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A NOTE ON REVENUE FORECASTING DURING THE DUKAKIS ADMINISTRATIONS

Daniel R. Feenberg

Harvey S. Rosen

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ABSTRACT

Critics of Governor Michael Dukakis have suggested that this year's $400 million overestimate of tax revenues in Massachusetts casts doubt on his putative managerial skills. In this paper, we carefully examine the entire Dukakis forecasting record. We find that the 1988 experience was "unusual" in the sense that on average, revenue forecasts produced by his administration have been too low rather than too high. In addition, we find that there is no significant difference between the quality of the Dukakis forecasts and those of his predecessors in Massachusetts. Hence, those who seek to discover anything extraordinarily positive or negative about Dukakis' managerial capabilities should shift their attention to skills other than revenue forecasting.

Daniel R. Feenberg
National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138

Harvey S. Rosen
Department of Economics
Princeton University
Princeton, NJ 08544

I. Introduction

Customarily, discussions of state revenue forecasting are consigned to the pages of journals on government administration. In recent months, however, the problems caused by large underestimates of revenues in California, Massachusetts and New York have received substantial publicity in the national press. The situation in Massachusetts has received particular attention due to the Presidential aspirations of Governor Michael Dukakis. The Dukakis campaign has emphasized his superb managerial skills. Critics of Dukakis argue that the revenue shortfall in Massachusetts is evidence that these skills are not all that they are cracked up to be. For example, after the magnitude of the revenue shortfall became public, The Wall Street Journal approvingly quoted a Massachusetts official who said, "The Massachusetts Miracle is starting to sound like the last days of Pompeii."[1]

While we do not believe that good revenue forecasting is necessarily the sine qua non for good administration, neither is it a trivial matter. After all, sensible deliberations about expenditures cannot be made in the absence of "good" forecasts. Indeed, in the presence of constitutional or statutory provisions for balanced budgets, unanticipated changes in revenues can wreak havoc not only on projects that are scheduled for funding, but on plans that have already been put into effect as well. Hence, we believe that an evaluation of an administration's forecasting

[1] Wall Street Journal, May 20, 1988, page 22.

ability plays an important role in assessing its overall competence.

The first thing to realize when conducting such an evaluation is that state revenue forecasters operate in an environment characterized by great uncertainty. Future revenues generated by a given revenue structure depend on future values of variables like employment, population, and nominal income, none of which is easy to predict. Additional uncertainty is created since the state tax structure itself may be changed in the future. Such changes depend in part on the political climate in the state, another thing that is hard to predict. Operating in such an environment, forecasters cannot be expected to obtain precisely correct answers.

Related to this point is the observation that it is not sensible to evaluate an administration solely on the basis of any given year's outcome. Due to random fluctuations any particular forecast may be quite "bad," and this is not necessarily the "fault" of the administration. Indeed, extraordinary fluctuations in certain variables may make forecasting intrinsically more difficult in some periods than others; one should try to take such fluctuations into account in evaluating forecasts.

This paper uses such an approach to evaluate the forecasting record of the Dukakis administration. The relevant institutional issues are described in Section II. Section III discusses the data and results. We find that overall, there is not much to

distinguish the Dukakis forecasting record from that of other Massachusetts governors. That is, on average, his forecast errors do not differ significantly from those of his predecessors. Section IV concludes with a summary.

II. Institutional Background

The last week of every January the Governor of Massachusetts submits to the legislature a budget statement that includes forecasts of revenues and expenditures. The forecast for each item is made over two time horizons. The first, which we call the short forecast, is for the fiscal year that began the previous July 1. The second, which we call the long forecast, is for the fiscal year beginning the subsequent July 1. Hence, the short forecast presented in January 1988 covers the period July 1, 1987 to June 30, 1988; the long forecast contained in that message is for July 1, 1988 to June 30, 1989.

In most states, forecasts are made by a budget division within the executive branch (Hyde and Jarocki [1983, p. 266]. The final responsibility lies with the governor, who reviews the forecasts, and can modify them before presentation. Massachusetts is typical in these respects. The forecasting process begins in the October preceding the budget address, and a set of figures is produced by the Bureau of Administration and Finance (BA&F) in November. However, these figures are usually revised once or twice before the budget message goes to press in January.

Revenue forecasting methods differ widely across the states.

Some states rely on econometric models, others on much more informal methods. In Massachusetts, formal econometric modelling plays a greater role than it does in many other states. The BA&F receives econometric forecasts for Massachusetts generated by a consulting firm (Data Resources, Inc.), and then plugs these forecasts into a micro simulation model based on Massachusetts tax returns. However, all forecasts are subject to the judgment of "old hands," and some revenue sources are forecast without any formal modelling at all.

III. Evaluating The Revenue Forecasts

Table 1 shows total tax revenues during each year Dukakis was governor, along with the corresponding short and long forecasts. Thus, for example, reading the row for the year 1987 indicates that in January 1986, Dukakis predicted that the revenues for fiscal 1987 would be $7.88 billion; in January 1987 he revised this estimate down to $7.73 billion, and actual tax revenues were $8.10 billion. The 1988 fiasco is represented by the fact that the short forecast of $8.64 billion exceeded actual revenues of $8.24 billion, a shortfall of $400 million. Note, however, that such over-optimistic predictions of revenues are not the rule. For the four years preceding 1988, both the short and long forecasts were less than actual tax revenues.

Because the level of nominal tax revenues quadrupled between 1975 and 1988, comparisons across time are facilitated by computing the forecast errors for each year as a proportion of total revenues. This is done in Table 2. The quality of the

short forecasts appears to have deteriorated over time in the sense that the absolute values of the proportional forecast errors have increased. Interestingly, the absolute value of the proportional overestimate of 1988 revenue was about the same magnitude as that of the underestimates for 1986 and 1987. Then why was there so much more fuss about the 1988 error than its two predecessors? One obvious answer is the increased prominence of Governor Dukakis in national politics. However, this also appears to be a manifestation of a more general phenomenon -- politicians and journalists appear to regard over-optimistic revenue forecasts as being worse than over-pessimistic ones. (See Feenberg, et al. [1988].)

In any case, as we emphasized in the previous section, a given set of revenue forecasts cannot be analyzed in a vacuum. We do not know whether the figures in Table 2 are "good" or "bad" without some basis for comparison. One possibility is to compare the Dukakis forecasting record to that of other Massachusetts governors. This is done in Table 3. The first column shows statistics relating to the Dukakis administrations; the second column relates to all other governors since 1953. The first row in the column is for reference. It indicates that during the Dukakis years, actual tax revenues grew at 12.1 percent annually, a bit higher than the 11.5 percent rate during other administrations. The second and third rows refer to the errors in the predictions of proportional revenue growth. Specifically, let R_t be the actual proportional change in nominal revenues in

year t, and F_t be the forecast of R_t. The second row shows the mean value of $R_t - F_t$. The positive value of both of the mean errors in row 2 indicates that on average, both Dukakis and other Massachusetts governors tended to underestimate revenue growth. The Dukakis short forecasts have been somewhat more optimistic than those of other Massachusetts governors in the sense that their mean value is closer to zero. On the other hand, Dukakis' long forecasts have been more pessimistic.

Of course, a lower mean value might be associated with a regime in which the forecasting is done very poorly, but large positive and negative errors happen to cancel each other out. To investigate this possibility, we also computed the mean absolute value of the forecast error. (See row 3.) For the short forecasts, the mean absolute value of $R_t - F_t$ is essentially the same for Dukakis and other Massachusetts governors. For the long forecasts, Dukakis has been more accurate in the sense that the mean absolute error is smaller, but the difference is not statistically significant.

Interpretation of the figures in Table 3 is complicated by the fact that the underlying difficulty of making revenue forecasts may vary from year to year. Suppose, for example, that income growth during the Dukakis administrations was less volatile than during other administrations. Then in a sense it was "easier" to forecast during his administrations, and the fact that the proportional errors in his long forecasts were smaller should not be attributed to any special forecasting skill. On

the other hand, perhaps the economic environment he faced was more volatile than others, in which case the figures in Table 3 do not do justice to his forecasting ability.

In order to investigate these possibilities, we estimated two regressions of the form:

$$(R_t - F_t)^2 = a_0 + a_1 INC_t^2 + a_2 INC_{t-1}^2 + a_3 INC_t \times CPI_t + a_4 POP_t^2 + a_5 EMP_t^2 + a_6 TAX_t^2 + a_7 DUKE_t + e_t,$$

where[2]

$(R_t - F_t)^2$ = square of the proportional forecast error in year t;

INC_t = proportional change in nominal personal income in period t minus its mean growth rate;

CPI_t = proportional change in the Consumer Price Index in period t minus its lagged growth rate;

POP_t = proportional change in population in year t minus its mean growth rate;

EMP_t = proportional change in nonagricultural employment in period t minus its mean growth rate;

TAX_t = proportional change in revenues due to legislative modifications of the Governor's tax proposals.

$DUKE_t$ = 1 for revenue forecasts made during a Dukakis administration, and zero otherwise; and

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[2]Data sources are as follows: Employment: Bureau of Labor Statistics, Statistical Abstract of the United States, various issues; CPI: Economic Report of the President 1987, Table B-57; Population and Personal Income: Bureau of Economic Analysis, State Personal Income: 1929-82, U.S. Government Printing Office, Washington, DC 1984, pp. 79-82, and updated with various issues of the Statistical Abstract of the United States. Data for 1988 are based on the authors' projections; when the regressions in Table 4 were estimated with 1988 deleted, the results were essentially unchanged.

e_t = random error.

The rationale behind this specification is that the squared forecast error is a function of innovations in variables like income, and the innovation in a particular variable can be measured by the difference between its actual rate of growth and its trend rate of growth. (The exception is TAX_t, the "surprise" in tax revenues due to legislative modification of the governor's tax program. TAX_t is equal to zero if the legislature does as requested by the governor; otherwise, it is the change in revenues attributable to the difference.) By including the squared innovations on the right hand side of a regression with $(R_t - F_t)^2$ as a dependent variable, we are in effect controlling for other factors that might affect forecast errors. Thus, the coefficient on the dichotomous variable DUKE indicates whether the Dukakis forecasts were better or worse, holding constant the volatility of the forecasting environment. Of course, there is some arbitrariness in selecting a set of variables to control for volatility, and in determining whether they should be entered with lags and/or interacted with each other. However, the substantive results presented below were unaffected by various changes in specification.

The regression results are presented in Table 4. Let us first consider the coefficient on the variable of primary importance, DUKE. For both the long and short forecasts, the coefficients are statistically not significantly different from zero. We conclude that revenue forecast errors during the

Dukakis years were about the same as those of other Massachusetts governors. Turning now to the other variables in Table 4, the coefficients are generally insignificant, except for TAX_t. Apparently, uncertainty about the outcome of the legislative process is a more important explanation for forecast errors than volatility in the economic environment.

IV. Conclusion

We have examined data on Massachusetts tax revenue forecasts during the Dukakis administrations in Massachusetts. Our main findings are as follows:

1. Despite the well-publicized shortfall in revenues in 1988, during most years, Dukakis' revenue forecasts have generally been less than actual revenues.
2. The average growth rate of nominal tax revenues during the Dukakis years was about the same as during the administration of other Massachusetts governors since 1953.
3. On average, both Dukakis and other Massachusetts governors have underestimated the rate of tax revenue growth.
4. Once we control for factors that might affect the difficulty of making revenue forecasts, there is no statistically significant difference between the Dukakis record of revenue forecasting and that of other Massachusetts governors.

In short, the 1988 shortfall in revenues is not part of a

pattern of terribly incompetent forecasting. On the other hand, there is nothing that makes Dukakis' record as a revenue forecaster stand out against that of his predecessors. Hence, those who seek to discover anything extraordinarily positive or negative about Dukakis' managerial capabilities should shift their attention to skills other than revenue forecasting.

Table 1

Tax Revenues and Their Forecasts*
(millions of dollars)

Year	Total Tax Revenue	Short Forecast	Long Forecast
1975	$ 2088	$ 2292	$ **
76	2641	2648	2395
77	2843	2824	2837
78	3208	3094	2951
79	3502	**	3268
1983	4989	5023	**
84	5654	5467	5521
85	6412	6240	6043
86	7484	7168	6670
87	8102	7739	7875
88	8236	8636	8287

*Source: House Bill #1, January of each year.

**Forecast not prepared by the Dukakis administration.

Table 2

Proportional Errors in Tax Revenue Forecasts*

Year	Proportional Revenue Growth	Short Forecast	Long Forecast
1975	-.083	-.089	**
76	.26	-.0032	.11
77	.076	.0064	.0021
78	.12	.040	.090
79	.091	**	.072
1983	.075	-.0073	**
84	.13	.037	.026
85	.13	.030	.065
86	.16	.049	.12
87	.082	.048	.030
88	.016	-.049	-.0062

*Source: Computed from House Bill #1, January of each year.

**Forecast not prepared by the Dukakis administration.

Table 3

Tax Revenue Forecasting*

Dukakis vs. Other Massachusetts Governors

	Dukakis	Other Governors
Average Annual Revenue Growth	0.121 (0.0231)	0.115 (0.0199)
Short Forecasts		
Mean Error	0.00632 (0.0144)	0.0322 (0.0130)
Mean Absolute Error	0.0362 (0.00827)	0.0357 (0.0126)
Long Forecasts		
Mean Error	0.0585 (0.0161)	0.0366 (0.0205)
Mean Absolute Error	0.0599 (0.0154)	0.0754 (0.0159)

*Numbers in parentheses are standard deviations of the means.

Table 4

Regression Results*
(Dependent Variable is $(R_t - F_t)^2$)

	Short Forecasts	Long Forecasts
Constant	0.00876 (0.000890)	0.00601 (0.00376)
INC_t^2	0.121 (0.318)	-0.100 (1.41)
INC_{t-1}^2	-0.00130 (0.00502)	-0.0172 (0.0203)
$INC_t \times CPI_t$	0.392 (0.591)	1.97 (2.52)
POP_t^2	-0.0771 (3.92)	2.83 (16.7)
EMP_t^2	0.383 (0.817)	-3.88 (3.48)
TAX_t^2	2.63 (0.0741)	1.42 (0.142)
$DUKE_t$	0.000621 (0.00120)	-0.000794 (0.00523)
R^2	0.98	0.80

*Sample period is 1953-1988. Numbers in parentheses are standard errors.

References

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