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Stephen R. Blough

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A Cautionary Tale*

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*Technology Life Cycles and State
Economic Development Strategies*

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*Gary V. Engelhardt and
Christopher J. Mayer*

*Gifts for Home Purchase and
Housing Market Behavior*

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Contents

Yield Curve Forecasts of Inflation: A Cautionary Tale

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Technology Life Cycles and State Economic Development Strategies

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Long-term interest rates that are unusually high relative to short-term interest rates are often seen to reflect market expectations of increasing inflation. Given that the term structure of interest rates (also called the yield curve) reacts to inflation expectations, does it do so in a reasonable manner? Does the term structure embody inflation forecasts that bear a sensible relationship to the inflation that in fact occurs?

This article reviews the theoretical link between the term structure and inflation expectations, and then it provides empirical evidence on the link in light of the theory. It finds little evidence of a link between the term structure and future inflation at the horizon chosen for study, the relationship between one- and two-year interest rates and the one-year-ahead change in the one-year inflation rate. 3

The extensive literature on state economic development efforts has not been much help to states in developing competitiveness strategies. The materials are primarily descriptive, with little evidence on success or failure of the experiments. In addition, state initiatives have not been viewed in a larger analytical framework that would permit generalizations and understanding of the dynamic processes underlying these changes.

This article adopts production life-cycle models as a framework in which to analyze systematically the interrelationships between industrial and technological change, human resource needs, and state economic development policies. The framework suggests that states that incorporate the dynamics of industrial and technological change into their competitiveness strategies will reap employment and productivity benefits that technology can provide. 17

Contents

Privatization of Local Public Services: Lessons for New England

Yolanda K. Kodrzycki

Gifts for Home Purchase and Housing Market Behavior

*Gary V. Engelhardt and
Christopher J. Mayer*

As governments consider ways to provide public services more efficiently, privatization can seem like an attractive option. Yet the subject engenders sharp controversies. In New England, local governments generally have not engaged in as much privatization as those in other parts of the country.

This article examines the evidence on the relative merits of privatizing public services and attempts to determine whether these costs and benefits actually appear to explain local government behavior throughout the United States. The limited scope of privatization by New England local governments defies explanation, suggesting that communities in the region may wish to reexamine their choices of how to provide services, if they have not done so recently. 31

Rapid increases in house prices can make home ownership more difficult for prospective first-time home buyers by increasing the required down payment amount and, if the increases outpace income growth, by increasing the ratio of mortgage payments to income. In response to such constraints, households may seek a gift or loan from a family member to use as part of the down payment.

Family transfers for housing purchase may be useful in understanding the relationship between housing finance and housing markets. Gifts may play a critical role for some households in home purchase activity in real estate cycles. This article documents the frequency and magnitude of family gifts for housing purchase and explores economic explanations for their role in home financing. 47

Yield Curve Forecasts of Inflation: A Cautionary Tale

A commonplace of financial market analysis is the dependence of interest rates on inflation and, further, the dependence of the term structure of interest rates (also called the yield curve) on the expected future path of inflation. Thus, for example, long-term interest rates that are unusually high relative to short-term interest rates are seen to indicate that the market expects increasing inflation in the future. News of strong economic growth may tend to increase long-term rates more than short-term rates, and we read that the market fears such growth will lead to increasing inflation in the future.

Given that the term structure reacts to inflation expectations, does it do so in a reasonable manner? Does the term structure embody inflation forecasts that bear a sensible relationship to the inflation that in fact occurs? This article will review the theoretical link between the term structure and inflation expectations, and then provide empirical evidence on the link in light of the theory.

The theory of the term structure of interest rates has received intensive scrutiny (Shiller 1990 provides a survey), as has the relationship between interest rates and inflation. However, relatively little work has been done linking the term structure to future changes in inflation, which is the focus of this article. The most closely related recent work is that by Fama (1990) and by Mishkin (1990), who run simple regressions of inflation changes on yield spreads. Regressions such as theirs will be shown to arise as a special case in the model considered here.

The link between the term structure and inflation is indirect. The theory of the term structure says only that the term structure should reflect expectations of future *interest rates*. The term structure should be useful in forecasting changes in *inflation* only if it is useful in forecasting changes in interest rates *and* changes in interest rates are, to a substantial extent, driven by changes in inflation. As shown below, proper accounting for the indirect nature of this link has important implications for interpreting the data. In particular, to the extent that the yield curve has

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no power to forecast changes in interest rates, it *cannot* have power to forecast changes in inflation within the standard theoretical mechanism.

Rather than give results for many different maturities, this study looks at only one pair. The relationship examined is that between one- and two-year interest rates and the one-year-ahead change in the one-year inflation rate. For example, the one- and two-year interest rates at the end of 1993 should embody expectations of the change in inflation from 1994 to 1995.

This horizon is chosen as a balance between practical and econometric considerations. Horizons

The link between the term structure of interest rates and inflation is indirect.

shorter than one year are of limited relevance to policymakers, but examination of longer horizons is handicapped by data limitations. Reliable data are available only since World War II. That seemingly lengthy span contains only nine independent five-year periods, however, preventing reliable inference about the relationship between five-year interest rates and five-year inflation rates. Longer data series of lesser quality are available, and prewar data will be used in this study for comparing results across periods, an exercise that asks less of the data than using them to obtain results for long maturities.

This study finds little evidence of a link between the term structure and future inflation at this horizon. Regressions that control for expected changes in the real rate of interest find no statistically significant evidence of such a link for any time period examined. This evidence is consistent with previous studies, which find that the term structure does not predict changes in interest rates at this horizon.

I. Theory of the Term Structure and Inflation

The theoretical relationship between the term structure and inflation presented here combines the Fisher equation, relating nominal interest rates, real interest rates, and inflation, with the expectations theory of the term structure. The latter gives a rela-

tion between long-maturity interest rates and the expected path of short rates.

The box summarizes the relationships between the yield curve, spot rates, and forward rates, and the implications of the expectations theory of the term structure for those relationships. In the notation used there, let i_t refer to the nominal interest rate (spot rate) at the end of year t of the one-year security maturing at the end of year $t + 1$. (Throughout this article, time subscripts will refer to the *date of observation* of the given variable.) Let f_t be the one-year-ahead, one-year forward rate implicit in the term structure observed at the end of year t . As explained in the box, the forward rate is the interest rate that can be locked in, in advance, by appropriate purchase and sale of securities of different maturities. The expectations theory maintains that the spread (difference) between the forward and the spot rates should equal the expected change in the spot rate plus a term premium. Mathematically,

$$(f_t - i_t) = E_t(\Delta i_{t+1}) + \theta \quad (1)$$

where $E_t(\cdot)$ represents expectations as of the end of year t and θ is a term premium, which the expectations theory assumes is constant over time.¹

Equation (1) is often called the "forward unbiasedness condition," because it implies that the forward rate provides an unbiased forecast of the future spot rate. As expressed by equation (1), the expectations theory directly implies that the term structure (as reflected in the forward-spot spread $f - i$) forecasts changes in *interest rates*, not changes in *inflation*. To bring inflation into the analysis, let π_{t+1} be the rate of price inflation from the end of year t to the end of year $t + 1$ (recalling that the subscripts denote the date of observation). Let r_{t+1} denote the ex post real rate of interest for the same period. The ex post real rate is simply the rate of interest earned over a period in excess of actual inflation over that period,² and therefore:

$$r_{t+1} \equiv i_t - \pi_{t+1} \quad (2)$$

which implies:

$$E_t(\Delta i_{t+1}) = E_t(\Delta \pi_{t+2}) + E_t(\Delta r_{t+2}). \quad (3)$$

¹ The term premium is permitted to vary across maturities, but not over time. Alternative theories that drop this assumption are discussed in Section IV below.

² Tax considerations are ignored. However, some of the data used below have been adjusted for differential tax treatment of the underlying securities.

The Expectations Theory of the Term Structure of Interest Rates

The expectations theory of the term structure is the benchmark model in economics and finance of the relationship between interest rates of differing maturities. An abbreviated development is presented here, examining only securities with maturities of one and two periods and confining the analysis to pure discount securities. For a thorough analysis that includes the extension to coupon bonds, see Shiller (1990).

Let p_t and p_{2t} be the prices at time t of securities that will pay \$1 at times $t + 1$ and $t + 2$, respectively. The securities are assumed to have zero risk of default. Let i_t and i_{2t} be the continuously compounded, per-period yields to maturity of the two securities. Then by definition:

$$p_t \cdot e^{i_t} = p_{2t} \cdot e^{2 \cdot i_{2t}} = 1$$

so that:

$$i_t = -\ln p_t \text{ and } i_{2t} = -(\ln p_{2t})/2.$$

Now consider an agent who has no net borrowing needs at time t , but will need to borrow money at time $t + 1$ to be repaid at time $t + 2$. Without loss of generality, assume the borrowing need can be expressed as a need to repay \$1 at $t + 2$. The agent could simply wait until $t + 1$, and borrow p_{t+1} dollars at an interest rate of i_{t+1} .

An alternative transaction would lock in an interest rate at time t . The agent could issue a two-year bond, and invest the proceeds p_{2t} in p_{2t}/p_t one-year bonds. Then the agent would carry a zero balance from t to $t + 1$. At $t + 1$ the one-year bonds mature and the agent would receive p_{2t}/p_t dollars, with a requirement to repay \$1 at $t + 2$. The implied interest rate from $t + 1$ to $t + 2$ on this transaction is:

$$f_t = -\ln(p_{2t}/p_t) = 2 \cdot i_{2t} - i_t$$

which is called (if a period is a year) the one-year-

ahead, one-year forward rate: it is the one-year rate of interest that can be locked in, one year ahead of time. Note that this definition implies that the two-year rate is the average of the one-year rate and the forward rate.

The agent faced with a choice between locking in the forward rate at time t and waiting to borrow at time $t + 1$ is likely to compare the forward rate to the one-year rate expected to prevail at $t + 1$. The expectations hypothesis of the term structure supposes that market forces will drive the forward rate to equal the expected one-year spot rate plus a "term premium," which is supposed to be constant over time for each maturity but might differ across maturities. Hence (since only one maturity is considered here), the expectations hypothesis can be stated:

$$f_t = E_t(i_{t+1}) + \theta.$$

The term premium θ is commonly understood to reflect the differing risk of the two strategies; alternatively it could reflect maturity-specific forces of supply and demand for funds (compare Culbertson 1957). In either case, the premium could in principle be positive, negative, or zero.

It is important to note that there is no theoretical reason for the expectations hypothesis to hold except as an approximation. If $\theta = 0$, as might be suggested by risk neutrality, the hypothesis in fact *cannot* hold for all maturities simultaneously. When non-zero term premia are allowed, there are no compelling reasons why they should be constant over time. Some recent attempt to explain failures of the expectations hypothesis concentrate on modelling changes in the term premia—for example, Engle and Ng (1993). See Shiller (1990) and the references therein for further detail on these matters.

Substituting (3) into (1) and rearranging, we obtain:

$$E_t(\Delta \pi_{t+2}) = (f_t - i_t) - E_t(\Delta r_{t+2}) - \theta. \quad (4)$$

According to the expectations theory, the forward-spot spread reflects the expected change in the spot rate, which in turn reflects both expected changes in inflation and expected changes in the real rate of interest. As expressed mathematically in Equa-

tion (4), *the term structure cannot be linked to expected inflation without consideration of the real rate.* The forward-spot spread will directly measure expected changes in inflation only if the real rate is expected to remain unchanged.

Equation (4) forms the basis for the empirical investigation. Given an assumption about the expected change in the real rate, the right-hand side of (4) expresses the "market" expectations of the change

in inflation. If those expectations are rational, they should predict the actual change in inflation. Therefore, regressions of the actual change in the inflation rate on the forward-spot spread two years previous and the expected change in the real rate can be used to assess the consistency of historical data with the predictions of the expectations hypothesis.

Two types of checks will be used. First, equation (4) predicts that, in a regression of the actual change of inflation on the lagged spread and the expected change in the real rate, the coefficients on those two

*This study finds little evidence
of a link between the
term structure of interest
rates and future
inflation, at the
horizon explored here.*

variables will be 1 and -1 , respectively. If the estimated coefficients are consistent with (not significantly different from) those values, the data are consistent with the expectations hypothesis. However, such a result alone does not measure the importance of the yield curve in predicting inflation. Results will also be reported for tests of the hypothesis that the coefficient on the forward-spot spread is 0. Only if this hypothesis is rejected can the spread be said to have a significant relationship to future inflation.

II. Data and Econometric Method

Three different sets of data for interest rates on U.S. risk-free (or low-risk) securities are used. These are described fully in Appendix 1, "Data Sources." The data sets jointly cover the period 1919 to 1990. Because of the varying quality of the data and the possibility of temporal instability, results will be reported for subperiods corresponding to the individual data sets and to the first and second halves of the postwar sample, as well as for the full period.

The variables used in the empirical analysis are:

i_t : Yield on one-year-maturity securities, December observations.

f_t : One-year-ahead, one-year-forward interest rate, computed from December observations of one-year and two-year yields. (See the box.) Date subscript refers to time of observation, so f_t is the forward rate applicable to the period $t + 1$ to $t + 2$.

π_t : December-to-December percentage change in the Consumer Price Index. The dating convention means that π_t is the rate for the period $t - 1$ to t .

r_t : Ex post real rate of interest, as defined by equation (2).

$\Delta r_{t-2,t}^e$: Change in the real rate from $t - 1$ to t , "expected" at $t - 2$. See Appendix 4, "The 'Expected' Real Rate."

While monthly observations of all variables are available, only one annual observation is used, for several reasons. First, use of monthly data gives a misleading indication of the amount of information present in the data set. The number of fully independent observations is equal to the span of the data divided by the longest maturity used; thus, 20 years of data contain only 10 fully independent observations of two-year horizons, even if all 240 monthly observations are used. Monthly data do in principle contain more information than annual data, and in principle reported standard errors can be adjusted for the observation overlap. However, these adjustment methods are known to work poorly when the overlap is substantial (see, for example, Richardson and Stock 1989).

The use of December observations for the variables may be questioned. December financial data may be contaminated by "end-of-year effects" due to tax and accounting influences on portfolios. Any such effects should be mitigated here by the fact that *only* December data are used; changes are December-to-December rather than December to some other month. Nevertheless, December data might be especially noisy. For this reason, all equations were reestimated using June data for the periods 1950 to 1990, 1950 to 1970, and 1971 to 1990. The results using June data were broadly similar to those using December data and are not reported in detail; any significant differences are noted where appropriate.

Econometric details for the results presented below are given in Appendix 2, "Theoretical Structure of Error Terms" and Appendix 3, "Econometric Method."

Table 1
Estimates of Equation (5)
 $\Delta\pi_t = \beta_0 + \beta_1(f_{t-2} - i_{t-2}) + u_t$

Variable	Estimation Period						
	1923-90	1950-90	1950-70	1971-90	1922-49	1932-49	1921-30
constant	-.561 (.442)	-.351 (.416)	-.108 (.600)	-.782 (.585)	-.060 (1.466)	-1.697 (2.948)	-.847 (1.793)
(f - i)(t - 2)	1.741 (.618)	1.764 (.693)	2.475 (1.501)	1.838 (.663)	.768 (1.902)	2.676 (2.530)	-2.024 (9.064)
\bar{R}^2	.050	.168	.018	.266	-.034	-.036	-.120
D.W.	2.217	1.519	1.389	1.656	2.024	2.272	2.018
s.e.	3.940	2.410	2.333	2.541	5.821	6.477	6.697

Newey-West standard errors in parentheses. See Appendix 3, "Econometric Method," for details of computations.

III. Results

Suppose that the expected change in the real rate Δr^e is always zero.³ After imposing this condition, the theoretical relationship (4) implies a coefficient of 1 on the forward-spot spread ($f - i$) in the regression:

$$\Delta\pi_t = \beta_0 + \beta_1(f_{t-2} - i_{t-2}) + u_t. \quad (5)$$

This regression is closely related to those reported by Fama (1990) and Mishkin (1990).⁴

Results of estimating (5) are reported in Table 1. The coefficient on the forward-spot spread is nowhere significantly different from 1; the data are in this sense consistent with the expectations hypothesis with a zero expected change in the real rate. The spread also appears to have some explanatory value for future inflation: the hypothesis that the coefficient on the spread is 0 can be rejected for the full 1923-90 sample and for the 1950-90 and 1971-90 subsamples.

However, the results also show that the forward-spot spread forecasts very little of the subsequent change in inflation. The \bar{R}^2 is 0.05 for the full sample. Furthermore, the correlation between the spread and inflation arises almost entirely in the most recent 20-year period; \bar{R}^2 is 0.27 for 1971-90 but 0.02 for 1950-70 and negative for all pre-war samples.

If the expected real rate of interest is not constant, equation (5) is not a valid representation of the expectations hypothesis. As discussed above, that hypothesis says that the forward-spot spread predicts the sum of the expected change in inflation and the expected change in the real rate. If the expected change in the real rate is not zero, the hypothesis no longer implies that the coefficient on the forward-

spot spread in (5) is 1; in fact, in this case the expectations hypothesis has no testable implications at all for equation (5).⁵

Direct measures of the expected change in the real rate of interest are not available. However, such changes have been in part predictable in the data used in this study. Figure 1 shows actual values and the fitted values of a regression of the change in the ex post real rate on observations of variables in our data set dated $t - 2$ or earlier, over the whole sample. Under rational expectations, this information would have been incorporated in market expectations. Therefore, the fitted values from this regression⁶ can be used as proxies for the expected changes in the real rate. Details and further justification of this procedure are given in Appendix 4.

The next set of results incorporates this measure of the expected change in the real rate into the inflation change regression. Table 2 provides estimates of the regression:

$$\Delta\pi_t = \beta_0 + \beta_1(f_{t-2} - i_{t-2}) + \beta_2\Delta r_{t-2,t}^e + u_t. \quad (6)$$

The expectations hypothesis as given by (4) predicts

³ This hypothesis is implied by the hypothesis that the ex ante real rate is constant. An expectation of no change also allows the real rate to follow a random walk. Note that this discussion refers to the change from $t + 1$ to $t + 2$ expected at t .

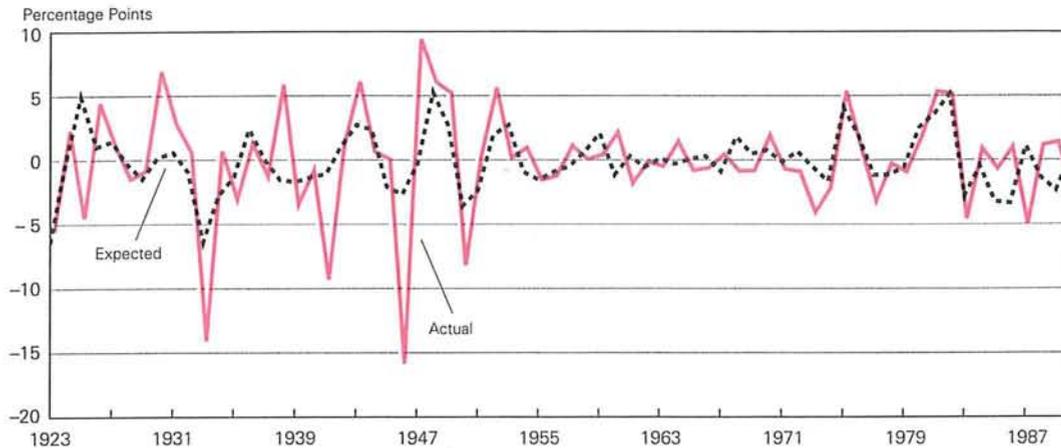
⁴ The regressions are not directly comparable, because both Fama and Mishkin use the difference between long-term average and short-term average inflation rates instead of inflation rate changes, and yield spreads between long-term and short-term securities rather than forward-spot spreads.

⁵ Mishkin (1990) discusses how the coefficients in a regression similar to (5) can be interpreted when the real rate varies, under the assumption that the expectations hypothesis holds exactly.

⁶ The estimation is done separately for each sample period.

Figure 1

Actual and "Expected" Change in the Ex Post Real Rate of Interest



values of 1 and -1 for the coefficients β_1 and β_2 , respectively. The last line of Table 2 gives p-values for tests of this restriction so that, for example, a p-value of 0.10 or less means that the restriction is rejected at the 10 percent level.

Table 2 contains good news and bad news for the

expectations hypothesis. The data are consistent with the coefficient values predicted by the theory: the hypothesis that the coefficients are 1 and -1 is nowhere rejected at the 10 percent level or below. Furthermore, these regressions explain substantially more of the variation in inflation than those reported

Table 2
Estimates of Equation (6)

$$\Delta \pi_t = \beta_0 + \beta_1(i_{t-2} - i_{t-1}) + \beta_2 \Delta r_{t-2,t}^e + u_t$$

Variable	Estimation Period						
	1923-90	1950-90	1950-70	1971-90	1922-49	1932-49	1921-30
constant	.036 (.389)	.175 (.429)	.056 (.401)	.066 (.693)	-.181 (1.196)	-.114 (2.203)	-.278 (.953)
(f - i)(-2)	.005 (.559)	-.050 (.852)	1.396 (1.300)	-.171 (1.022)	.116 (1.553)	.192 (2.090)	.905 (6.417)
Δr^e	-.905 (.222)	-.957 (.284)	-.900 (.240)	-.987 (.380)	-.847 (.186)	-.828 (.130)	-.916 (.351)
\bar{R}^2	.241	.417	.553	.419	.145	.184	.298
DW	2.596	1.882	1.565	1.996	2.428	2.839	2.934
s.e.	3.521	2.018	1.574	2.261	5.291	5.749	5.303
p-value ^a	.104	.157	.891	.101	.558	.307	.967

^ap-value for the null hypothesis that the coefficients on (f - i) and Δr^e are 1 and -1, respectively. A value less than 0.10 means the hypothesis is rejected at the 10 percent level, and so on.

Newey-West standard errors in parentheses. See Appendix 3, "Econometric Method," for details of computations.

Table 3
Estimates of Equation (7)
 $\Delta i_t = \beta_0 + \beta_1(i_{t-1} - i_{t-2}) + u_t$

Variable	Estimation Period						
	1922-89	1949-89	1949-69	1970-89	1921-48	1931-48	1920-29
constant	.100 (.162)	.199 (.227)	.074 (.307)	.077 (.420)	-.203 (.189)	.215 (.445)	-.226 (.208)
(f - i)(-1)	-.178 (.240)	-.132 (.274)	1.276 (.921)	-.196 (.275)	-.002 (.478)	-.324 (.775)	1.174 (.985)
\bar{R}^2	-.008	-.022	.067	-.047	-.038	-.047	.026
DW	2.077	1.981	2.022	1.606	2.542	3.240	1.924
s.e.	1.264	1.498	.902	1.954	.822	1.048	.687

Newey-West standard errors in parentheses. See Appendix 3, "Econometric Method," for details of computations.

in Table 1, which excluded the expected change in the real rate. However, little credit for these results is due to the forward-spot spread. While the estimates of β_1 are nowhere significantly different from 1, they are also nowhere significantly different from 0. The forward-spot spread is not making a statistically meaningful contribution to explaining the change in inflation in these regressions. To the extent that movements in inflation are predictable with these data, they are associated with movements in the expected real rate of interest and *not* with the shape of the yield curve.

Note in particular the results for the 1971-90 period, which were the most favorable for equation (5). When the expected real rate is included in the regression, the coefficient on the forward-spot spread has a negative sign and a large standard error. The simple correlation between the spread and the future change in inflation during this period, as reported in Table 1, appears to be an artifact of the omission of the expected real rate, and cannot be attributed to the expectations theory mechanism.⁷

According to the expectations hypothesis, any ability of the yield curve to forecast changes in inflation must be a byproduct of the ability of the yield curve to forecast changes in short-term interest rates. The results in Table 2 suggest an examination of the extent to which the yield curve performs this function. Table 3 presents results of the regression:

$$\Delta i_t = \beta_0 + \beta_1(f_{t-1} - i_{t-1}) + u_t \quad (7)$$

where the forward unbiasedness condition (1) predicts a slope coefficient of 1.

The equation performs poorly. The slope coefficient is significantly less than 1 for the full sample and

for the subperiods 1949-89 and 1970-89; estimated values are negative for all periods except 1949-69 and 1920-29. The coefficient is not significantly different from 0 for any period. Thus, the forward-spot spread has essentially *no* ability to forecast changes in the spot rate.⁸ This result is consistent with previous findings in the term structure literature. (Shiller 1990 includes a summary of empirical work.)

The results in Table 3 do *not* mean that the expectations hypothesis is badly misguided as a description of the yield curve. Rather, they are consistent with a view that changes in the one-year rate have a negligible forecastable component. The expected change in the spot rate will be nearly zero throughout the sample. The strict expectations hypothesis would then require that the forward-spot spread be a constant (the term premium). If the expected change in the spot rate is zero, any variations in the forward-spot spread are necessarily variations in the term premium. Such deviations from the expectations hypothesis could be small while being consistent with the results in Table 3.⁹

⁷ This particular result is sensitive to the use of December observations. When June observations are used for this time period, the coefficient on the forward-spot spread is 0.85 with a standard error of 0.42.

⁸ When June data are used, the coefficient on the spread is positive and not significantly different from 1 for the post-war samples. The coefficient is not significantly different from 0 for any of these samples, however, so the conclusion that the spread has no ability to forecast changes in interest rates is robust to the change of dates.

⁹ Mankiw and Miron (1986) give this interpretation, and suggest that the unforecastability of changes in short rates is a result of Federal Reserve behavior: they find that forward unbiasedness regressions have substantially more explanatory power for interest rates changes prior to the founding of the Fed.

Table 4

Estimates of Equation (8)*

$$\Delta\pi_t = \beta_0 + \beta_1(i_{t-2} - i_{t-2}) + \beta_2\Delta r_t + u_t$$

Variable	Estimation Period						
	1923-90	1950-90	1950-70	1971-90	1922-49	1932-49	1921-30
constant	.036 (.184)	.175 (.245)	.056 (.305)	.066 (.616)	-.181 (.168)	-.114 (.578)	-.278 (.103)
(f - i)(-2)	.005 (.262)	-.050 (.379)	1.396 (.957)	-.171 (.742)	.116 (.273)	.192 (.663)	.905 (.607)
Δr	-.905 (.066)	-.957 (.103)	-.900 (.064)	-.987 (.309)	-.847 (.038)	-.828 (.058)	-.916 (.008)
\bar{R}^2	.911	.685	.865	.546	.976	.966	.994
DW	1.930	1.915	1.888	1.587	2.393	2.352	2.320
s.e.	1.209	1.484	.866	1.998	.882	1.172	.491
p-value ^a	.000	.001	.261	.003	.000	.004	.000

*Instruments: See Table A2.

^ap-value for the null hypothesis that the coefficients on (f - i) and Δr are 1 and -1, respectively.

Newey-West standard errors in parentheses. See Appendix 3, "Econometric Method," for details of computations.

For purposes of this study, the point is that predictability of changes in the spot rate is essential for the yield curve to predict changes in inflation, under the expectations hypothesis. The forward-spot spread will predict changes in inflation *only* if changes in short rates are predictable *and* such changes reflect changes in expected inflation. If changes in short rates are not predictable, the yield curve has no role to play, and expected changes in inflation will be completely absorbed by expected changes in the real rate.

This point can be emphasized by examining a hybrid equation that replaces the expected change in the real rate with its actual (ex post) value. Table 4 presents estimates of the regression:

$$\Delta\pi_t = \beta_0 + \beta_1(f_{t-2} - i_{t-2}) + \beta_2\Delta r_t + u_t \quad (8)$$

Since the ex post real rate is likely to be correlated with the error term, the equation is estimated using instrumental variables. Again the coefficients on the spread and on the change in the real rate should be 1 and -1 under the expectations hypothesis.

The interest of equation (8) is that it can be derived by subtracting the ex post real rate from both sides of the forward unbiasedness condition (equation 1). It therefore provides a direct link between that equation and the inflation forecasting equation (6). Equation (8) is not a forecasting equation because it includes the ex post real rate, which is not known in advance; on the other hand, it can be

shown to have a smaller error variance under the expectations hypothesis than (6) and therefore permits more precise statistical inference. (See Appendix 2 for details.)

The results in Table 4 indicate that the expectations hypothesis is rejected at well below the 1 percent level for all periods except 1950-70. Even though the smaller error variances give smaller standard errors, the coefficient on the spread is nowhere significantly different from 0.¹⁰ *For this data set, the yield curve has no ability to forecast changes in inflation within the expectations theory framework.*

IV. Alternative Hypotheses

The analysis to this point has been based entirely on the expectations theory of the yield curve, with rational expectations assumed. This section will briefly consider alternative theories.

As an empirical background for this discussion, first consider whether the yield curve has any ability to forecast changes in inflation when the constraints of the expectations hypothesis are dropped. Table 5 presents results of regressions of the form:

¹⁰ When June observations are used, the coefficient on the forward-spot spread for the 1971-90 period is positive and marginally significantly different from 0 at the 5 percent level. Otherwise the results are very similar.

Table 5
Estimates of Equation (9)

$$\Delta\pi_t = \beta_0 + \sum_{i=1}^n \beta_i (f_{t-1-i} - i_{t-1-i}) + \sum_{i=1}^n \gamma_i \pi_{t-1-i} + \sum_{i=1}^n \delta_i i_{t-1-i} + u_t$$

Variable	Estimation Period						
	1923-90	1950-90	1950-70	1971-90	1922-49	1932-49	1921-30
constant	-.532 (.902)	.249 (.724)	-3.551 (1.273)	3.018 (3.263)	-.210 (3.681)	3.094 (3.245)	-23.012 (16.799)
(f - i)(-2)	2.013 (1.315)	.756 (.881)	1.512 (1.161)	.674 (1.021)	5.547 (3.434)	-.347 (5.781)	17.854 (19.003)
(f - i)(-3)	-.803 (.989)	1.455 (.648)	5.000 (2.226)	.855 (1.162)	-3.933 (2.709)	-.108 (2.988)	—
(f - i)(-4)	1.071 (.670)	—	—	—	—	—	—
$\pi(-2)$	-.329 (.083)	-.313 (.142)	-.031 (.203)	-.498 (.287)	-.458 (.119)	-.515 (.149)	-.681 (.260)
$\pi(-3)$	-.036 (.124)	.535 (.167)	.659 (.211)	.596 (.219)	.198 (.171)	-.091 (.190)	—
$\pi(-4)$	.296 (.149)	—	—	—	—	—	—
i(-2)	.413 (.375)	.062 (.266)	-.511 (.289)	.135 (.318)	1.370 (.993)	1.334 (.760)	4.602 (3.416)
i(-3)	-.426 (.307)	-.386 (.262)	.946 (.376)	-.679 (.328)	-1.326 (.996)	-2.269 (1.302)	—
i(-4)	-.004 (.413)	—	—	—	—	—	—
\bar{R}^2	.173	.412	.444	.427	-.012	-.095	.181
DW	2.609	1.995	1.477	2.584	2.509	2.931	2.932
s.e.	3.676	2.026	1.756	2.245	5.757	6.659	5.727
p-value ^a	.256	.011	.116	.591	.269	.988	.347

^ap-value for the hypothesis that the coefficients on the (f - i) terms are jointly zero. Newey-West standard errors in parentheses. See Appendix 3, "Econometric Method," for details of computations.

$$\Delta\pi_t = \beta_0 + \sum_{i=1}^n \beta_i (f_{t-1-i} - i_{t-1-i}) + \sum_{i=1}^n \gamma_i \pi_{t-1-i} + \sum_{i=1}^n \delta_i i_{t-1-i} + u_t \quad (9)$$

where the lag length n varies with the sample length. The last row of Table 5 gives p-values for the hypothesis that the coefficients on the forward-spot spread are jointly 0. This hypothesis is accepted for the full period, but is rejected for the postwar sample 1950-90. That rejection appears to arise largely in the 1950-70 period.¹¹ This result provides some evidence that the spread has an association with future

changes in inflation. Because the spread was not significant in the equations based on the expectations hypothesis, however, any such association must arise through some other mechanism.

Time-Varying Term Premia

If the term premium is not constant but rather reflects a time-varying risk premium, expected changes in inflation could be associated with changes in risk and therefore could affect the term premium.

¹¹ When June observations are used, the hypothesis that the coefficients on the spread are jointly 0 is not rejected for any postwar period.

This would lead to an association between the forward-spot spread and future changes in inflation that is not captured by the expectations hypothesis. This possibility deserves further investigation, which would require linking expected changes in inflation with the volatility of interest rates (possibly including a link between the level and the variance of inflation). Note, however, that in the Table 5 regressions the sum of coefficients on the forward-spot spread is positive, so increases in the spread predict increases

The results presented here undermine a particularly strong form of the view that interest rates respond to inflation expectations, the view that interprets a steep yield curve as a reliable forecast of accelerating inflation.

in inflation. Since no change in the spot rate is predicted, this implies a predicted *decline* in the real rate (see also Fama 1990). A risk-based model would therefore have to explain why an increase in the risk premium embedded in the term structure anticipates a decline in the real rate of interest.

Dropping Rational Expectations

The discussion in this paper has presumed that market prices reflect rational expectations of future inflation and interest rates. Another avenue for exploration would examine the expectations hypothesis without assuming rational expectations. If the market expects a constant real rate, ignoring the forecastability found here, the real rate can be ignored in making the link between the yield curve and inflation. Equation (5) above takes that approach, but inconsistently presumes that the market rationally anticipates changes in the inflation rate while ignoring the evidence that such changes are likely to be offset by changes in real rates.

An alternative uses direct measurement of expectations. Froot (1989) finds some correspondence between the forward-spot spread and survey expecta-

tions of changes in spot rates. Combining those results with survey measures of inflation expectations could illuminate the relationship between inflation expectations and the yield curve without insisting on a further connection to actual inflation.

The Modigliani-Sutch Equation

Modigliani and Sutch (1966) and a number of successors model long rates as a distributed lag of short rates. Shiller (1987) argues that equations of this type have proved quite robust as a description of the yield curve. This approach can be interpreted within the expectations theory as assuming adaptive expectations of the future path of short rates.

This theory leaves little room for the forward-spot spread to predict inflation. If long rates are a distributed lag of short rates, so is the forward rate and so is the forward-spot spread. Therefore, in this view, the spread is an artifact of the recent history of spot rates, and any association between the spread and future inflation would be an indirect result of the impact of spot rates on economic activity.

V. Conclusion

The findings of this study may be summarized as follows. First, the expectations theory of the term structure implies that the forward-spot spread forecasts the *sum* of the expected change in inflation and the expected change in the real rate of interest. Second, changes in the real rate of interest are in part predictable, so that such expected changes should be taken into account in linking the term structure to expected changes in inflation. Third, after such account is taken, the forward-spot spread has essentially no power to explain one-year-ahead changes in one-year inflation.

The results presented here consider only one maturity. However, they provide some guidance for other horizons. Under the expectations hypothesis, the term structure can forecast inflation only if it forecasts changes in interest rates. Horizons for which other work has found little predictability in interest rate changes are unlikely to give results different from those in this paper.

The results presented here do not contradict the view that interest rates respond to inflation expectations. Rather they undermine a particularly strong form of that view, which interprets a steep yield curve as a reliable forecast of accelerating inflation.

Appendix 1: Data Sources

- π_t : For all sample periods, the inflation rate is defined as the percentage change from December of year $t - 1$ to December of year t of the Consumer Price Index.
- i_t, f_t : December observations of one-year and two-year interest rates were taken from the data sets described below. The one-year rate was used as i_t ; the forward rate was constructed so that the two-year rate was the average of the forward rate and the one-year rate.
- 1946–90 Data provided by J. Huston McCulloch, constructed as described in McCulloch (1975) and summarized in Appendix B of Shiller (1990). Data are pure discount yields implied by observed end-of-month data on U.S. Treasury securities, adjusting for tax effects and using a cubic spline to fit a yield curve. While in principle these yields are subject to measurement error, for the maturities examined here the errors are surely trivial.¹²
- 1929–49 Data from Cecchetti (1988). These data also were constructed by fitting a yield curve to end-of-month U.S. Treasury data; Cecchetti corrected the data for distortions caused by an exchange privilege carried by many Treasury bonds during this period. The Cecchetti data are coupon bond yields, unlike the theoretically preferable discount yields provided by McCulloch, but comparison of the McCulloch pure discount series with coupon yields suggests the differences are small for these maturities. For combined data sets, Cecchetti data are used for the 1929–46 period.
- 1919–30 Data from Baum and Thies (1992). These data were constructed using curve-fitting methods, but using railroad bonds rather than Treasury securities. Like the Cecchetti data, these are coupon bond yields. The Baum and Thies data have been mean-adjusted so that the 1929 observations equal those from Cecchetti. This amounts to assuming that the railroad bonds carried a constant risk premium over Treasuries.

Table A-1 gives means and standard deviations of the various data series for the sample periods covered by each data set, including the constructed ex post real rate, forward-spot spread, and differenced inflation, real rate, and spot rate series.

Appendix 2: Theoretical Structure of Error Terms

The hypothesis of rational expectations has implications for the error terms of the equations estimated. Certain econometric points require understanding of these proper-

Table A1
Sample Statistics

Variable		1919–30	1929–49	1946–90
π	mean	-.038	1.736	4.606
	std. dev.	6.087	6.403	4.005
i	mean	4.684	1.105	5.433
	std. dev.	1.099	.975	3.250
f	mean	4.712	1.825	5.750
	std. dev.	.926	1.148	3.200
r	mean	6.095	-.689	1.102
	std. dev.	4.735	7.238	3.274
$f - i$	mean	.028	.720	.317
	std. dev.	.199	.387	.625
$\Delta\pi$	mean	-1.904	-.133	-.273
	std. dev.	6.859	6.276	3.139
Δr	mean	.711	-.343	.227
	std. dev.	6.824	6.639	2.946
Δi	mean	-.188	-.116	.139
	std. dev.	.661	1.022	1.439

ties. First, define the expectational errors for the change in the spot rate and the change in the real rate:

$$\varepsilon_t \equiv \Delta i_t - E_{t-1}(\Delta i_t). \quad (A1)$$

$$\nu_t \equiv \Delta r_t - E_{t-2}(\Delta r_t). \quad (A2)$$

Under the hypothesis of rational expectations, ε_t is uncorrelated with any information available at time $t - 1$ or earlier, and ν_t is uncorrelated with any information available at time $t - 2$ or earlier (since the expectations are formed at $t - 2$). However, ν_t is likely to be correlated with information available at $t - 1$, and in particular with ν_{t-1} . Therefore, it is likely to have a first-order moving average (MA(1)) structure.

Then equations (1), (2), and (3) in the text imply that:

$$\Delta\pi_{t+2} = -\theta + (f_t - i_t) - E_t(\Delta r_{t+2}) - \nu_{t+2} + \varepsilon_{t+1} \quad (A3)$$

where the error terms are theoretically uncorrelated with the right-hand-side variables, justifying least squares estimation of the empirical relationship (5). However, ν_t is MA(1) and further may be correlated with ε_t , introducing an additional MA(1) effect to the total error in (A3). This serial correlation requires use of a correction in calculating standard errors and test statistics in the results, as described in Appendix 3 below.

Equation (A1) immediately gives the error term for the forward unbiasedness regression (7):

$$\Delta i_{t+1} = -\theta + (f_t - i_t) + \varepsilon_{t+1}. \quad (A4)$$

Under rational expectations ε_t is serially uncorrelated so no correction is needed for that equation. Finally, the following equation is obtained by subtracting the ex post real rate from both sides of (A4):

¹² The discount bond yields used are almost indistinguishable from the constant maturity coupon bond yield series maintained by the Federal Reserve Board. This conclusion is further reinforced by comparison of the McCulloch data for recent periods to market yields for stripped Treasury bonds.

$$\Delta\pi_{t+2} = -\theta + (f_t - i_t) - \Delta r_{t+2} + \varepsilon_{t+1}. \quad (A5)$$

This equation has the same structure as (A3) but omits the expectational error for the change in the real rate. The smaller error variance explains the smaller standard errors obtained when the hybrid equation (8) is estimated instead of the forecasting equation (6).

Appendix 3: Econometric Method

All coefficient estimates were generated by ordinary least squares except for those in Table 4, which are instrumental variables estimates. Instruments for each time period are the independent variables for the real rate regressions in Table A-2. As noted above, theory suggests that the error terms of all but the forward unbiasedness regression are serially correlated. Therefore, all standard errors and hypothesis tests were computed using covariance matrices robust to heteroskedasticity and first-order serial correlation as per Newey and West (1987) except for those in Table 2, which omit the serial correlation adjustment.

The tables report Durbin-Watson statistics for first-order serial correlation. Again, the expectations hypothesis predicts MA(1) errors in all equations except those in Table

2; note also that except in Table 2 standard errors incorporate an (asymptotically) appropriate adjustment. Q-statistics for serial correlation of first and higher order (depending on sample length) were computed but are not reported in the tables. P-values for these tests fell below 0.15 only as follows: Table 1, 1923–90 (0.003); Table 2, 1932–49 (0.005); Table A-2, 1921–30 (0.109) and 1971–90 (0.027).

P-values for the hypothesis tests in Tables 3, 4, and 5 were computed from Wald test statistics generated by RATS version 4.01 (in which all computations were performed). The Wald statistics are asymptotically chi-square with degrees of freedom equal to the number of restrictions. In view of the limited number of observations in many of the regressions here, the reported p-values incorporate a small sample adjustment: the Wald statistic is divided by the number of restrictions and the result is compared to an F-distribution with degrees of freedom equal to the number of restrictions (numerator) and degrees of freedom of the regression (denominator). The adjustment slightly increases the p-values; those closer to 0 are increased proportionately more. A small number of p-values are changed from being slightly less than 0.10 to being slightly more than 0.10, but the adjustment does not affect significance of any hypothesis at the 5 percent or 1 percent level.

Table A-2
Real Rate Regression

$$\Delta r_t = \beta_0 + \sum_{i=1}^n \beta_i (f_{t-i} - i_{t-i}) + \sum_{i=1}^n \gamma_i \pi_{t-i} + \sum_{i=1}^n \delta_i i_{t-i} + u_t$$

Variable	Estimation Period						
	1923–90	1950–90	1950–70	1971–90	1922–49	1932–49	1921–30
constant	.930 (.885)	.478 (.618)	3.584 (1.464)	-1.170 (4.162)	.788 (3.866)	-2.564 (3.313)	25.881 (17.277)
(f - i)(-2)	-3.509 (1.522)	-1.486 (1.125)	.007 (1.345)	-1.784 (1.135)	-6.910 (3.892)	1.276 (6.027)	-19.622 (19.505)
(f - i)(-3)	1.547 (1.329)	-.572 (1.049)	-5.906 (2.499)	.215 (1.821)	4.548 (3.202)	-1.357 (3.075)	—
(f - i)(-4)	-.907 (.810)	—	—	—	—	—	—
$\pi(-2)$	.383 (.085)	.424 (.121)	.048 (.214)	.558 (.341)	.494 (.133)	.522 (.150)	.739 (.286)
$\pi(-3)$	.028 (.119)	-.579 (.168)	-.701 (.203)	-.549 (.189)	-.218 (.179)	.114 (.197)	—
$\pi(-4)$	-.270 (.160)	—	—	—	—	—	—
i(-2)	-.868 (.450)	-.373 (.359)	.481 (.399)	-.496 (.405)	-2.101 (1.116)	-2.238 (.814)	-5.240 (3.507)
i(-3)	.457 (.365)	.541 (.359)	-.828 (.455)	.728 (.440)	1.839 (1.161)	2.896 (1.373)	—
i(-4)	.352 (.456)	—	—	—	—	—	—
R ²	.288	.464	.613	.517	.254	.351	.471
DW	2.747	2.450	2.065	2.740	2.461	2.920	2.934
s.e.	3.872	2.176	1.831	2.580	5.987	6.825	6.079

Newey-West standard errors in parentheses. See Appendix 3, "Econometric Method," for details of computations.

Appendix 4: The "Expected" Real Rate

Estimation of equation (6) requires construction of a measure of the change in the real rate of interest from year $t + 1$ to $t + 2$ that is expected in year t . This variable $\Delta r_{t,t+2}^e$ is constructed as the fitted values of a regression of the ex post change in the real rate Δr_{t+2} on the variables $(f_t - i_t)$, π_t , and i_t , and lags of these variables. The regression is performed separately for each sample period. Table A-2 indicates the lags included for each subsample, gives coefficient estimates and Newey-West standard errors, and provides summary statistics.

Given the importance of the real rate in the empirical results, some discussion of this procedure is warranted. Most importantly, note that *these results are not intended as a structural estimate of the expected change in the real rate*. This constructed measure is not asserted to represent the expectations of "the market" or of any participant(s). Rather, a proxy is sought for the expected change that has desirable *econometric* properties under the hypothesis of rational expectations.

The advantage of the procedure used here is that the expectations errors (ν_t in Appendix 2) implied by this procedure are by construction uncorrelated with the independent variables in all regressions estimated, since those variables are used as explanatory variables in the real rate regressions. This implies that deviations of the coefficient estimates from their theoretical values cannot be due to

mismeasurement of expectations: the procedure by construction cannot generate coefficient bias. (Deviations could be due to failure of the rational expectations assumption, a possibility discussed in the text.) Another way to understand this argument is to note that the coefficient estimates (but not the standard errors or measure of fit) produced by this procedure are identical to those given by instrumental variables estimation of (8), since the instruments are identical to the independent variables in the real rate regressions. Validity of instrumental variables estimation requires that instruments be correlated with the variables instrumented (the change in the ex post real rate) and be independent of the error term, but it does not require any structural relationship between the instruments and the instrumented variable.

Under rational expectations, "the market" uses all available information to form expectations, while here only variables in the data set are used. Thus the "market" expectation could be more accurate than that used here. This difference causes no estimation bias, although the estimates would be more precise if a more accurate forecast were used. On the other hand, the expected change used here is formed using sample information not available to market participants. No formal stability tests were performed on the results in Table A-2, but the estimates show no obvious sign of instability. In any case, this would not affect the validity of the instrumental variables interpretation.

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Technology Life Cycles and State Economic Development Strategies

States have become increasingly active in promoting industrial competitiveness and economic development in recent years. Some of these efforts involve the reorientation of existing institutions and programs that provide training, small business assistance, and recruitment incentives. In addition, states have undertaken a variety of new initiatives with respect to technology transfer, venture capital, and the modernization of established firms.

An extensive literature has emerged on state economic development efforts. The results, however, have not been of much help to states in terms of developing competitiveness strategies, for two major reasons. First, the materials are primarily descriptive, highlighting the actions of various communities, states, and regions. Little evidence is given on the success or failure of such experiences. Moreover, for many programs, not enough time has elapsed to evaluate effectiveness, at least over the long term.

Second, state experiments and initiatives have not been viewed in a larger analytical framework that would permit generalization and an understanding of the dynamic processes underlying these changes. Lacking this larger context, information about the experiences of other states, no matter how detailed or successful, is of limited value to states operating under different industrial and technological conditions.

This article adopts production life-cycle models as a framework in which to analyze systematically the interrelationships between industrial and technological change, human resource needs, and state economic development policies. This framework—in which products, production processes, and technologies are seen as dynamic phenomena whose locational, skill, and training requirements change as they evolve—provides a conceptual model useful for evaluating and designing state economic development policies.

The life-cycle framework suggests that states that incorporate the dynamics of industrial and technological change into their competitive-

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ness strategies will reap employment and productivity benefits that technology can provide. In contrast, states that fail to address these issues increase their vulnerability to the negative impacts of technological change, including widespread unemployment and job loss.

I. Trends in State Economic Development Efforts

State economic development efforts revolve around three major strategies: the recruitment of firms to the state, the development of high-tech start-up firms, and the revitalization of established businesses. All state economic development strategies attempt to boost the local economy. States hope such steps will result in net increases in the private

State economic development efforts revolve around the recruitment of firms to the state, the development of high-tech start-up firms, and the revitalization of established businesses.

employment base (direct and indirect), in state and local tax revenues, and in long-term economic growth. The number of jobs created or maintained is not the only factor to consider. The quality and level of income associated with the jobs and the potential for spin-offs and other positive externalities play key roles in the long-term results.

Recruitment of Firms

In the 1960s and 1970s, state economic development efforts focused on the recruitment of employers and jobs, either luring existing plants to relocate or attracting new plants. Seeking to differentiate themselves, states offered tax and financial incentives to encourage firms to relocate within their borders. A relatively low-wage work force and a good labor climate—which generally meant accommodating labor or no unions—were often highlighted in recruit-

ment packages, particularly those offered by southern states.

Historically, North Carolina has been noted for its ability to attract manufacturing plants—a majority of the Fortune 500 companies have at least one plant located in this southern, right-to-work state. More recently, Tennessee, Kentucky, South Carolina, and Alabama have been successful industrial recruiters. A Nissan plant located in Tennessee in 1980, and in 1985 the state won its bid for the General Motors Saturn plant. Kentucky attracted a Toyota plant in 1985 and was first runner-up in the Saturn contest. South Carolina was successful in recruiting a BMW plant in 1992, and Alabama was the site selected in 1993 by Mercedes-Benz for its first North American plant.

More generally, states throughout the country sought to recruit high-tech industries during the late 1970s and early 1980s. These efforts included various tax and financial concessions and promises of work forces trained to accommodate the needs of individual employers.

Recruitment efforts continue to be an active component of many states' economic development plans. The competition for the Saturn plant, for example, included 38 states and 1,000 local communities. Further, state recruitment packages have become more complex as well as more expensive. In its winning proposal for the Saturn plant, Tennessee provided a significant property tax abatement and infrastructure improvements and promised to spend an extra \$45 million on higher education, in order to offer a range of technical courses (such as robotics and automation) for upgrading General Motors employees. Michigan's recruitment of a Mazda plant in 1986 included \$19 million to train new workers, and Illinois offered \$64 million in 1988 in hiring and training assistance in its successful bid for a Mitsubishi/Chrysler plant (U.S. Congress, Office of Technology Assessment 1990b).

In the 1990s, the stakes escalated. South Carolina offered a \$130 million incentive package in its successful bid in 1992 to lure a 2,000-job BMW assembly plant. South Carolina reportedly offered Mercedes Benz a similar package to that offered BMW but lost out to Alabama, which promised a record-setting incentives package worth over \$300 million. In addition to the price, another unusual feature of the package was Alabama's agreement to pay the salaries of the 1,500 workers (at an estimated \$45 million) while they were being trained during the first year or so on the job (Applebome 1993; Browning and Cooper 1993).

In recent years, recruitment efforts in many states have focused on attracting new plants of firms that are expanding, rather than trying to induce employers to relocate existing facilities. The trend has also been toward greater emphasis on international investors, as states hope to lure plants of Japanese and other foreign companies.

High-Tech Job Creation

In the 1970s and early 1980s, many states began supplementing industrial recruiting strategies with efforts to create jobs at home. The impetus behind this trend came partly from some states' disappointment with their lack of success in recruiting jobs from outside. It was also in response to growing evidence nationally that the key to employment growth and good jobs lay in "growing your own" (Grubb and Stern 1988).

The experiences of California's Silicon Valley and Massachusetts' Route 128 provided tempting examples of the high-tech job creation approach. Seeking to replicate the success of these areas, many states adopted a range of high-tech development initiatives that focused on research, development, and technology transfer.

Efforts to stimulate technological innovation have taken a variety of forms, including research centers, industry-university partnerships, matching grants, and research parks. Research centers, often operated in conjunction with universities, conduct applied research and allow firms to pool their resources for facilities and equipment. Research parks, which encompass concentrations of R&D firms, are designed to generate the exchange of new ideas and hasten their transfer to the market. By the mid 1980s, approximately 150 research parks were in operation in the United States, almost double the number a decade earlier (Eisinger 1988).

Programs to support high-tech start-up firms have also grown in recent years. All states now operate programs to assist small businesses and most have programs designed to stimulate new firm formation. Traditionally, small business assistance programs offered technical and managerial help; states are expanding these efforts to include more entrepreneurial and financial assistance. A few states have created small business "incubators," which provide shared services such as legal assistance, conference rooms, accounting services, and research facilities at relatively low rents to start-up firms.

Increasingly, state initiatives to create and de-

velop new firms have influenced private investment practices and filled gaps in capital markets. By the mid 1980s, most states had funded venture capital programs to finance new and emerging businesses. These programs, some of which require matching funds from the firms, are generally quite small. They often seek to expand or change existing lending practices in the private sector. They may support firms that might not have approached traditional sources of seed money, or encourage private investments in potentially productive projects traditionally bypassed because they were considered too risky.

These entrepreneurial venture capital programs have brought states into relatively unfamiliar territory for public sector institutions. Traditionally, state industrial development loan programs worked with existing firms that backed their loans with collateral. In contrast, the new loan programs often focus on start-up operations and new product development, for which collateral is often not required (Eisinger 1988).

Revitalization of Established Businesses

Recent years have also witnessed a shift in emphasis in state economic development programs toward assistance to established businesses (Ganzglass and Heidkamp 1987; Osborne 1987; Rose and Kotlowitz 1991). Efforts to help established firms in the United States historically have focused on the prevention of job loss or on the reemployment of workers displaced from their firms. Measures to retain jobs in mature or declining industries, for example, have often included import quotas, domestic content rules, restrictions on outsourcing, and protection against unfair competition.

At the state level, cost-reduction incentives (for example, reductions in unemployment insurance, workers' compensation, or taxes and direct subsidies) have been used in attempts to offset cost disadvantages in an area and to keep employers in the state. States have also taken an active role in seeking to offset the adverse consequences of structural change. Many states have developed worker assistance centers or emergency teams to assist with plant closings and provide job search assistance, supplemental unemployment benefits, and assistance in moving.

Some states have created programs to assist existing firms before a shutdown becomes imminent. Michigan's Jobs Opportunity Bank, Delaware's Blue Collar Jobs Act, and the New Jersey Jobs Training Program specifically target resources to retrain current workers and possibly forestall plant closings.

Skills corporations, in which business and academic institutions work together and share training and retraining costs, emerged in the 1980s to assist established firms that were growing rapidly and facing skill shortages.

Increasingly, states have begun to take broader measures, which include programs for modernization and the development of new, foreign markets, in order to bolster the competitiveness of existing firms. Michigan's Modernization Services Program and Massachusetts' Center for Applied Technology, for example, seek to revitalize the states' traditional manufacturing sectors, such as auto parts, apparel, and cutting tools. These programs assist firms in the integration of new technologies by identifying both technological and training needs and by providing support and technical assistance.

In a multistate effort, the Southern Technology Council Consortium for Manufacturing Competitiveness was established in 1988 to utilize the states' vocational schools and community colleges to assist small and medium-sized enterprises with new technologies. Some states have begun experimenting with programs to stimulate exports by helping small and medium-sized enterprises market their products overseas.

Some state-financed training programs have shifted their efforts toward retraining the potentially unemployed and upgrading the skills of current workers. California's Employment Training Panel, the nation's largest state-financed training program, funded at approximately \$55 million a year, was originally designed to assist firms moving into the state. It now focuses on helping existing businesses retool and reorganize in order to enhance productivity.

A few states have begun linking their training funds for established firms to capital investments. Indiana's Basic Industrial Training Program, for example, requires firms in mature industries (such as transportation, steel, and heavy machinery) that are expanding or modernizing to invest in capital equipment in order to be eligible for retraining assistance. The state covers between 10 percent and 50 percent of training costs, depending on the level of investment. Illinois' Industrial Training Program, which added a mature industry component to complement the traditional support of new and expanding companies, also makes training contingent on capital investment by the firms.

While the revitalization of established businesses has taken on increasing importance, the shift in this direction is still quite limited. Most states continue to

focus their technology program funds on university R&D and on assisting start-up firms, rather than on the integration of new technologies into established firms. For instance, only about 10 percent of the \$550 million spent on various kinds of technology programs in 1988 was spent on technology transfer and on technical and managerial assistance. As of 1990, only 10 states operated programs whose primary function was to assist manufacturers in technological adoptions. A mid 1980s survey by the Office of Technology Assessment (1990a) showed that only 2 percent of small and medium-sized enterprises had received industrial extension services from the state.

The recent Department of Defense "build-down" and growing defense conversion efforts will bring greater attention and funding to industrial modernization activities. The federal Advanced Research Projects Agency will be providing hundreds of millions of dollars nationwide for R&D and dual use (defense and commercial) technologies. In October 1993, for example, Massachusetts received \$10.6 million in the Clinton Administration's first round of defense conversion grants. These funds will be used to create a statewide Manufacturing Modernization Partnership Program to help small and medium-sized firms diversify into commercial markets.

*II. Technology Life Cycles, Competitiveness, and Economic Development*¹

Life-cycle models emphasize the evolutionary character of production and employment needs. The "industry life cycle" concept dates back to the 1930s, when industries were found to undergo a sequence of stages—experimentation, rapid growth, diminished growth, and stability or decline—as they developed. Separate "life cycles" have subsequently been delineated for products, for production processes, and for technologies.

Technology and Skill-Training Life Cycles

The technology life cycle, in particular, is a valuable tool in understanding the impact of industrial change on jobs and employment (Ford and Ryan 1981; Shanklin and Ryans 1984). Technologies—such as a numerical control technology, a microelectronics

¹ This section draws heavily upon Flynn (1991, 1993).

Table 1
Skill Training Life Cycle

	I Introduction: New and Emerging Skills	II Growth: Increased Demand for Skills	III Maturity: Slower Growth in Demand for Skills	IV Decline: Skill Obsolescence
Nature of Tasks	Complex	Increasingly routinized	Increasingly routinized	Narrowly defined
Type of Job Skills	Firm-specific	Increasingly general	General: transferable	General: transferable
Effects on Job Structure	Job enlargement: new positions created when significant change in skill needs occurs	Emergence of new occupations	Relatively rigid job hierarchy; occupations associated with formal education and related work experience requirements	Elimination of occupations
Skill Training Provider	Employer or equipment manufacturer	Market-sensitive schools and colleges	Schools and colleges, more generally	Declining number of schools and colleges; some skills provided by employer

Source: Adapted from Patricia M. Flynn, *Technology Life Cycles and Human Resources*, Lanham, MD: University Press of America, 1993, p. 19.

technology, or a data-processing technology—exhibit patterns of development in which they are introduced slowly at first, become more widely adopted as intensive research and development efforts lead to improved performance, and are then replaced by a new, superior technology.

A clear understanding of the technology cycle can provide signals of impending changes in products and production processes. Rapid product innovation accompanies the earliest phases of a technology's development, whereas process innovation peaks later in the technology's cycle as product design stabilizes. As a technology matures, uncertainty about its capabilities and limitations declines, and products and processes can become more standardized. Innovations in the later stages of development of a technology, if they occur at all, are primarily minor improvements in equipment rather than major, fundamental changes in either product or production processes.

Just as the production processes change over the life cycle of a product, so do the skill and training needs of industry over the life cycle of a technology (Table 1). The early stages of a technology, which are characterized by a high degree of product innovation, are relatively skill- and labor-intensive; professionals such as engineers and scientists perform most of the tasks later assumed by production and marketing managers, technicians, and skilled craftworkers.

The firm-specific nature of skills required by the new technologies also means that employers must provide their own training or rely on equipment vendors to do so.

As a technology becomes more widely adopted and equipment standardized, skills that were once firm-specific become general skills transferable among employers. Increased demand and standardization of skills permit their "production" on a larger scale and at locations away from the R&D sites. As a result, skill development tends to shift from the workplace to the formal education system as technologies mature. Computer programming, keypunching, and word processing are classic examples of this transfer.

As technologies become obsolete, training focuses on replacement needs and on the retraining of workers for other areas. A limited market for these skills and declining student enrollments result in the termination of school-based training programs in these fields. The responsibility for training to fill relatively short-term, skilled replacement needs, thus, shifts back to firms.

The Geographic Location of Jobs

In addition to altering production processes and skill needs, technology and production life cycles affect the geographic location of jobs. Patterns of

regional specialization occur, as employers seek to locate different production activities in areas best suited to their needs. Furthermore, changes in the labor and skill requirements over a product's life can trigger geographic shifts in employment over time.

The "regional life cycle model" suggests that the attractiveness of regional and local economies varies with the skill needs of products at different stages of development (Rees and Stafford 1984). Early stages of product innovation and development occur in areas in which highly skilled professional and technical workers are available to conduct R&D. Standardization and increasing output of the product trigger reduced skill requirements, inducing production shifts to geographic areas characterized by lower labor costs.

The "regional life cycle model" suggests that the attractiveness of regional and local economies varies with the skill needs of products at different stages of development.

Similarly, on a global level, the "international product cycle model" posits that firms initially locate close to the source of demand for their newly developed products so they can rapidly communicate market information into product changes (Wells 1972; Vernon 1979). As foreign markets emerge for the product, they generate exports for the producing country. At some point, depending on the nature of the products and the characteristics of foreign demand, the expanded foreign market attracts its own production base. When production costs abroad are low enough to compensate for transportation and other costs, such as tariffs, the country that originally produced the product becomes a net importer of the good. At the final stages of product development, production activities may shift from the sites of product demand to lower-cost areas in other countries.

Industries usually rely on a range of technologies, have products in several phases of development, and are characterized by diverse skill needs and employment patterns. The electronics industry, for example, produces both highly sophisticated

products that incorporate technologies on the cutting edge and more mature consumer electronics goods, such as radios and televisions. Firms manufacturing the newer goods tend to concentrate their production operations near R&D. More mature products are produced in lower-cost areas. Similarly, while an increasing share of the world supply of semiconductors is produced outside the United States in countries with relatively abundant supplies of low-cost labor, the design and development work is still highly concentrated in Silicon Valley.

The computer industry shows similar patterns of regional specialization and employment trends (Hekman 1980). R&D, design, and production of state-of-the-art equipment continue to be geographically concentrated in Massachusetts and California, along with company headquarters. In contrast, the large-scale production of relatively standardized computer components and routinized assembly activities have dispersed away from R&D centers, taking place in large branch plants in states with relatively low labor costs (such as Tennessee, South Dakota, and North and South Carolina) or in low-wage countries (such as Mexico, Hong Kong, and Taiwan).

III. State Strategies and Life Cycles

When viewed in the life-cycle framework, the evidence on recruitment, high-tech job creation, and business revitalization strategies sheds new light on the role of states in fostering economic development.

Recruitment Strategies

Relocation incentives will have different effects on different types of production activities. In the early stages of product development, firms compete mainly via innovation and through product differentiation. In contrast, for firms that produce relatively standardized products, competition is mainly a function of cost. Incentives such as low wages and tax abatements will, therefore, be a greater inducement to plants operating at the later stages of production cycles than to firms involved primarily with R&D and entrepreneurial activities. Similarly, short-term customized training programs are likely to appeal to employers engaged in large-scale, mass production processes, but be of little value to firms characterized by complex, nonstandardized activities, which require relatively high-skilled and broadly trained workers.

The life-cycle framework accentuates the need to look beyond industry aggregates in fashioning recruitment strategies for economic development. Most industries and many, especially larger, firms encompass products, processes, and technologies at various stages of maturity. Industrywide data, therefore, combine production activities requiring different capital and labor requirements, and with diverse location needs.

In the life-cycle perspective, the concept of a high technology *industry* is a misnomer. "High tech" is a dynamic and relative concept that describes the earliest phase of development. "High-tech employment" should refer only to those jobs involved with R&D, innovation, or nonstandardized production activities—jobs that exist across a wide range of industries, including those that are relatively mature. "Low-tech" or routinized production activities (at the other end of the development cycle) also are found across a variety of industries, including computers and electronics.

In attempts to recruit "high-tech" employers during the late 1970s and early 1980s, many states used incentives including tax abatements and short-term customized training programs to pursue a list of "high-tech" industries. While the industries were selected on the basis of their relatively high proportions of R&D expenditures and of professional and technical workers, the bulk of the employment in these industries was in blue-collar and clerical jobs. Many states succeeded in recruiting only the relatively low-skilled, standardized manufacturing jobs (for example, the assembly of printed circuit boards) in these industries.

Earlier recruitment activities yielded similar results, with jobs relocating from other states primarily in manufacturing branch plants (Malecki 1983). These jobs are more apt to involve relatively standardized production activities and be more vulnerable to further dispersion to lower-cost locations than are jobs in firms indigenous to a geographic area. Many of the northern firms that relocated to southern states to take advantage of a low-wage work force and company-specific training, for instance, subsequently relocated to still lower wage areas (Southern Growth Policies Board 1988; Rosenfeld 1992).

The bulk of recruitment incentives used by states are still those (for example, tax and financial abatements, customized training) that appeal primarily to plants with relatively low-skilled and low-wage positions. The attractiveness of the Carolinas to German firms locating plants there in recent years, for in-

stance, has been attributed to trained and malleable labor, low wages, and cheap land. With respect to workers, in particular, the Germans are said to have found "a work force willing to tolerate management practices that Americans often find idiosyncratic, if not obnoxious. . . . Such adaptability has more than made up for the skill levels of many of the workers" (McCarthy 1993). In 1993 Mercedes-Benz sought a U.S. location in order to move closer to the vast American market and avoid a 25 percent tariff on imported trucks. The Alabama site selected offered relatively low labor costs and a tax and incentive package that will result in Mercedes paying the equivalent of \$100 for the site (Appelbome 1993).

Few businesses move their operations between states, and very little employment growth is attributable to the migration of jobs into a state.

While many states continue to actively recruit employers, a relatively small number of states can be expected to launch effective recruitment strategies that contribute significantly to the number of "good" jobs and to long-term economic development. Few businesses move their operations between states, and very little employment growth is attributable to the migration of jobs into a state.

Moreover, recruitment strategies, even those initially appearing quite successful in terms of numbers of new jobs, can actually undermine long-term economic growth. For instance, if tax and other financial incentives have a negative impact on the quality of life by restricting education and services in the area, relocation incentives could deter the entry of employers whose work force contains relatively high proportions of professional and technical workers. In addition, the recruitment of new industries and firms can backfire if, in the process, incentive packages to new firms impair the competitiveness of established employers or prompt their "premature" departure from the area. Expensive recruitment packages, for instance, can drain resources from more traditional sources of employment, which comprise the bulk of all jobs in local economies. Existing companies may

also suffer if the state subsidizes the entry of firms that are their direct competitors.

The external control inherent in branch plant economies, whereby major corporate decisions are made elsewhere, suggests that local employment and other community concerns may not be a top priority in discussions of firm location and restructuring. Further, given their mix of production activities and occupations, branch plants are less likely than indigenous new firms to act as a "seed bed" or "growth pole" in stimulating spin-offs and new employment opportunities in an area.

Recent anecdotal evidence does indicate, however, that several foreign auto assembly plants (for example, Toyota in Kentucky, Honda in Ohio, Nissan in Tennessee) have attracted supplier branch plants to the area. Moreover, if state recruitment strategies provide longer and more complex education and training programs than in the past, states may be able to attract better-quality jobs. More highly skilled and more broadly trained work forces are incentives that appeal to firms in innovative, non-standardized activities in earlier stages of development. Michigan, for example, one of the top three contenders for a Saturn plant in 1985, offered a recruitment package that encouraged development of "world-class" manufacturing and engineering talent. While it lost its bid for the manufacturing plant, it won the company headquarters and R&D facilities, and the relatively high-skilled jobs that accompany these functions (Fosler 1988).

High-Tech Job Creation Strategies

The life-cycle framework helps to clarify the role of new and emerging businesses in economic development. The creation and development of new entrepreneurial firms require strategies that focus on the characteristics and needs of products and technologies during their early stages.

In the high-tech success stories of the Silicon Valley and Route 128, growth was driven by local start-ups and spin-offs from companies already in the area. The technical infrastructure of both areas encompasses applied research and product development at universities, informal local communication networks, a scientific and technical labor force, and proximity to complementary and competitive firms and to distributors and markets. These examples accentuate the importance of innovation, research, product design, and non-routine production activities. Venture capital can provide the means to create

and develop these new and emerging firms. Research on the location of technology-based entrepreneurial firms confirms these life-cycle hypotheses with regard to the importance of R&D, venture capital, and skilled labor in high-tech development strategies (Malecki 1990, 1991).

"High-tech" job creation strategies are not likely to be very effective for many states (Browne 1983; Gittel and Flynn 1994). Historically, small technology-based firms, and high-tech employment more generally, have accounted for a relatively small proportion of all employment. High-tech employment in the United States is geographically concentrated, with most found in New England, California, and Texas. R&D activities, in particular, remain geographically concentrated in a few areas of the country.

States with significant university R&D, venture capital, and highly skilled labor have the most potential for implementing a successful competitive strategy based on entrepreneurial new firms.

States with significant university R&D, venture capital, and highly skilled labor have the most potential for implementing a successful competitive strategy based on entrepreneurial new firms. In addition, an established base of high-tech employment provides an area with a competitive edge in the creation of new entrepreneurial firms. An existing agglomeration of firms in similar or related sectors is a principal determinant of both birth rates and the distribution of small technology-based firms. Concentration of these resources in one area enhances the firms' productivity by creating external economies of scale in production and marketing. A self-sustaining "critical mass" of employers can develop, as the concentration of entrepreneurial firms attracts additional firms and venture capital, strengthens the technological infrastructure, attracts and retains skilled professionals, further promotes informal communication networks, and encourages innovative activities (U.S. Congress, Office of Technology Assessment 1984; Malecki 1990, 1991).

The flow of venture capital further highlights the advantages of an established high-tech base and the presence of research universities in the formation of new firms. The availability of venture capital varies widely by state and region, with funds flowing from U.S. financial centers like New York and Chicago to centers of innovation and technology. California, Massachusetts, and Texas regularly attract venture capital, with California alone often accounting for one-third to one-half of all U.S. venture capital. In contrast, many states have virtually no venture capital funds.

While an established high-tech employment base gives an area a decided advantage in new firm formation, relatively little is known about the initial generation of local start-ups. The initial "confluence of technological opportunity," or the appearance of the first entrepreneurs, appears to be due to the availability of start-up financing and the existence of informal (noninstitutional) personal and local contacts supportive of new, unproven entrepreneurs (U.S. Congress, Office of Technology Assessment 1984). Small firms, that is, those with fewer than 100 employees, are the major source of entrepreneurs, although a significant number of founders do originate from large firms.

It is important to differentiate among small firms in fashioning a high-tech development strategy. Most small businesses create no jobs after the first few years and many, particularly in the service sector, generate lots of relatively low-paying, dead-end jobs conducive neither to innovation nor to entrepreneurship. Relatively few small firms have the potential for growth and expansion and act as "seed beds" for future jobs. Such firms are dominated by innovative, nonstandardized activities.

A high-tech job development strategy will be extremely difficult, if not impossible, for relatively small areas that lack universities, existing technology-based companies, and skilled labor. Areas dominated by relatively mature industrial bases and technologies are also unlikely to be able to implement an effective economic development strategy around technology-based entrepreneurial firms.

Empirical evidence confirms that most research parks fail (Eisinger 1988). Some are unable to attract tenants; others fail to generate spin-offs; almost all fail to stimulate technology transfer. With respect to venture capital, most state programs are quite small and probably will not prove effective in establishing the "critical mass" of high-tech firms needed to generate a self-sustained growth environment.

Business Revitalization Strategies

The life-cycle framework also sheds new light on strategies to revitalize traditional and established firms, whose activities are primarily beyond the initial stages of development. Some established firms involve "mature" production activities. Representing the extreme opposite of high-tech activities, mature activities are those in which technologies and products are relatively standardized, mass production predominates, skill requirements are relatively low, and little or no innovation is taking place. Competition is primarily a function of cost.

*The potential across states
for programs to enhance
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is extensive.*

Considerable diversity exists among traditional industries in terms of their organizational structures, occupations, wage rates, and skill requirements. Within industries and even firms, mature segments often coexist with high-tech segments, as well as with activities that involve products and technologies along the mid-range of the development spectrum. Effective revitalization strategies for these industries will take a variety of forms, including integration of new technologies, better utilization of mature technologies, development of specialized product niches, and reorganization of the workplace.

In contrast to the recruitment and high-tech job creation strategies, the potential across states for programs to enhance productivity and competitiveness through revitalization of established businesses is extensive. There are two main reasons for this. First, the dynamics of technological and industrial change accentuate the ongoing need for upgrading of human resources and facilities to maintain competitiveness. Second, states have only just begun to tap the opportunities available to them regarding business modernization strategies.

The introduction of new technologies across a variety of established industries can benefit states by

fostering product and process innovations that lead to new and improved products and new markets. States need not have high-tech firms located within their boundaries in order to benefit from such a strategy. While still a strong competitor in terms of R&D and innovation, the United States continues to fare poorly with respect to the transmission of "best practice" technologies throughout the industrial structure. U.S. rates of adoption of robotics, computerized numerical control devices, and other advanced technologies continue to fall behind those of our industrial competitors. Moreover, even when adoption rates are similar, U.S. firms have been found to be less efficient in their implementation (Osterman 1988; Dertouzos, Lester, and Solow 1989; U.S. Congress, Office of Technology Assessment 1990a, 1990b).

The failure of firms to remain technologically competitive contributes more to worker displacement and job loss than does the adoption of new technologies.

Some observers express concern that adoption of new technology causes permanent job loss. In fact, however, the failure of firms to remain technologically competitive contributes more to worker displacement and job loss than does the adoption of new technologies (U.S. Government Accounting Office 1986; Cyert and Mowery 1987; OECD 1988). Adoption of technologies in their relatively early phases of development has primarily positive impacts such as upgrading and job enlargement. In contrast, the preponderance of negative impacts such as mass layoffs, unemployment, and job downgrading relate to adoptions of relatively mature technologies or to the failure of firms to adapt at all.

An alternative to the technology-based approach for enhancing the competitiveness of established firms involves a shift toward customization and market niches. Flexible manufacturing systems that make shorter production runs economical and encourage product differentiation have promoted a trend toward greater use of small-batch production of relatively specialized products. More flexible production

processes and highly skilled labor also facilitate adoption of more advanced technologies (Doeringer, Terkla, and Topakian 1987).

Organizational and managerial changes are often necessary to fully exploit the potential productivity gains of new technologies and corporate restructuring. U.S. managers have been criticized, however, for several shortcomings in this area: (1) failure to evaluate effectively both the short-term and the long-term costs and benefits of technological adoptions; (2) inadequate development of human resources to meet changing needs; (3) insufficient development of organizational structures that can fully exploit the productivity gains associated with new technologies; and (4) failure to establish fruitful cooperative relationships with workers (Hayes and Abernathy 1980; Cyert and Mowery 1987; Drucker 1988; Hayes and Jaikumar 1988).

Small firms, in particular, have difficulties with technological adoptions because of costs, skill and retraining requirements, and the need to keep up-to-date. State industrial extension and training efforts, however, reach relatively few small firms. State officials indicate that it is hard to find small companies, assess their needs, and spend enough time with them to make a difference.

The fact that industrial extension programs are rarely integrated with state training efforts highlights other missed opportunities. Neither technology nor training in isolation from systemwide support will effectively increase productivity and jobs. The recent trend, albeit small, to link training with capital investments is a good step in promoting industrial competitiveness.

The shift in some state-financed training programs away from recruitment and toward the more efficient use of existing state resources and firms also has the potential to enhance competitiveness and long-term economic growth. However, while modernization efforts generally require flexible and more broadly trained workers, most state-financed training programs continue to provide relatively short-term training for individual firms (Creticos and Sheets 1990). In-plant training provided by state-financed training programs has not been assessed on a sustained basis; skills corporations, too, have had few evaluations. Furthermore, the firms accepting public funds might have provided the training anyway. Matching requirements help to limit the degree of substitution taking place; questions remain, however, about the transferability of the skills being provided.

IV. Development of State Strategies

The life-cycle perspective on competitive strategies is useful to states for several reasons. First, states can use it to assess where their economies are in terms of emerging, evolving, and maturing employment opportunities, and thus what economic development needs might be. Second, states can use it to guide their determination of where they might want to be, the feasibility of their aspirations, and the economic development issues that must be addressed to move in that direction. Third, states can use it to determine the relevance of the experiences of other states to their own competitiveness strategies.

Tailoring Competitiveness Strategies to Individual States

Most states will select a mix of strategies (recruitment, job creation, retention) to promote competitiveness and long-term economic development. A state's economic development goals should reflect its competitive strengths and opportunities. In addition, the selection and design of strategies and particular programs should be linked to the state's employment base and resource mix.

States will differ with respect to composition of employers, characteristics of the work force, institutional capabilities, and other resources. Goals and strategies, therefore, are expected to vary from state to state. In tailoring their strategies, states should assess their existing employment base, the characteristics and potential of state resources, and the strengths on which they can build competitive advantage.

Initially, states should analyze the nature and mix of their employers and jobs. This analysis requires looking beyond industry aggregates and identifying the types of production activities (for example, R&D, standardized assembly), types of employers, occupational requirements, and skill needs. Business revitalization strategies, in particular, further accentuate the importance of understanding the existing employment base. While each state is likely to identify additional questions relevant to its particular circumstances, the first box provides guidelines for conducting this employment assessment.

States should then develop an inventory of labor and other resources available (educational and training institutions, R&D facilities, venture capital) that can influence competitiveness efforts. Does the state have the types of resources necessary to effectively

State Employment Assessment

- How does the state's industrial structure compare with the national economy? How has this been changing over time?
- How does the state's occupational mix in its major industries compare with the national averages in those industries?
- Describe the extent of various kinds of production activities located in the state (the mix of branch plants, headquarters, and R&D facilities). Is there a trend in recent years?
- Make a grid classifying the state's major industries and employers by development stage (emerging, growing, stabilizing, declining).
- What is the birth rate of new firms in the state? How does this compare with the national average?
- What are the characteristics (industries, firms, products, technologies) of the state's high-tech employment?
- What are the characteristics (industries, firms, products, technologies) of the state's major traditional employers?
- What is the extent of entrepreneurial small firms within the state? Identify potential high-growth areas.
- What industries have been the primary sources of plant closings, layoffs, and unemployment in the state in recent years? What were the reasons for these events?
- What are the needs (skills, technological, financial) of the state's traditional employers?

implement a high-technology job creation strategy or to recruit good jobs? The characteristics (age distribution, education levels, occupations, wages) of the state's labor force should be compared with national averages to identify state strengths or potential problems. A state with a relatively old work force, for instance, will face more replacement needs than others. A state with relatively high proportions of engineering and technical talent can have an advantage over others in high-tech development possibilities. A state with relatively low production wages can attract manufacturing plant production jobs. The overall structure of a state's education and training

State Resource Inventory

- How does the state's work force compare with national statistics regarding demographic and educational factors? What are the implications in terms of education and training needs?
- What are the major R&D institutions in the state?
- What are the extent and sources of venture capital available to new firms?
- Describe the "business culture," labor climate, and status of labor relations in the state. Give examples.
- What major skill shortages and surpluses have occurred in recent years? How were these imbalances resolved?
- Describe the evolution and current status of the state's education and training network. What are the strengths and weaknesses of the various institutional components of this network?
- Which firms have used state-financed training programs? Describe the extent and types of skills provided.
- What relationships/partnerships exist between education and training institutions and employers (for example, co-op programs, apprenticeships, advisory boards)? Have these met expectations?

network should be identified. Further, the roles and track records of the institutional components of the education and training network should be assessed in terms of skill generation and responsiveness to changing labor market needs, in order to understand the capabilities of the system. The second box provides guidelines for the development and assessment of the state's resource inventory.

Lastly, competitiveness strategies and programs should be assessed in light of the state's employment and resource bases. In which activities is state policy likely to be most effective in generating good jobs and long-term economic development? In which industries? In which types of firms? Assessments should be made of various recruitment, job creation, and business revitalization programs previously implemented in the state. Such assessments should include both the short-term and the long-term impacts. In addi-

tion, potential barriers and constraints to implementing strategies and programs should be identified. When policy options have been identified as particularly appropriate for the state, the experiences of other states in that regard may then prove particularly useful. What were the impacts of those programs elsewhere, and what problems were encountered? The third box provides guidelines for thinking strategically about the state's economic development policies and employment and work force needs and opportunities.

"Defensive" and "Proactive" State Actions

The life-cycle framework highlights the importance of distinguishing between "defensive" and "proactive" actions in seeking to bolster a state's competitive advantage and long-term economic development. Defensive actions represent an expedient way of improving competitive position by lowering costs. They do not, however, address issues of work force quality and technological change that underlie business performance. In contrast, proactive or innovative adjustment mechanisms can lower costs by increasing labor productivity, motivating workers, improving efficiency, and increasing the quality of the work force (National Center on Education and the Economy 1990; Doeringer and others 1991).

Classifying state actions as defensive or proactive can be useful in understanding the impacts and trade-offs, both short-term and long-term, of various policy options. Defensive state actions such as tax abatements or other financial incentives can quickly lower costs to potential employers and perhaps attract relatively large numbers of jobs to some states in a short period of time. As discussed above, however, these mechanisms may undermine long-term economic growth, as the jobs recruited are often relatively low-skilled and vulnerable to further relocation to even lower-cost areas. Proactive strategies may increase costs initially and will take longer to reduce costs via productivity increases. However, the ultimate impacts on jobs and growth are likely to be more positive and longer-lasting.

The defensive/proactive dichotomy highlights the importance of having public policies focus on "good jobs" as opposed to "jobs" per se. Moreover, "output" should be viewed in addition to jobs in evaluating policy effectiveness, particularly with respect to relatively mature industries where increasing competitiveness and long-term viability are often achieved with lower employment levels.

Strategic Thinking about Economic Development Policy and Employment and Work Force Needs

- What are the areas in which the state has particular strengths, in light of the employment and resource inventory assessments?
- What firms have moved into the area in recent years? Did they relocate from another state (if so, which)? Are they foreign-owned? What are their major production activities and the nature and extent of their jobs?
- What incentives have been used by the state in recruiting firms? Did those firms that have moved in take advantages of these?
- To what extent have new, high-tech firms been created in the state in recent years? In what fields? What was the source of venture capital?
- What are examples of traditional industries and firms in the state that have modernized their workplaces in recent years? Were state-financed training programs involved? Were any education and training institutions directly involved?
- Has the state been able to leverage funds to provide for training? To what extent? With which employers?
- What types of coordination and cooperation of education and training institutions appear necessary to implement the programs that appear to meet best the state's current and future employment and training needs?
- What barriers and constraints may inhibit the implementation of strategies and programs that appear to meet best the needs of the state?

In recent years, state economic development strategies have begun to focus more on proactive options and less on defensive responses. The trend away from an almost exclusive focus on recruitment toward job creation and business revitalization, for

instance, is indicative of this shift away from a pure cost orientation to one that emphasizes productivity and technological competitiveness. The policy options being used within these broader strategies have been evolving in a similar direction. More complex recruitment packages that include training grants for upgrading and for relatively skilled positions, for example, can reduce labor costs through productivity gains—in contrast to tax abatements and other financial incentives.

With respect to business revitalization, while efforts are still limited, states are experimenting with a range of options with the potential to enhance productivity at the workplace. These include helping older firms adopt new technologies or make more effective use of traditional technologies, and helping them develop new markets by customizing or exporting their products. This shift toward more proactive approaches promises more highly skilled jobs. Proactive approaches also should provide real cost savings over time, whereas defensive ones threaten to become increasingly expensive. With respect to recruitment strategies, for example, when the first few states began offering tax abatements and customized training, these incentives helped to differentiate one state from another as they sought to attract new employers. Over time, more and more states have found it necessary to follow suit or risk not being considered a serious contender. Now virtually all states offer tax and financial incentives and customized training, so states are incorporating additional features into recruitment packages in order to distinguish themselves from the others.

Proactive approaches have a further advantage: At the national level the likelihood is greater of real net employment gains, rather than just a reshuffling of jobs among states. Moreover, proactive approaches have the potential to lead the way to an economic development outcome with relatively high wages, high skills, and high living standards, effectively bypassing low-wage, low-skill alternatives.

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Privatization of Local Public Services: Lessons for New England

As governments consider ways to provide public services more efficiently, privatization can seem like an attractive option. Yet the subject engenders sharp controversies. As noted in a recent report by the National Governors' Association, "Proponents of privatization believe private enterprise can deliver the same services government provides for less money, with higher quality of service and increased flexibility. . . . Opponents of privatization believe that such efforts undermine the quality of services, destroy public employee unions, invite corruption, and weaken government control of services key to the public interest" (1993, p. 43). In New England, the latter concerns appear to dominate, since local governments in the region generally have not engaged in as much privatization as those in other parts of the country.

This article examines the evidence on the relative merits of privatizing public services and attempts to determine whether these costs and benefits actually appear to explain local government behavior throughout the United States. The article begins with a broad description of the mechanisms used in privatization, followed by evidence on the extent to which state and local governments have privatized service delivery. Contracting with private vendors turns out to be more common than use of vouchers or subsidies. However, the tendency to contract out varies considerably across services. The advantages and disadvantages of contracting are then discussed, followed by an empirical analysis of why some localities contract out more or less than others. Measurable advantages and disadvantages vary by community, and explain part (but only part) of the differences in contracting across communities. The limited scope of privatization by New England local governments in particular defies explanation, suggesting that communities in the region may wish to reexamine their choices of how to provide services, if they have not done so recently.

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I. What Is Privatization?

Privatization refers to a shift from public to private production. This article focuses on privatization of traditional public services.¹ By definition, these are services for which purely private markets are considered inadequate (see the box). Privatization takes advantage of the perceived cost efficiencies of private firms. However, government intervention is required even after privatization in order to ensure that sufficient services are provided to residents. Privatization of public services has been largely a "bottom up" experience in the United States, with local governments in the vanguard and higher levels of government trailing behind. As a result, this article concentrates on efforts by local and, to a lesser extent, state governments.²

Under a common privatization arrangement, the government enters into an agreement specifying that a selected private entity (rather than a government agency) is responsible for producing particular services. The government chooses the service level and pays the amount specified in the contract, but leaves decisions about production methods to the private firm. Contracting may be used, for example, to privatize the disposal of hazardous waste or oper-

¹ In some countries, governments have privatized state-owned enterprises involved in the production of goods and services that elsewhere are commonly produced by the private sector. Western European countries, especially the United Kingdom and France, have sold off state-owned enterprises in industries such as automobiles, glassmaking, telecommunications, airlines, finance, and insurance (see Hemming and Mansoor 1988). The countries of the former Soviet bloc are now engaged in similar privatization efforts, on a more massive scale. Once enterprises have been sold, they function like any other private business. By contrast with foreign economies, the role of commercial and industrial public enterprises has been considerably more limited in the United States. Government enterprises have been estimated to account for only about 1 percent of total U.S. GDP, compared to a range of 4 to 16 percent in other OECD countries, and 65 to 97 percent in the former Soviet bloc prior to recent reforms (Schwartz 1993). Furthermore, government enterprises in the United States tend to specialize in a limited range of activities (primarily postal services, utility services, and liquor sales) rather than competing with private corporations on a broad scale. In light of the relatively limited role of the public sector in the United States, it is not surprising that only minimal sales of government enterprises or other government-owned assets have taken place. In 1990-91, for example, the share of general own-source revenue raised by selling property was only 0.45 percent for the federal government, 0.04 percent for state government, and 0.22 percent for local governments (U.S. Bureau of the Census 1993, Table 6).

² For discussion of privatization by the federal government, see Donahue (1989), especially chapter 6. Also, the article's emphasis on public services, as opposed to public goods, simply reflects the fact that governments in the United States rarely provide goods.

Public Goods and Services

Pure public goods and services are those for which consumption is nonrival (that is, adding another consumer imposes no additional cost of providing the goods and services) and nonexcludable (that is, preventing another person from consuming the goods and services is either very expensive or impossible). Other goods and services have some degree of "public-ness," even though they are not "pure." Traditional textbook examples of public services include national defense and fire protection.

Economic theory has demonstrated that, in the absence of government intervention, the private sector would underprovide public goods and services compared to the level that society as a whole would prefer. By contrast, the private sector is the preferred provider of those goods and services for which each consumer is charged a (nonzero) price equal to the added cost of supplying the good or service to him/her, and where it is feasible costlessly to exclude anyone who does not pay.

Another, somewhat different justification for government intervention relates to distributive justice. The citizenry may object to purely private markets in cases where the prices charged would deter some individuals from consuming what are viewed as socially desirable quantities. In these cases, the government charges needy residents a price below the cost of providing the goods or services, and it funds the difference through other mechanisms, principally taxation.

ation of homeless shelters (as well as a range of other services).

Another form of privatization is the franchise, whereby a private firm or firms are awarded the right to perform a specified service within a geographic area over which the government has jurisdiction. The company charges members of the public for services (rather than receiving payment from the government, as in a contract), while the government regulates the level of service and the price charged. Examples of services for which franchises are awarded include trash collection, vehicle towing, and operation of a public utility. These are services for which governments typically charge user fees even when the service is produced internally.

A final type of privatization maintains a funding role for government (in order to maintain some level of demand for the services), but permits individual consumers to choose providers. For example, governments may issue vouchers to residents for the purchase of private day care.³ Or they may provide subsidies to private service organizations, such as grants to private human services providers or capital equipment for use by citizen groups performing neighborhood improvement projects.

Privatization alters who produces public services, but it does not inherently alter who pays.

Privatization alters who produces public services, but it does not inherently alter who pays. Suppose that prior to privatization, a service was produced by government employees and funded by the government. Upon privatization, the service would be produced by private sector employees, but the government could continue its financing role. In other cases, government funds might be supplemented by user fees—both before and after privatization. To take a specific example, a contract could specify that a private company provide free bus services for riders (to be paid for totally by the contracting government), or it might allow the company to charge a fare (thereby reducing the size of the public subsidy). Similar funding options apply to government-operated transportation services: they may be paid for by taxpayers in general, by individual consumers, or by some combination of the two groups. To take another example, suppose that prior to privatization, trash is collected by public employees, but residents are charged a fee for this service. Under a franchise arrangement, residents would pay fees to a private company.

If privatization saves on overall costs, government outlays decline even if service levels and user fees remain unchanged. Governments engaging in privatization sometimes decide to cut back the share of costs covered by public funds. In these cases, government outlays decline further. Residents consuming public services pay more if the overall cost saving from privatization is less than the decrease in public funding.

II. The Scope of Privatization

Although state and local governments on the whole continue to use their own employees for the majority of services provided to residents, a great variety of public services are fully or partially privatized in a large number of localities. Contracting is the most common form of privatization.

Privatization by Local Governments

Methods of delivering local services vary considerably, and a locality may use a mix of different types of public and private providers for any given service. The International City Management Association (1989) conducted a poll of 1,681 cities and counties regarding 71 services that may have been available to their residents in 1988. In general, public employees were more important producers of public services than private employees. Services differed in the extent to which they were privatized. The services most likely to be performed exclusively by local government employees were street cleaning, meter maintenance and collection, cemetery administration and maintenance, inspection and code enforcement, utility meter reading, water distribution, water treatment, traffic control and parking enforcement, building security, payroll, secretarial services, personnel services, and public relations/information. For these services, three-quarters of responding localities indicated using only their own employees. Police and fire services, which are considered by many to be at the core of local government functions, were exclusively performed by local government employees in about 70 percent of cases.⁴

By contrast with these functions, other local government functions have been privatized to a greater extent (Table 1). The most commonly privatized service is vehicle towing and storage: 80 percent of respondents reported issuing contracts, and another 8 percent issued franchises. This may be because towing services are identical whether vehicles are towed from public or private property. Several other services that are commonly contracted out,

³ Special-purpose tax credits and deductions are equivalent to vouchers, even though they do not result in actual outlays by government. To emphasize their similarity to government spending programs, such credits and deductions often are referred to as tax expenditures.

⁴ Some of the remaining cities and counties used employees of another level of government to supply services, in addition to their own employees. Intergovernmental arrangements were especially common in the case of health and human services.

Table 1

Private Provision of Public Services in a Sample of Cities and Counties, 1988

Percent of Respondents	Services and Method of Provision			
	Contract with Private Firm	Franchise	Subsidies	Volunteers
75 and higher	Vehicle towing and storage	—	—	—
50 to 74	Legal services	Gas	—	—
25 to 49	Solid-waste collection and disposal, street repair, traffic signal installation/maintenance, tree trimming/planting, bus system operation/maintenance, paratransit system operation/maintenance, airport operation, utility billing, street light operation, hazardous materials disposal, day care facility operation, operation of mental health/retardation programs/facilities, drug/alcohol treatment programs/facilities, operation of homeless shelters, food programs for the homeless, buildings/grounds maintenance, fleet management/vehicle maintenance, labor relations	Electricity	Operation of homeless shelters, food programs for the homeless	Programs for the elderly, operation of homeless shelters, food programs for the homeless, recreation services, operation of cultural/arts programs, operation of museums

Note: Where applicable, respondents indicated more than one method of providing a service. Fewer than 10 percent of respondents indicated using vouchers or regulatory and tax incentives for any service.

Source: International City Management Association (1989).

including legal services and maintenance of equipment and facilities, also are often purchased by the private sector. In addition, a variety of transportation-related and human services have been privatized by local governments. Localities commonly grant franchises for gas and electricity supply (though, interestingly, not for water). Compared to contracts and franchises, vouchers and subsidies were used relatively rarely. Volunteers—another way of minimizing government employment—were used in at least one-quarter of localities for certain human and recreational services, as well as by between 15 and 20 percent of fire, police, and ambulance departments.

The quinquennial Census of Governments includes information about privatization starting in 1987.⁵ One-third of all general-purpose local governments in the United States contracted out or issued franchises for at least one service shown in Table 2.⁶

⁵ Information from the 1992 Census of Governments was not yet available at the time this article was prepared.

⁶ General-purpose governments provide a variety of services. By contrast, school districts and special districts perform a single function. In the terminology of the Census, "contracting" includes franchise agreements. Henceforth, this article will adopt the Census terminology.

In broad consistency with the results of the ICMA poll, the Census data show that gas supply, public transport, and electric power often involve private sector employees, while the services of libraries, sewerage systems, fire protection, and water supply are usually supplied by public employees. The remaining services—airports, hospitals, landfills, nursing homes, and stadiums and conference centers—are intermediate cases.

On the whole, local governments were more likely to contract out for services that commonly are offered by the private sector or other levels of government. Conversely, they tended not to contract out for services that are commonly the responsibility of local government. For example, fire protection, sewerage systems, and water—which are among the least likely services to be contracted out—were provided by more local governments than was the case for the remaining services.⁷ Two potential explanations exist

⁷ For all 12 services, a simple regression explaining the percentage of all governments contracting out by the percentage of all governments providing the service (using either their own or private employees) yielded a significant negative coefficient for the explanatory variable. The adjusted R-squared was 0.33.

for this behavior, the first attitudinal and the second practical. Services commonly provided by local governments may be viewed as part of their essential mission, and therefore officials may be reluctant to allow them to be performed under contract. Furthermore, for this category of services, outside contractors may be in scarce supply.

Townships were more likely to contract out than municipalities or counties.⁸ In part, this reflects their limited size. Localities with under 10,000 in population generally were more likely to contract out than larger localities. For a variety of services, the largest local governments contracted out less often than medium-sized governments.

Contracting varies across geographic regions, with the Midwest (encompassing the West North Central and East North Central Census areas) and West South Central regions having the greatest and the South Atlantic the least tendency for private production (Table 2). New England was the second to lowest region, as only one-quarter of local governments have contracted out or issued franchises for the services indicated. Out of the nine Census regions, New England ranked seventh or lower in privatization of airports, electric power, fire protection, hospitals, landfills, libraries, and nursing homes. Only in the cases of gas supply, public transit, and water supply was New England's extent of private supply more extensive than the national average.

Local governments in New England are much more likely to provide fire protection, landfills, and libraries for their residents than is true nationwide.⁹ For the reasons noted above, this fact may contribute to limited contracting. Conversely, gas supply and water are provided by a relatively low fraction of general-purpose local governments in New England, which may contribute to an above-average willingness among the remaining local governments to contract out for these services.¹⁰ For the other seven services, however, contracting behavior in New En-

gland is not explained by a simple hypothesis about the extent to which they fall within the purview of local governments. Alternative hypotheses are examined later in this article.

Privatization by State Governments

According to the Council of State Governments, states have been slower to privatize services than have local governments, but their interest has accelerated sharply in the past several years (Chi 1993). Although comprehensive numerical data are not available, the New England states appear to be as active as others in privatizing a variety of services. Maine and Massachusetts are among 22 states issuing recent studies exploring the feasibility of privatization. Connecticut, Maine, Massachusetts, New Hampshire, and Vermont (along with 21 states outside New England) have reportedly privatized more than 15 percent of their mental health and mental retardation programs. Ten states (including Rhode Island and Vermont) have privatized more than 15 percent of their remaining health services programs, 14 (including New Hampshire and Vermont) social services, and 23 (including Maine, Massachusetts, and Vermont) transportation. However, no New England states were among those with high rates of privatization of general administrative services, corrections, or educational programs.¹¹

III. Advantages and Disadvantages of Privatization

Case studies have been used to evaluate particular experiences with privatization of state and local government functions. Taken as a whole, these studies do not indicate that contracting is uniformly better or worse than provision of services by public sector employees. But they do come to a consensus on the advantages and disadvantages of contracting in cases where it has been tried.

Reduced Costs and Other Potential Advantages

In a wide variety of cases, contracting has resulted in the same level of service being provided at

⁸ Only 18 states, concentrated in the Northeast and Midwest, have the township form of government. In other states, the smallest units are municipal governments. Municipalities serve specific population concentrations; townships serve inhabitants of geographic areas defined without regard to population concentrations. In some states, municipalities and townships serve overlapping territories, but this is not the case in New England.

⁹ The percentages of New England localities providing these services were 73.2, 60.7, and 54.5, respectively, compared to national averages of 50.6, 21.2, and 20.6 percent.

¹⁰ Only 1.5 percent of New England localities indicated that they were responsible for supplying gas, and 28.9 percent water, to their residents. The national averages were 5.7 and 36.9 percent, respectively.

¹¹ Eight states report privatization of at least 15 percent of their general administrative services. Five states report privatizing 11 to 15 percent of their corrections programs and two have privatized an equivalent share of educational programs.

Table 2
Local Governments Contracting Selected Services as a Percent of Total Providing Services, by Type of Government, Population, Size, and Geographic Region, 1987

	Airports	Electric Power	Fire Protection	Gas Supply	Hospitals	Landfills	Libraries	Nursing Homes	Public Transit
Type of Government									
Counties	31.1	73.5	23.9	77.8	35.2	22.2	15.2	25.5	39.8
Municipalities	28.5	50.9	11.4	57.5	53.8	42.3	12.8	56.7	47.5
Townships	47.7	84.9	52.1	93.6	71.4	35.7	23.2	68.4	59.5
Population									
100,000 and over	15.6	32.7	13.3	53.3	27.8	22.8	7.9	12.8	40.1
50,000 to 99,999	34.0	35.7	11.3	60.0	41.0	20.5	19.7	20.0	40.3
25,000 to 49,999	35.3	31.9	10.3	63.9	41.5	28.1	7.3	28.3	37.6
10,000 to 24,999	38.5	33.1	11.3	55.9	40.9	29.3	15.4	44.4	48.8
Less than 10,000	28.3	58.9	29.1	62.0	53.0	40.2	16.4	53.5	56.2
Geographic Region									
New England	23.4	47.3	8.4	75.0	37.8	30.1	3.6	29.2	70.8
Mid-Atlantic	45.8	72.9	35.9	97.0	61.6	46.0	26.1	30.2	54.7
East North Central	38.1	62.6	35.5	81.9	51.6	42.2	21.0	41.2	48.6
West North Central	23.7	56.0	36.0	69.2	39.3	45.4	11.2	39.1	44.9
West South Central	24.6	56.2	36.0	67.8	38.2	39.9	11.0	40.2	48.6
South Atlantic	34.6	42.2	13.1	40.1	48.1	26.0	16.9	44.9	37.5
East South Central	36.5	45.0	5.7	26.6	41.7	33.8	14.4	51.9	45.6
Mountain Pacific	26.1	49.2	10.3	71.9	51.3	31.6	12.2	50.6	41.3
Pacific	27.5	42.0	13.5	67.6	43.8	37.3	24.6	52.3	50.2
All Local Governments	30.1	55.3	26.1	61.4	45.7	36.4	15.4	39.6	48.5
Memo: Number of Governments Providing Service	3,059	3,846	19,698	2,204	1,404	8,268	8,032	1,148	1,313

Source: U.S. Bureau of the Census (1988).

substantially lower cost, although utilities seem to be an exception. In a response to a 1987 survey, three-quarters of city and county executives with experience with contracting cited cost reductions as the primary benefit of contracting out, and most indicated that they were satisfied with the quality of the work performed by the private contractor (David 1988). Of those reporting some cost saving, 18 percent estimated it at below 10 percent, 39 percent between 10 and 19 percent, and the remaining 43 percent at 20 percent or more. In response to a survey by the Council of State Governments, many states cited savings in the range of 11 to 30 percent (Chi 1993). Transit authorities in the United States and the United Kingdom have saved in the range of 20 to 30

percent by privatizing bus services (Gómez-Ibáñez and Meyer 1993).

Econometric analyses have provided concurring evidence in some cases. One such study examined public and private suppliers of municipal services in the Los Angeles metropolitan area (Stevens, as cited in Donahue 1989). After controlling for the scale of service, the level and quality of service, and the physical conditions of the service area, the author estimated cost savings ranging from 37 percent for tree maintenance to 96 percent for asphalt overlay construction, with intermediate results for janitorial service, traffic signal maintenance, street cleaning, trash collection, and turf maintenance. Private contractors and public employees were equally efficient

Sewerage System	Stadiums, Auditoriums, Convention Centers	Water Supply	Total	Memo: Number of Governments
19.5	22.2	21.6	32.1	3,300
6.3	20.4	5.8	25.6	19,910
21.4	46.8	24.4	48.7	9,036
5.7	16.5	7.8	30.2	771
13.1	9.2	9.0	29.6	900
14.7	18.9	10.6	29.4	1,598
12.5	24.2	11.7	30.3	3,385
7.2	30.2	7.2	33.4	25,592
6.9	21.4	8.6	25.4	1,752
17.4	38.0	16.7	34.8	3,925
10.7	35.6	9.0	36.5	8,504
2.8	26.1	5.1	40.6	7,141
2.9	24.0	5.5	39.3	8,083
9.6	17.9	7.3	24.5	2,998
7.5	12.6	8.0	25.5	1,848
6.2	16.9	4.7	26.8	1,639
10.6	19.0	4.8	30.7	1,526
8.2	22.8	7.8	32.7	32,246
13,224	969	14,367		

in providing the remaining service, payroll preparation. Another econometric study found greater operating efficiency for privately owned than for publicly owned urban transit systems across the United States (Perry and Babitsky 1986).¹²

Studies of water and electric utilities are less decisive. Seven out of the thirteen studies cited in Donahue (1989) indicate no significant difference in costs between publicly and privately owned utilities, after controlling for other factors (such as the size of the service area) that might affect unit costs. Of the remaining six studies, all but one found publicly owned utilities to be more cost efficient than privately owned utilities.

Cost savings from using private contractors may

come from a variety of sources. Some authors contend that privatization reduces costs primarily by introducing competition into markets in which public agencies enjoyed a monopoly position (see, for example, Savas 1992 and Gómez-Ibáñez and Meyer 1993).¹³ Under this view, governments can foster cost efficiencies by encouraging bidding by multiple entities when a contract is up for renewal and by ensuring that the current supplier does not have an unfair advantage in the contract process.¹⁴ The argument also provides an explanation for the lack of cost savings from privatizing utilities. Because utilities are natural monopolies, with per customer costs falling as the service area increases, competition is not advantageous.

Additional studies point to specific cost advantages of private suppliers (see, for example, Kettl 1993a and 1993b, Dudek & Company 1988). Private firms may pay lower wages and fringe benefits (notably retirement benefits) than local governments. But they also often appear to have higher labor productivity. Private firms have more flexibility to use part-timers to meet peak loads, to fire unsatisfactory workers, and to allocate workers across a variety of tasks. In some cases, a private contractor may enjoy greater economies of scale or scope, or access to more productive capital. For example, the private contractor providing firefighting services to Scottsdale, Arizona also serves adjacent rural communities and designs its own specialized vehicles and equipment (Donahue 1989, p. 71).

While a private contractor may produce services more efficiently than public employees, governments incur new contracting and monitoring costs when they shift to private suppliers. The best studies of contracting have attempted to measure these additional costs in evaluating privatization efforts, although admittedly this is hard to do. Actions against contractors overrunning projected costs, not main-

¹² However, the authors found that private management of publicly owned transit systems did not result in cost savings; they attributed this result to a lack of sufficient incentives in contracts.

¹³ In a similar vein, Boardman and Vining (1989) concluded that previous studies comparing public and private enterprises failed to find greater efficiencies on the part of the latter largely because they examined markets with limited possibilities for competition. Their own study, which is limited to industrial markets where competition exists, finds greater efficiencies for private firms.

¹⁴ The United Kingdom introduced mandatory competitive bidding for local services starting in 1988. This provision covers refuse collection, street cleaning, and maintenance of vehicles and grounds, among others (Lauder 1992). However, Donahue (1989, p. 64) notes that open competition is an expensive option if it results in a loss of economies of contiguity.

taining quality standards, or perhaps even engaging in fraud are likely to engage multiple departments of government.

Burdens for Public Employees and Other Potential Disadvantages

The burdens of contracting are concentrated on the public sector work force. In some cases, privatization results in layoffs of public sector employees, although governments often lower the burdens on employees by reassigning them to other government jobs, placing them with private contractors, or offering early retirement programs. One study proposes that governments link the pace of privatization to the rate of public employee attrition, in order to avoid

The burdens of contracting out are concentrated on the public sector work force, and public employee unions oppose privatization.

disruptions for workers (Cox and Love 1992). Still, because burdens on civil servants often are not eliminated entirely, public employee unions oppose privatization. Surveys have indicated that, where present, this opposition lowers the likelihood that public services will be contracted out (Dudek & Company 1988; The Mercer Group 1990, 1992).¹⁵

On the whole, consumers do not appear to be hurt by contracting, and in some cases they actually benefit. For example, privately operated prisons have been found to result in higher satisfaction for inmates and guards, lower escape rates, and fewer disturbances (Thomas and Logan 1993). Studies of transit have found better maintenance, greater safety, and more innovations in the private sector (Perry and Babitsky 1986; Cromwell 1991; Gómez-Ibáñez and Meyer 1993).

Even though consumers as a whole may not suffer from privatization, certain subsets may be at risk. For example, contracting can be used to mask decisions to reduce services (Donahue 1989, p. 136). Contracting can be especially risky in human ser-

vices. Elderly residents and those with infirmities tend to be sensitive to the way services are provided, and government may have very imperfect measures of quality with which to measure performance by the contractor (see especially Kettl 1993a and Schlesinger, Dorwart, and Pulice 1986). Furthermore, part of what advocates of privatization call waste on the part of the public sector may be the inevitable consequence of a conscious effort to redistribute resources to particular parts of the population (Borcherding and Pommerhne 1982). Despite these natural obstacles to privatization of human services, many examples of contracting exist—in part because of legislative mandates that governments seek bids from outside vendors.¹⁶

Finally, scattered examples exist of contractors who failed to live up to expectations, even though the average experience does not appear to be negative. As a consequence, elected officials may feel they can more readily avoid political risks by having public services operated by public employees.

IV. Determinants of Contracting

The previous section suggests that contracting can result in savings if private sector firms are more cost-effective suppliers of services than the public sector, and if markets for contracted services are sufficiently competitive. On the other hand, public sector employees have an incentive to block privatization because their jobs and incomes are at risk. Public sector unionization may increase the effectiveness of opposition to privatization. This section tests whether these factors actually appear to explain contracting patterns among local governments in the United States.¹⁷

¹⁵ Unions may lobby for legislation that limits the potential cost savings from privatization, as well as directly opposing particular moves to privatize. For example, Chi (1992) reports that New York state has a law requiring government contractors to pay prevailing union wage rates.

¹⁶ For example, Schlesinger, Dorwart, and Pulice (1986) cite a Massachusetts law requiring all new contracts for mental health patient services valued in excess of \$40,000 to be competitively bid and all renewal contracts to be subject to competitive bidding at least once every three years. Before the enactment of the law, contracting existed but often was limited to designated private nonprofit organizations staffed at least in part by state employees.

¹⁷ By way of comparison, Abraham and Taylor (1993) found multiple explanations for contracting by private firms. These included a desire to reduce labor costs, make use of specialized skills, and meet volatile demands.

Potential Explanations for Contracting

This section describes how the extent of contracting and potential explanations for contracting are measured. Appendix Table I provides additional details.

Extent of Contracting. The data on contracting are taken from the 1987 Census of Governments.¹⁸ The sample consists of 655 municipalities and townships with population of at least 25,000 that provide at least four of the 12 services covered in the Census questionnaire.¹⁹ The extent of contracting is measured as follows. For each service j that it provides, locality i is assigned a contracting dummy d_{ij} , equal to 1 if the service is contracted out and 0 if it is not contracted out. Let μ_j equal the fraction of all localities that contract out for service j (in other words, the average value of d_{ij}). The overall contracting index for locality i is measured as the sum of the deviations of its contracting dummies from their average values for all localities:

$$C_i = \sum_{j \in J_i} (d_{ij} - \mu_j)$$

where J_i represents the set of services provided by locality i . A positive value of the contracting index indicates that the locality contracts out more than average, adjusting for the mix of services provided to its residents and the fact that not all services are equally likely to be contracted out. A negative value indicates below-average contracting.

It is important to bear in mind that C_i provides a somewhat imprecise measure of the extent of contracting. The Census data indicate that a community contracts out for a service whether or not the service is entirely provided by outside contractors. Frequently, only some aspects of a given service are contracted out. For example, a town may contract out for hookup of new water customers while using its own employees to read meters. Or it may operate a general public transit system while it contracts out for shuttle services for senior citizens. In the extreme

case, a single private sector manager may be hired to supervise civil servants. All these examples yield a contracting dummy equal to 1 in the Census survey, even though they represent different degrees of privatization. Unfortunately, no estimates of the dollar value of contracts or the number of contract employees exist for a broad sample of governments.

A potential problem with interpreting the Census data is that measured contracting includes cases when governments contract with other governments or quasi-governmental agencies. Therefore Census-measured contracting is not necessarily equivalent to privatization. The results of a small, informal survey confirm that the reported percentages of contracting for library and water services, though relatively low, indeed may overstate the degree of privatization.²⁰

Costs of Providing Services. All else equal, a community should be more likely to hire private contractors the higher the costs of providing services by public employees relative to the cost of providing them using workers from the private sector. Average monthly earnings of local government noneducational workers are used to measure costs in the public sector. Average revenues per employee in the business services industry are used as an indicator of the costs of hiring private contractors.²¹ Unfortunately, measures of non-wage cost differentials, which some studies find to be substantial, were not available.²²

As the literature summary indicated, in the absence of competition among contractors, the community may not achieve potential cost savings from privatization because contractors are able to earn monopoly profits. Small, remote localities are especially likely to encounter this problem. The regressions include a dummy variable indicating whether or not the community is located in a metropolitan area as a proxy for the availability of contractors.²³

¹⁸ Note again that the Census of Governments uses "contracts" to encompass both contracts and franchises.

¹⁹ Counties are omitted from the study and are a relatively unimportant level of government in New England. The omission of municipalities and townships with population below 25,000 reduced the total sample size from 28,946 to 1,662. The sample was further reduced to 1,196 because some communities did not report on the manner in which they provide the services covered in the Census questionnaire. Omitting localities that provide fewer than four services and those that lacked some of the explanatory variables further reduces the sample to 655.

²⁰ In connection with the current study, 22 communities in Massachusetts and Michigan were called in order to ascertain the nature of their contracts. All three communities contracting for library services, two (out of four) contracting for water supply, one (out of one) contracting for sewerage treatment, and one (out of four) contracting for transit did so with another government or public authority. Also, one administrator believed that the 1987 response to the Census of Governments regarding contracting for water was erroneous. In the cases of airports, hospitals, and landfills, the respondents confirmed that the contracts were with private firms.

²¹ This measure was used by Good (1992).

²² For example, Gómez-Ibáñez and Meyer (1993) note that more than one-half of the savings associated with transport privatization come from sources other than wages.

²³ Abraham and Taylor (1993) found this variable to be significant in explaining contracting behavior for two of the four private industries they studied.

Finally, abstracting from location issues, smaller localities may incur relatively high unit costs if they operate their own services as a result of not being able to achieve economies of scale. They may benefit from turning to a contractor that serves multiple communities. This hypothesis is tested by including the population of the locality among the explanatory variables.

Privatization may be more acceptable in fast-growing communities, where services are being expanded and contractors are less likely to displace public employees.

Opposition to Privatization. The study evaluates whether public employees may provide more effective opposition to privatization where they are unionized. In the regressions, the unionized percentage of local noneducational public employees varies by state, and is measured separately for municipalities and townships in cases where a state has these two forms of local government.²⁴ On the other hand, privatization may be more acceptable in fast-growing communities. If services are being expanded to cover new residents, contractors are less likely to displace existing public sector employees. The regressions use each locality's population growth rate over a six-year period.

Sensitivity to Costs. Even if two communities face identical cost differentials between private contractors and public employees, one may be more likely than the other to economize because its residents are less willing to pay for services. Per capita income provides one indication of the community's ability to pay. Income tends to be positively related to the value of property, which in turn is the major tax base for many communities. Furthermore, for a given value of property, a community will find it easier to raise revenues the higher the monetary income of its residents.²⁵

Another measure of sensitivity to costs relates to the number of local governments in a given geographic area. Where government density is higher, each locality will be under greater pressure to minimize the costs of providing a given bundle of services

(or to maximize the services it provides per dollar of revenue collected locally) in order to attract households and businesses. Eberts and Gronberg (1988) have shown that, all else equal, per capita government spending falls as the number of local general-purpose governments rises, a result they attribute to competition among governments.

Finally, contracting may vary with the number of services provided to residents. As the number of services increases, differences in the cost and effectiveness with which they are provided become more apparent. Prevailing pay scales or work rules may limit the possibilities for altering how public employees deliver services. Therefore, all else equal, localities providing diverse services may be more open to exploring private-sector alternatives than those localities where services are more limited.²⁶ The regressions include as an explanatory variable the total number of services covered by the Census questionnaire that are provided in the locality, whether by government employees or private contractors.

Other Determinants. The receptivity of a community to contracting may also depend on how residents view the role of their government. If citizens believe that local government should emphasize a narrow range of essential services, they might be relatively comfortable with using contractors in order to minimize the number of public employees. On the other hand, in places where the local government has a broader mandate to redistribute income, citizens may be less likely to support privatization. The first measure tested in the regressions is the percentage of the

²⁴ Information on the extent of unionization for individual municipalities and townships is not publicly available. For private firms, Abraham and Taylor (1993) found no systematic association between unionization and contracting out.

²⁵ Because information on contracting is available only for 1987, this study cannot distinguish factors that originally lead a locality to contract out for services from those factors that continue to play a role. For this reason, the study does not examine direct measures of fiscal health or fiscal stress, since they tend to fluctuate with business cycles. Alm, McKee, and Skidmore (1993) found, for example, that in the earlier years of their sample, fiscal stress contributed to states' decisions to adopt lotteries. More recently, decisions have been more influenced by practices in neighboring states.

²⁶ Somewhat analogously, Abraham and Taylor (1993) find that firms requiring diverse skills are more likely to contract out for work that pays wages that lie outside company norms. Specifically: "Our finding that high-wage establishments are more likely to contract out for janitorial services suggests that these establishments cannot easily pay low wages to janitors on their own payrolls. Similarly, the finding that low-wage establishments are more likely to contract out for certain types of high-skill services suggests that these establishments cannot easily pay high wages to workers in selected occupational groups."

locality's general noneducational expenditures allocated to core services, here measured as police and fire protection. The other is the percentage spent on human services, measured as public welfare plus health and hospitals. Because these indicators are negatively correlated with each other, they are entered sequentially rather than simultaneously.²⁷ Finally, regional dummies are used to test for attitudes or other unspecified influences that may be widespread in a region rather than being specific to any given community.

Regression Results

The regressions reveal that, in deciding how to provide services, smaller localities respond more to economic variables than do larger localities. In both cases, attitudinal variables also matter, as do additional factors not taken into account in the regressions. Table 3 presents the most satisfactory regression results, while Appendix Table 2 presents results using a more comprehensive set of explanatory variables.²⁸

Costs are highly significant determinants of contracting for localities with a population under 50,000 (columns 1 to 3). These localities were more likely to contract out if the average wage in the public sector was high, if they were located in a metropolitan area, and if they were small. Costs mattered both for non-utility services and for utilities, though they mattered more for the former category.²⁹ Private sector revenues per employee were not significant (Appendix Table 2). Unionization and population growth were significant at the 10 percent level for non-utility services; they entered with the expected signs (negative and positive, respectively) for utility services, but were not significant. The number of services provided was a strong predictor of the likelihood of contracting. The performance of the other measures of sensitivity to costs—per capita income and the density of governments—was disappointing; often they were insignificant or entered with the wrong sign. As expected, localities where government expenditures are highly concentrated on health and human services were less likely to contract out. Conversely, places where the government concentrates on providing "core" services are more likely to contract out, although the significance of this variable was somewhat lower than the health and human services variable. (This latter version of the regression is not shown in the tables.)

Columns 4 to 6 report on regressions with se-

lected regional dummies.³⁰ The New England dummy enters with a negative coefficient that is significantly different from zero in the "All Services" equation. With the regional dummy variables, the unionization and population growth variables lose significance, which suggests that the exact causes of objections to or acceptance of privatization are hard to pin down. Finally, adjusted R-squared values in the range of 0.2 to 0.3 confirm that localities are strongly guided by factors that are not measured in the regressions—including perhaps the presence or absence of political leaders who support privatization, the reputation of local contractors, or differences in costs of providing fringe benefits or in productivity between the public and private sectors.

A smaller set of explanatory factors mattered for localities with population of 50,000 or more (columns 7 to 9). The larger localities in this group were a little less likely to contract out than localities with population under 50,000. Higher public sector wages contributed to contracting, but the coefficients were not as significant and were smaller than for communities with population of less than 50,000. Since all places with population of at least 50,000 are located in a metropolitan area, the availability of contractors was not an issue. Contracting was more prevalent in localities providing a greater number of services (among the 12 covered) or concentrating a greater share of expenditures on core services, and among those located in the Middle Atlantic states. Unionization and population growth were insignificant (even in the absence of regional dummies), and the explanatory power of the regressions was less than in the case of smaller communities.

²⁷ The omitted category of expenditures largely represents public infrastructure. It includes roads, recreational facilities, and community development.

²⁸ A separate set of regressions (not shown) used a probit model to examine privatization with respect to individual services. Variables generally entered with the same signs as in the regressions measuring the total extent of contracting, but the coefficients were less likely to be significantly different from zero. In another set of alternative regressions, contracting indexes were defined separately for localities with population under and over 50,000, based on each group's average contracting experiences. In other words, the values of μ_i were allowed to differ between the two groups. These regressions yielded results very similar to the ones reported, which used averages from the entire sample.

²⁹ The non-utility regressions are estimated for those localities providing at least four (out of nine) non-utility services. The utility regressions include localities providing at least two of the following three services: electricity, gas, and water. As a result of these criteria, the number of observations is much smaller for the utility equation than the other equations.

³⁰ Omitted dummies were rarely (if ever) significant in any regression.

Table 3
Contracting Regressions

Independent Variable	Population Between 25,000 and 49,999						Population 50,000 and Over		
	Without Regional Dummies			With Regional Dummies			All Services	Non-Utility Services	Utilities
	All Services	Non-Utility Services	Utilities	All Services	Non-Utility Services	Utilities			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Costs									
Average wage in public sector	.8123*** (.1942)	.9780*** (.2148)	.5268** (.2446)	.7761*** (.1987)	.9646*** (.2218)	.5031** (.2354)	.3410* (.1859)	.2164 (.1676)	.0593 (.2554)
Location in metropolitan area	.6659*** (.1774)	.4445*** (.1649)	.4521** (.2248)	.6729*** (.1766)	.4613*** (.1656)	.4875** (.2348)			
Population	-.0195** (.0097)	-.0218** (.0102)	-.0146 (.0125)	-.0212** (.0097)	-.0223** (.0102)	-.0125 (.0129)	-.0004** (.0001)	-.0003*** (.0001)	-.0002 (.0002)
Opposition to Contracting									
Unionization	-.0053 (.0041)	-.0078* (.0043)	-.0057 (.0047)	-.0037 (.0047)	-.0073 (.0051)	-.0042 (.0057)	.0020 (.0053)	.0016 (.0046)	.0082 (.0087)
Population growth	.0033 (.0039)	.0107* (.0055)	.0040 (.0043)	.0023 (.0039)	.0093 (.0056)	.0031 (.0044)	.0037 (.0050)	.0037 (.0045)	.0021 (.0068)
Sensitivity to Costs									
Number of services	.3034*** (.0432)	.2580*** (.0447)	.2424*** (.0423)	.3148*** (.0433)	.2534*** (.0444)	.2431*** (.0427)	.2224*** (.0384)	.1568*** (.0354)	.1825*** (.0468)
Other									
Concentration on core functions							.0186** (.0094)	.0171** (.0087)	.0133 (.0129)
Concentration on health and human services	-.0139*** (.0051)	-.0096* (.0053)	-.0061 (.0054)	-.0134*** (.0051)	-.0094* (.0052)	-.0053 (.0056)			
New England dummy				-.4835** (.2255)	-.3081 (.2262)	-.3324 (.2986)	-.0481 (.3059)	-.0999 (.2621)	.3868 (.9377)
Middle Atlantic dummy				.1364 (.2584)	.3758 (.3677)	.0488 (.4140)	.8450*** (.2743)	.9106*** (.2656)	1.442*** (.3968)
West North Central dummy				-.4492* (.2558)	-.3555 (.2409)	-.3121 (.3724)	-.4801* (.2698)	-.3888* (.2260)	-.0362 (.3191)
Constant	-2.855*** (.5317)	-2.742*** (.5379)	-2.318*** (.6916)	-2.756*** (.5354)	-2.628*** (.5427)	-2.366*** (.7071)	-2.747*** (.5015)	-2.063*** (.4473)	-2.170*** (.7175)
Adjusted R-squared	.200	.240	.298	.215	.252	.291	.119	.126	.255
Number of observations	316	213	89	316	213	89	339	269	86

***Significant at 1 percent level.

**Significant at 5 percent level.

*Significant at 10 percent level.

Contracting Decisions in the New England States

The equations including regional dummies fit the New England averages very closely.³¹ Without the dummies, New England contracting is overpredicted. For example, for localities with population under 50,000, the regression excluding regional dummies

predicts the overall New England contracting index to be close to, rather than substantially below, the

³¹ For localities with population under 50,000, the nine regional values of the overall contracting index ranged from -0.32 to +0.60; New England's value of -0.26 was the second lowest (Table 4). For localities with population of at least 50,000, New England had the third to lowest value.

Table 4
Regression Variables

Variable	Population Between 25,000 and 49,999		Population 50,000 and Over	
	United States	New England	United States	New England
Contracting Index				
Overall	.09	-.26	-.12	-.24
Non-utility services	.08	-.24	-.12	-.30 ^a
Utilities	.07	-.14	.07	
Average wage in public sector	2.00	2.03	2.19	2.05
Location in metropolitan area	.81	.90	1.00	1.00
Population	34.54	33.87	197.23	97.24
Unionization	35.49	53.80	36.78	64.39
Population growth	8.55	1.40	8.65	-.35
Number of services	5.52	5.73	6.10	5.97
Concentration on core functions	24.50	24.57	24.70	23.52
Concentration on health and human services	4.71	6.62	4.51	9.92

Note: The values shown for the independent variables are average values for localities providing at least four (of the twelve) services.

^aOnly one local government in New England was included in the utilities regression.

national average. In other words, the region's low contracting tendency remains a mystery.

Table 4 indicates the role of measurable influences on privatization. Given their cost factors, New England localities with population under 50,000 would be expected to contract out more than their counterparts in other parts of the country. Ninety percent are located in a metropolitan area, compared to 81 percent nationally. Also, the average New England locality pays slightly higher wages and is slightly smaller than the average included community in the nation. For localities with population over 50,000, cost factors are mixed.

Factors other than costs partly explain low privatization in New England. In other states, on average only about one-third of public sector employees are unionized, compared to over one-half in New England. Population growth has been minimal in the region, which means that there is little need for

expansion of public services. Therefore, private contractors would be likely to displace public employees. Finally, a relatively high share of government non-education spending is devoted to health and human services, which the regressions showed was a negative indicator of contracting.³²

V. Conclusions

Surveys and other analyses confirm that state and local governments can achieve savings, without sacrificing quality, by privatizing the delivery of services through judicious use of private contractors. Regressions indicate that localities do in fact tend to contract out to avoid paying high public sector wages. They also are more likely to contract out if they provide multiple services. A wide range of functions apparently makes cost comparisons across programs more feasible, while making it less likely that civil service rules produce desirable results for all programs. Local governments are more likely to contract out when they serve a small population and when they are located in a metropolitan area. In such circumstances, they may find it difficult to achieve sufficient scale economies on their own, but have access to a number of contractors to ensure competition.

These factors, while significant, do not explain much of the observed variation in the degree of contracting across localities. Attitudes are important. Places where government concentrates a greater share of resources on provision of basic public services such as police and fire protection are more likely to contract out than places where the government is charged with more active redistribution of resources. Unobservable factors—including perhaps the views of local politicians or relative non-wage costs between the public and private sectors—also affect government decisions.

In addition to this variation across localities, some services are less likely to be contracted out than others. In particular, basic public services such as fire protection are contracted out far less often than services that are commonly purchased individually by private businesses. The reason for this discrep-

³² A study by Tannenwald (1990) had found that New England's high priority on collective services and redistributive expenditures limited the extent to which the region could rely on user fees to finance public expenditures. An interesting extension of the work in that article and the current study would be to consider in a simultaneous model the effects of preferences for public services on methods of service delivery and financing.

ancy may be partly economic (the relative abundance or scarcity of private contractors for some services) and partly attitudinal (whether or not the service is viewed as the responsibility of local governments). For electric power and gas supply, contracting rates are relatively high, despite evidence that public utilities often can produce services at costs that are no higher, and may even be lower, than those of private utilities.

Cities and towns in New England have shown less willingness to privatize public services than their national counterparts. This discrepancy could not be explained. Despite historical opposition, however, there is reason to believe that contracting out and

other forms of privatization will become more popular in the future. A general move to improve cost efficiency and productivity in government has created considerable interest in privatization efforts, and some state officials in the region are actively exploring further use of this option. Equally important, New England's local governments serve communities that on average are smaller, but more likely to be located close to concentrations of population, than is true for the nation as a whole. Access to multiple service providers increases the likelihood of being able to produce meaningful competition among contractors, which is an important prerequisite to achieving cost savings.

Appendix Table 1
Variable Definitions, Sources, Means, Minimums, and Maximums

Variable	More Detailed Definition	Data Source	Mean (Observations for 1196 Localities)	Minimum	Maximum
Contracting index	See text.	a	3.86e-10	-2.43	6.97
Average wage in public sector	Average October 1987 earnings of full-time employees, thousands of dollars.	b	2.15	.94	4.63
Location in metropolitan area	Dummy = 1 if the municipality or township is located in a metropolitan statistical area.	a	.94	0	1
Population	1986 population, thousands.	a	91.41	25.02	7,262.75
Unionization	Percent of public noneducational employees that are organized, by state. Computed separately for municipalities and townships.	b	37.73	1.31	93.67
Population growth	Population growth rate from 1980 to 1986.	a	9.85	-24.21	497.86
Government density	The number of county, municipal and township governments per square mile, by state. Computed separately for metropolitan statistical areas and other areas.	b & d	.03	.00	.08
Revenues per employee	Annual receipts for firms providing business services relative to the number of paid employees.	a	3,005.5	350.0	11,070.6
1987 income per capita	Per capita money income, thousands of dollars.	c	12.89	4.39	36.69
Number of services	Sum of the number of services operated and the number of services contracted.	a	4.43	0	12
Concentration on core functions	Expenditures on police and fire protection as a percent of total expenditures less education.	b	25.6	0	57.5
Concentration on health and human services	Expenditures on public welfare and health and hospitals as a percent of total expenditures less education.	b	3.4	0	79.8
New England dummy	Dummy = 1 if state = CT, MA, ME, NH, RI, or VT.	a	.1	0	1
Middle Atlantic dummy	Dummy = 1 if state = NJ, NY, or PA.	a	.17	0	1
East North Central dummy	Dummy = 1 if state = IL, IN, MI, OH, or WI.	a	.17	0	1
West North Central dummy	Dummy = 1 if state = IA, KS, MN, MO, NE, ND, or SD.	a	.07	0	1
South Atlantic dummy	Dummy = 1 if state = DE, DC, FL, GA, MD, NC, SC, VA, or WV.	a	.11	0	1
East South Central dummy	Dummy = 1 if state = AL, KY, MS, or TN.	a	.04	0	1
West South Central dummy	Dummy = 1 if state = AR, LA, OK, or TX.	a	.09	0	1
Mountain dummy	Dummy = 1 if state = AZ, CO, ID, MT, NV, NM, UT, or WY.	a	.06	0	1
Pacific dummy	Dummy = 1 if state = AK, CA, HI, OR, or WA.	a	.19	0	1

Source: U.S. Bureau of the Census: ^amachine readable data, 1988; ^b(1988); ^c(1993); ^dunpublished data.

Appendix Table 2

Contracting Regressions with a Comprehensive Set of Independent Variables

Independent Variable	Population Between 25,000 and 49,999								
	Without Regional Dummies			With Regional Dummies			Population 50,000 and Over		
	All Services (1)	Non-Utility Services (2)	Utilities (3)	All Services (4)	Non-Utility Services (5)	Utilities (6)	All Services (7)	Non-Utility Services (8)	Utilities (9)
<u>Costs</u>									
Average wage in public sector	.6534*** (.2199)	.8660*** (.2558)	.4186* (.2510)	.5064** (.2305)	.7845*** (.2737)	.2933 (.2743)	-.0797 (.2326)	-.0856 (.2091)	-.2763 (.2928)
Revenues per employee in private services sector	.0473 (.0756)	-.0237 (.0926)	.0082 (.1134)	.0355 (.0748)	-.0448 (.0921)	-.0070 (.1133)	.0070 (.0812)	-.0277 (.0734)	.0866 (.0906)
Location in metropolitan area	.5595*** (.1970)	.3983** (.1842)	.3205 (.2644)	.5437*** (.1950)	.4185** (.1836)	.3104 (.2740)			
Population	-.0138 (.0104)	-.0172 (.0111)	-.0134 (.0133)	-.0159 (.0103)	-.0176 (.0110)	-.0108 (.0134)	-.0004** (.0001)	-.0003** (.0001)	-.0001 (.0002)
<u>Opposition to Contracting</u>									
Unionization	-.0061 (.0044)	-.0083* (.0047)	-.0077 (.0053)	-.0028 (.0050)	-.0068 (.0055)	-.0033 (.0065)	.0066 (.0057)	.0055 (.0050)	.0073 (.0094)
Population growth	.0033 (.0042)	.0103 (.0064)	.0060 (.0046)	.0030 (.0041)	.0102 (.0063)	.0048 (.0047)	.0049 (.0053)	.0048 (.0047)	-.0017 (.0073)
<u>Sensitivity to Costs</u>									
Number of services	.3185*** (.0449)	.2706*** (.0459)	.2457*** (.0447)	.3323*** (.0446)	.2664*** (.0455)	.2473*** (.0441)	.2345*** (.0395)	.1608*** (.0364)	.1730*** (.0494)
Per capita income	.0302 (.0231)	.0252 (.0237)	.0430 (.0364)	.0505** (.0240)	.0369 (.0248)	.0670* (.0394)	.0821*** (.0282)	.0710*** (.0269)	.0616 (.0395)
Government density	-.3232 (3.821)	-.7637 (4.528)	6.715 (5.723)	1.634 (4.056)	1.285 (4.749)	7.281 (5.661)	.9190 (4.215)	.1050 (4.202)	-4.423 (6.380)
<u>Other</u>									
Concentration on core functions							.0215** (.0098)	.0181** (.0091)	.0178 (.0136)
Concentration on health and human services	-.0147*** (.0054)	-.0099* (.0054)	-.0064 (.0058)	-.0137*** (.0053)	-.0092* (.0054)	-.0046 (.0060)			
New England dummy				-.6974*** (.2489)	-.4454* (.2550)	-.6012* (.3203)	-.4719 (.3342)	-.4410 (.2940)	.7034 (.9613)
Middle Atlantic dummy				-.0019 (.2809)	.3082 (.3846)	.2980 (.4440)	.6846** (.3131)	.7869** (.3070)	1.409*** (.5114)
West North Central dummy				-.4525 (.2820)	-.3651 (.2743)	-.5339 (.4255)	-.4762* (.2870)	-.4049* (.2444)	.0013 (.3525)
Constant	-3.171*** (.5854)	-2.907*** (.6026)	-2.697*** (.7682)	-3.132*** (.5788)	-2.824*** (.5981)	-2.820*** (.7685)	-3.133*** (.5525)	-2.355*** (.4951)	-2.322*** (.8127)
Adjusted R-squared	.198	.236	.292	.220	.251	.310	.146	.149	.279
Number of observations	303	202	85	303	202	85	321	252	80

***Significant at 1 percent level.

**Significant at 5 percent level.

*Significant at 10 percent level.

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Gifts for Home Purchase and Housing Market Behavior

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Between 1970 and 1980, real house prices increased 23 percent in the United States. The 1980s brought little growth in the real price of housing nationally, but rapid increases continued in many regions and, in some areas, far outpaced growth in household income. In Boston, for example, real house prices rose 34 percent in 1984 alone. Such rapid increases in house prices can make home ownership more difficult for prospective first-time home buyers by increasing the required down payment amount and, if the increases outpace income growth, by increasing the ratio of mortgage payments to income. Both effects reduce affordability.

The typical first-time home buyer saves for several years to accumulate the down payment, and high or rising home prices relative to income require an increasing sacrifice of consumption. In response to such constraints, households may seek a gift or loan from a family member to use as part of the down payment. These transfers allow prospective home-buying households to make larger down payments. In turn, these larger down payments allow some households who otherwise would not be creditworthy to qualify for a mortgage loan, and others to purchase a more expensive home than they could afford without a gift.

In this sense, family transfers for housing purchase may be useful in understanding the relationship between housing finance and housing markets. If gifts are an important source of funds, they may play a critical role for some households in home purchase activity in real estate cycles. For example, a positive correlation between the receipt of gifts and the level or growth rate of house prices may suggest that these transfers reduce the degree to which marginal households are "crowded out" of the home-buying market. In this way, gifts may be important in sustaining real estate booms.

The causality could also go in the opposite direction. Home owners who experienced windfall housing capital gains in the 1970s and 1980s

may transfer part of these gains in the form of gifts to their children, who now face substantially higher relative housing costs. If this is true, then intergenerational transfers might mitigate the effects of housing booms and busts on aggregate spending patterns.

Family gifts may also affect the link between real estate cycles and household mobility. Stein (1993) has recently put forth a model of the housing market whereby negative shocks to housing prices substantially reduce housing equity. Since home equity from

First-time home buyers in cities with higher house prices and rates of appreciation fund a larger proportion of the down payment with gifts from relatives.

the sale of the previous home accounts for the majority of the down payment on a trade-up home, the loss of home equity due to a drop in home prices may "lock" some households into their homes. That is, households may not be able to move to a similar home in a different part of the metropolitan area, or a different metropolitan area altogether, because they would not have enough wealth to make a down payment on a new home. However, if households have access to other funds through family gifts, they may not become "locked in" when house prices fall.

From a broader perspective, understanding the role of family gifts for housing purchase has implications for other areas of economic analysis: evaluation of the effects of fiscal policy, study of the distribution of wealth and the transmission of wealth inequality over time, evaluation of the life-cycle hypothesis, and evaluation of economic models of the family, among others. This article documents the frequency and magnitude of family gifts for housing purchase and explores economic explanations for their role in home financing. Initial empirical work focuses on the effect of housing market conditions on the receipt of gifts from relatives. The results show that, controlling for income, age, and family size, first-time home buyers in cities with higher house prices and rates of appreciation fund a larger proportion of the down payment with gifts from relatives. No such pattern is evident for repeat buyers. This suggests that gifts are targeted

to constrained households, since repeat buyers are less likely to have difficulty putting together a down payment; they tend to use the equity from their previous home.

Next, the article explores the pattern of gift receipts using a sample of mortgage applicants. Evidence shows that households with lower incomes and net worth, more years of education, and poor credit histories are more likely to have a gift or grant as part of the down payment. These findings further support the hypothesis that such transfers are targeted to households financially constrained in their housing decisions, versus the alternative hypothesis that gifts are purely related to family wealth and have nothing to do with the ability of the recipient to get a loan.

I. Gifts for Home Purchase: Economic Hypotheses

There are many possible explanations for private income transfers between households. Most transfers—defined in most data sets as a gift or a loan by a relative—are intergenerational and can be motivated by altruism to or exchange with family members.¹ Transfers can be inter vivos or bequests, and if they are bequests they can be intentional or unintentional. Most previous research has examined whether gifts are altruistic in nature or exchange-motivated and has not focused on the timing or specific reasons that gifts were given. Exceptions include Cox (1990), Cox and Japelli (1990), and Guiso and Japelli (1991), who study whether private income transfers are targeted toward "credit-constrained" households. While they present evidence in the affirmative, the specific credit constraints the households actually face are not made clear.

This study focuses on transfers for a specific purpose: down payments for home purchase. It documents the frequency and magnitude of transfers for down payments and explores the relative importance of economic explanations for their occurrence. For example, transfers might be targeted to "constrained" households or to households showing "merit" through education, marriage, or children, or

¹ Cox (1987) has explored the implications of models of altruism and exchange and develops and implements empirical tests in order to differentiate between the competing hypotheses. He finds evidence that favors exchange-motivated behavior and casts doubt on the empirical relevance of pure altruism.

they might just be the conduit for the intergenerational transmission of wealth.²

The latter two hypotheses seem fairly straightforward. If gifts reward merit, their receipt should be positively related to years of education, being married, or having children. If gifts are given solely to encourage "desirable" behavior, and are not related to actual need, then one would expect no correlation between gift-giving and aggregate economic or housing activity. The relationship between gift giving and economic activity might be complicated, however, if families living in areas with high housing price appreciation are wealthier and thus give more money to their children who live nearby. Because first-time buyers are much more likely than repeat buyers to be constrained in cities with rising house prices, comparisons between first-time and repeat buyers may separate these two explanations.

In deciding to purchase a home, many households face binding down payment and obligation ratio constraints, which can be released by increasing the amount of the down payment.

The question of whether gift giving is related to family wealth may at first seem obvious. After all, a family must have wealth in order to give a gift. The purpose of this study, however, is to explore whether the timing and magnitude of the gifts are related to constraints faced by the receiving household. Households' housing purchases may be constrained by current income that is low relative to expected permanent income or because they have insufficient assets to meet the minimum down payment requirement. If constrained households are more likely to get family help, households receiving gifts may appear to be "poorer" than households not receiving gifts, despite the fact that their families may actually have more financial resources than the families of those who do not receive a gift.

In deciding to purchase a home, many households face binding down payment and obligation ratio constraints. Down payment requirements on conventional mortgages range from 5 to 20 percent of

the purchase price of the home. For example, to purchase a \$150,000 home, the typical 10 percent minimum down payment would require a prospective first-time buyer to accumulate, in the absence of transfers, \$15,000 in savings plus another \$4,500 to \$7,500 to pay for points and closing costs. This is a rather substantial amount for many young American households. Typically, households that do not put 20 percent down must also purchase private mortgage insurance at the additional cost of 25 basis points per year. Households that qualify for low down payment, government-insured loans, through agencies such as the Federal Housing Administration (FHA) or the Veterans Administration (VA), may face down payment requirements as low as 2 to 3 percent. These loans have strict maximums, however, that have in the past effectively limited their use to the South and Midwest, where nominal house prices are low.

The obligation ratio guideline stipulates that mortgage payments, plus property taxes and insurance premiums, not exceed a certain fraction of gross income, usually 28 percent.³ Importantly, the obligation ratio is measured in terms of current, not permanent, income. Therefore, young households expecting their incomes to rise over time may be constrained in the size of their first home purchase by this requirement. Whether or not the obligation ratio constraint binds will depend on the amount of the down payment, since a larger down payment reduces the loan amount, decreasing the mortgage payments. That is, a household can always release the obligation ratio constraint by putting more money into the transaction.

Empirically, the down payment constraint has been shown to be the most important of the two. Engelhardt (1992) shows that down payment requirements are binding liquidity constraints and that households significantly distort their preferred consumption profiles in order to accumulate the down payment. Engelhardt (1994) also finds that the decision to save for home purchase is substantially affected by the interaction between house prices and down payment requirements: house price increases raise down payment amounts for any given percentage down payment requirement and, hence, require more savings to purchase the same home.

² For estimates of the magnitude of transfers in the accumulation of aggregate wealth, see Modigliani (1988), Kotlikoff (1988), and Gale and Scholz (1990).

³ In practice, financial institutions consider the whole application, and so might allow borrowers to have a higher obligation ratio if they also have a higher net worth or a good credit history.

Several articles show the obligation ratio to be less critical. In separate studies of mortgage loans passed on to the secondary market, Linneman and Wachter (1989) and Zorn (1989) show that actual obligation ratios often exceed those stated in the secondary market underwriting guidelines, suggesting that the obligation ratio constraint is often not binding, and that lenders consider the quality of the whole mortgage application rather than looking at each variable individually. Munnell and colleagues (1992) get a similar result in a study of mortgage applicants. Finally, in a recent study, the U.S. Bureau of the Census (1991) found that most renters could afford the monthly payments on the average-priced house in their region but lacked the assets to make a typical down payment.

Mortgage lending institutions may view gifts in two ways. Lenders may see households that receive gifts for down payments as riskier mortgage applicants, since these households are likely to be using the gift to purchase a larger house than they could otherwise afford on their own resources. On the other hand, lenders may view these gifts favorably in that they signal a familial safety net in the lending relationship: the household is less likely to default and forgo the family's investment or, if the household's cash flow is interrupted, the family may step in to financially support the household in distress. Evidence from the study by Munnell and others (1992) of mortgage applicants is consistent with the latter hypothesis about lenders' views of gifts, showing that applicants with a gift or grant are less likely to be rejected, controlling for other information on the mortgage application.⁴

II. Frequency and Size of Gifts

Summary statistics on the sources of funds for down payments by first-time buyers are presented in Table 1. These figures are taken from the Chicago Title and Trust Company's annual survey of recent home buyers, entitled *Who's Buying Homes in America*, which began in 1976. The survey asks detailed information on income, mortgage financing including the source of funds used to purchase homes, and socio-demographic characteristics. Chicago Title and Trust Company contracts with an independent research

⁴ The coefficient on the dummy variable indicating the receipt of a gift or grant was significantly different from zero with a 10 percent confidence interval.

Table 1
Sources of Down Payments by First-Time Buyers, 1976 to 1982

Percent	1976	1977	1978	1979	1980	1981	1982
a. Sources of Funds, All First-Time Home Buyers							
All Savings and Investments	70.9	75.6	73.5	43.8	51.1	63.8	67.6
Some Help from Relatives	20.4	14.3	8.7	32.6	32.6	17.0	21.3
Half or More from Relatives	10.6	9.2	6.8	15.2	26.2	7.3	15.5
Entirely from Relatives	5.8	4.2	2.9	6.4	6.1	.7	3.9
Part from a Lending Institution	6.8	7.6	13.7	17.5	8.1	6.5	6.6
b. Percent of Down Payment, by Source of Funds, All First-Time Home Buyers							
Own Savings and Investments	80.1	84.7	79.9	62.5	66.9	74.5	76.7
Lending Institution	4.5	4.4	11.6	13.2	6.3	5.6	6.6
Relatives	10.8	8.4	6.2	14.4	19.5	7.0	11.3
Others	4.0	2.5	2.2	10.2	7.7	13.3	5.4
c. Average Percent of Down Payment Coming from Relatives, for First-Time Home Buyers Receiving Help from Relatives							
	52.9	58.7	71.3	44.2	59.8	41.2	53.1

Source: Chicago Title and Trust Co., *Who's Buying Homes in America*, 1976 to 1982.

organization to interview buyers via telephone. The number of households surveyed varied between 500 and 1,000 in the 1976 to 1987 surveys. Starting in 1988, the survey was expanded to about 2,000 households, covering 18 major metropolitan areas.

Panel a. of Table 1 shows the percentage of first-time home buyers reporting various sources for down payments for the years 1976 to 1982. Unfortunately, the Chicago Title and Trust surveys do not report these figures after 1982. The frequency of gifts for the entire down payment is low: on average, only 4 percent of first-time buyers finance their down payments wholly from funds from relatives.⁵ The fraction of buyers receiving some type of help from relatives is much higher, averaging about 20 percent. The vast majority of first-time buyers accumulate their down payments from their own savings. Panel b. reports the fraction of down payment funds by

⁵ Note that help from relatives in the Chicago Title and Trust survey includes loans as well as gifts.

Table 2
Sample Statistics for First-Time Buyers, 18 Cities, 1992
 Ranked by Median Sale Price as Reported by National Association of Realtors

City	NAR Median Price (\$)	First-Time Buyer				
		Median Purchase Price (\$)	Median Income (\$)	Years to Save	Gift Percent of Down Payment	Down Payment Percent of Price
San Francisco	254,800	211,100	61,800	3.0	18.2	16.8
Orange County	234,900	168,100	63,900	3.4	22.1	12.4
Los Angeles	213,200	183,600	59,200	4.8	20.4	15.7
New York	172,700	148,100	60,200	4.2	12.6	24.6
Boston	171,100	144,000	57,100	3.7	8.7	17.0
Washington	157,800	130,000	66,700	2.7	10.2	14.2
Seattle	145,700	114,300	51,300	2.3	15.5	14.3
Chicago	136,800	112,900	47,400	2.9	13.8	15.3
Philadelphia	117,000	103,600	47,200	2.8	8.6	14.7
Denver	96,200	82,400	39,400	1.9	16.7	11.7
Atlanta ^a	95,600	91,400	50,800	2.5	12.4	11.0
Minneapolis	94,300	89,300	46,400	2.0	15.5	11.9
Dallas/Fort Worth	91,300	92,200	46,400	1.9	17.9	15.7
Cleveland	90,700	70,100	41,000	2.4	8.5	16.2
Orlando	87,600	81,600	40,600	2.1	12.4	16.4
Phoenix	86,800	76,800	47,800	1.4	14.6	12.6
Memphis	85,300	73,700	39,400	2.2	7.0	17.2
Detroit	81,300	75,300	52,800	2.6	15.2	14.1

^aThe Atlanta median price was calculated by indexing the 1991 median price to the percentage change in median price between 1991 and 1992 as reported in the Chicago Title and Trust survey.

Source: National Association of Realtors; Chicago Title and Trust Co., *Who's Buying Houses in America*, 1992.

type of source. In the period 1976 to 1982, roughly 80 percent of all down payment funds came from own savings, whereas approximately 10 percent came from relatives. Panel c. combines information from the previous two panels, showing that, for those who did receive help from relatives for the down payment, the magnitude of the help is substantial, averaging 50 percent of the down payment.

Similar figures for repeat buyers (not shown in Table 1) indicate that 66 percent of the funds used in the down payment comes from the sale of the previous home and 28 percent from own savings, whereas only 2 percent comes from relatives. The stark difference between the incidence of gifts for first-time (panel b.) and repeat buyers suggests that gifts for housing purchase may be mostly targeted to households initially constrained in the housing market. Once households become home owners, they rely on accumulated home equity to finance subsequent home purchases.

Table 2 shows the relationship between house

prices, income, down payment saving behavior, and gifts for the sample of 18 metropolitan areas surveyed by Chicago Title and Trust in their 1992 survey. The metropolitan areas are ranked in descending order by the National Association of Realtors (NAR) median home price, and are broken into three tiers. The top tier includes the most expensive areas, three cities in California. The middle tier contains the mid-priced cities of the Northeast corridor as well as Seattle and Chicago. The bottom tier includes the less expensive cities of the Midwest and South.

The table does not show a strong inverse correlation across all cities between house prices and the percentage of down payments from relatives. Rather, patterns between price tiers appear to exist. Gifts from relatives are more important in the very expensive California cities than anywhere else in the country. Beyond these cities, however, no positive correlation can be seen between gifts and house prices. On average, 12.6 percent of down payments came from relatives in New York, and the same was true in

Atlanta and Orlando. This is particularly interesting since government-insured FHA/VA mortgages with low down payments are much more popular and more widely available in the South and Midwest. That is, it is likely that average first-time home buyers face lower down payment requirements in these areas than on the East and West coasts, yet they receive just as high a percentage of the down payment in gifts as buyers in the middle price tier.

A second way of looking at the role of gifts is to compare them with average time required to save, which is given in years in the fourth column of the table.⁶ A positive relationship can be seen between time to save and the gift percentage of the down payment for residents of cities in the upper two tiers. Longer times to save are associated with higher percentages as gifts. One interpretation might be that households in these areas are constrained in a way that requires both long periods to save for the down payment *and* help from relatives in order to afford a first home. For households in the bottom price tier of cities, however, an inverse correlation exists between time to save and family help. Here, it appears that the time to save for a down payment is shorter, owing to the receipt of gifts. That is, gifts in these cities "buy off" time to save for households, allowing them to purchase earlier than if they had not received a gift.

III. House Prices and the Receipt of Gifts: Empirical Results

This section examines the relationship between house prices and the receipt of gifts from relatives, using the Chicago Title and Trust survey of recent home buyers for the five years 1988 to 1992. For each of the 18 cities in Table 2, the surveys provide data on the average percentage of the down payment funds that comes from relatives, which is the dependent variable in our analysis, for both first-time and repeat buyers. Pooling these cities over the five years yields 90 observations on average gift and home purchase behavior for each set of buyers.

As noted earlier, the hypothesis that gifts for housing purchase are related to housing constraints predicts a positive relationship between gifts and house prices as well as between gifts and the rate of house price appreciation. In areas where house prices are rising faster than incomes, owner-occupied housing becomes less affordable. To the extent that these price increases are associated with rent increases, the prospective first-time home buyer is doubly affected,

since less income remains after paying rent from which to save for the down payment, which is increasing along with house prices.

The estimation results for first-time home buyers for a number of specifications are presented in Table 3. Since the dependent variable is constrained to lie between 0 and 100, ordinary least squares estimation would induce heteroskedastic errors. Weighted Least Squares (WLS) corrects for this heteroskedasticity. The weights equal the inverse of the square root of the error variance, which is $P^*(100 - P)$, where P is the dependent variable. The base specification is given in column 1. The explanatory variables are average age, family size, and real pre-tax income of first-time buyers, all taken from the Chicago Title and Trust surveys, and real median house prices and rates of appreciation for all single-family houses, constructed from NAR data. The income and house price variables are indexed to 1992 dollars using the national consumer price index less the shelter component.

The results in column 1 indicate that the percentage of down payment funds from relatives is higher in cities with high house prices. The coefficients suggest modest effects: the average percentage of down payment funds increases 4 percentage points for every \$100,000 increase in real house prices. None of the other coefficients, however, are statistically different from zero, possibly because the data contain only city-year averages.

The estimates in column 2 include the real one-year rate of house price appreciation for each city-year observation. It is positively but not significantly related to the amount of gift receipt. In column 3, which also includes year dummies, the appreciation rate is still positive and becomes significantly different from zero at the 10 percent significance level. The test that all the coefficients on the year dummy variables equal zero, however, cannot be rejected at conventional significance levels. The estimated coefficient on the house appreciation rate implies that a 1 percentage point increase in the real rate of appreciation raises the average percentage of down payments from gifts by 0.1 percentage points. This effect seems plausible, but small in size.

Households that live in certain cities may have particular tastes for transfers to their children. If these transfers are simply from wealthy households to their children, then one would expect city-specific patterns to play a role in gift receipt, since the distribution of

⁶ The Chicago Title and Trust Company survey asks each buyer how long it took to save the down payment amount.

Table 3
Weighted Least Squares Dependent Variable: Average Percentage of Down Payment from a Gift, for First-Time Buyers

Variable	(1) All Cities	(2) All Cities	(3) All Cities	(4) All Cities	(5) Coastal Cities	(6) Non-Coastal Cities
Average Age	.19 (.33)	.21 (.33)	-.03 (.35)	-.14 (.39)	.92 (.50)	-.46 (.52)
Average Family Size	1.99 (1.84)	1.97 (1.85)	1.64 (1.91)	2.42 (2.21)	1.83 (2.43)	3.19 (2.83)
Real Median Family Income	-.07 (.08)	-.08 (.08)	-.04 (.08)	-.07 (.12)	-.11 (.10)	-.12 (.12)
Real Median House Prices	.04 (.01)	.04 (.01)	.04 (.01)	-.03 (.05)	.04 (.02)	.03 (.05)
Real One-Year Appreciation Rate		7.34 (7.32)	11.34 (7.47)	3.79 (7.62)	16.4 (8.24)	-14.99 (15.29)
Constant	-.03 (10.09)	-.39 (10.16)	7.97 (10.78)	24.42 (14.15)	-20.29 (15.81)	18.82 (16.64)
Year Dummies	no	no	yes	yes	no	no
City Dummies	no	no	no	yes	no	no
P-Value: Year Dummies ^a			.17	.31		
P-Value: City Dummies ^b				.001		
Number of Observations	90	89	89	89	40	49
R-Square	.15	.16	.23	.56	.25	.07

Note: Columns 2 to 6 have only 89 observations because the NAR median house price for Atlanta is not available for 1987. Standard errors in parentheses.

^aFor the joint test that all of the coefficients on the year dummies equal zero.

^bFor the joint test that all of the coefficients on the city dummies equal zero.

Source: Chicago Title and Trust Co., *Who's Buying Houses in America*, 1988 to 1992.

wealth differs across cities. Therefore, column 4 adds a dummy variable for each city in the sample to the column 3 specification. None of the previous (column 3) variables except the constant have any statistically significant effect on gift receipt. This result should not be surprising, since little cross-time, cross-city variation occurs in the other explanatory variables to identify the other coefficients. In this sense, the city effects are picking up both differences in house price levels across cities (as well as cross-city differences in the other variables) and the true city effects. Without data at the household level, separate city effects cannot be estimated.

The results so far for first-time home buyers provide weak evidence at the city level that the percentage of down payments from relatives depends on house prices, in a manner consistent with the financial constraint hypothesis. Columns 5 and 6 split the sample into two groups, coastal (East and West) cities and non-coastal (South and Midwest)

cities, to test whether the behavior varies according to region. Since residents of the South and Midwest have access to low-down-payment, FHA/VA loans and most residents of the coastal cities do not, one would expect households in the non-coastal cities to be less financially constrained. The results in columns 5 and 6 confirm this. In the coastal cities, older buyers, and higher house prices and appreciation rates, are positively related to the fraction of the down payment in the form of a gift. These results are all statistically different from zero with at least 10 percent significance. Conversely, in the non-coastal states, none of these factors has any significant bearing on gift receipt.

Table 4 estimates the same specifications for repeat home buyers. House prices and rates of appreciation have no statistical effect on gift receipt in any of the specifications. In fact, none of the explanatory variables (except the city dummy variables in column 3 and real median family income in column 6)

Table 4
Weighted Least Squares Dependent Variable: Average Percentage of Down Payment from a Gift, for Repeat Buyers

Variable	(1) All Cities	(2) All Cities	(3) All Cities	(4) All Cities	(5) Coastal Cities	(6) Non-Coastal Cities
Average Age	-.07 (.08)	-.08 (.08)	-.10 (.09)	-.13 (.09)	-.24 (.17)	.01 (.10)
Average Family Size	-.79 (.72)	-.87 (.73)	-.89 (.74)	-1.12 (.96)	-.59 (1.10)	.34 (1.23)
Real Median Family Income	-.01 (.03)	-.01 (.03)	-.004 (.03)	-.01 (.05)	.08 (.06)	-.06 (.03)
Real Median House Prices	.05 (.05)	.05 (.05)	.04 (.05)	-.03 (.02)	-.04 (.09)	.10 (.16)
Real One-Year Appreciation Rate		-2.71 (2.78)	-2.14 (2.94)	.44 (3.12)	-.04 (.04)	-5.24 (5.02)
Constant	8.35 (5.21)	8.89 (5.25)	10.00 (5.41)	16.65 (7.06)	9.21 (9.34)	3.93 (6.91)
Year Dummies	no	no	yes	yes	no	no
City Dummies	no	no	no	yes	no	no
P-Value: Year Dummies ^a			.61	.60		
P-Value: City Dummies ^b				.02		
Number of Observations	90	89	89	89	40	49
R-Square	.03	.04	.07	.41	.13	.11

Note: Columns 2 to 6 have only 89 observations because the NAR median house price for Atlanta is not available for 1987.

Standard errors in parentheses.

^aFor the joint test that all of the coefficients on the year dummies equal zero.

^bFor the joint test that all of the coefficients on the city dummies equal zero.

Source: Chicago Title and Trust Co., *Who's Buying Houses in America*, 1988 to 1992.

have any statistical effect on the receipt of gifts for down payments. The difference between the first-time and repeat buyers is striking and is consistent with the view that the most important role of gifts is to loosen the down payment constraint for first-time buyers.

IV. Who Gets Gifts for Home Purchase? Evidence from HMDA Data

The results from the previous section, although consistent with the use of gifts to alleviate housing finance constraints, indicate the limitations of using city-level data in the analysis. In order to explore more directly other possible explanations of gifts, this section uses data taken from a sample of mortgage applications in metropolitan Boston in 1990 to estimate the determinants of the likelihood of receiving a gift for a down payment. These data were supplied to

the Federal Reserve Bank of Boston by various Boston banks to assist in a study of the determinants of mortgage loan approval. The data include all black and Hispanic applicants plus 3,300 randomly selected white applicants. The Home Mortgage Disclosure Act (HMDA) requires that lending institutions report income, race, gender, census tract of the property to be purchased, and whether each application was rejected or accepted. The Federal Reserve Bank of Boston augmented the HMDA data for 1990 by requesting additional information found on the mortgage application, including employment history, credit history, co-applicant data, other demographic information, and whether or not the applicant received a gift or grant for part of the down payment. The data set is described in detail in Munnell and others (1992).

This article uses the general research data set from the original Boston Fed data. This data set contains limited data on some of the previously

discussed variables in order to protect the confidentiality of the original applicants. The general research data set was supplemented with complete information about the applicant's age and education. The sample used in this article contains only applications that contain complete information for all variables used in the subsequent analysis.

The gift variable in the Boston Fed data includes both gifts from relatives and grants from other sources, including community organizations. Although the data do not distinguish between these two sources, discussions with bankers suggest that few, if any of the gifts noted in the data are actually grants.

The probability of receiving a gift as part of the down payment is modeled as a function of applicant demographic characteristics, whether or not there was a co-applicant, household income and net worth, employment history, and credit history, using a probit model. Applicant demographic characteristics include age, number of years of education, number of dependents, and whether the applicant was a male, a minority, and married, respectively. Three variables control for consumer credit history: whether the applicant had no credit history, had one or more accounts in slow-pay status, and had any current delinquencies.⁷ The number of years in the current line of work and the number of years in the current job are the employment history variables.

Table 5 gives the means for the variables in the sample data reported separately for first-time and repeat buyers and for those who received a gift and those who did not. On average, applicants receiving gifts are younger and have more years of education and fewer dependents. They have smaller incomes and net worth and shorter employment histories, and they are more likely to have a history of delinquent credit. Finally, those receiving gifts request mortgage loans with higher loan-to-value ratios—which imply lower down payments—and larger obligation ratios. Thus, they appear to be more financially constrained than applicants without gifts.

Since the results presented earlier suggest that the receipt of gifts for down payments may vary systematically between first-time and repeat buyers, the probit results also are presented separately for the two types of buyers. Table 6 gives the estimation

⁷ The credit history variables from Munnell and others (1992) were combined into a smaller number of variables for this analysis. Current delinquencies include any applicants with one or more account that is at least 60 days delinquent.

Table 5
Sample Means: Boston Mortgage Applicants

Variable	First-Time Buyers		Repeat Buyers	
	Received a Gift	No Gift	Received a Gift	No Gift
Age of Applicant (years)	32.3	35.7	35.1	39.1
Years of Education	15.0	14.9	16.3	15.9
Married (%)	.57	.52	.67	.75
Male (%)	.75	.76	.81	.87
Minority (%)	.27	.29	.18	.12
Number of Dependents	.6	.7	.8	1.0
Coapplicant (%)	.70	.67	.81	.81
Median Monthly Income (\$)	4,342	4,428	5,948	6,452
Median Net Worth (\$)	40,000	57,000	115,000	203,000
Less than Two Years in Line of Business (%)	.14	.10	.08	.04
Less than Two Years in Current Job (%)	.35	.31	.27	.24
No Credit History (%)	.04	.06	0	0
Has Chronic Slow Payments (%)	.21	.21	.36	.28
Has Delinquent Credit History (%)	.22	.18	.19	.13
Loan-to-Value Ratio	.83	.79	.73	.71
Obligation Ratio	34.1	33.0	33.2	33.1
Number of Observations	423	1,491	85	790

Source: Federal Reserve Bank of Boston.

results for the sample of 1,914 first-time buyer applicants. The base specification is presented in column 1. The estimation results are similar to the patterns in the sample means shown in Table 5. Younger, married applicants are statistically more likely to get gifts for home purchase, consistent with the hypothesis that transfers are given because families see owner-occupied housing as a reward for meritorious behavior. However, number of dependents is not an important determinant of gift receipt, which goes against the aforementioned hypothesis.

The employment history variables have little statistical impact on the receipt of a gift. One of the credit history indicators does, however. Households with delinquent credit are more likely, all other things equal, to receive a gift for home purchase,

Table 6
Probit Equation Dependent Variable:
Applicant Received a Gift (1 = Yes)
 (Standard Errors)

Variable Sample	(1) First-Time Buyer	(2) First-Time Buyer	(3) Repeat Buyers	(4) Repeat Buyers
Age	-.026 (.004)	-.025 (.004)	-.033 (.008)	-.033 (.008)
Education	.028 (.013)	.030 (.013)	.057 (.023)	.058 (.023)
Married	.222 (.085)	.229 (.086)	-.176 (.176)	-.179 (.176)
Male	-.083 (.086)	-.084 (.087)	-.246 (.185)	-.241 (.186)
Minority	-.064 (.079)	-.092 (.080)	.190 (.175)	.195 (.177)
Number of Dependents	-.026 (.035)	-.025 (.035)	-.040 (.059)	-.042 (.059)
Coapplicant	.077 (.090)	.057 (.091)	.285 (.198)	.283 (.198)
Total Monthly Income (000s)	-.086 (.018)	-.077 (.019)	-.040 (.018)	-.042 (.018)
Less than Two Years in Line of Work	.086 (.117)	.096 (.118)	.229 (.273)	.232 (.273)
Less than Two Years in Same Job	-.042 (.083)	-.042 (.083)	-.044 (.149)	-.047 (.150)
No Credit History	-.133 (.163)	-.125 (.163)		
One or More Slow Accounts	.028 (.085)	.018 (.085)	.250 (.137)	.252 (.137)
Current Delinquencies	.181 (.087)	.174 (.088)	.353 (.178)	.362 (.179)
Constant	.018 (.254)	-.303 (.300)	-.720 (.485)	-.601 (.545)
Total Net Worth (000s)		-.276 (.105)		.013 (.067)
Obligation Ratio		.003 (.004)		-.003 (.006)
Loan-to-Value Ratio		.184 (.090)		-.042 (.232)
Number of Observations	1,914	1,914	875	875
Log Likelihood	-964.0	-957.7	-257.5	-257.3

Source: Federal Reserve Bank of Boston.

which is consistent with the hypothesis that credit-constrained households are more likely to receive familial help.

Higher educational levels and lower incomes are both positively related to the receipt of gifts. Two interpretations can be offered for this finding. First, these are households that have low current income but high permanent income (as measured by education). These households are constrained to buy a smaller house than is consistent with their permanent income because the obligation ratio is tied to current income. Alternatively, educational level may proxy for the wealth of the applicant's family. A home purchase may just serve as a trigger event for the wealthy to transfer assets to their children that they would have otherwise transferred at a later date.

Total net worth is added as an explanatory variable in column 2 of Table 6. If applicants who receive gifts are income-constrained, then we would expect an inverse relationship between the receipt of a gift and net worth. Alternatively, if gifts are simply wealth transfers from the wealthy to their offspring, one might predict a positive relationship between gifts and net worth if the children of the wealthy have relatively more net worth than the children of families with less wealth. Net worth in this study is that reported by the applicant on the mortgage application and should include the value of the gift in the net worth figure if net worth is reported correctly.⁸ In this sense, net worth is endogenous. If the applicant included the value of the gift in net worth, the data would show a positive relationship between gift receipt and reported net worth. According to the results in column 2, however, the estimated coefficient on net worth is actually negative and statistically different from zero with more than 99 percent confidence. In addition, the coefficients on the other variables change very little.

The specification in column 2 also includes the obligation ratio and the loan-to-value ratio. Again, the obligation and loan-to-value ratios are endogenous because these variables may include the proceeds of any gifts, and thus a negative relationship would be expected between gift receipt and the loan-to-value and obligation ratios. Despite the abovementioned bias, the estimation results show that households with higher loan-to-value ratios—

⁸ Because of problems in verifying net worth and questions about when the actual transfer of the gift takes place, the reported net worth for some applicants may not include the proceeds of the gift.

less money put down—are more likely to receive gifts for the down payment, with the result statistically different from zero at the 5 percent level. Again, financial constraints appear important.

The results for prospective first-time buyers strongly support the view that financially constrained households are the most likely to receive support from others in financing the down payment. If financial constraints are truly important, one would expect to see a larger frequency of transfers at the first-time buyer level, where the constraints are more likely to bind, and one also would expect that the financially constrained repeat buyers, however few there are, also would receive gifts.

*Family gifts allow otherwise
constrained households
to purchase homes earlier
than they would
without a gift.*

As shown in Table 5 and mentioned above, gifts for home purchase are substantially less frequent for repeat buyers. According to Table 5, 22 percent of first-time buyer applicants received gifts while only 9 percent of the repeat buyer applicants received gifts. To explore the determinants of the receipt of a gift for repeat buyers, columns 3 and 4 in Table 6 present estimated probit models for repeat buyers akin to those presented for first-time buyers. Note that the indicator variable "No Credit History" is not included in these regressions.⁹

The results in the last two columns of Table 6 are roughly similar to those for first-time buyers. In particular, younger, more educated, and higher-income households received gifts. In addition, the indicators for current delinquencies and one or more slow pay accounts are positive and statistically different from zero at the 7 percent level, again showing that credit-constrained households are more likely to receive gifts. In contrast to the sample of first-time

⁹ Also, the sample does not include applicants who had already owned a previous home, but had no consumer credit history. The original data contained only 9 such applicants, and the coefficient for the no credit history variable in the subsequent probit equations was unstable.

buyer applicants, however, the measures of obligation and loan-to-value ratios are not statistically important determinants of gift receipt.

V. Conclusion

About one in five first-time home buyers receives some help from relatives in making the down payment, with the average gift to those receiving help roughly one-half of the total down payment. This evidence suggests that gifts for home purchase may be an important fraction of aggregate private transfer activity. Using data from Chicago Title and Trust Company and the National Association of Realtors, it is possible to estimate roughly the value of these family transfers for down payments. In 1992, those computations show that total gifts equaled \$2.5 billion for first-time buyers and \$1.9 billion for repeat buyers, for a total of \$4.4 billion.¹⁰

Gale and Scholz (1990), using data on intergenerational transfers in the 1983 and 1986 Survey of Consumer Finances, estimate that the annual flow of non-educational, non-bequest transfers is \$71 billion in 1992 dollars. Based on the rough calculation above, transfers for down payments would be 6 percent of the annual flow of non-educational transfers.

Although the aggregate value of such gifts is modest, this article shows that these gifts allow otherwise constrained households to purchase a home. Earlier estimates show that the average percentage of gifts is higher in cities with more expensive houses, and that persons who receive gifts have more education, are younger, are more likely to have credit problems, and have smaller net worth than those not receiving gifts. In total, gifts allow households to avoid significant liquidity constraints and purchase homes earlier than they would without a gift.

¹⁰ The calculations were made as follows. The NAR reports that the median sales price of an existing single-family home in 1992 was \$103,700, and 3.5 million single-family homes were sold in the U.S. that year. According to the 1992 Chicago Title and Trust survey, first-time home buyers purchased homes valued at an average of 86 percent of the median, whereas repeat buyers purchased homes valued at an average of 112 percent of the median. Thus, nationally, the median first-time buyer bought an \$89,182 house and the median repeat buyer a \$116,144 house. The average down payments for first-time and repeat buyers are 15 and 29 percent, respectively. Also, first-time buyers buy about 45 percent of all homes sold in a given year. Finally, 12 and 3 percent of down payment funds came from relatives for first-time and repeat buyers, respectively. Putting together all of these estimates gives the estimates cited in the text.

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