VII. SIMULATION RESULTS

The simulation model described in Section VI, above, was used to simulate the effects during the years 1975–1978 of abolishing legal minimum wages in 1975. The results of the simulation are reported in Tables 1 and 2a–2e. We will begin by discussing the simulation results for the aggregate variables reported in Table 1. Consider the figures reported in the first row of Table 1. They indicate that Q, which is GDP in constant 1972 dollars, would have been 0.58% lower in 1975 if legal minimum wage rates had been abolished in 1975. Also, Q would have been lower by 1.34%, 2.08%, and 3.83%, respectively, in 1976, 1977, and 1978 if minimum wages had been abolished in 1975. This "increasing over time" aspect of the simulation is a result of the increasing (actual, historical) values of the minimum wage rates in the control simulation and of the recursive structure of the simulation model, which captures the increasing impact of a policy change as its indirect effects "feed back" on the variables of interest. An alternative way of describing the figures in the first row of Table 1 is the following. Because of the legal minimum wage rates in effect during 1975–1978, real GDP was higher by approximately 0.58%, 1.34%, 2.08%, and 3.83%, respectively, during the years 1975, 1976, 1977, and 1978.[8] Finally, the last column of Table 1 reports the average of the

Table 1. Simulated Effects of Abolishing Minimum Wages

Row	*Variable*	*1975*	*1976*	*1977*	*1978*	*av.*
1	Q	−0.58%	−1.34%	−2.08%	−3.83%	−1.96%
2	H_ℓ	5.96	5.91	10.41	10.82	8.28
3	H_h	−2.24	−2.70	−3.32	−4.63	−3.22
4	H	−0.46	−0.81	−0.23	−0.96	−0.62
5	E_ℓ	5.84	5.72	10.22	10.71	8.12
6	E_h	−2.15	−2.52	−3.12	−4.38	−3.04
7	E	−0.40	−0.69	−0.07	−0.74	−0.48
8	E_ℓ/E	6.23	6.39	10.27	11.44	8.58
9	H_ℓ/E_ℓ	0.12	0.19	0.19	0.11	0.15
10	H_h/E_h	−0.09	−0.18	−0.20	−0.25	−0.18
11	H/E	−0.06	−0.12	−0.16	−0.22	−0.14
12	P	−0.32	−1.17	−1.81	−2.66	−1.49
13	W_ℓ/P	−7.36	−12.03	−17.61	−21.29	−14.57
14	W_h/P	0.36	0.18	0.23	−0.03	0.19
15	W/P	−1.38	−1.98	−3.19	−4.16	−2.68
16	$W_\ell H_\ell/P$	−1.39	−6.13	−7.21	−10.47	−6.30
17	$W_h H_h/P$	−1.88	−2.51	−3.10	−4.66	−3.04
18	WH/P	−1.84	−2.79	−3.42	−5.12	−3.29
19	(PQ − WH)/P	1.41	0.91	−0.07	−1.92	0.08
20	G	2.55	0.31	6.38	6.72	3.99
21	$[(P_t/P_{t-1})^\circ - (P_t/P_{t-1})^c] \times 100$	—	−0.92	−0.68	−0.95	−0.85

TABLE 1

Mean Values of the Variables[a]

	All States		Minimum Wage States		Non-minimum Wage States	
Variable[b]	1974-75	1969-70	1974-75	1969-70	1974-75	1969-70
MW	1.449	0.959	1.811	1.332	0	0
UR	0.261	0.272	0.278	0.291	0.192	0.224
*KR*1	0.137	0.137	0.138	0.137	0.134	0.137
*KR*2	0.124	0.135	0.123	0.132	0.129	0.143
AE	4.313	3.101	4.412	3.179	3.919	2.901

[a]On January 1, 1970 there were thirty-six states with specified minimum wages, and on January 1, 1975 there were forty such states.

[b]*MW* is the highest state minimum wage in effect on January 1 of 1970 and 1975.

UR is the number of union members and members of employee associations as a proportion of total nonagricultural employment in 1969 and 1974.

*KR*1 is the sum of rents, dividends, and interest as a proportion of state personal income by place of residence in 1969 and 1974.

*KR*2 is proprietor income as a proportion of state earned income by place of work in 1969 and 1974.

AE is average hourly earnings in manufacturing in 1969 and 1974.

Sources: The Council of State Governments, *The Book of the States, 1980-81*, 1980.

U.S. Department of Commerce, Bureau of Economic Analysis, *Local Area Personal Income*, Vol. 1 Summary, June 1976.

U.S. Department of Labor, Bureau of Labor Statistics, *Directory of National Unions and Employee Associations*, Bulletin 1750, 1971 and Bulletin 1937, 1975.

U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings, States and Areas 1939-75*, Bulletin 1370-12, 1977.

U.S. Department of Labor, Employment Standards Administration, *Wages and Hours of Work of Nonsupervisory Employees in All Private Non-Farm Industries by Coverage Status Under the Fair Labor Standards Act*, 1972.

U.S. Department of Labor, Employment Standards Administration, Division of State Employment Standards, unpublished data.

tic with respect to its determinants. For example, in 1975, a 10 percent rise in the extent of organized labor or a 10 percent fall in the capital income share would raise the expected minimum wage by 4 percent and 3 percent, respectively. A 10 percent rise in the manufacturing wage is associated with an increase in the expected minimum wage of 7 percent.

TABLE 3

Tobit Results for the Determinants of State Minimum Wage Rates

Minimum Wage Determinants[a]	1975				1970			
	Estimated Marginal Effects		Estimated Elasticities		Estimated Marginal Effects		Estimated Elasticities	
UR	2.173	1.066	0.402	0.198	1.433	1.063	0.385	0.288
*KR*1	-3.275	—	-0.301	—	-2.009	—	-0.254	—
*KR*2	—	-2.144	—	-0.176	—	-1.635	—	-0.201
AE	0.250	0.245	0.734	0.722	0.182	0.180	0.535	0.533

[a] *UR*, *KR*1, *KR*2, and *AE* are defined in table 1.

The estimated minimum wage differentials attributable to the presence of organized labor and capital are reported in table 4.[17] Consider a hypothetical minimum wage state with the 1974 average extent of organized labor, average capital income share, and average manufacturing wage. The state's 1975 expected minimum wage is estimated to be 62% higher than it would have been in the absence of organized labor. On the other hand the state's 1975 expected minimum wage is estimated to be 26% lower than it would have been in the absence of a capital income share. Suppose these differentials are applied to the actual average 1975 state minimum wage of about \$1.80/hr. In the absence of organized labor the minimum wage would have been close to \$1.10/hr, and in the absence of capital income share it would have been about \$2.45/hr.

TABLE 4

Estimated State Minimum Wage Differentials Due to the Presence of Organized Labor and Capital

	1975		1970	
KR[a]	Labor	Capital	Labor	Capital
*KR*1	0.619	-0.262	0.548	-0.234
*KR*2	0.264	-0.166	0.391	-0.190

[a] *KR*1 and *KR*2 are defined in table 1.

As expressed in statement (21), the minimum wage determination model also determines the probability that a given state at a given point in time would have an established minimum wage. This result follows from the fact that

$$\begin{aligned} \text{Prob}\,(MW > 0 \mid I(\cdot)) &= \text{Prob}\,(\epsilon/\sigma > -I(\cdot)/\sigma) \\ &= F(I(\cdot)/\sigma), \end{aligned} \tag{26}$$

17. The expected minimum wage differentials attributed to the presence of organized labor and capital are calculated from the following expression evaluated at the sample mean for minimum wage states:

$$[E(MW \mid I(UR, KR, AE), MW > 0)/E(MW \mid I(UR\cdot(1-D), KR\cdot D, AE), MW > 0)] - 1; D = 0, 1.$$

Table I
Minimum Wage Effects with Output Stabilization[a]

Row	Variable	Qualitative Predictions of the Theoretical Models			Quantitative Predictions from the Econometric Model (%)
		Model #1	Model #2	Model #3	
1	P_y/P_x	+	+	+	+0.99
2	Y	−	−	−	−0.09
3	X	+	+	+	+0.48
4	W_u/P_x	+	+	+	+0.25
5	W_1/P_x	+	+	+	+0.53
6	W_u/P_y	+	?	?	−0.74
7	W_1/P_y	+	?	?	−0.46
8	r/P_x	−	−	−	−0.37
9	r/P_y	−	−	−	−1.37
10	W_u/r	+	+	+	+0.63
11	W_1/r	+	+	+	+0.91
12	L_{1x}/K_x	−	−	−	−1.40
13	$L_{1y}K_y$	−	−	−	+2.48
14	L_{1x}	+	+	+	−0.37
15	L_{1y}	−	−	−	+1.70
16	L_2	?	?	−	−11.17
17	K_x	+	+	+	+1.03
18	K_y	−	−	−	−1.14
19	$(W_uL_{1x} + W_1L_{1y})/P_x$	+	+	+	+1.84
20	$(W_uL_{1x} + W_1L_{1y})/P_y$	+	?	?	+0.86
21	$r(K_x + K_y)/P_x$	−	−	−	−1.12
22	$r(K_x + K_y)/P_y$	−	−	−	−2.11
23	W_u/W_1	(0)	(0)	(0)	−0.28
24	W_2/r	(+)	(+)	+	+15.70
25	W_2/P_x	+	?	(+)	+15.33
26	W_2/P_y	0	?	(+)	+14.34
27	$L_{1x} + L_{1y}$	+	(0)	(0)	+1.41
28	$K_x + K_y$	−	(0)	(0)	−0.75
29	W_2L_2/P_x	+	?	?	+4.16
30	W_2L_2/P_y	?	?	?	+3.17

Definitions

P_x, P_y Prices per unit of union sector output and nonunion sector output, respectively.

X, Y Outputs of the union sector and the nonunion sector, respectively.

W_u Union wage rate.

W_1 Wage rate of nonunion skilled labor.

W_2 Wage rate of unskilled labor.

Table I
Minimum Wage Effects with Output Stabilization[a]—Continued

Row	Variable	Qualitative Predictions of the Theoretical Models			Quantitative Predictions from the Econometric Model (%)
		Model #1	Model #2	Model #3	
r	Rental rate on capital.				
L_{1x}, L_{1y}	Quantities of skilled labor in the union sector and nonunion sector, respectively.				
L_2	Quantity of skilled labor.				
K_x, K_y	Quantities of capital in the union sector and nonunion sector, respectively.				

a. Qualitative results determined by assumption are enclosed in parentheses ( ), and theoretically indeterminant effects are denoted by '?'. The rental rate on capital is not endogenously determined by the econometric model.

ernment) with approximately 200 equations. This set of equations consists of product demand functions, factor supply price functions, factor share equations, product supply price functions, factor employment equations, and accounting identities. Space limitations preclude discussion of the specific equations here. A detailed presentation of the basic model is in Cox and Oaxaca [1984].

Two simulations are conducted with the econometric model for the period 1975–78. First, we set minimum wages equal to zero. This simulation sets base line values in a nonminimum wage environment of the economic variables of interest. Second, we set minimum wages equal to their actual historical values, and constrain real Gross Domestic Product (GDP) to its values determined in the first simulation. This constraint on GDP corresponds to the assumption that stabilization authorities hold output constant when the minimum wage is imposed. In both simulations, all exogenous variables are assigned their actual historical values. We use a method of numerical iteration (called the Gauss-Seidel method) to solve the model for the values of the endogenous variables under each of the two simulations.[3] Minimum wage impacts are calculated as the percentage differences between the two sets of simulation values.

Output stabilization is incorporated into the model through three sets of equations. The first set of equations determines the preliminary estimate of each industry's contribution to constant dollar GDP at time t (Q_{it}^s) as a function of total U.S. population at time t (N_t) times the estimated per capita

3. A good discussion of the Gauss-Seidel algorithm is contained in Spivey and Wrobleski [1979, 23-4].

Table II
Union Membership as a Percent of Nonagricultural Employees on Payrolls—1978

Industry	% Union Membership
Mining	50.3
Construction	67.5
Manufacturing	39.7
Trans., Comm., & Utilities	53.8
Trade	8.8
Fin., Ins., & Real Estate	1.1
Services	12.3
Government	23.4

Source: Bureau of Labor Statistics, U.S. Department of Labor, *Handbook of Labor Statistics*, Bulletin 2070 (Washington, D.C.: Government Printing Office), 1980, Tables 72 and 162.

a union sector.[5] This is to be expected in view of the fact that some nonunion firms are present in the three heavily-unionized industries. Accordingly, the implied production functions in the econometric model must allow for the employment of low wage labor within the broad industry categories used. However in keeping with the spirit of the theoretical models, minimum wage effects pertaining to low wage labor are reported only for low wage labor in the nonunion sector. Excluding low wage labor from the union sector makes virtually no difference in the empirical results.

IV. SIMULATION RESULTS

The last column of Table I reports the quantitative predictions obtained from simulations with the econometric model. The numbers reported are estimates of the average annual percentage effects of the minimum wage on the 30 variables in the rows of the table.

Some important effects of the minimum wage are not central to our analysis of the political economy of minimum wage legislation, and one or more of the theoretical models yield no predictions for these effects. Prominent among these is the level of employment of low wage labor. We estimate that the minimum wage reduces low wage employment by about 11.2 percent, which implies a loss of approximately 2.2 million unskilled jobs. This effect is produced by the 15.7 percent increase in the average nominal wage rate of unskilled labor that results from imposition of the minimum wage. Some other estimates are that the minimum wage: (1) raises the real wage of low wage labor by 14.3 - 15.3 percent; (2) raises real earnings of low wage

5. Nevertheless, low wage employment constitutes less than 8 percent of the total employment in the three heavily unionized industries, whereas about 30 percent of the employment in the remaining industries is low wage.