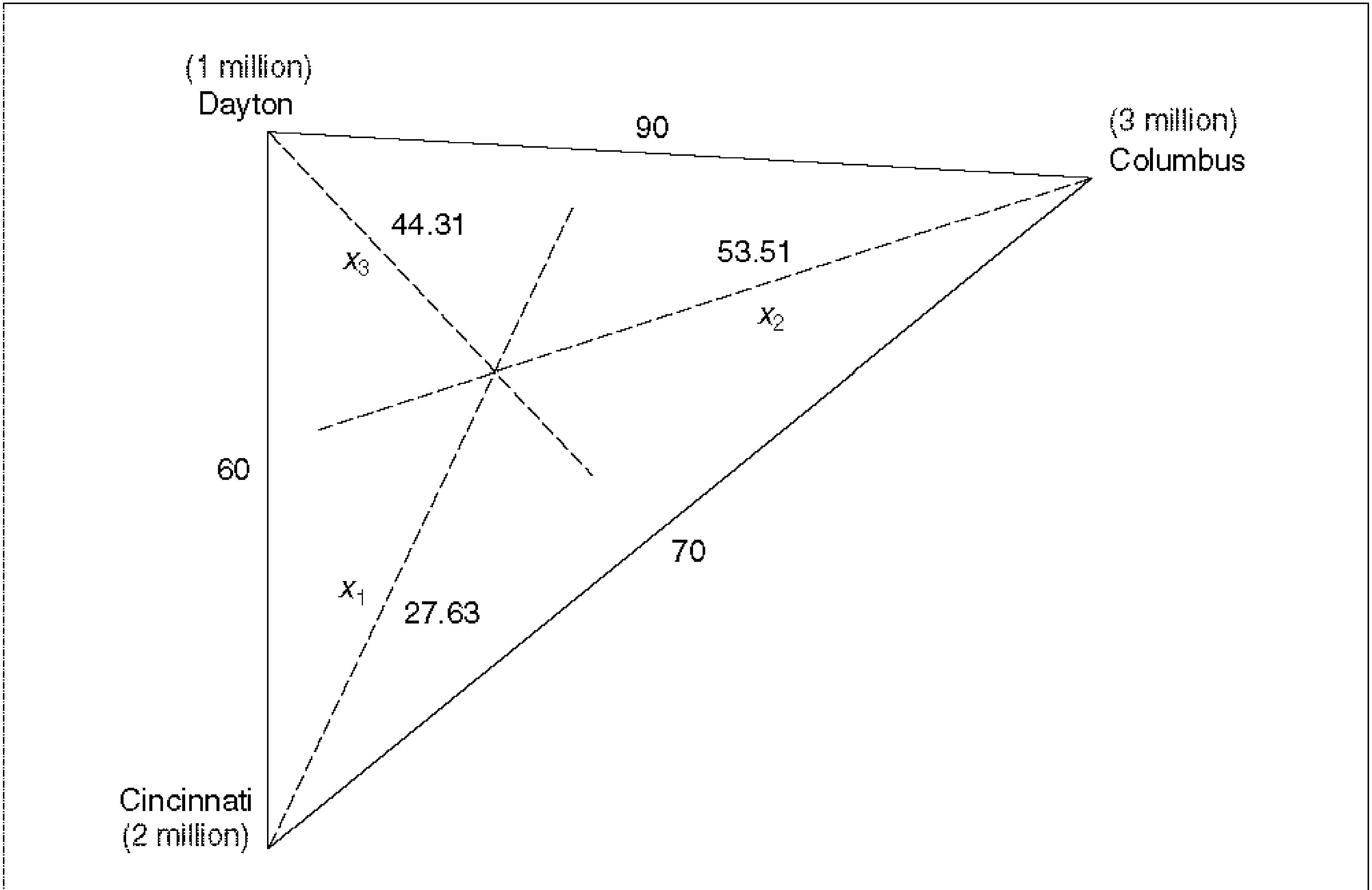
Figure 3.1 A LOCATION DETERMINED BY ANGLE BISECTORS



SOURCE: Claunch, Goehring, and Chan (1992). Reprinted with permission.

Figure 3.2 BLOCK DIAGRAM OF THE NEW YORK-NEW HAVEN DEVELOPMENT EXAMPLE

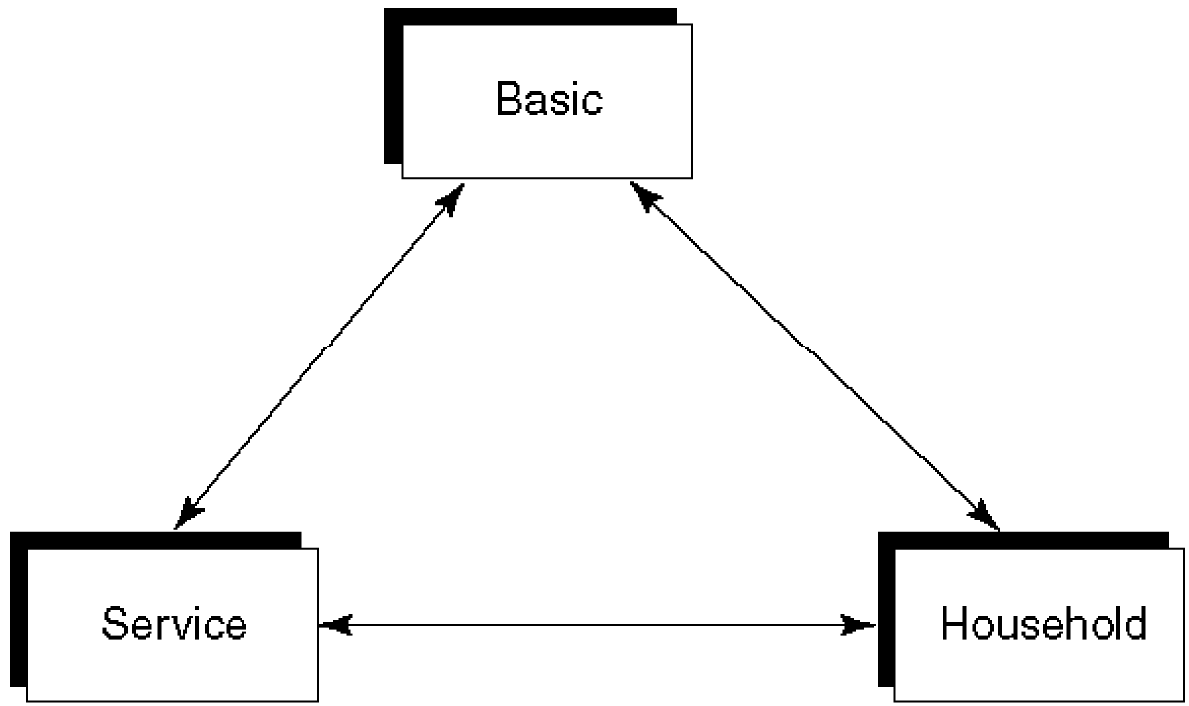


Figure 3.3 LOGIC FLOW CHART OF THE NEW YORK-NEW HAVEN EXAMPLE

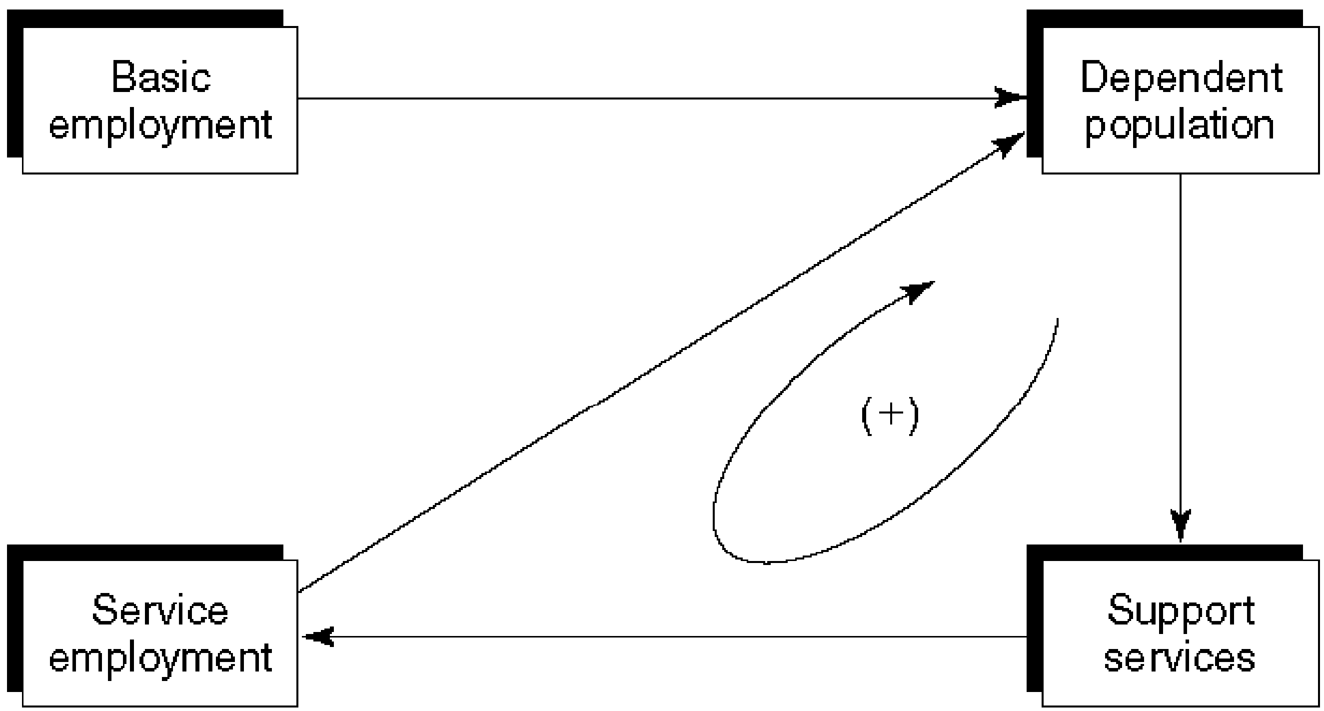


Table 3.1 ILLUSTRATION OF A DETERMINISTIC SIMULATION ON REGIONAL ECONOMIC DEVELOPMENT

Time n	Basic emp E^B	Basic emp pop	Support service emp E^R	Support service pop	Total emp E	Total pop N
1	E^B	fE^B	afE^B	af^2E^B	$(1 + af)E^B$	$f(1 + af)E^B$
2			$a^2f^2E^B$	$a^2f^3E^B$	$(1 + af + a^2f^2)E^B$	$f(1 + af + a^2f^2)E^B$
3			$a^3f^3E^B$	$a^3f^4E^B$	$(1 + af + a^2f^2 + a^3f^3)E^B$	$f(1 + af + a^2f^2 + a^3f^3)E^B$
...			...	...	...	...
∞			0	0	$(1 + af + a^2f^2 + a^3f^3 + ..)E^B$	$f(1 + af + a^2f^2 + a^3f^3 + ..)E^B$

Figure 3.4 LIMITS TO GROWTH MODEL

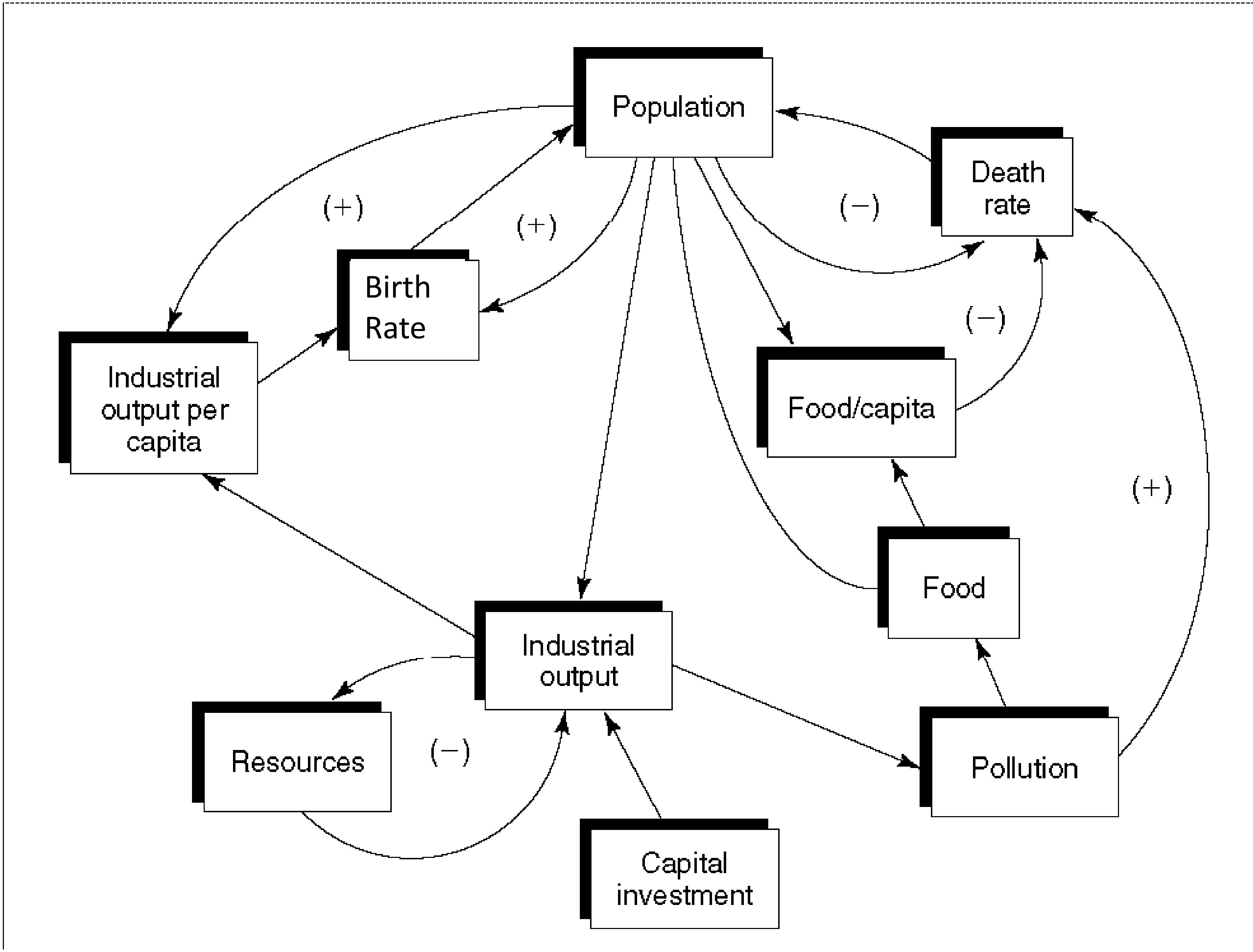


Figure 3.5 WORLD FORECAST THROUGH 2100

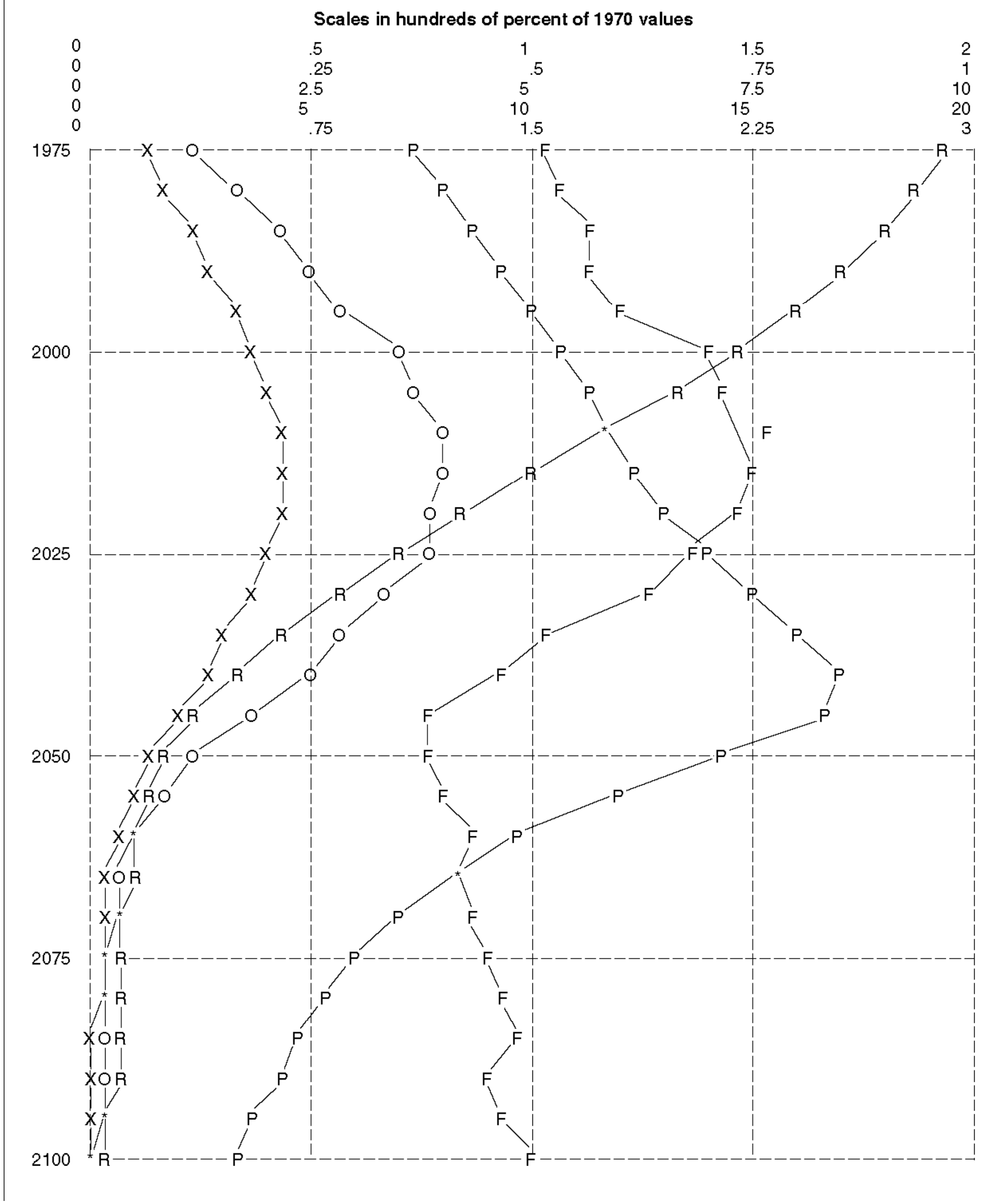
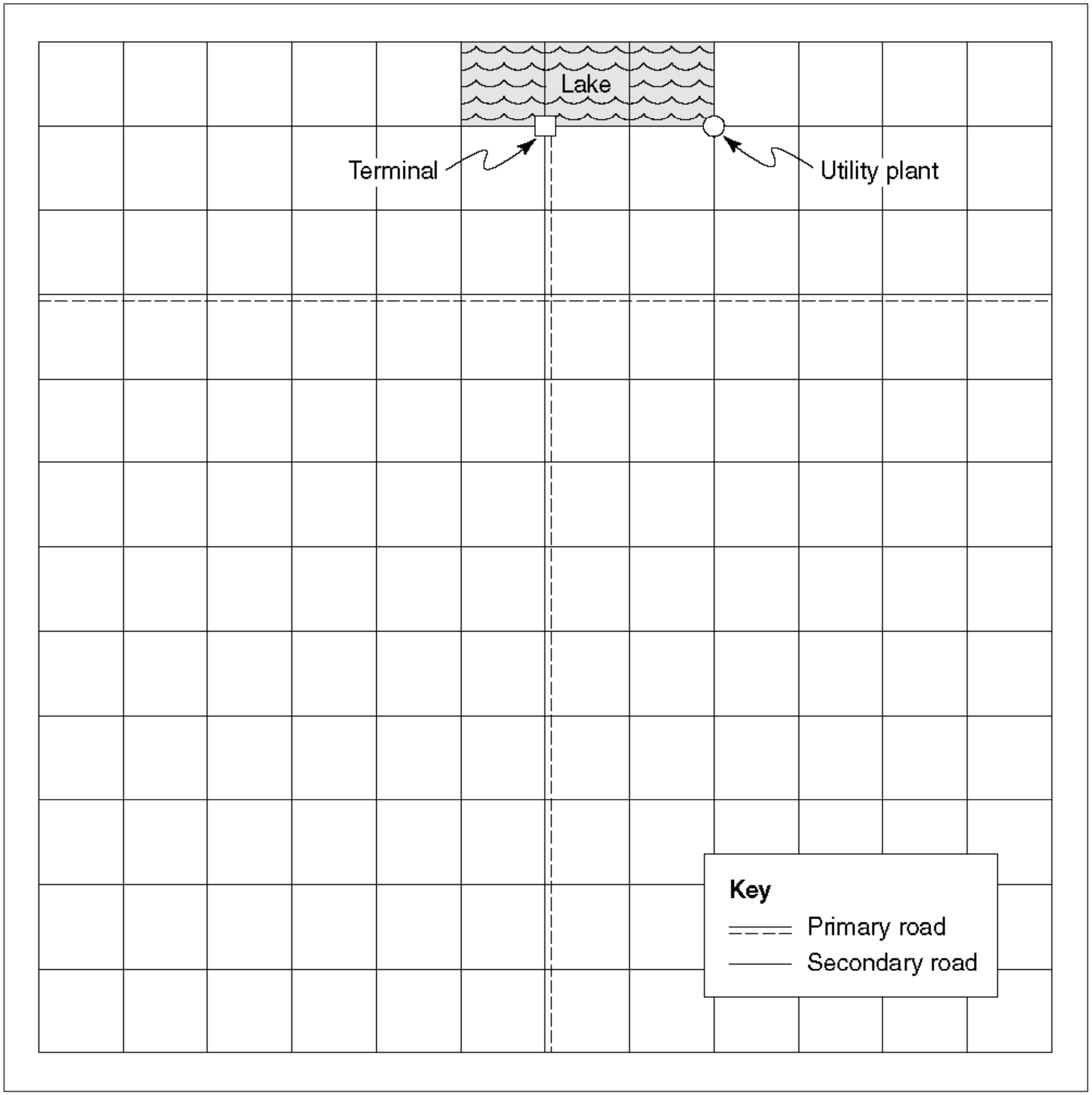


Figure 3.6 THE CLUG PLAYING BOARD

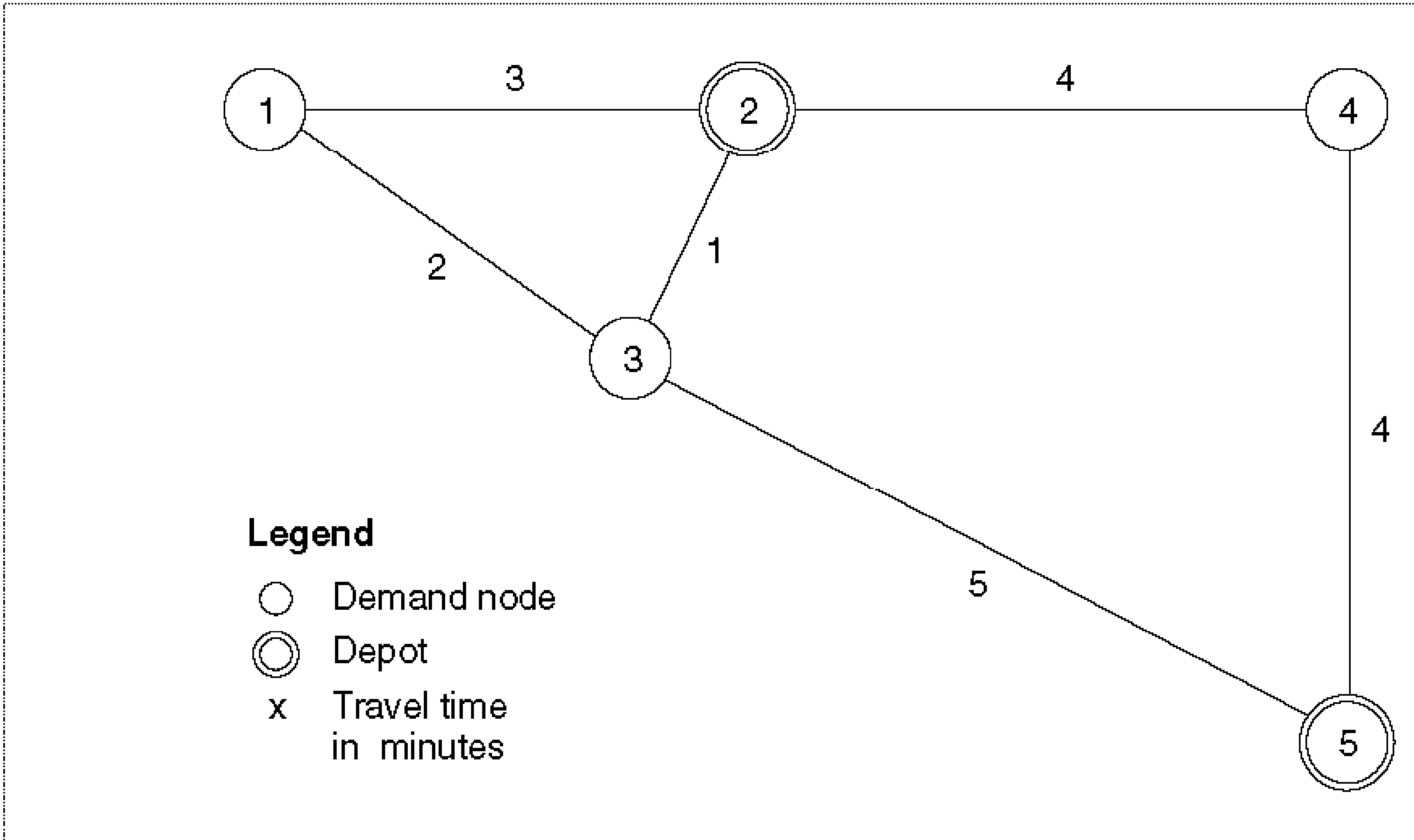


SOURCE: Feldt (1972). Reprinted with permission.

Table 3.2 PROBABILITY OF BUILDING LOSS

Age of building	Probability of loss	Losing numbers
0	0.056	3
1	0.111	5
2	0.167	7
3	0.195	2, 7
4	0.250	2, 7, 11
5	0.306	2, 7, 9
6	0.362	3, 7, 8
7	0.417	5, 7, 8
8	0.445	6, 7, 8
9	0.500	3, 6, 7, 8
10	0.555	5, 6, 7, 8

Figure 3.7 SAMPLE NETWORK FOR HYPERCUBE MODEL



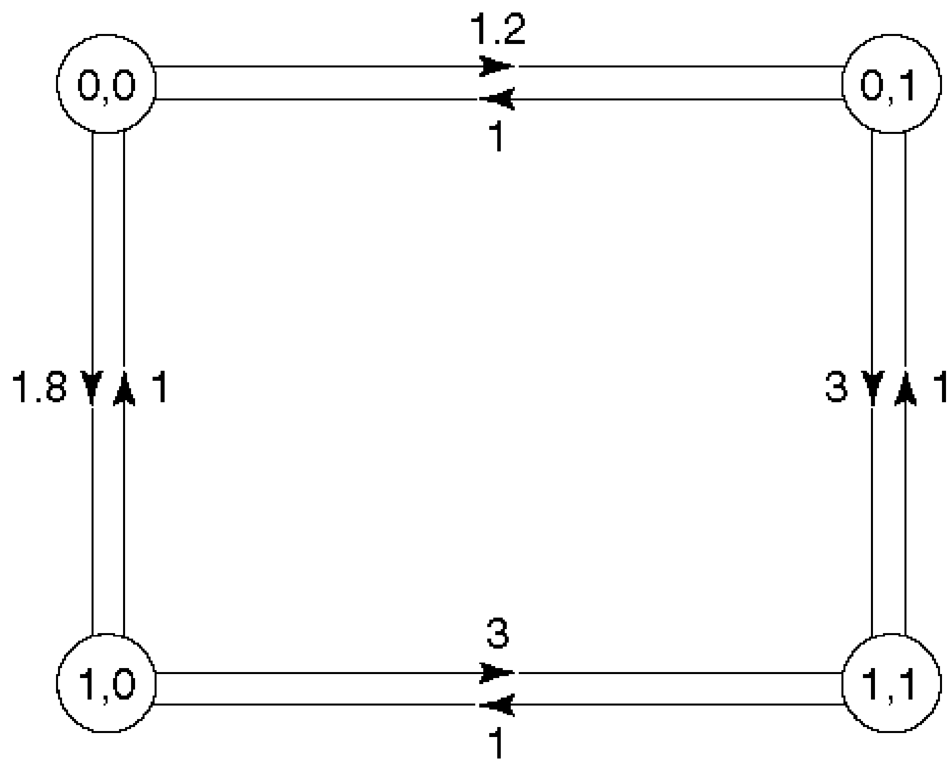
SOURCE: Ahituv and Berman (1988). Reprinted with permission.

Table 3.3 DISPATCHING RULES FOR THE HYPERCUBE NETWORK

State	**Server vehicle location**	**Demand node**				
		1	**2**	**3**	**4**	**5**
(0, 0)	2	✓	✓	✓	—	—
	5	—	—	—	✓	✓
(0, 1)	2	✓	✓	✓	✓	✓
(1, 0)	5	✓	✓	✓	✓	✓
(1, 1)		not relevant				

SOURCE: Ahituv and Berman (1988). Reprinted with permission.

Figure 3.8 TRANSITION BETWEEN STATES IN A HYPERCUBE MODEL



SOURCE: Ahituv and Berman (1988). Reprinted with permission.

Figure 3.9 A CONVEX EXPECTED TOTAL-COST FUNCTION

Figure 3.10 Tree representation of Bayes' Rule

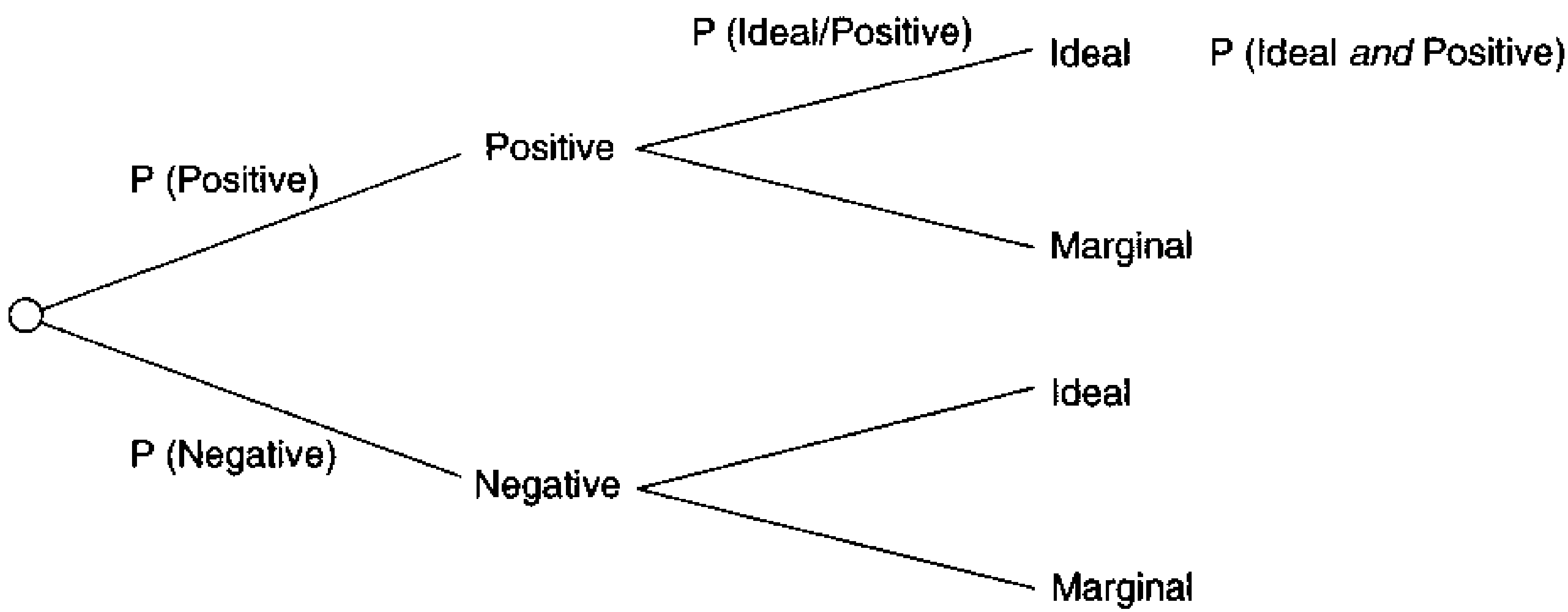
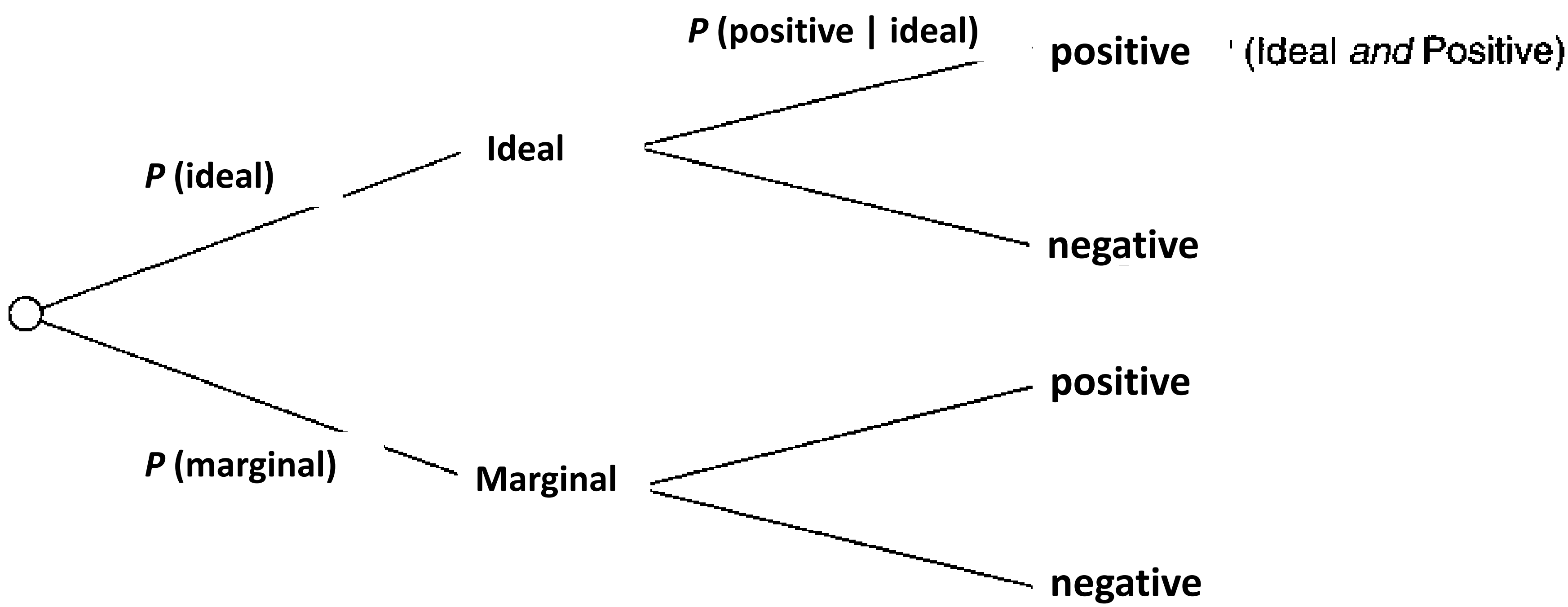


Figure 3.10A Bayes' rule revisited



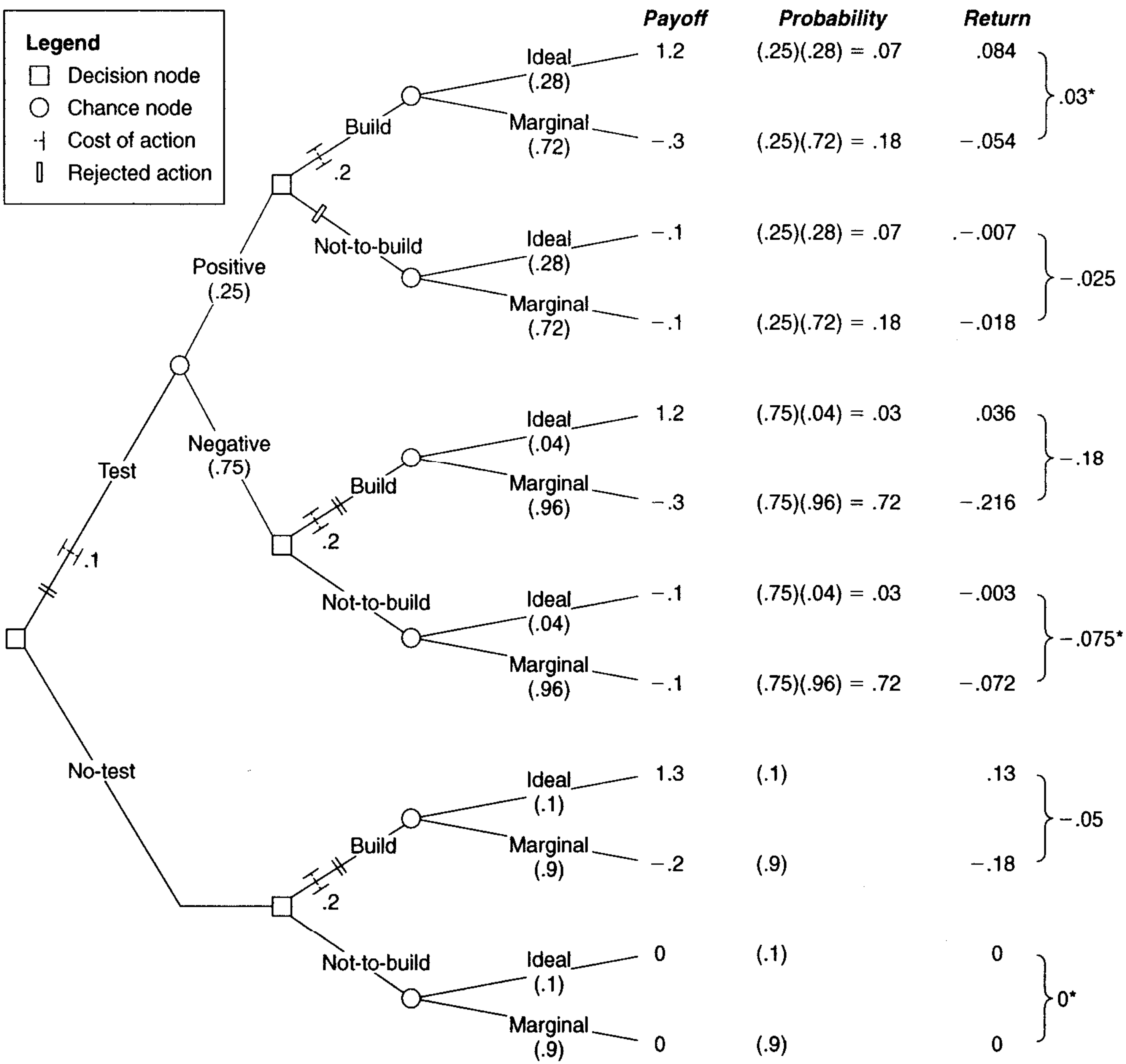


Figure 3.11
Decision Tree
with returns

Figure 3.12 An Example Influence Diagram

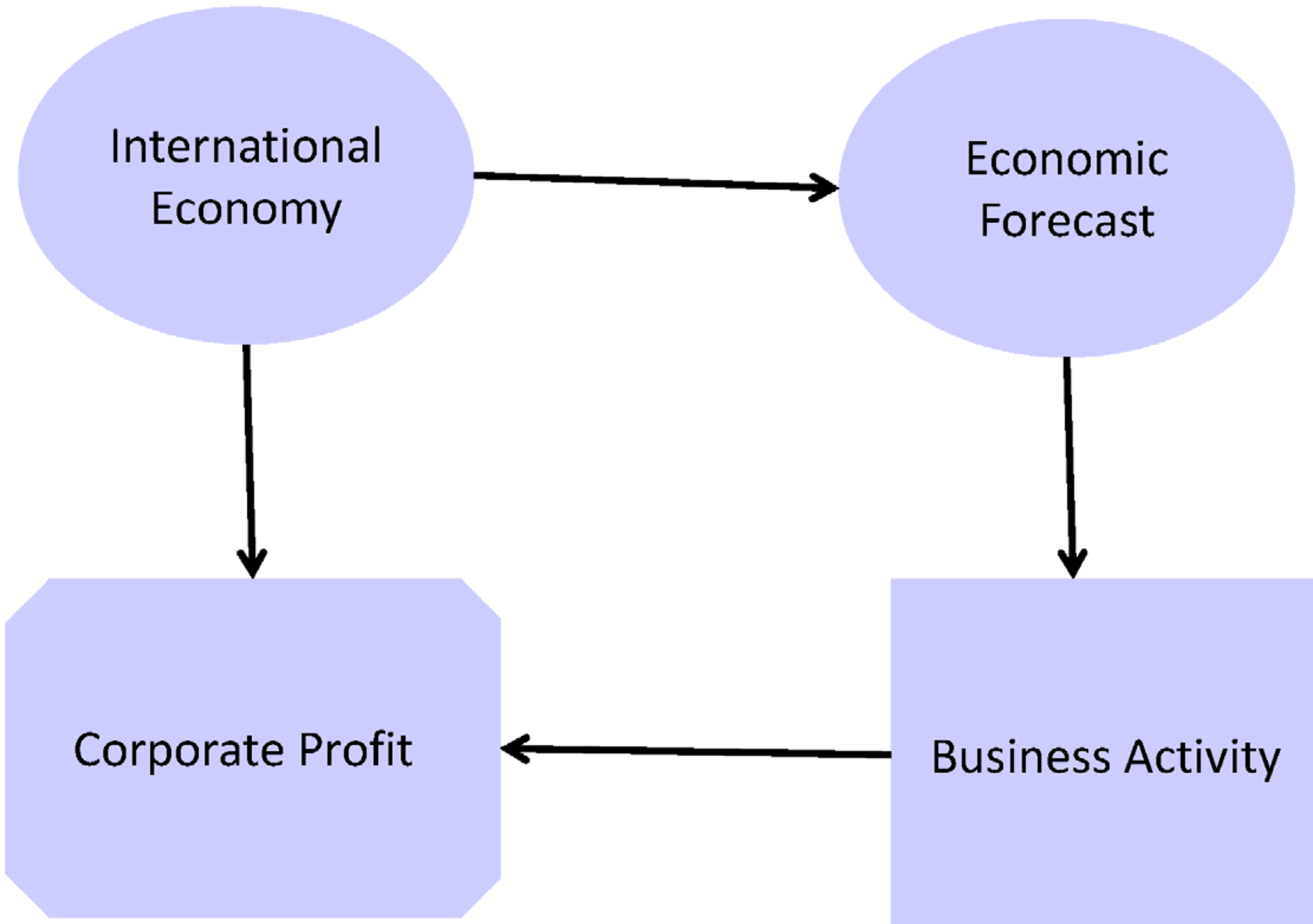


Figure 3.13 Two-class example

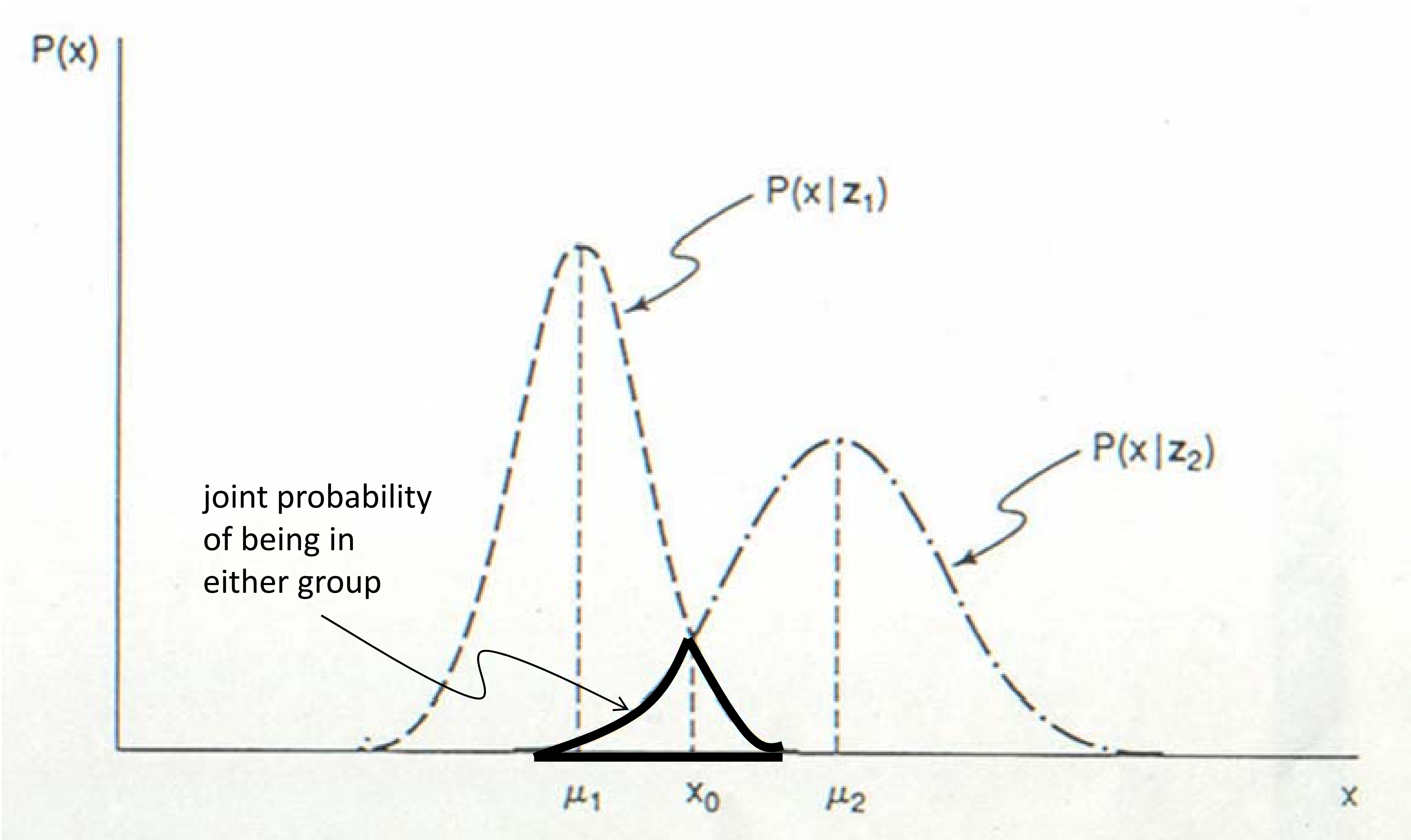


Figure 3.14 ARROW DIAGRAM FOR ECONOMIC-BASE EXAMPLE

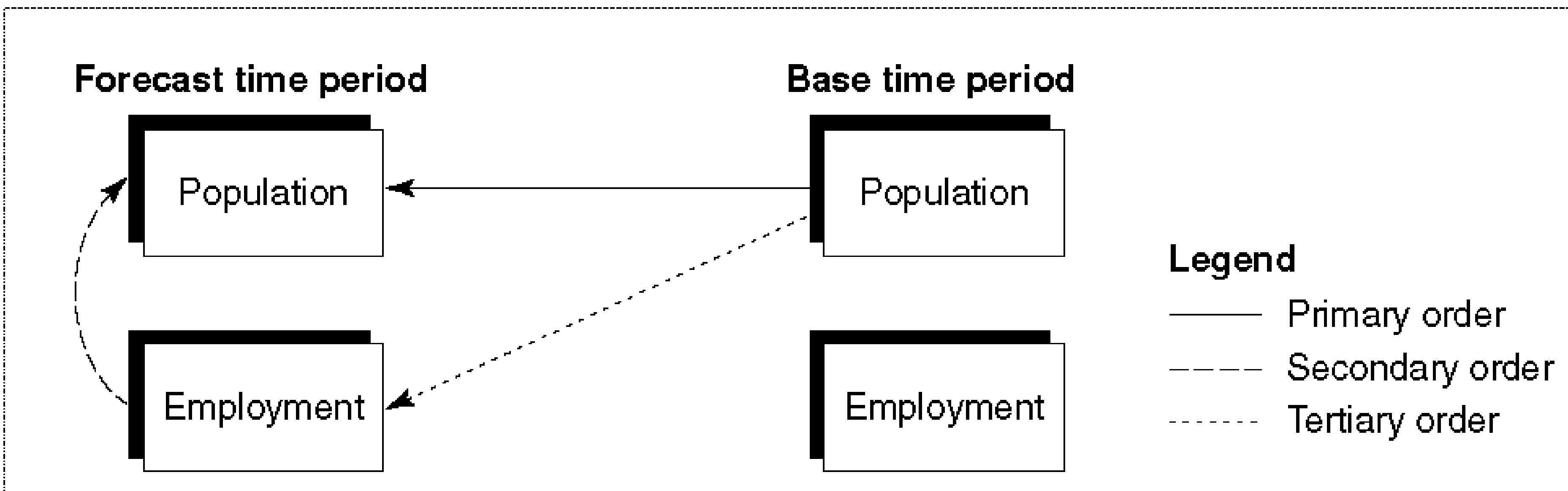


Figure 3.15 PATH ANALYSIS FOR THE ECONOMIC-BASE EXAMPLE

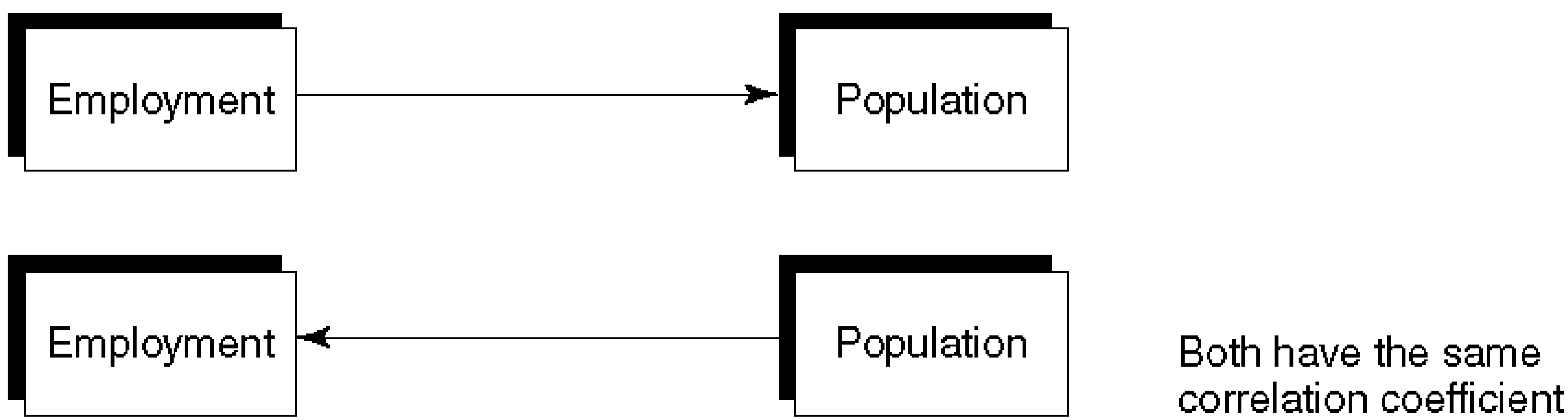


Figure 3.16 CORRELATION COEFFICIENTS

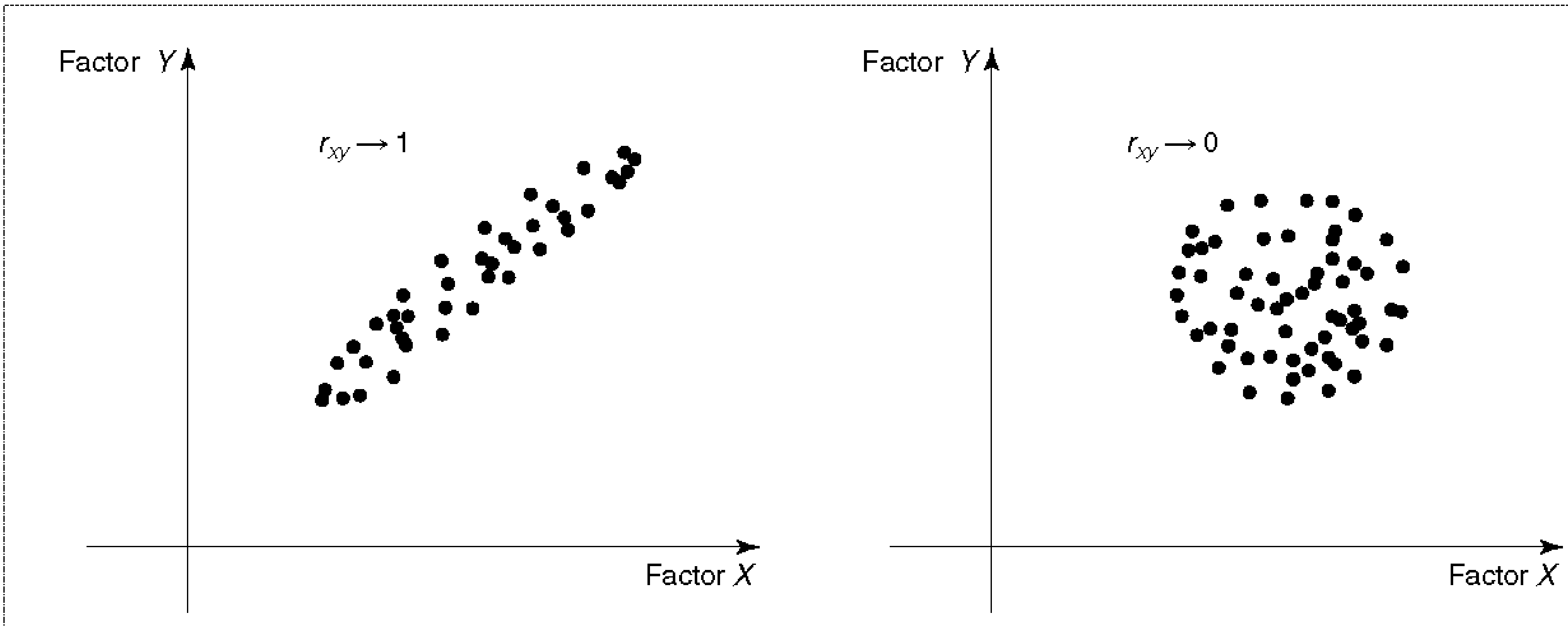
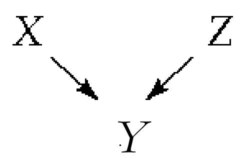
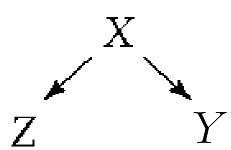
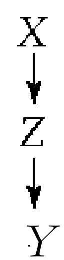
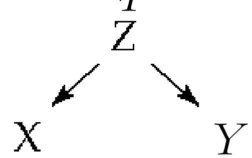


Table 3.4 TYPOLOGY OF 2-ARROW MODELS

Model type	Arrow diagram	Econometric equations
Both X and Z independently affect Y.	$X \searrow Y \swarrow Z$	$X = b_1$ $a_{21} X + Y + a_{23} Z = b_2$ $Z = b_3$
X, partially caused by Z, causes Y.	$Z \downarrow X \downarrow$	$X + a_{13} Z = b_1$ $a_{21} X + Y = b_2$ $Z = b_3$
The primary variable X causes both Z and Y.	$Z \swarrow X \searrow Y$	$X = b_1$ $a_{21} X + Y = b_2$ $a_{31} X + Z = b_3$
The secondary variable Z intervenes between X and Y.	$X \downarrow Z \downarrow Y$	$X = b_1$ $Y + a_{23} Z = b_2$ $a_{31} X + Z = b_3$
The primary variable X and the supposedly dependently variable Y are correlated but not casually connected.	$X \swarrow Z \searrow Y$	$X + a_{13} Z = b_1$ $Y + a_{23} Z = b_2$ $Z = b_3$

SOURCE: De Neufville and Stafford (1971). Reprinted with permission.

Table 3.5 RESULTS OF PATH ANALYSIS

Grouping of models	Arrow diagram	Path analysis prediction	Condition
Y in the middle		$r_{XZ} = 0$	$r_{XY} \neq 0$ $r_{YZ} \neq 0$
X in the middle	 	$r_{XY} = \frac{r_{YZ}}{r_{XZ}}$	$r_{XY} \neq 0$ $r_{XZ} \neq 0$
Z in the middle	 	$r_{XY} = r_{XZ} r_{YZ}$	$r_{XZ} \neq 0$ $r_{YZ} \neq 0$

SOURCE: De Neufville and Stafford (1971). Reprinted with permission.

Table 3.6 CORRELATION MATRIX BETWEEN VARIABLES IN THE CENTRAL BERKSHIRE MODEL

	N	E^R	E^B	ΔN	ΔE^R	ΔE^B	u
E^R	0.6722						
E^B	0.7284	0.9028					
ΔN	0.1892	−0.3478	−0.0167				
ΔE^R	0.7042	0.9885	0.9113	−0.3026			
ΔE^B	0.5747	0.4634	0.6423	0.2719	0.5801		
u	0.8455	0.5413	0.5331	0.1559	0.5697	0.3929	
t'	0.8063	0.5342	0.4937	0.0859	0.5609	0.3613	0.9821

SOURCE: Foot (1981). Reprinted with permission.

Table 3.7 DISAGGREGATE CALIBRATION OF A MAXIMUM LIKELIHOOD MODEL

Individual n	Time to location 1 τ_{n1} (min)	Time to location 2 τ_{n2} (min)	Locational choice k
1	5	7	1
2	4	6	1
3	6	4	2

SOURCE: Kanafani (1983). Reprinted with permission.

Table 3.8 DATABASE FOR CALIBRATING AN AGGREGATE LOCATION CHOICE MODEL

Shopping center k	Average time τ_k	Average cost c_k	No of patrons at center k
1	15	3	50
2	10	4	40
3	20	7	10

Table 3.9 REPLICATION TEST DATA FOR LOGIT MODEL

Shopper	Time to location 1 τ_1 (min)	Time to location 2 τ_2 (min)	$\delta\tau = \tau_2 - \tau_1$ (min)	Cost to location 1 c_1 (\$)	Cost to location 2 c_2 (\$)	$\delta c = c_2 - c_1$ (\$)	Locational decision
1	25	30	−5	3.00	1.00	2	1
2	10	15	−5	1.00	1.00	0	1
3	50	40	10	5.00	1.00	4	2
Average	—	—	0	—	—	2	—

Table 3.10 EXISTING INTERZONAL TRAVEL

From/to	Zone 1	Zone 2	Zone 3	Zone 4	V_i
Zone 1		500	200	300	1000
Zone 2		800	100	500	1400
Zone 3					
Zone 4					
V_j		1300	300	800	2400

SOURCE: Dickey (1983). Reprinted with permission.

Table 3.11 INTERZONAL TRAVEL TIMES (IN MINUTES)

From/to	Zone 1	Zone 2	Zone 3	Zone 4
Zone 1	3	8	5	10
Zone 2	8	3	10	5
Zone 3	5	10	3	20
Zone 4	10	5	20	3

SOURCE: Dickey (1983). Reprinted with permission.

Figure 3.17 TRIP DISTRIBUTION PLOTS

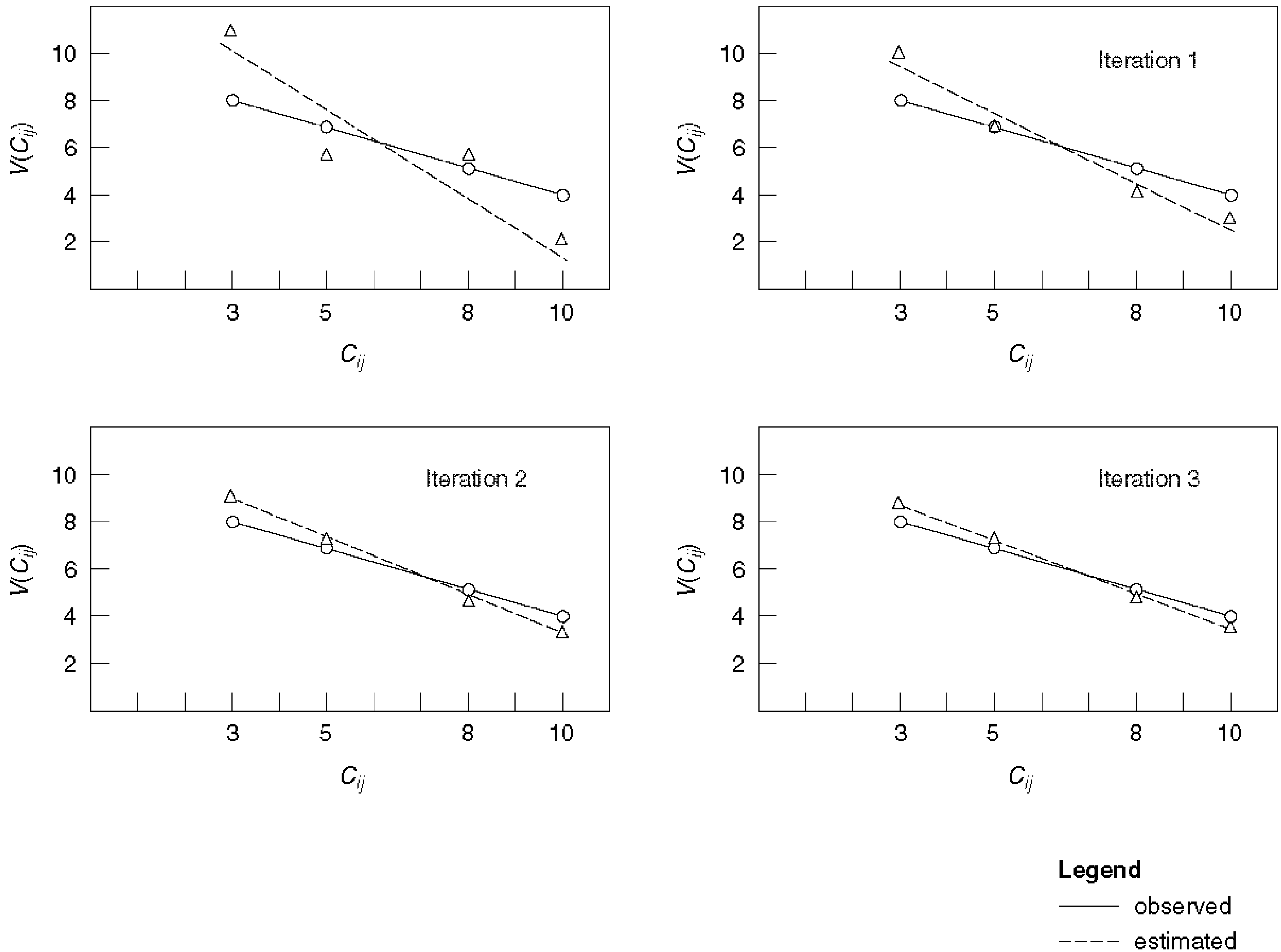


Table 3.12 CHI-SQUARE TEST

Time Interval (min)	**3**	**5**	**8**	**10**
Observed y_i	800	700	500	400
Estimated $\hat{y}_i$	857.28	707.90	457.40	377.00
$(y_i - \hat{y}_i)$	−57.28	−7.90	42.60	23.00
$(y_i - \hat{y}_i)^2$	3281.00	62.41	1814.76	529
$(y_i - \hat{y}_i)^2/\hat{y}_i$	3.83	0.09	3.97	1.40
$\Sigma_i (y_i - \hat{y}_i)^2/\hat{y}_i$	3.83	3.92	7.88	9.29

Table 3.13 Observed inter-zonal travel of doubly-constrained model

From/to	$j = 1$	$j = 2$	$j = 3$	V_i
$i = 1$	1,800	3,100	100	5,000
$i = 2$	3,100	1,500	400	5,000
$i = 3$	15,100	25,400	4,500	45,000
V_j	20,000	30,000	5,000	55,000

Table 3.14 Calibration of a doubly-constrained model

	Iteration number						
	1		2		3		4
k_1	1		0.9148		0.9125		0.9125
k_2	1		1.3312		1.3437		1.3437
k_3	1		0.9833		0.9824		0.9824
l_1		0.1187[1]		0.1164		0.1164	
l_2		0.1058		0.1073		0.1073	
l_3		0.0965		0.0961		0.0961	

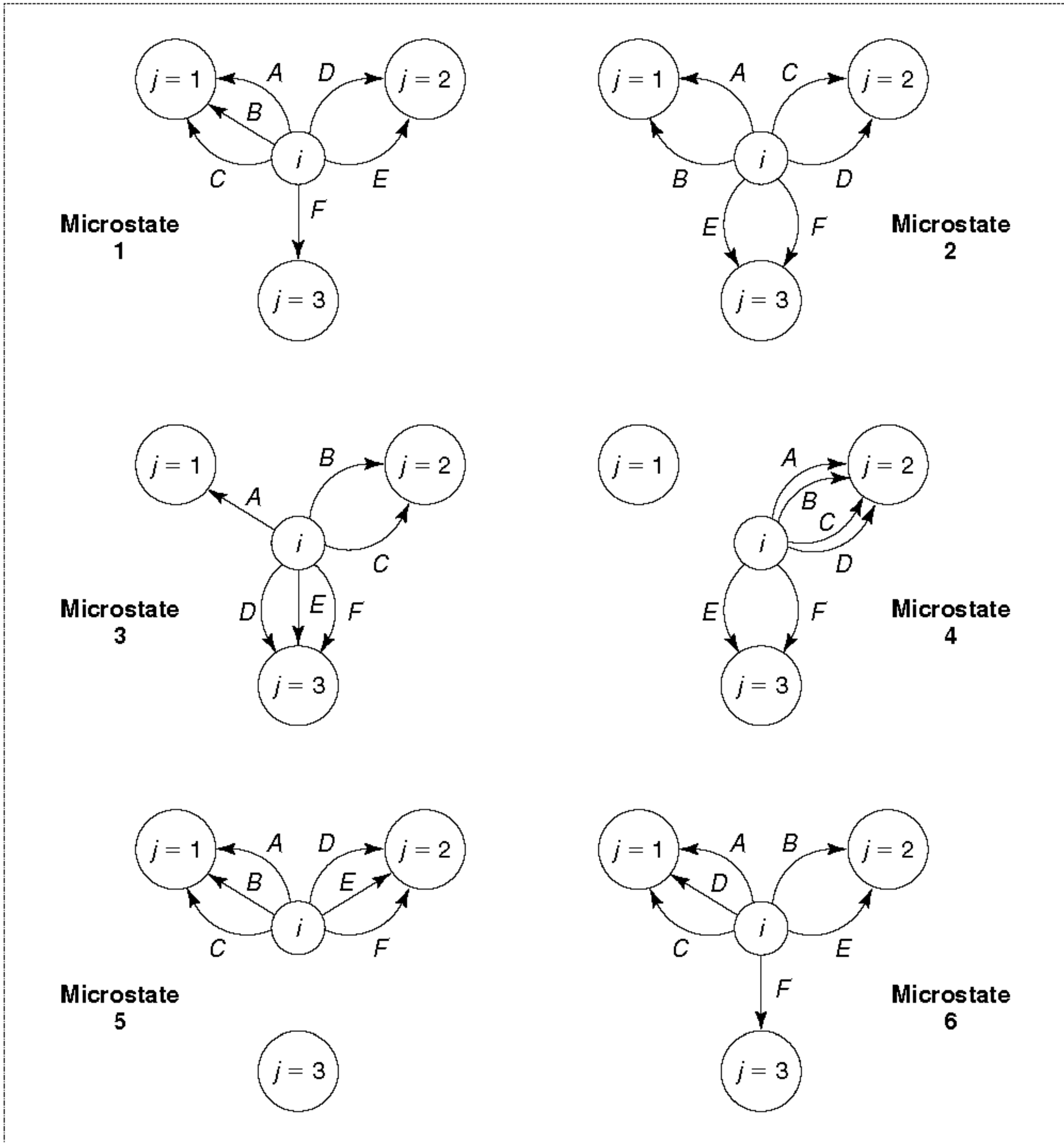
1 All these nine values are to be multiplied by 10^{-4}. For example, 0.1187 is actually 0.1187×10^{-4}.

Table 3.15 Estimated inter-zonal travels in a doubly-constrained model

From / to	j =1	j = 2	j = 3	V_i
i = 1	1,563 (-15.2)[1]	3,178 (+2.5)	257 (+61.1)	4,998
i = 2	3,209 (+3.4)	1,313 (-14.3)	478 (+16.3)	5,000
i = 3	15,238 (+1.0)	25,498 (+0.4)	4,265 (-5.51)	45,001
V_j	20,010	29,989	5,000	54,999

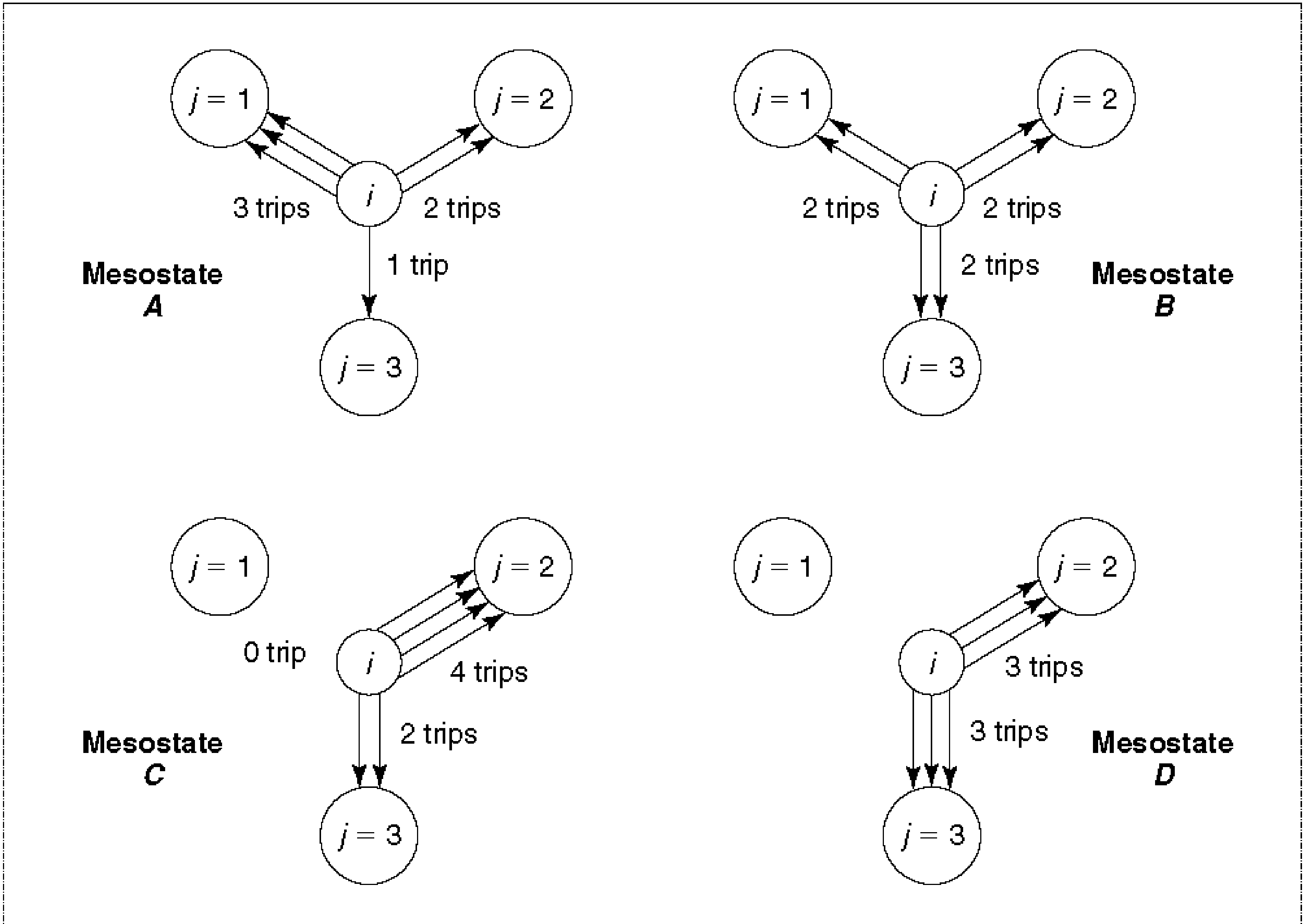
1 Numbers in parenthesis indicate the percentage errors between observed and estimated inter-zonal travel.

Figure 3.17 SYSTEM MICROSTATES



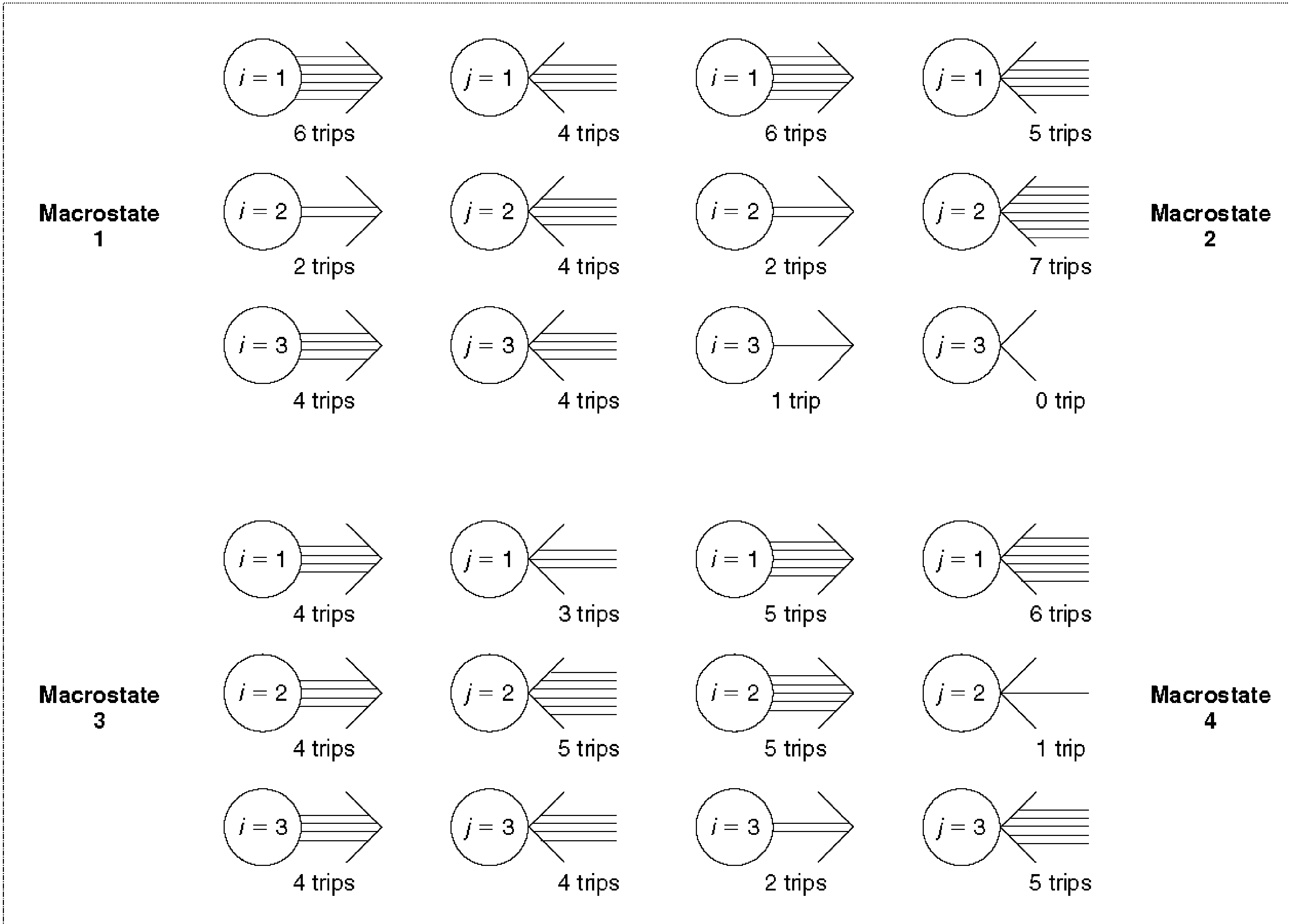
SOURCE: Putman (1978). Reprinted with permission.

Figure 3.19 SYSTEM MESOSTATES



SOURCE: Putman (1978). Reprinted with permission.

Figure 3.20 SYSTEM MACROSTATES



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