Dividend Policy At The "Baby Bells":

A Study of Septuplets

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This paper exploits an exceedingly rare event -- the birth of septuplets -- to gain insights about dividend payouts. We use the 1984 birth of the seven "Baby Bells" to investigate the dividend puzzle, and develop a relative-deviations estimator that controls for the effects of taxation, regulation, clienteles, and the legal structure. This estimator, coupled with the initial homogeneity and subsequent heterogeneity of the Baby Bells, allows us to identify some of the benefits and non-tax costs associated with dividends. We find strong evidence in favor of an agency cost effect operating on the managers' supply schedule for dividends. The financing channel also receives substantial support, while the signaling model is decidedly rejected. The agency and financing channels are both statistically and economically important.

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I. Introduction

Nearly four decades after Miller and Modigliani questioned the theoretical underpinnings of dividend behavior, virtually no consensus has emerged on the fundamental factors influencing dividend policy. Why firms distribute earnings to shareholders as dividends, rather than as relatively lightly-taxed capital gains (either directly via share repurchases or indirectly via retained earnings), remains puzzling. Dividend payments are even more perplexing when a positive wedge exists between the costs of external and internal finance. For a given amount of investment spending, dividends force firms into relatively costly external capital markets. Several offsetting benefits associated with dividend policy have been advanced -- the reduction of agency costs and the creation of a profitability signal. However, empirically substantiating the importance of these channels has remained elusive. Indeed, a recent survey concludes rather bleakly that "The empirical evidence on the importance of dividend policy is, unfortunately, very mixed" (Allen and Michaely, 1995, p. 833).

This paper exploits an exceedingly rare event -- the birth of septuplets -- to gain insights about dividend payouts. A key difficulty confronting applied econometric work is to "hold all other factors constant." One strategy popular in labor economics controls for distorting factors by studying outcomes with
identical twins (e.g., Ashenfelter, 1998). Since genetic and environmental factors are held constant, differences in incomes, for example, can be readily attributed to differences in education. In the same spirit, we use the 1984 birth of the seven "Baby Bells" and the initial homogeneity among these septuplets to investigate the dividend puzzle and identify some of the benefits and non-tax costs associated with dividends. Immediately after their birth, the Baby Bells' dividend payout ratios were nearly identical, but have diverged subsequently. Our estimation strategy exploits this divergence through time and across firms to assess the determinants of dividend policy.

The paper proceeds as follows. Section II examines the divergence in dividend payout ratios following the birth of the Baby Bells. Section III describes the econometric testing strategy. We develop a relative-deviations estimator that controls for factors either unobservable or difficult to measure, and isolates several channels of influence. Section IV discusses the theoretical arguments concerning the impact of dividends in reducing agency costs, generating credible signals, or raising financing costs. The testable implications of these channels are drawn with respect to investment opportunity and indebtedness variables. Empirical evidence is presented in Section V. We find strong evidence in favor of an agency cost effect operating on the managers' supply schedule for dividends. The financing channel also receives substantial support, while the signaling model is decidedly rejected. In addition to being statistically significant, the agency and financing channels also have had
economically important effects on dividend payouts over the sample. Section VI summarizes.
II. Background And Data

The U.S. Department of Justice's antitrust case against AT&T was initiated in 1974, settled in 1982, and finalized in 1984 in the Modification of Final Judgement.\(^1\) Effective January 1, 1984, seven regional phone companies were created from AT&T's local operating companies, and became known as the Baby Bells:

1: Ameritech
2: Bell Atlantic
3: Bell South
4: Nynex
5: Pacific Telesis Group
6: SBC Communications
7: USWest

Not surprisingly, given that they were formed from one company, the Baby Bells emerged from the Breakup with several similar financial characteristics. Dividend payout ratios are plotted in the three panels of Figure I. (The dividend payout ratio is defined as common stock dividends divided by "permanent income," measured by the mean of income before extraordinary items adjusted for common stock equivalents for the current period and the two prior periods.) The first panel contains the dividend payout ratios for the first three Baby Bells. To enhance comparisons across the seven series, the remaining two panels each plot dividend payout ratios for Ameritech and two of the remaining firms. Dividend payout ratios all hover around 66% in the first year of the sample, very similar to the pre-Breakup

\(^1\) See Temin (1987) and Higgins and Rubin (1995) for further details about the breakup of AT&T and the birth of the Baby Bells.
figure of 69%.\textsuperscript{2} This close conformity was not driven by regulation, but rather reflects a continuation of past practice.\textsuperscript{3}

Subsequently, the dividend payout ratios diverge sharply. Two of the slowest growing firms -- NYNEX and USWEST -- have the highest dividend payout ratios. SBC, which emerged as the most aggressive of the Baby Bells, has the only declining ratio.\textsuperscript{4}

The dataset is divided into three groups of variables: the dividend payout ratio (D) discussed above and investment opportunity and indebtedness variables. Investment opportunities is measured by the historical growth in sales ($\%\Delta S^3$, the annualized percentage change in sales over the current and past two years) or by the market-to-book ratio (MKBK). Indebtedness is measured by interest expenses relative to assets (INT) or by leverage (LEV). The sample extends from 1986 (two years after the birth of the Baby Bells because of lags used in the construction of some of the variables) to 1996. See the Appendix for detailed definitions of the variables.

Table 1 contains several statistics quantifying the variation in the data along several dimensions. Panel A contains the coefficients of variation (CV, the standard deviation divided by the mean) across the seven firms for 1986 and the full sample.

\textsuperscript{2} This figure represents the mean dividend payout ratio for AT&T for the four years prior to and inclusive of the 1982 settlement.

\textsuperscript{3} Six of the seven CEO's of the newly-born Baby Bells were Bell Operating Company presidents, and the remaining CEO was an executive vice president of AT&T (Temin, 1987, pp. 293-294).

\textsuperscript{4} The generally increasing dividend payouts contrast with some analyses (e.g., Smith, 1986) suggesting that dividends would
A comparison of these two CV's indicates a substantial divergence in several of the series (as in Figure I). In 1986, CV(D) = 0.030; over the 11 year sample, the same statistic increases by more than five-fold to 0.171. While historical events compressed dividend payout ratios immediately after the Breakup, initial investment opportunities for the Baby Bells differed sharply. In 1986, the CV's for %ΔS^3 and MKBK are 0.360 and 0.077, respectively, and are larger than the comparable statistic for D. As with the dividend payout ratio, investment opportunities diverged following the Breakup, with the CV's for the full sample being at least twice as large as those for 1986. By contrast, the dispersion of the indebtedness variables does not increase over time as dramatically.

Table 1 also presents means and standard deviations. Panel B contains these statistics across firms for 1986 and the full sample. The moments in Panel C are for each of the Baby Bells over the sample, and indicate the substantial time series variation available to this study. These statistics suggest that, while limited in size, the dataset contains a great deal of variation with which to identify the factors affecting dividend payouts.

fall after regulations were relaxed.
III. The Estimation Strategy

Our estimation strategy exploits the initial homogeneity and subsequent heterogeneity of the Baby Bells to identify the empirically important channels of influence on dividend behavior.

We begin with a general specification of the desired dividend payout ratio \( D^*_{i,t} \) for each of the seven firms,

\[
D^*_{i,t} = F[X_{i,t}, W_{i,t}], \quad i=1,7 \tag{1}
\]

where \( F[.] \) is a linear function, \( i \) and \( t \) are indices denoting firms and time periods, respectively, and \( X_{i,t} \) and \( W_{i,t} \) are sets of variables influencing optimal dividend policy. The \( X_{i,t} \)'s represent the investment opportunity and indebtedness variables capturing the effects of signaling, agency, and financing, and these variables will be discussed in Section IV. The \( W_{i,t} \)'s represent variables related to dividend policy but unobservable to the econometrician or difficult to measure -- for example, taxation, regulation, the legal structure, and clienteles.\(^5\)

At any point in time, actual dividend payouts \( D_{i,t} \) are likely to differ from \( D^*_{i,t} \). To account for the resulting adjustment behavior, we follow a well-established literature, and assume that the change in the dividend payout ratio is determined by the discrepancy between today's desired and yesterday's actual

\[^5\] Firms may tailor the extent of dividend payouts to investor clienteles defined by tax status (Miller and Modigliani, 1961; Allen and Michaely, 1995, Section 3; Allen, Bernardo, and Welch, 1999). For example, tax-exempt institutions may favor high-dividend paying firms. With the relatively high dividend payout ratios characterizing the Baby Bells, investor clienteles will be common to all firms.
payout ratios \( (D_{i,t-1}) \) multiplied by the speed of adjustment coefficient \( (\lambda) \), and thus adopt the following Koyck-adjustment model,\(^6\)

\[
D_{i,t} - D_{i,t-1} \equiv \Delta D_{i,t} = \lambda (D'_{i,t} - D_{i,t-1}). \quad i=1,7 \tag{2}
\]

Equation (2) implies that \( D_{i,t} \) depends on an infinite distributed lag of \( D'_{i,t} \), where the lag coefficients decline geometrically in \( (1-\lambda) \).\(^7\) Moreover, (2) is a parsimonious specification requiring only one estimated coefficient for the entire distributed lag and the loss of one year of data for the first difference. Combining (1) and (2), appending a white-noise error term \( (E_{i,t}) \) and, for ease of exposition, allowing \( X_{i,t} \) and \( W_{i,t} \) to be scalar variables, we obtain the following equation,

\[
\Delta D_{i,t} = a\lambda X_{i,t} + b\lambda W_{i,t} - \lambda D_{i,t-1} + E_{i,t}, \quad i=1,7 \tag{3}
\]

\(^6\) Since dividend payments (per share) fell appreciably only once in our sample, we do not need to allow for the possibility that the speed of adjustment to the optimum depends on whether dividends are increasing or decreasing. The results to be presented in Tables 2-4 are robust to dummying-out the one observation with a fall in dividends. Interestingly, in the year of the decline, Pacific Telesis' annual report emphasized the availability of substantial growth opportunities and the floating of $1 billion in preferred securities. While the dividend cut was not highlighted in the report, it would serve as an additional source of funds. These events are consistent with the financing channel documented in this study.

\(^7\) Normalizing (2) in terms of \( D_{i,t} \) and substituting successively for \( D_{i,t-v} \) \((v=1,\infty)\), we can rewrite (2) as follows,

\[
D_{i,t} = \lambda \sum_{s=0}^{\infty} (1-\lambda)^s D'_{i,t-s} \quad \text{where} \quad \lambda \sum_{s=0}^{\infty} (1-\lambda)^s = 1.
\]

We assume that \( \phi = 0 \) for the term, \( \phi(1-\lambda)^t \), which is part of the backward-looking solution to (2).
where a and b are estimated coefficients. Equation (3) is effectively linear in the coefficients, as the interactions between $\lambda$ and a and b only impact the estimated standard errors for a and b. Tables 2-4 report separate estimates of $\lambda$ and the a's.

Our focus on the dividend behavior of the Baby Bells yields several econometric advantages. In large panel datasets, it is virtually mandatory to adjust for firm heterogeneity by using a fixed effects estimator. This estimator removes variation across firms but, at the same time, may also throw-out the "baby with the bathwater." For example, assume that there exists a strong positive relation between an X variable and dividend payouts. Consider two firms, one with large values of $D_{1,t}$ and $X_{1,t}$, and the other with small values of $D_{2,t}$ and $X_{2,t}$. Assume that these values are more or less constant over time. A fixed effects estimator will obliterate the information contained in these hypothetical data, and make it very difficult to identify the positive relation with only time-series variation. Given the similarity of firms operating in our sample, no such adjustment is needed. By focusing on relatively homogenous firms, we retain the cross-section variation, and our estimates will be more precise. Additionally, the time variation in the sample will be informative. As indicated in Figure I, the dividend payout ratios were approximately equal at the beginning of the sample but, in some cases, changed sharply over time. There is a
notable amount of interesting cross-section and time-series variation with which to estimate the coefficients in (3).\(^8\)

The remaining estimation issue is how to model the unobservables, \(W_{i,t}\). This is a particularly important issue because a number of unsettled questions abound in the dividend literature (cf. Allen and Michaely, 1995). We assume that these unobservables have a substantial effect on dividend payout behavior but, based on the homogeneity of the sample, that the effects are similar across firms. Formally, we assume that \(W_{i,t}\) depends on fixed factors specific to the Baby Bells such as investor clienteles (\(\alpha_{BB}\)), time-varying factors such as telecommunications regulation, laws protecting investors, and the tax code that are common to all firms and that can be serially correlated to any arbitrary degree (\(\beta_t\)), and random factors that are white-noise,

\[
W_{i,t} = \alpha_{BB} + \beta_t + \zeta_{i,t}. \tag{4}
\]

We use (3) and (4) to calculate deviations with respect to firm 1, and form the following relative-deviations estimator,

\[
\Delta D_{i,t} - \Delta D_{1,t} = a\lambda (X_{i,t} - X_{1,t}) - \lambda (D_{i,t-1} - D_{1,t-1}) + U_{i,t} \tag{5}
\]

\[
U_{i,t} = b\lambda (W_{i,t} - W_{1,t}) + (E_{i,t} - E_{1,t}) = b\lambda (\zeta_{i,t} - \zeta_{1,t}) + (E_{i,t} - E_{1,t}) \quad \text{i=2,7}
\]

\(^8\) Additionally, the assumption that the slope coefficients are constant across all of the firms in the sample is more likely to be valid than for a set of firms with widely ranging characteristics.
The relative-deviations estimator has several desirable properties. First, the estimates do not depend on a complete model of dividend behavior. Second, the estimator controls for the effects of taxation, regulation, clienteles, and the legal structure, though their impacts are not identifiable. Third, the regression error \( U_{i,t} \) is serially uncorrelated both within and across equations, even if the time-varying factors are serially correlated. Fourth, \( U_{i,t} \) will be contemporaneously correlated across firms and, to enhance efficiency, the system of six equations is estimated as a Seemingly Unrelated Regression.

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9 Recent work by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998a, 1998b) documents that laws protecting investors impact capital structure and dividend decisions. Thus, it is important that our estimates are robust to any links between the legal structure and dividends.
IV. Dividend Theories And Testable Implications

The Miller and Modigliani (1961) revolution in thinking about dividend policy was based on a straightforward (in hindsight) examination of benefits and costs. In a world without the frictions introduced by taxes, information asymmetries, nor agency conflicts among shareholders, bondholders, and managers, Miller and Modigliani showed that dividends conveyed neither benefits nor costs, and hence were irrelevant to the value of the firm. Dividend payouts become determinant with the consideration of personal income taxes assessed against dividends. With this cost and no offsetting benefits, optimal dividends are zero.\textsuperscript{10} Since this prediction is so strongly rejected by the data, researchers have sought to generate convincing theoretical stories and empirical evidence about the benefits associated with dividend payments.

One class of explanations is based on the signaling value of dividends. Asymmetric information between managers and shareholders, coupled with an inability by investors to

\textsuperscript{10} This statement is based on the traditional view of dividend taxation in which dividend payouts are negatively affected by their relative tax cost. By contrast, dividends continue to be irrelevant even in the presence of personal income taxes under the "new view," a model in which dividend taxes are capitalized into asset values and the marginal source of finance is retained earnings. See Sinn (1991) for further discussion of traditional and new views and the transformations that occur over a firm's life-cycle. The empirical evidence tends to favor the traditional view, though recently La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998a, p. 24) "find no conclusive evidence on the effect of taxes on dividend policies." See Poterba and Summers (1985) and Allen and Michaely (1995, Section 3) for a review of theories and evidence. Note that our results are robust to any of these links between taxes and dividends.
costlessly bridge this information gap, leads to a demand for credible signals that must involve some dissipative cost. These costs involve either transactions costs for external finance (Bhattacharya, 1979), distortions in the optimal investment decision (Miller and Rock, 1985), or the costliness of dividend taxes that less profitable firms can not bear (John and Williams, 1985). As noted by Allen and Michaely (1995, Section 4.1), each of these theories has weaknesses in that there readily exists less expensive ways to signal, such as repurchasing new shares. This concern aside, the testable implication is that dividend payouts should be higher for those firms with robust investment opportunities.

These benefits may be counterbalanced by a cost also associated with investment opportunities. Fast-growing firms are likely to have investment expenditures that exceed internal funds. Insofar as external funds are more costly than internal funds, finance constrained firms have an incentive to cut back on dividend payments to limit reliance on external capital markets. Financing constraints imply that firms with robust investment opportunities should have lower dividend payout ratios, an implication diametrically opposed to that from the signaling model.

A second class of models begins with the agency problems emphasized by Jensen and Meckling (1976) and Jensen (1986), and suggests that dividend payments yield a non-monetary benefit by reducing agency costs. One important agency problem is that managers are better informed about the firm's prospects than
shareholders. As a result of this information imbalance, managers may divert corporate assets for perquisite consumption or other benefits (as discussed in Shleifer and Vishny, 1997) or overinvest in order to build empires (particularly important since executive compensation is strongly linked to firm size). As emphasized by Easterbrook (1984), dividends have the decided benefit of taking cash out of the hands of managers, and are thus a potentially powerful tool for controlling agency problems.\textsuperscript{11} For a given level of investment, dividends force firms to obtain funds from financial intermediaries or capital markets where monitoring is arguably more effective. The agency cost view of dividends is based on an informational hierarchy rising from shareholders to commercial banks, investment banks, and other external financiers to managers. Indebtedness in the form of leverage or interest payments leads to greater scrutiny by knowledgeable outsiders, and hence affects equilibrium agency costs borne by investors.

The relation between external monitoring and dividends payments is ambiguous.\textsuperscript{12} The agency cost model is based on a

\textsuperscript{11} Easterbrook offers a second explanation for dividends that resolves agency problem between shareholders and bondholders. In his model, shareholders use dividends to siphon funds from the firm, thus attempting to increase the ex-post riskiness of debt. Bondholders restrict, if not eliminate altogether, this behavior by ex-ante bond covenants. A divergence between ex-ante and ex-post actions can not be an equilibrium outcome in the long-run. Hence, the optimum payout ratio will not be affected, and this second mechanism can not be assessed in the present framework.

\textsuperscript{12} Our discussion of testable implications of the agency cost model of dividends is similar to that of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998a). The implications from their outcome and substitute models of dividend behavior corre-
demand for dividends by investors and a supply of dividends by better-informed managers reluctant to divulge information about the firm. Changes in the level of monitoring shifts these schedules in opposite directions. If greater external monitoring pressures managers away from the consumption of perquisites and toward a more efficient use of corporate assets, then more cash is disgorged, and dividends increase with indebtedness. Alternatively, rather than shifting the dividend supply schedule outward, greater monitoring by knowledgeable external financiers decreases investors' concerns about agency problems. Consequently, investors are less interested in having firms disburse cash in the form of tax-disadvantaged dividends and, in this case, dividends decrease with indebtedness. In sum, the agency cost model of dividends implies that greater monitoring by external financiers as measured by indebtedness shifts either the supply schedule outward (increasing dividends) or the demand schedule inward (decreasing dividends).

While these stories about the signaling and agency benefits and financing costs are plausible, and perhaps even persuasive, empirical support remains mixed. An additional benefit from dividends is that they may serve as compensation to large corporate shareholders (who prefer dividends to capital gains for tax reasons) for monitoring services rendered (Shleifer and Vishny, 1986). Even though they would prefer lightly taxed capital gains, small shareholders are better off because the monitoring services have a sufficiently favorable impact on share value. The equilibrium can exist for stakes of 15% or more (Table 1). However, this channel is not operative for our sample of firms because the largest shareholder
relations between dividend payouts and investment opportunities -- a positive/negative relation consistent with signaling/financing models -- and indebtedness -- a positive/negative relation consistent with supply-driven/demand-driven models of agency costs).
V. Empirical Evidence

A. Basic Results

This section exploits the initial homogeneity and subsequent heterogeneity of the Baby Bells to quantify the empirical importance of signaling, financing, and agency on dividend policy. Seemingly Unrelated Regression estimates with heteroscedastic-consistent standard errors from our relative-deviations model (5) are presented in Table 2. In column 1, both investment opportunity variables ($\%\Delta S^3$ and MKBK) and both indebtedness variables (INT and LEV) enter the regression model, and all but LEV are statistically significant at conventional levels. The negative signs on $\%\Delta S^3$ and MKBK indicate that, in the face of robust investment opportunities, firms cut-back on dividends because of costly external finance. The positive coefficient on INT is consistent with a supply-driven model of agency costs in which managers are pressured to increase dividend payouts. These significant results suggest that the data have sufficient variation to identify the factors influencing dividend policy.

There is evidence of autocorrelated residuals. The null hypothesis of no autocorrelation is evaluated by a Modified Lagrange Multiplier statistic asymptotically distributed as $\chi^2(6)$\(^*_1\). The LM reported in the tables is the p-value for this

\[^1\] The Modified Lagrange Multiplier statistic developed by Harvey (1982, as reported in Judge, Griffiths, Hill, Lütkepohl, and Lee, 1985, Section 12.3.4) is defined as
statistic, and equals 0.002. This low value is of some concern
but, as we shall see, qualitative results are very robust to
these signs of autocorrelated residuals.

These results may not accurately portray the effects of
investment opportunities and indebtedness because each channel of
influence is being represented by two possibly interacting
variables. To get a firmer assessment of these channels, the
remaining entries in Table 2 are two-regressor models that
consider jointly and sequentially one investment opportunity and
one indebtedness variable. Columns 2 and 3 define investment
opportunities in terms of current and past sales growth.
Relative to column 1, the estimated coefficient on $\% \Delta S^3$ falls,
while those on INT and LEV rise. Both Indebtedness variables are
now precisely estimated. The LM statistic continues to indicate
that the residuals are autocorrelated. However, this potential
problem with the specification is decisively eliminated when
investment opportunities is measured by the market-to-book ratio.
This forward-looking variable is likely to be superior to ex-
post sales growth as a measure of investment opportunities that

$$q = (T-1) \sum_{i=1}^{N} \hat{\rho}_i^2,$$

where $T$ is the number of time periods (10, adjusted for the loss
of one degree of freedom in estimating $\rho_i$), $N$ is the number of
equations (6), and $\hat{\rho}_i$ is the estimated coefficient from the
following least squares regression,

$$r_{i,t} = \eta_i + \rho_i r_{i,t-1} + \nu_{i,t},$$

where $r_{i,t}$ are the residuals for the $i$th equation, $\eta_i$ is a
extend into the future. The coefficients in columns 4 and 5 are similar to those in column 1 with the notable exception of LEV, which is now larger and statistically significant. In sum, the five specifications in Table 2 generate qualitatively similar results clearly indicating that dividends fall with investment opportunities but rise with indebtedness. These results are consistent with a firm facing costly external finance and nonetheless being forced by outside monitors to withdraw resources from the firm. The signaling model receives no support in Table 2.\textsuperscript{15}

In addition to being statistically significant, the financing and agency channels are also economically important. We assess economic importance by the proportion of the sample variation in the desired dividend payout ratio accounted for by the sample variation in a given independent variable. Variation is measured by the sample standard deviation (\(\sigma\)) per firm.\textsuperscript{16}

Economic importance is calculated with the following statistic,\textsuperscript{17}

\[
\Gamma = \sum_{i=1}^{7} \frac{\epsilon(D^*_i, X_i) CV(X_i)}{CV(D^*_i)}.
\]

\textsuperscript{15} DeHaan (1997, Table 5.1) also finds a negative relation between dividends and investment opportunities in the Netherlands. This result provides particularly strong evidence against the signaling model because share repurchases are taxed more heavily than dividends. Hence, if Dutch firms wish to use payouts as a signal, they are more likely to use the less expensive alternative of dividends.

\textsuperscript{16} We approximate the \(\sigma(D^*_i)\) by \(\sigma(D_i)\).

\textsuperscript{17} Equivalently, \(\Gamma\) can be defined in terms of elasticities (\(\epsilon(.)\)) and coefficients of variation (CV(.)),
\[ \Gamma = \sum_{i=1}^{7} \left( \frac{\partial D^*_i}{\partial X_i} \right) \sigma \left( X_i \right) / \sigma \left( D^*_i \right) \] (6)

where \( \left( \frac{\partial D^*_i}{\partial X_i} \right) \) is measured by the estimated coefficients. The \( \Gamma \) statistics are reported in brackets. Over the sample, the investment opportunity variables generally have had a greater impact on desired dividend payouts. In our preferred equations in columns 4 and 5, MKBK explains 274% of the variation in \( D^* \), while the indebtedness variables explain a smaller but not insubstantial 40%-50% of the variation.\(^\text{18}\) Investment opportunity and indebtedness variables are significant both statistically and economically.

While not directly relevant to the signaling, financing, and agency issues that are the focus of this study, the speed of adjustment coefficients (\( \lambda \)'s) are precisely estimated, and adjustment toward the desired dividend payout ratio is gradual. For the two-regressor models, the \( \lambda \)'s range from 0.30 to 0.45, implying that, in two years, 50% to 70% of the discrepancy between today's desired and yesterday's actual dividend payout ratios will be eliminated. These \( \lambda \)'s are somewhat larger than the estimate of 0.21 reported by Lintner (1956, p. 109) in his classic paper with aggregate dividends. Estimating Lintner's specification with panel data, Fama and Babiak (1968, Table 2) obtain estimates close to our \( \lambda \)'s; their median values range from

\(^{18}\) Note that the sum of the \( \Gamma \)'s for all regressors in a given model will generally differ from the sample variation in dividend payouts because the influence of the unobservables \( (W_{i,t}) \) does not
0.28 to 0.40. In a recent panel data study of Dutch firms, De Haan (1997, Table 5.2) estimates Lintner's specification (though with dividends scaled by assets), and reports a larger speed of adjustment coefficient of 0.54. Our speed of adjustment coefficients are similar to prior estimates, and the well-known sluggish adjustment characterizing dividends applies as well to the dividend payouts studied in this paper.

B. Additional Results

Since the regressors and dividends are jointly determined by the firm, the results in Table 2 may be affected by simultaneous equations bias. To assess the importance of this potential bias, Table 3 presents Three Stage Least Squares estimates with the lagged values of the regressors as instruments.\footnote{The use of lagged $\%\Delta S^3$ as an instrument could preclude estimation over the same sample period used in Tables 2 and 4. This series is defined as the annualized percentage change in sales over the current and past two years. Its first value is for 1987, and instrumental variable estimation would thus begin in 1988. To conserve degrees of freedom and ensure comparable sample periods, the 1986 value of $\%\Delta S^3$ is defined as a two-year annualized percentage change in sales, rather than a three-year} The results prove very robust, and simultaneity does not have an important impact on our inferences about dividend behavior.

The agency cost effects identified in Table 2 can be further examined by dividing leverage between short-term (LEV-ST, debt due in one year or less) and long-term (LEV-LT) components. A key element of the agency cost model of dividends is interactions with knowledgeable outsiders. For a given amount of debt, shorter maturities should increase the number of contacts and, enter the relative-deviations model.
under the supply-driven model, dividends should increase. Table 4 contains Seemingly Unrelated Regressions with the full set of investment opportunity and indebtedness variables (column 1) and with the two leverage variables entered with either of the investment opportunity variables (columns 2 and 3). In the latter two regressions, both LEV-ST and LEV-LT are positive and precisely estimated, though the magnitudes differ by the measure of investment opportunities. Column 2 indicates that short-term leverage has a more substantial effect in compelling firms to disgorge cash in the form of dividends. However, the coefficients on LEV-ST and LEV-LT are nearly equal in column 3. This is the preferred specification because of the forward-looking measure of investment opportunities and the favorable LM statistic. While short-term debt increases the frequency of contacts with external financiers, we do not find clear evidence that it has a greater impact on dividend policy.

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change used in the definition of the remaining elements of $%ΔS^3$. 
VI. Summary and Conclusions

This paper exploits the unique circumstances surrounding the 1984 birth of the seven Baby Bells to identify factors influencing dividend policy. Immediately after their birth, the Baby Bells' dividend payout ratios were nearly identical, but have diverged subsequently. Our estimation strategy uses this divergence through time and across firms to assess the determinants of dividend policy. To understand why dividends are paid and why they vary, we focus on the impact of dividends in reducing agency costs, generating credible signals, or raising financing costs. This is not a complete list of factors affecting dividends. Consequently, we develop a relative-deviations estimator under which the coefficient estimates are robust to important factors that are either unobservable or difficult to measure, such as taxation, regulation, clienteles, and the legal structure.

Three key results emerge. First, investment opportunities and dividend payouts are negatively related. Investment opportunities increased greatly after the Breakup. At the end of 1983, the market-to-book ratio for AT&T was slightly below one. By contrast and most likely due to the newly deregulated environment, the average value of the market-to-book ratio for the Baby Bells in our sample is 2.396. We establish that increases in investment opportunities across time and firms are related to lower dividend payouts, a finding consistent with firms facing relatively costly external finance.

Second, the negative impact of investment opportunities is
inconsistent with a signaling benefit from dividends. This rejection may not be too surprising given the delicate theoretical underpinnings of the signaling model and the ambiguity of the dividend signal. Does a dividend increase signal robust future growth or a frank admission by managers that investment opportunities are weak and funds can be better used by shareholders? Our empirical work decidedly rejects the signaling model.

Third, reducing agency costs is an additional benefit of dividend payouts. Increased indebtedness leads to increased contacts with external financiers that result in closer monitoring of firms, an increase in dividends, and a reduction in agency problems. We document that indebtedness is positively related to dividend payouts, a result similar to that obtained by La Porta, et. al. (1998a). Dividends are a powerful mechanism aligning the interests of managers and shareholders, and thus agency costs are central to understanding the dividend decision.
Appendix

Notes:
All data are for the years 1984 to 1996 and for the seven Baby Bells, unless otherwise noted. The source of the data is the Standard and Poor's Compustat PC Plus Database, Version 6.02. Series drawn from this database use Compustat labels.

Series:

AT
(Total Assets): Current assets, net property, plant, equipment, and other noncurrent assets. The unit for this series is millions of dollars.

D
(Dividend Payout Ratio-Averaged): Calculated as the total dollar amount of dividends declared on the common stock divided by the mean of the income before extraordinary items adjusted for common stock equivalents for the current period and the two prior periods. Calculated as \[\frac{DVC}{IBADJ_i(t)+IBADJ_i(t-1)+IBADJ_i(t-2)}\] * 300. The unit for this series is percent.

DT
(Total Debt): The sum of total long-term debt (debt due in more than one year) and debt in current liabilities (debt due in one year or less). The unit for this series is millions of dollars.

DVC
(Cash Dividends-Common): Calculated as the total dollar amount of dividends (other than stock dividends) declared on the common stock of the company during the year. The unit for this series is millions of dollars.

IBADJ
(Income before Extraordinary Items, Adjusted for Common Stock Equivalents): Calculated as income before extraordinary items and discontinued operations, less preferred dividend requirements, adjusted for the additional dollar savings due to common stock equivalents. The unit for this series is millions of dollars.

INT
(Interest Payments Ratio-Averaged): The total dollar amount of payments for securing short-term and long-term debt divided by average total assets. Calculated as \(\frac{XINT}{AT'}\) * 100, where AT' is the average of AT for the beginning and end of the period. The beginning-of-period value is measured by the prior year's end-of-period value. The unit for this series is percent.
LEV
(Debt To Assets Ratio): Calculated as (DT / AT)’ * 100, where the prime indicates that the ratio is averaged for the beginning and end of the period. The beginning-of-period value is measured by the prior year's end-of-period value. The unit for this series is percent.

LEV-LT
(Long-Term Debt to Assets Ratio): Calculated as (LDT / AT)’ * 100, where the prime indicates that the ratio is averaged for the beginning and end of the period. The beginning-of-period value is measured by the prior year's end-of-period value. The unit for this series is percent.

LEV-ST
(Short-Term Debt to Assets Ratio): Calculated as (SDT / AT)’ * 100, where the prime indicates that the ratio is averaged for the beginning and end of the period. The beginning-of-period value is measured by the prior year's end-of-period value. The unit for this series is percent.

LTD
(Long-Term Debt): Total long-term debt (debt due in more than one year). Calculated as (LTDDT * DT). The unit for this series is millions of dollars.

LTDDT
(Long-Term Debt / Total Debt): Ratio of Long-Term Debt to Total Debt. Calculated as (1 / ((STDLTD / 100) + 1)). The unit for this series is decimal.

MKBK
(Market-To-Book Ratio): Defined as the closing share price multiplied by the common shares outstanding, divided by common equity, and averaged for the beginning and end of the period. The beginning-of-period value is measured by the prior year's end-of-period value. The share price, common shares outstanding, and common equity are valued at the end of the calendar year. The series is unitless.

SALE
(Sales-Net): Calculated as gross sales less cash discounts, trade discounts, and returned sales. The unit for this series is millions of dollars.

%ΔS^3
(Annualized Percentage Change In Sales, 3 Year): Calculated as [((SALE / SALE(-3)) ** (1/3)) - 1] * 100. The unit for this series is percent. See footnote 19 concerning the 1986 value of this series.
STDLTD
(Short-Term Debt / Long-Term Debt): Ratio of Short-Term Debt to Long-Term Debt. The unit for this series is percent.

STD
(Short-Term Debt): Total short-term debt (debt due in more than one year). Calculated as (STDLTD / 100) * LTD. The unit for this series is millions of dollars.

XINT
(Interest Payments): The payments by the company for securing short-term and long-term debt. The unit for this series is millions of dollars.
References


Judge, George G., Griffiths, W.E., Hill, R. Carter, Lütkepohl, Helmut, and Lee, Tsoung-Chao, The Theory and Practice
La Porta, Rafael, Lopez-de-Silanes, Florencio, Shleifer, Andrei, and Vishny, Robert W., "Agency Problems and Dividend Policies Around The World," Harvard University (May 1998a).


Temin, Peter (with Louis Galbraiths), The Fall of the Bell System: A Study in Prices and Politics (Cambridge: Cambridge University Press, 1987).

graph
TABLE 1

Coefficients of Variation, Means, and Standard Deviations

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<th>Dividend Payout</th>
<th>Investment Opportunities</th>
<th>Indebtedness</th>
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<td>MKBK</td>
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<td>(1)</td>
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A. Across Firms -- Coefficients of Variation

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B. Across Firms -- Means and Standard Deviations

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C. Across Time By Individual Firms -- Means and Standard Deviations

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Table note is on the following page.
NOTE TO TABLE 1  --  Panel A contains coefficients of variation (CV) across firms for the indicated time period; see * below concerning the time period for column 2. For 1986-1996, the CV's are calculated for each year, and then averaged. Panel B contains means and (standard deviations) for the indicated time period. The standard deviations equal the average of the standard deviations for the seven firms. Panel C contains means and (standard deviations) for the indicated firm for the period 1986-1996. D is the dividend payout ratio. \( \% \Delta S^3 \) is the annualized percentage change in sales over the current and past two years. MKBK is the market to book ratio. INT is the ratio of interest expenses to assets. LEV is leverage. See the Appendix for detailed definitions of the variables.

* The figures in this column are for either 1987 or 1987-1996.
### TABLE 2

Seemingly Unrelated Regressions

1987-1996

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Table note is on the following page.
NOTE TO TABLE 2 -- Estimates based on equation (5). The dependent variable is the relative change in dividends. %ΔS^3 is the annualized percentage change in sales over the current and past two years. MKBK is the market-to-book ratio. INT is interest expenses relative to assets. LEV is leverage. See the Appendix for detailed definitions of the variables. λ is the coefficient representing the speed with which the discrepancy between today's desired and yesterday's actual dividend payout ratios is closed. LM is the p-value for the Modified Lagrange Multiplier statistic defined in footnote 14 testing for autocorrelated residuals. Under the null hypothesis of no autocorrelation, the Modified Lagrange Multiplier statistic is asymptotically distributed as λ^2(6). The entries in parentheses are heteroscedastic-consistent standard errors (White, 1980). The entries in brackets are the λ's measuring economic significance. They are defined in equation (6) as the proportion of the sample variation in the desired dividend payout ratio accounted for by the sample variation in a given independent variable.
### TABLE 3

#### Three Stage Least Squares Regressions

1987-1996

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<td>%ΔS^3</td>
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Table note is on the following page.
NOTE TO TABLE 3 -- Estimates based on equation (5). The dependent variable is the relative change in dividends. $\%\Delta S^3$ is the annualized percentage change in sales over the current and past two years. MKBK is the market-to-book ratio. INT is interest expenses relative to assets. LEV is leverage. See the Appendix for detailed definitions of the variables. $\lambda$ is the coefficient representing the speed with which the discrepancy between today's desired and yesterday's actual dividend payout ratios is closed. LM is the p-value for the Modified Lagrange Multiplier statistic defined in footnote 14 testing for autocorrelated residuals. Under the null hypothesis of no autocorrelation, the Modified Lagrange Multiplier statistic is asymptotically distributed as $\chi^2(6)$. The entries in parentheses are heteroscedastic-consistent standard errors (White, 1980). The entries in brackets are the $\Gamma$'s measuring economic significance. They are defined in equation (6) as the proportion of the sample variation in the desired dividend payout ratio accounted for by the sample variation in a given independent variable. The instrument list contains the lagged values of all variables appearing in the most general specification (i.e., column (1)). The lagged instruments correspond to the variables only for a given firm.
TABLE 4

Seemingly Unrelated Regressions

1987-1996

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Table note is on the following page.
NOTE TO TABLE 4 -- Estimates based on equation (5). The dependent variable is the relative change in dividends. \( \%\Delta S^3 \) is the annualized percentage change in sales over the current and past two years. MKBK is the market-to-book ratio. INT is interest expenses relative to assets. LEV-ST is short-term leverage (debt due in one year or less). LEV-LT is long-term leverage (debt due in more than one year). See the Appendix for detailed definitions of the variables. \( \lambda \) is the coefficient representing the speed with which the discrepancy between today's desired and yesterday's actual dividend payout ratios is closed.

LM is the p-value for the Modified Lagrange Multiplier statistic defined in footnote 14 testing for autocorrelated residuals. Under the null hypothesis of no autocorrelation, the Modified Lagrange Multiplier statistic is asymptotically distributed as \( \chi^2(6) \). The entries in parentheses are heteroscedastic-consistent standard errors (White, 1980). The entries in brackets are the \( \Gamma \)'s measuring economic significance. They are defined in equation (6) as the proportion of the sample variation in the desired dividend payout ratio accounted for by the sample variation in a given independent variable.
Figure 1. The Payout Ratio is the total dollar amount of dividends declared on the common stock divided by the mean of the income before extraordinary items adjusted for common stock equivalents for the current period and the two prior periods. In percents.