.10–0.20	0.20–0.30	0.30–0.40	0.40–0.50	0.50–0.60	0.60–0.70	0.70–0.80	0.80–0.90	0.90+	All firms
Total number of firms	1,633	149	156	187	169	164	192	178	156	172	389	3,545
Expected number of payers	90	56	77	101	107	117	145	147	137	157	375	1,509
Actual number of payers	65	13	23	36	22	36	53	56	62	90	274	730
Shortfall (number of firms)	25	43	54	65	85	81	92	91	75	67	101	779
Percent of total shortfall	3.2	5.5	6.9	8.3	11.0	10.3	11.9	11.7	9.6	8.6	13.0	100.0
Percent of total shortfall with this or higher level of RE/TE	100.0	96.8	91.3	84.4	76.0	65.1	54.7	42.9	31.2	21.6	13.0	—

a far larger absolute shortfall (ranging from 43 firms for the group with small positive RE/TE to 101 firms for the highest RE/TE group) even though each of these groups has far fewer firms than 1,633, the number with negative RE/TE. Firms with RE/TE of 0.30 or greater account for more than three-quarters (76.0%) of the decline in dividend payers that is attributable to a reduced propensity to pay. Bottom line, the unexplained component of Fama and French's "disappearing dividends" phenomenon is the failure to pay dividends on the part of about 750 firms whose positive RE/TE ratios identify them as likely in the distribution stage of their life cycles.

While our analysis does not resolve the "disappearing dividends" puzzle, it eliminates half the suspect population and establishes that, among firms whose RE/TE ratios make them reasonable candidates to pay dividends, the magnitude of the anomalous propensity to pay reduction reaches roughly twice the (already substantial) scale previously reported by Fama and French (2001). The clear implication is that future research needs to focus on explaining the sharp reduction in the propensity to pay dividends by firms whose earned/contributed capital mix implies they are likely in the distribution stage of their financial life cycle. In our sample, the sharpest reductions in the propensity to pay dividends occur among firms with RE/TE in the range 0.30 to 0.80, but firms with positive RE/TE ratios outside this range also exhibit substantial propensity reductions, while there is no anomalous propensity to pay reduction among the roughly half the 2002 industrial population that has negative retained earnings.

6. The impact of the earned/contributed capital mix on dividend initiations and omissions

Our analysis thus far focuses on explaining the cross-sectional variation in the decision to pay dividends and the role played by the mix of earned versus contributed capital in determining whether a firm is at the dividend-paying stage. We next investigate whether decisions to initiate or omit dividends are significantly affected by the firm's earned/contributed capital mix. Specifically, we expect the relative amount of earned versus contributed capital, size, and profitability to trend upward (and growth, if anything, to slow) in the years before dividend initiations, and the opposite trends to occur before dividend omissions. We also expect logit analyses of the initiation and omission decisions to show statistical relations for RE/TE and RE/TA in the same direction as we observe in cross section for the full sample. We define a dividend initiator as a firm that pays dividends after having not paid them for at least the prior five years and a dividend omitter as a firm that fails to pay dividends after five or more consecutive years of paying them. Within our sample, 823 firms initiated dividends during 1973–2002, of which 22 initiated them more than once (two or three separate times after five years of not paying them). We identify 987 dividend-omitting firms, of which 56 omitted more than once.

Fig. 3 plots the trends in the median values of RE/TE for dividend initiators and omitters over year −5 through year 0, the year of the initiation or omission. Table 8 reports the median levels of RE/TE, RE/TA, TE/TA, firm size, profitability, growth, and cash holdings for initiators (Panel A) and omitters (Panel B) in year −5 through year 0. (Fig. 3 and Table 8 include only the first dividend initiation for the 22 multiple initiators and the last omission for the 56 multiple omitters.) The median RE/TE trends in Fig. 3 are as expected, with dividend initiators showing an increase and omitters showing a decrease beginning in year −2. Panel A of Table 8 shows positive trends in RE/TE, RE/TA, size, and profitability (and stable sales growth, SGR) over the five years before the dividend

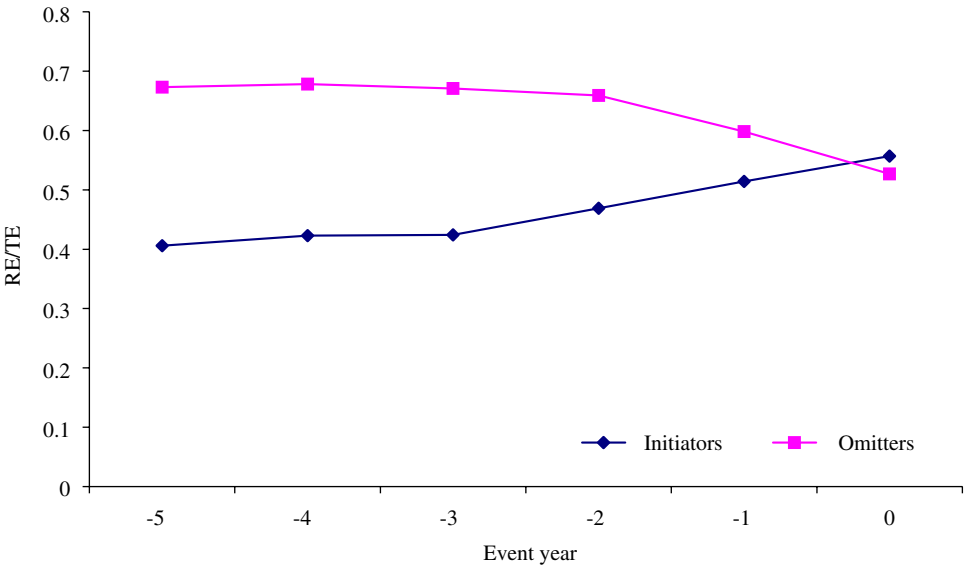

Fig. 3. Trend in median ratio of retained earnings to total common equity, RE/TE, beginning five years prior to dividend initiations and omissions. The initiation sample consists of 823 industrial firms that initiated dividends after paying zero dividends for at least five consecutive years. For the 22 firms that satisfy this sampling condition more than once during 1973–2002, the figure includes only the first dividend initiation. The omission sample consists of 987 firms that failed to pay a dividend after at least five consecutive years of paying them. For the 56 firms that satisfy this sampling condition more than once during 1973–2002, the figure includes only the last dividend omission. Event year 0 is the year of initiation (or omission), event year −1 is the immediately prior year, and so on.

initiation, while Panel B shows deterioration in RE/TE, RE/TA, size, and profitability for omitters. Growth actually turns negative for omitters in years −1 and 0, reflecting the troubled condition of many dividend-omitting firms.

The typical initiator and the typical omitter both fall in the middle ground between the typical nonpayer (with relatively low earned equity and smaller size) and the typical payer (with relatively high earned equity and larger size). For the median initiator, RE/TE is 0.557 in the initiation year, up from 0.406 five years earlier, but still below the 0.748 for the typical dividend payer in the full sample (per Table 1). For the median omitter, RE/TE erodes from 0.673 in year −5 to 0.527 in year 0. A similar pattern holds for RE/TA, with the median of 0.247 in the initiation year up from 0.175 five years earlier, yet still below the 0.341 for the median payer in the full sample. For omitters, the median RE/TA declines from 0.302 in year −5 to 0.163 in year 0. For the median initiator, the NYSE equity value percentile increases from NYE of 0.055 in year −5 to 0.113 in the initiation year, and the latter figure falls between the median values for payers and nonpayers (NYE = 0.302 and 0.026, respectively). Again, the opposite holds for omitters, with NYE falling from 0.164 in year −5 to 0.069 in year 0.

We run logit regressions to analyze the decision to initiate (omit) dividends as a function of the earned/contributed capital mix, TE/TA, profitability, cash, size, and growth. For each year from 1973 to 2002, our initiation logits seek to explain which of the firms that have not paid dividends for at least five years will start paying them, with *t*-statistics

Table 8
Median ratio of earned equity to total common equity (RE/TE) and other determinants of the decision to pay dividends in the years leading up to dividend initiations and omissions by industrial firms in the Center for Research in Security Prices (CRSP)/Compustat files over 1973–2002

The initiation sample consists of 823 industrial firms that initiated dividends after paying zero dividends for at least five consecutive years. For the 22 firms that satisfy this sampling condition more than once during the period 1973–2002, the table includes only the first dividend initiation. The omission sample consists of 987 firms that failed to pay a dividend after at least five consecutive years of paying them. For the 56 firms that satisfy this sampling condition more than once during 1973–2002, the table includes only the last dividend omission. Event year 0 is the year of initiation (or omission), event year −1 is the immediately prior year, and so on.

	Median level in specified event year relative to initiation in year 0					
	−5	−4	−3	−2	−1	0
A. *Dividend initiations*						
Earned equity to total equity (RE/TE)	0.406	0.423	0.424	0.469	0.514	0.557
Earned equity to total assets (RE/TA)	0.175	0.169	0.179	0.194	0.230	0.247
Total equity to total assets (TE/TA)	0.457	0.450	0.453	0.463	0.495	0.500
Size (NYE)	0.055	0.057	0.056	0.070	0.091	0.113
Profitability (ROA)	0.072	0.073	0.074	0.076	0.090	0.094
Growth (SGR)	0.139	0.133	0.114	0.123	0.156	0.136
Cash holdings (Cash/TA)	0.059	0.059	0.060	0.070	0.079	0.075
B. *Dividend omissions*						
Earned equity to total equity (RE/TE)	0.673	0.678	0.671	0.659	0.598	0.527
Earned equity to total assets (RE/TA)	0.302	0.298	0.281	0.258	0.202	0.163
Total equity to total assets (TE/TA)	0.483	0.476	0.452	0.423	0.368	0.363
Size (NYE)	0.164	0.170	0.172	0.129	0.087	0.069
Profitability (ROA)	0.084	0.080	0.072	0.057	0.016	0.025
Growth (SGR)	0.106	0.098	0.085	0.057	−0.016	−0.024
Cash holdings (Cash/TA)	0.051	0.048	0.044	0.036	0.034	0.043

calculated as in the earlier tables. We also run logits that seek to explain which of the firms that have paid dividends for at least the last five years will stop paying them. Our omission logits use RE/TA in place of RE/TE because of our concern that extreme TE values for troubled firms might warp results based on RE/TE. [We use RE/TA (or RE/TE) instead of the changes therein because the level of this variable is our proxy for life cycle stage and because, to a first approximation, the change in retained earnings is captured by our profitability variable.] For brevity, we simply report that the earned equity/contributed capital mix remains significant in all specifications, with the lowest t-statistic equal to 5.72. The overall explanatory power of the initiation logits is markedly lower than that of the full sample logits (with pseudo R^2s around 4.0% versus 35.0%), but these models do a good job identifying initiators or noninitiators, with about 95% on average of the observations classified correctly. The omission logits do a little better, with pseudo R^2s of around 7.0% or 8.0%, and about 97% correctly classified.

Table 8 shows that, while median RE/TE and RE/TA ratios trend as one would expect for initiator and omitters, these ratios do not change by large amounts in the five years before initiations and omissions. This observation suggests there is no definitive or unique RE/TE- or RE/TA-based trigger point that dictates that a firm has reached (or passed) the stage where paying dividends is appropriate. Instead, it appears that higher levels of

RE/TE (and RE/TA) simply indicate the firm has become a better candidate to pay dividends and that management has a fair degree of latitude in selecting the precise time (and RE/TE and RE/TA levels) at which it will begin distributing free cash flow to stockholders, taking into account such firm-specific details as, e.g., the scope of current and probable future investment opportunities, the potential for agency problems, and the likelihood that a decision to initiate might have to be reversed because of unexpected future earnings problems.

7. Retention versus distribution in the life-cycle theory

Firms in the early stages of their life cycle with ample profitable investment opportunities and limited earned equity will retain all funds when internal financing is cheaper than external financing (due, e.g., to flotation costs, personal taxes, or informational asymmetries). While these benefits of retention are widely accepted as empirically important in the literature, the motivations for later stage distributions are less so, probably because factors such as the agency costs of free cash flow are less easily measured than security issuance costs, tax penalties on payouts, and the stock-price impact of equity offerings. We next provide some indirect evidence on the economic magnitude of the costs associated with excess retention, i.e., the costs to mature firms of failing to distribute free cash flow. This evidence indicates that the life-cycle theory, which in essence is a theory of the evolution of the trade-off between the benefits and costs of retention, entails a trade-off between empirically meaningful factors rather than a new manifestation of Miller's (1977) "horse and rabbit stew" phenomenon.

Table 9 reports data to assess the impact of their chosen dividend policies on the asset and capital structures of the 25 largest long-standing dividend payers, i.e., the 25 industrial firms with the largest total real dividends over 1950–2002 that paid dividends in 2002. These firms account for 56.3% of all dividends paid by industrial firms in 2002 and are clearly in the mature stage of their life cycles, as can be seen from their identities in Table 9 and from the fact that the median firm has RE/TE = 0.97 in 2002, placing it in the top RE/TE group in Table 2. We project how the 25 firms' asset and capital structures would appear in 2002 had they not paid dividends over 1950–2002 and kept their investment outlays unchanged, actual year 2002 cash balances, and this evidence suggests that free cash flow distribution, in particular the avoidance of agency costs, most plausibly motivated these firms' actual dividend policies. For the 25 largest long-standing dividend payers, Table 9 reports total inflation-adjusted dividends over 1950–2002, actual year 2002 cash balances and long-term debt, and hypothetical year 2002 cash balances and long-term debt under a full retention (zero dividend) policy.

Over 1950–2002, the 25 firms collectively paid dividends of $1.6 trillion in 2002 dollars[7] and thus would have cash balances of $1.8 trillion instead of $157 billion, had they not

[7]The $1.6 trillion figure is a conservative estimate of the total value of payouts to stockholders in four respects. First, it assumes the firms would have earned a zero after-tax real return on cash retained. (A positive real return of 1% would raise our estimate from $1.6 trillion to $2 trillion.) Second, it ignores dividends paid prior to 1950, and most of these firms paid dividends for many years before 1950, e.g., General Motors paid an additional $48.5 billion (2002 dollars) in dividends over 1917–1949. Third, our estimate excludes the pre-acquisition dividends paid by target firms acquired by parents in the table, e.g., the dividends reported for ExxonMobil exclude $56.5 billion in real dividends paid over 1950–1998 by Mobil prior to its 1999 merger with Exxon. Finally, the 25 firms spent at least another $209 billion repurchasing stock.

Table 9
Inflation-adjusted dividends paid over 1950–2002 and cash holdings in 2002, in actual terms and as if total dividends were retained instead of distributed to stockholders for 25 industrial firms that paid dividends in 2002 and that paid the largest total dividends over 1950–2002

Columns 1–4 give actual values, while columns (5) and (6) give hypothetical values. Total real dividends are the sum of dividends over 1950–2002 (per Compustat), with each year's payment inflation adjusted to 2002 dollars using the Consumer Price Index. Cash, LTD, and TA are, respectively, the 2002 actual values of cash plus marketable securities, long-term debt, and total assets. To generate the as if value of Cash/TA in column 5, we add total real dividends over 1950–2002 to actual 2002 cash balances. To generate the as if values of Cash/TA in column 6, we first apply total dividends to pay down long-term debt in 2002 and add the remainder to cash balances. To generate this sample, we begin with U.S.-incorporated industrial firms listed on NYSE, Nasdaq, and Amex with Center for Research in Security Prices share codes 10 or 11 and with nonmissing data on Compustat for dividends and earnings for 2002. Industrials are those with Standard Industrial Classification codes outside the ranges 4900–4949 and 6000–6999 (financials and utilities). We restrict attention to firms that paid dividends in 2002 and, of these, the 25 firms listed below are those that paid the largest total real dividends over 1950–2002.

Firm	Total real dividends 1950–2002 (Billions of dollars) (1)	Cash in 2002 (2)	LTD in 2002 (3)	Actual in 2002 (Cash/TA) (4)	As if all retained (Cash/TA) (5)	As if debt paid down (Cash/TA) (6)
AT&T	$232.0	$8.1	$18.8	0.15	0.84	0.82
Exxon Mobil	208.5	7.2	6.7	0.05	0.60	0.59
General Motors	179.6	21.4	134.3	0.06	0.36	0.16
IBM	107.9	6.0	20.0	0.06	0.56	0.51
General Electric	103.3	16.7	140.6	0.03	0.18	0.03
Du Pont	74.2	4.1	5.6	0.12	0.72	0.70
Ford Motor	64.2	30.5	125.8	0.10	0.26	0.10
ChevronTexaco	64.1	3.8	10.9	0.05	0.48	0.44
Altria	61.6	0.6	21.4	0.01	0.42	0.32
Sears Roebuck	41.4	2.0	21.3	0.04	0.47	0.31
Merck	39.7	5.0	4.9	0.10	0.51	0.48
Eastman Kodak	39.6	0.6	1.2	0.04	0.76	0.75
Verizon	37.8	3.5	44.8	0.02	0.20	0.02
Procter & Gamble	35.8	3.6	11.2	0.09	0.51	0.43
Coca-Cola	33.4	2.3	2.7	0.10	0.62	0.60
SBC	32.6	3.6	18.5	0.04	0.28	0.16
Bristol Myers Squibb	31.3	4.0	6.3	0.16	0.63	0.58
BellSouth	30.5	2.5	12.3	0.05	0.41	0.31
Wyeth	30.2	5.5	7.5	0.21	0.63	0.58
3M	28.6	0.6	2.1	0.04	0.67	0.65
Dow Chemical	28.4	1.6	11.7	0.04	0.44	0.33
Pfizer	25.1	12.6	3.1	0.27	0.53	0.50
Johnson & Johnson	22.8	7.5	2.0	0.18	0.48	0.46
ITT	22.1	0.2	0.5	0.04	0.81	0.81
Lilly (Eli)	21.7	3.7	4.4	0.19	0.62	0.58
Total dollar amount	$1,596.5	$157.0	$638.6			
Median ratio				0.06	0.51	0.48

paid dividends. With full retention, the median firm's cash holdings increase from 6% (typical for industrial firms, per Opler et al. 1999, Table 1) to 51% of total assets, a ratio approaching the 62.3% in cash held by Microsoft in 1998, when it and many other tech firms were widely viewed as having enormous growth opportunities. Alternatively, full retention would allow the 25 firms to pay off their $639 billion in long-term debt and still increase cash balances by about $1 trillion, leaving the median firm with no long-term debt and a cash/assets ratio of 48%, which exceeds the 46.3% cash holdings of Dell Computer in 1998. In short, had they not paid dividends, the 25 largest long-standing dividend payers would have huge cash balances and little or no long-term obligations — asset and capital structures that are characteristic of rapidly growing firms in industries with massive technological change, and not of mature companies in stable industries, such as most of the 25 firms in Table 9.

The sheer scale of these 25 firms' dividends, both in the absolute and in terms of the asset and capital structure consequences of a full retention policy, and their persistence over many years are difficult to explain by non-life cycle theories such as signaling and catering. Signaling theory predicts that a firm will pay dividends when outside investors find it especially difficult to gauge the firm's future prospects. Firms in the early stage of their life cycle, with low RE/TE, would seem to be ideal signaling candidates because they have not yet generated substantial earnings, but few such firms pay dividends. And large, mature firms with high RE/TE typically pay dividends even though investors have many sources of information about prominent companies. Baker and Wurgler (2004) argue that firms have "catering" incentives to pay dividends when the market overvalues dividend payers, so that firms pay dividends depending on stock prices and independent of their RE/TE ratios, a prediction that is inconsistent with our empirical results. (Nor, as has been known since Lintner, 1956, do firms commonly start and stop paying dividends in response to informational impediments or market conditions, as they would if signaling or catering incentives were first-order determinants of dividend policy.)

The life-cycle theory offers a more plausible explanation for the massive payouts of the 25 firms in Table 9 because, in that theory, firms pay dividends when the agency and other costs of retaining free cash flow exceed the flotation cost and other benefits of retention. Most likely, the payouts we observe reflect direct or indirect pressure to pay out cash from stockholders concerned that managers might use the ample discretion provided by enormous cash balances and trivial debt obligations to make self-serving decisions that hurt stockholders, as in Jensen (1986). While agency costs are the most obvious costs of retention, they are not necessary to explain large payouts by mature firms with ample free cash flow. For example, managers of the 25 largest long-standing dividend payers in Table 9 may have paid substantial dividends over long periods simply because they wished to maximize stockholder wealth, and they recognized that shares have value only to the extent that stockholders eventually receive distributions from the firm, as in DeAngelo and DeAngelo (2006).

In our view, the agency cost-inclusive life-cycle theory most powerfully explains the dividend decisions of the 25 largest longstanding dividend payers because of their choice to distribute substantial dividends consistently over long horizons. With flotation costs and/or asymmetric information problems as in Myers and Majluf's (1984) pecking order theory, managers will distribute the full value of the free cash flow stream over the life of the enterprise, but will distribute nothing until the probability is zero that unanticipated attractive new investments might force them to seek outside capital. In principle, such

asymmetric information problems can cause firms to forego dividends entirely until the final period(s) of their lives. For the 25 long-standing dividend payers, Table 9's hypothetical numbers illustrate the result of a full retention policy through 2002, which is an asset and capital structure that, from an agency perspective, accords managers an extreme level of discretion over corporate resources. And because the 25 firms chose to pay dividends consistently for a long time and thereby to avoid giving managers such discretion, it seems reasonable to infer that the avoidance of agency costs played an important role in their dividend decisions.

8. Summary

Consistent with a life-cycle theory of dividends, the fraction of publicly traded industrial firms that pays dividends is high when retained earnings are a large portion of total equity (and of total assets) and falls to near zero when most equity is contributed rather than earned. In a broad set of multivariate logit tests, we consistently observe a highly significant relation between the decision to pay dividends and RE/TE (and RE/TA), controlling for firm size, current and recent profitability, growth, total equity, cash balances, and dividend history, a relation that also holds for dividend initiations and omissions. The earned/contributed capital mix has a quantitatively greater impact on the probability that a firm pays dividends than do measures of current profitability and growth opportunities, the determinants of the decision to pay dividends that to date have received primary attention in the empirical payout literature. We also document a massive increase in firms with negative retained earnings (from 11.8% in 1978 to 50.2% in 2002), a trend that closely mirrors the decline in dividend payers identified by Fama and French (2001). When we control for the earned/contributed capital mix, we find that firms with negative retained earnings show virtually no change in their propensity to pay dividends from the mid-1970s to 2002, while those whose earned equity makes them reasonable candidates to pay dividends have a propensity reduction that is twice the overall reduction estimated by Fama and French. All our evidence supports a life-cycle theory of dividends, in which a firm's stage in that cycle is well captured by its mix of internal and external capital, so that dividend payers tend to have high earned equity relative to contributed capital, and nonpayers the reverse.

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