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ALASKA ECONOMIC FORECAST FOR 1977

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ALASKA ECONOMIC FORECAST FOR 1977

1. Summary and Highlights

Alaska economic activity will experience a significant decline in 1977 as the trans-Alaska oil pipeline is completed. The unemployment rate will be substantially higher than in recent years, the rate of inflation (as measured by the Anchorage Consumer Price Index) will be the lowest since 1973. Almost all of Alaska's support sectors will be adversely affected, with substantial employment declines in services and trade, two of the largest groups of employers in the state. Overall employment in the state will fall by 14 percent below 1976. This decline will occur in spite of assumed rapid increases in employment in the mining, manufacturing, and agriculture, forestry, and fisheries sectors. Detailed forecasts:

UNEMPLOYMENT RATE:	12.1% for 1977 (highest ever recorded) 13.4% for first quarter of 1977 (highest in 3 years)
PRICES: (Anchorage C.P.I.)	6.3% higher in 1977 5.6% for fourth quarter of 1977
CIVILIAN EMPLOYMENT:	Down 14% compared to 1976 last quarter of 1977 lowest since mid-1974

EMPLOYMENT BY SECTOR:

Trade:	Down 13.6% compared to 1976
Services:	Down 17.9% compared to 1976
Construction:	Down 46.4% compared to 1976
Transportation, Communication, and Public Utilities	Down 17.4% compared to 1976
Finance, Insurance, and Real Estate:	Down 18.3% compared to 1976
State and Local Government:	Up 2.6% compared to 1976

2. Assumptions Made for the Forecast*

United States

U.S. Consumer Prices:	Up 7% over 1976
U.S. Wages:	Up 8% over 1976

Alaska

Mining Employment:	Up 15% over 1976
Manufacturing Employment:**	Up 15% over 1976
Agriculture, Forestry, Fisheries Employment:	Up 15% over 1976
Federal Government Employment:	Unchanged in 1977
Pipeline Employment:	5,000 in 1977 (by quarter: 7,500; 8,000; 4,000; 2,000)

Note: These assumptions are not derived from I.S.E.R.'s econometric model. Rather, they are necessary inputs to the model (See Section 4). The accuracy of the forecast may depend in part on the accuracy of these assumptions.

*Section 4 of this report explains the role of these assumptions in making forecasts of economic activity.

**Food, lumber, and paper

3. Forecast Discussion

Figures 1-9 on the following pages depict the extent of the decline forecast for 1977. Preliminary employment data for the first two quarters of 1976 are also shown on the forecast graphs, which can be compared with the 1976 results generated by the econometric model.*

Figure 1 shows a rapid increase for the state's unemployment rate beginning in the fourth quarter of 1976. (Very preliminary data for the last half of 1976 suggests this rise has in fact taken place.) The peak of 13.4 percent in the first quarter of 1977 is higher than any quarter in the last three years, but still not as high as the rate for 1974:1. In 1977, however, unlike previous years, the unemployment rate will not fall dramatically in the second and third quarters, and again exceeds 13 percent in the fourth quarter. Thus, the annual average of 12.1 percent will be the highest since record-keeping began in 1947.

Figure 2 presents our forecast for civilian wage and salary employment. The mid-year surge of 1975 and 1976, as the pipeline workforce rose to its peak, will be sharply attenuated in 1977. By the fourth quarter of 1977, with the pipeline construction workforce down to 2,000, employment will fall to the lowest level since

*The creation and testing of the model is discussed in Section 4.

1974:2, the commencement of the pipeline boom. The 1977 average shows a 14 percent decline from 1976, the sharpest decline since record-keeping began in 1947.

Price inflation will continue the moderating trend of 1976, with prices rising only 6.3 percent for the year, and increasing at an annual rate of only 5.6 percent by the end of 1977. This trend is graphed in Figure 3. The rate of inflation in Alaska is measured by the change in the Anchorage Consumer Price Index. Prices in other areas of the state, notably Fairbanks, may increase even more slowly. The 1977 rate of inflation is, however, still rather rapid compared to the pre-1974 years of mild inflation.

The trade sector is one of the largest support sectors in the Alaska economy, and employment falls by 13.6 percent in 1977, or approximately 3,500 employees. This decline (graphed in Figure 4) accounts for a sizable portion of the overall decline in employment. A major portion of this decline will occur in Anchorage, which accounts for three-quarters of the trade employment in the state.

A slightly more severe decline occurs in the service sector of the state economy, graphed in Figure 5. The annual percentage decline of about 18 percent again will be concentrated in Anchorage, the service center of the state. The fourth quarter of the year will be the low point for 1977, with service employment falling to its lowest level since the beginning of 1974. The annual percentage decline in 1977 is equivalent to approximately 4,000 employees.

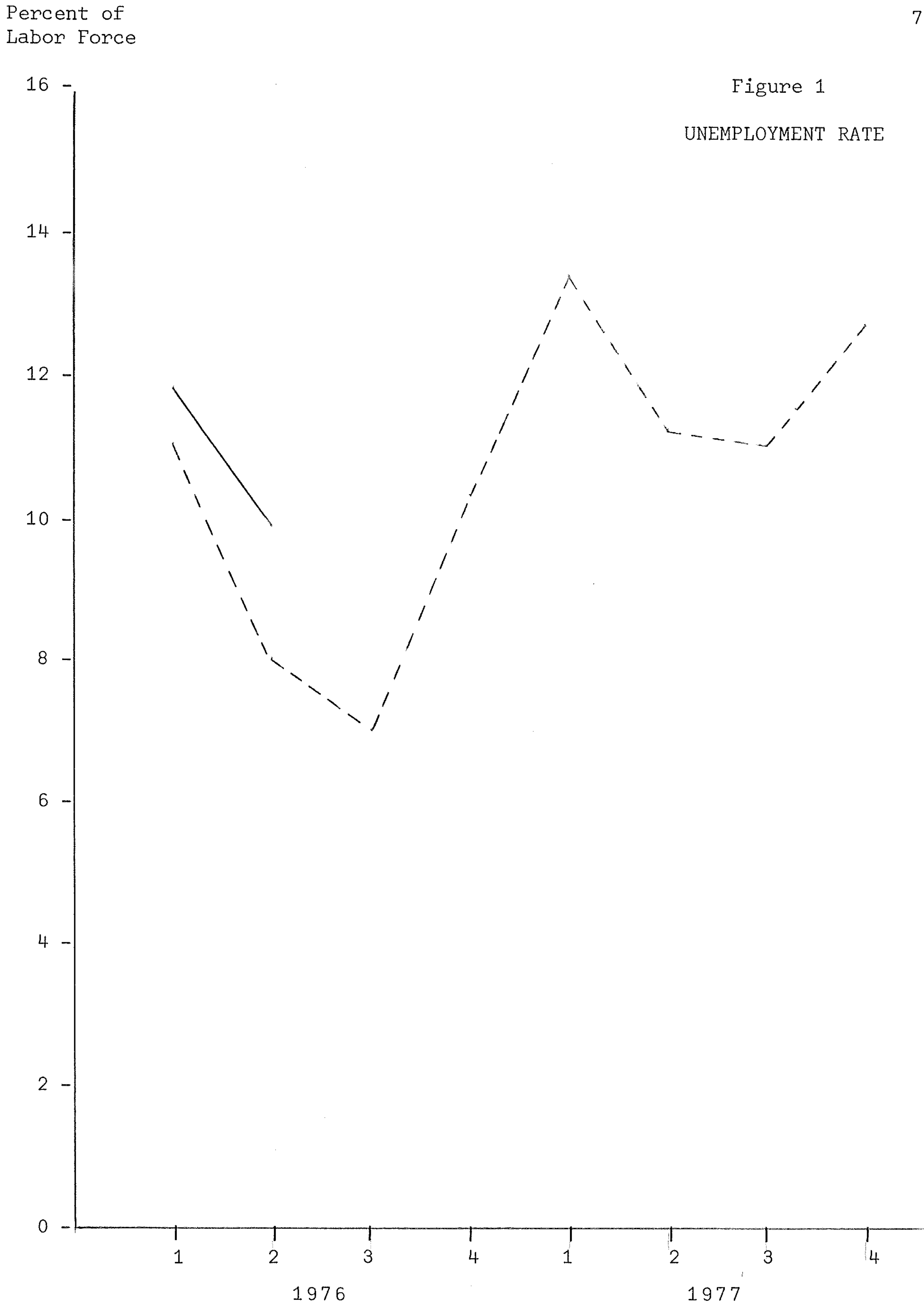
The construction sector, which exhibited phenomenal growth in the 1974-76 period as a direct result of the pipeline, will show a dramatic decline in 1977 of close to 50 percent, as pipeline employment falls from a peak of over 20,000 in mid-1976 to 2,000 by the end of 1977. (Figure 6) Non-pipeline construction falls also, but by a much smaller amount (23 percent or 3,000 jobs). The dramatic variations in pipeline employment have been, and will be, a prime determinant of the fluctuations in economic activity in the state.

The downward trend in employment in transportation, communications, and public utilities is graphed in Figure 7. Employment in the transportation sector, by far the largest employer of the three, falls the fastest (20 percent) in 1977, following a probable slight decline in 1976 from 1975. Communications employment falls only 7.5 percent and public utilities, which comprises less than 10 percent of this sector, falls 17 percent. The transport sector also was directly influenced by the construction of the oil pipeline and has been the first sector to experience post-pipeline weakness.

The forecasted employment decline in the finance, insurance, and real estate sector is graphed in Figure 8. The annual percentage decline of 18 percent may be a little steeper than will actually occur, based on very preliminary data for the last two quarters of 1976. Again, the major portion of this decline will take place in Anchorage, which is the financial center of the state.

Last, but certainly not least of the support sectors of the economy, is state and local government. Employment in this sector is forecasted to rise in 1977, reflecting higher spending levels by the state in fiscal year 1977 and especially fiscal year 1978, beginning July 1, 1977. This increase in employment will have an ameliorating effect on the decline in economic activity, but cannot prevent it. Figure 9 shows the forecasted trend in state and local government employment. Employment in this sector showed little growth in 1976, in contrast to the rapid growth in most other sectors.

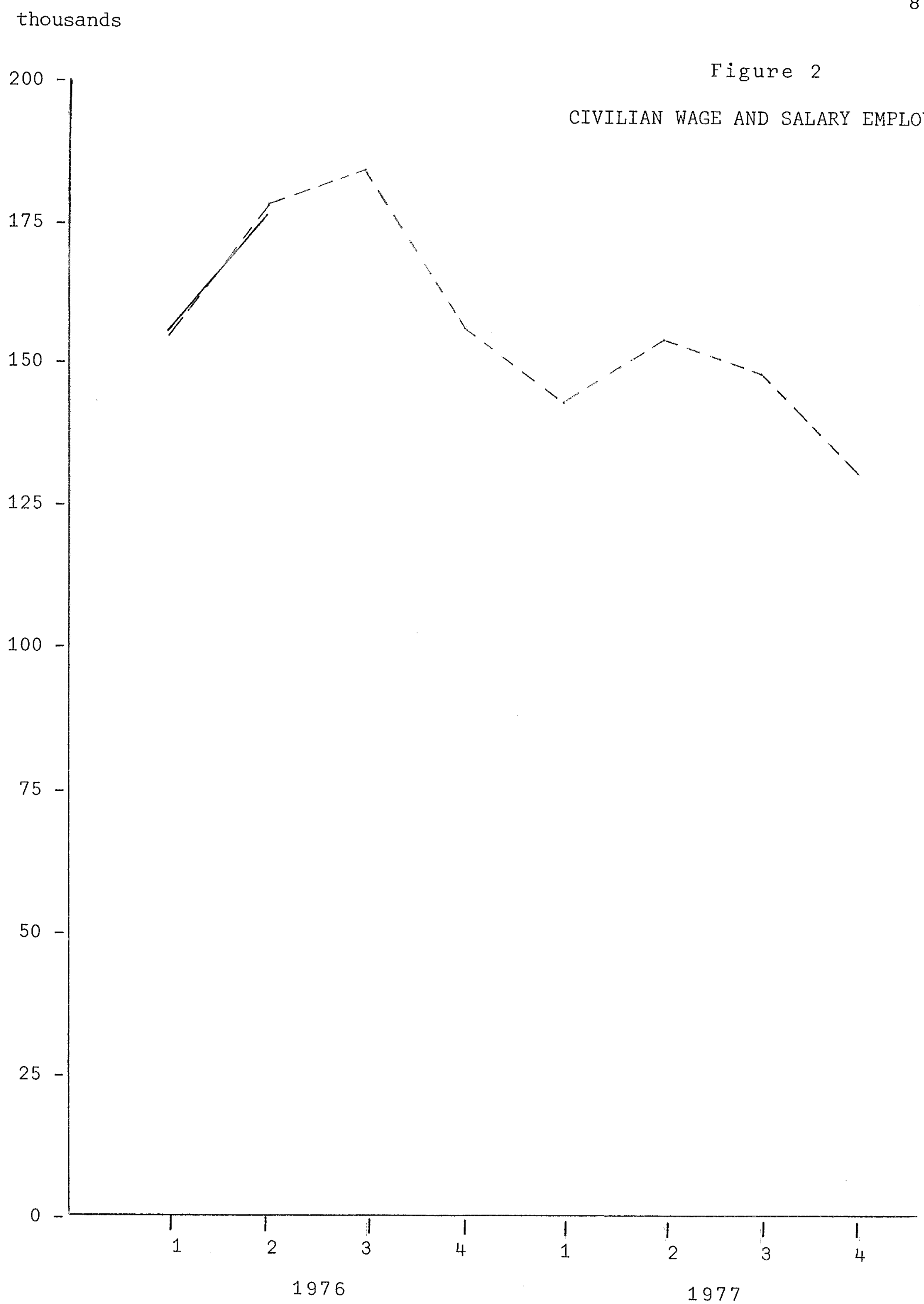
The I.S.E.R. short-run model cannot make regional forecasts. Yet it is obvious that much of the forecasted decline in employment will take place in the Anchorage area, which accounts for more than half of the state's support sector employment. The Fairbanks area will no doubt suffer a greater *relative* decline in employment, and probably higher unemployment also, given the dramatic boom in the area in 1974-1976.



Solid line - preliminary 1976 data
Dotted line - forecast

Figure 2

CIVILIAN WAGE AND SALARY EMPLOYMENT



Solid line - preliminary 1976 data
Dotted line - forecast

Figure 3

INFLATION RATE
(Anchorage CPI)

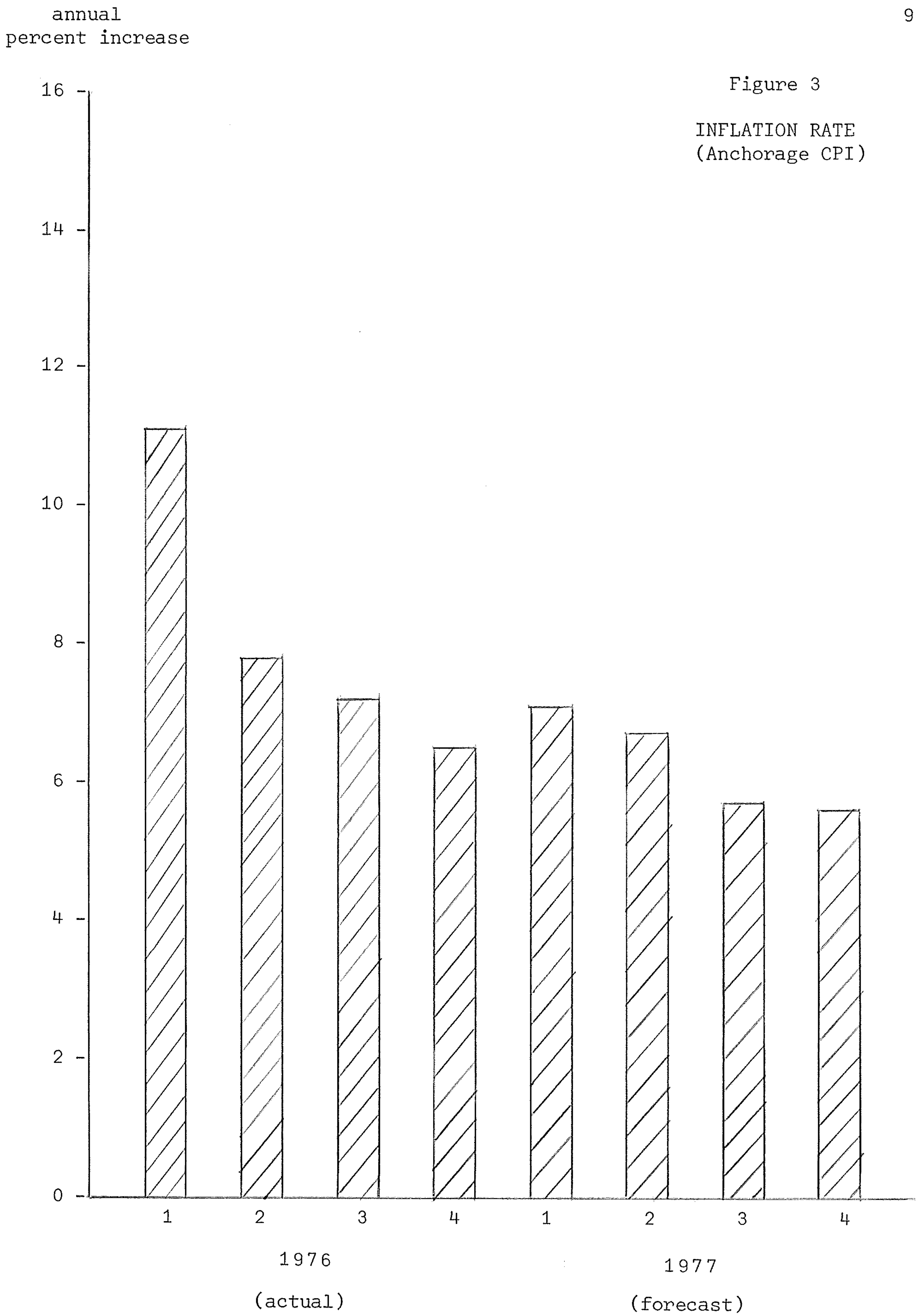
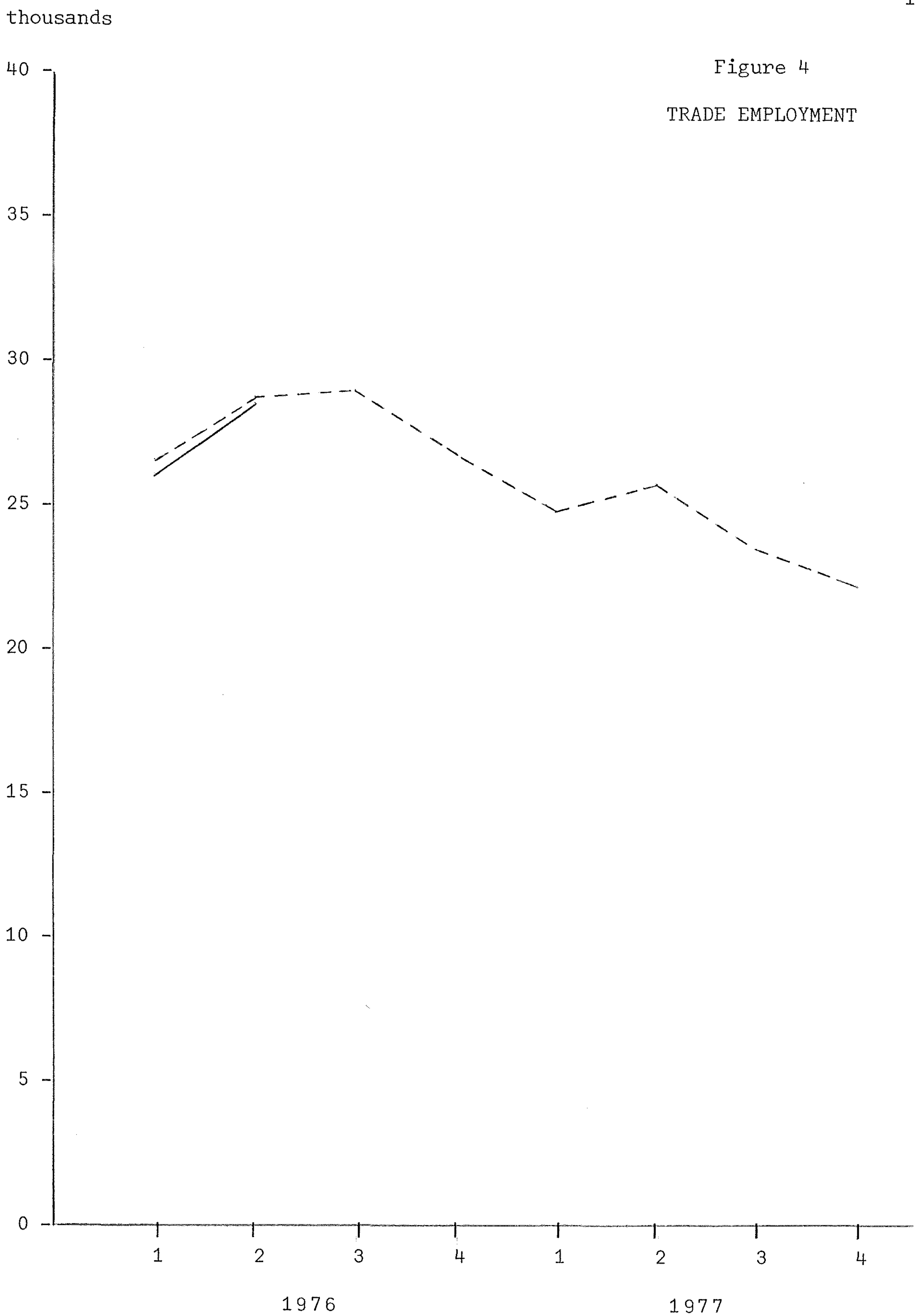
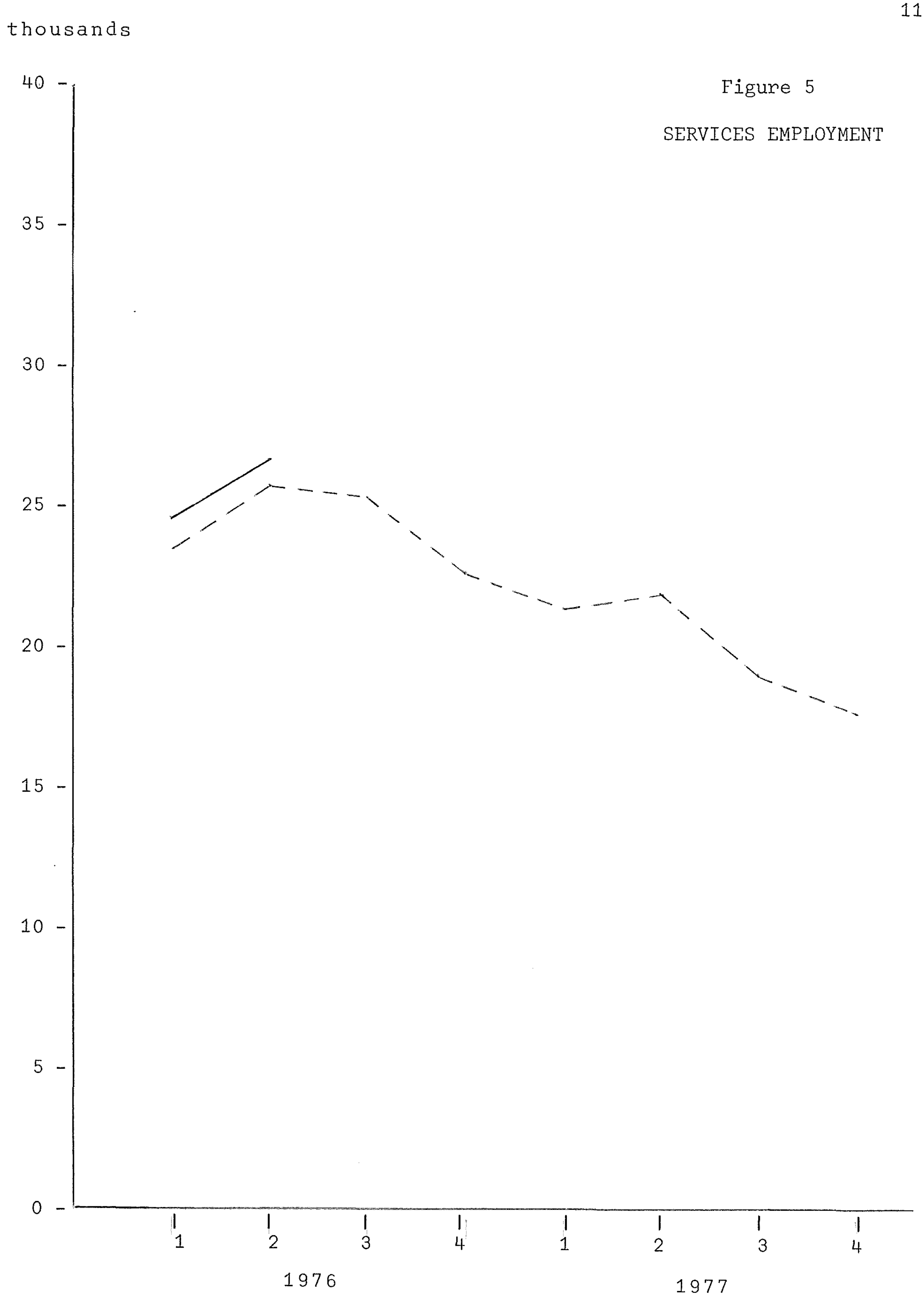


Figure 4

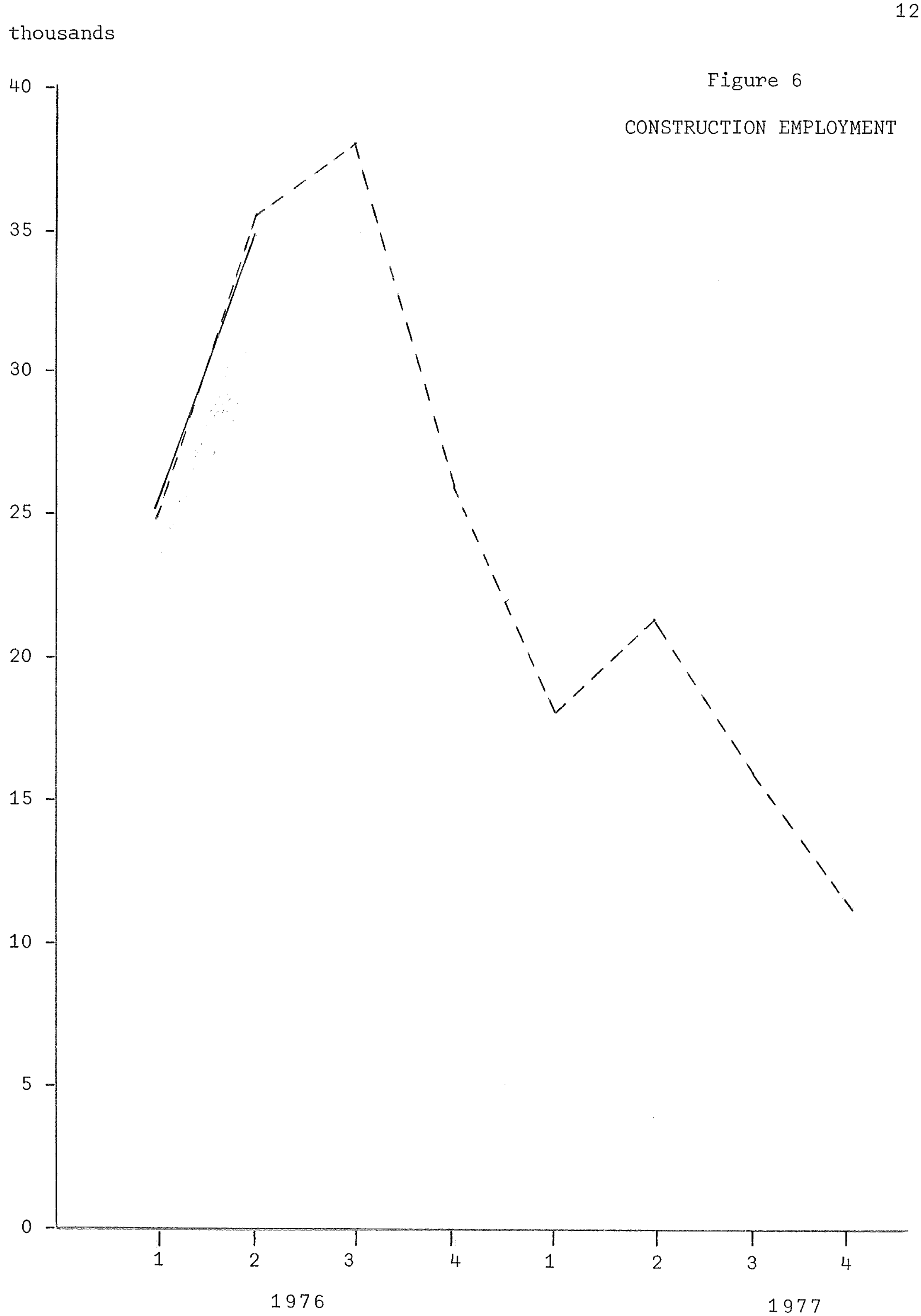
TRADE EMPLOYMENT



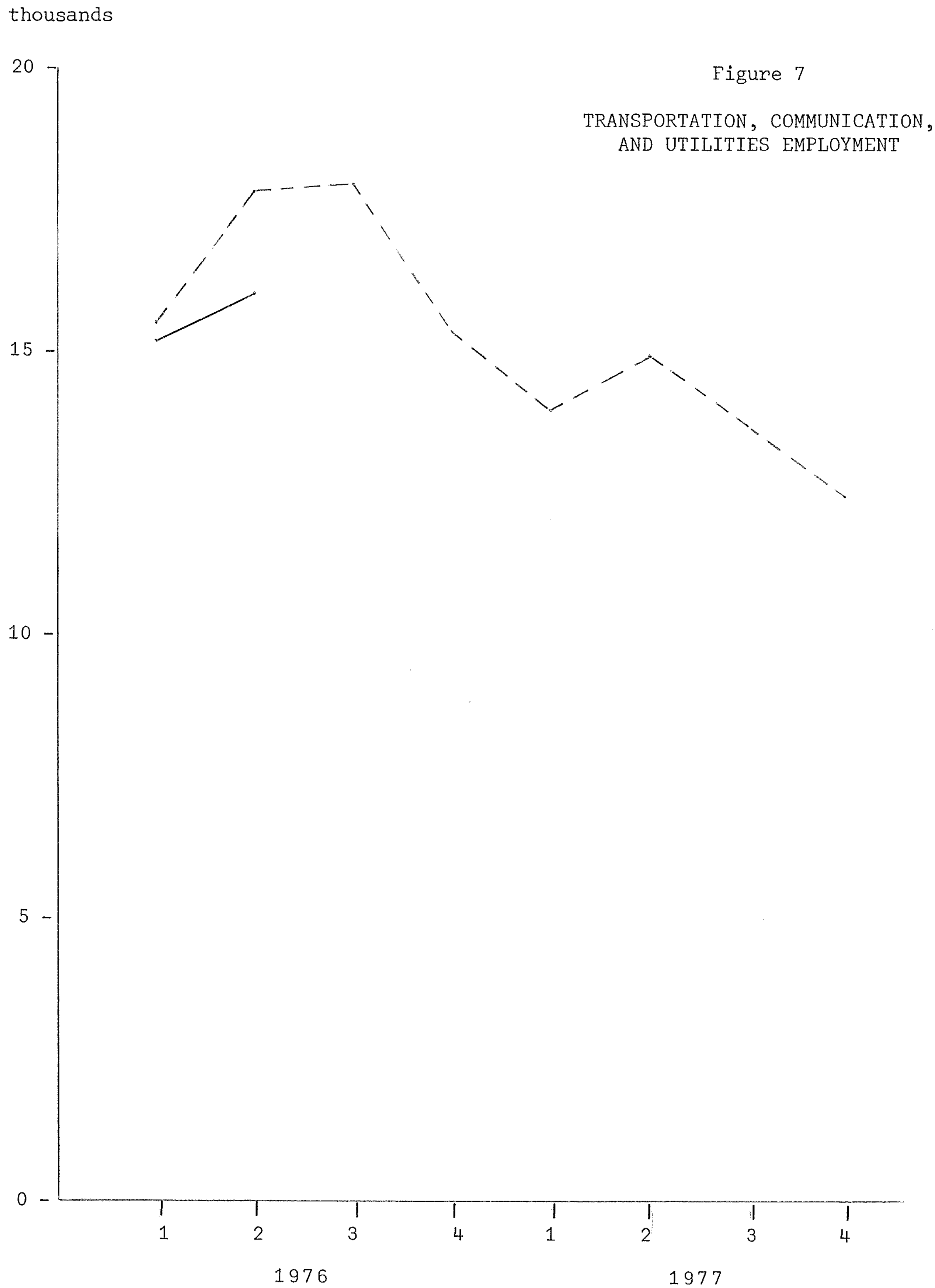
Solid line - preliminary 1976 data
Dotted line - forecast



Solid line - preliminary 1976 data
Dotted line - forecast



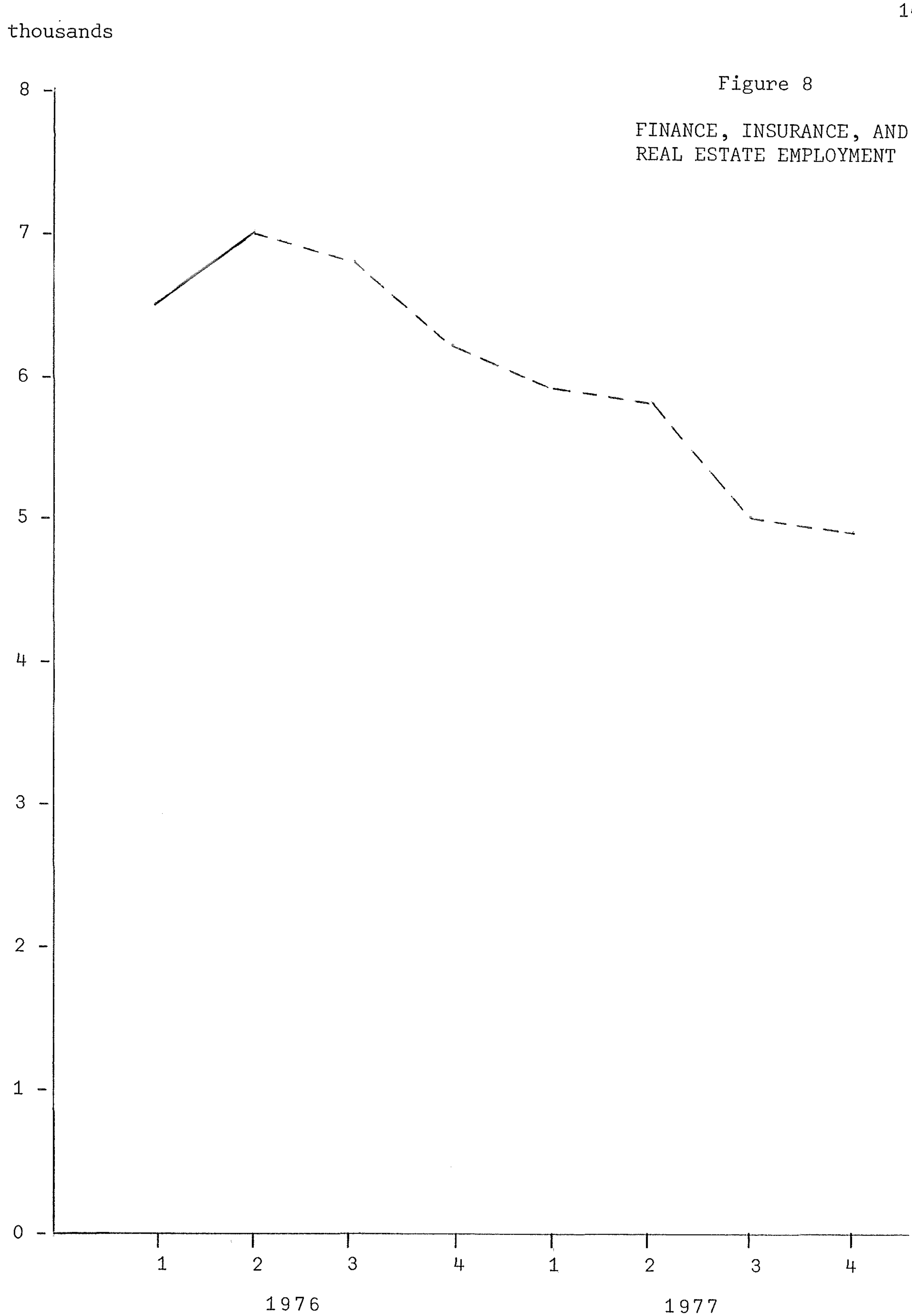
Solid line - preliminary 1976 forecast
Dotted line - forecast



Solid line - preliminary 1976 data
Dotted line - forecast

Figure 8

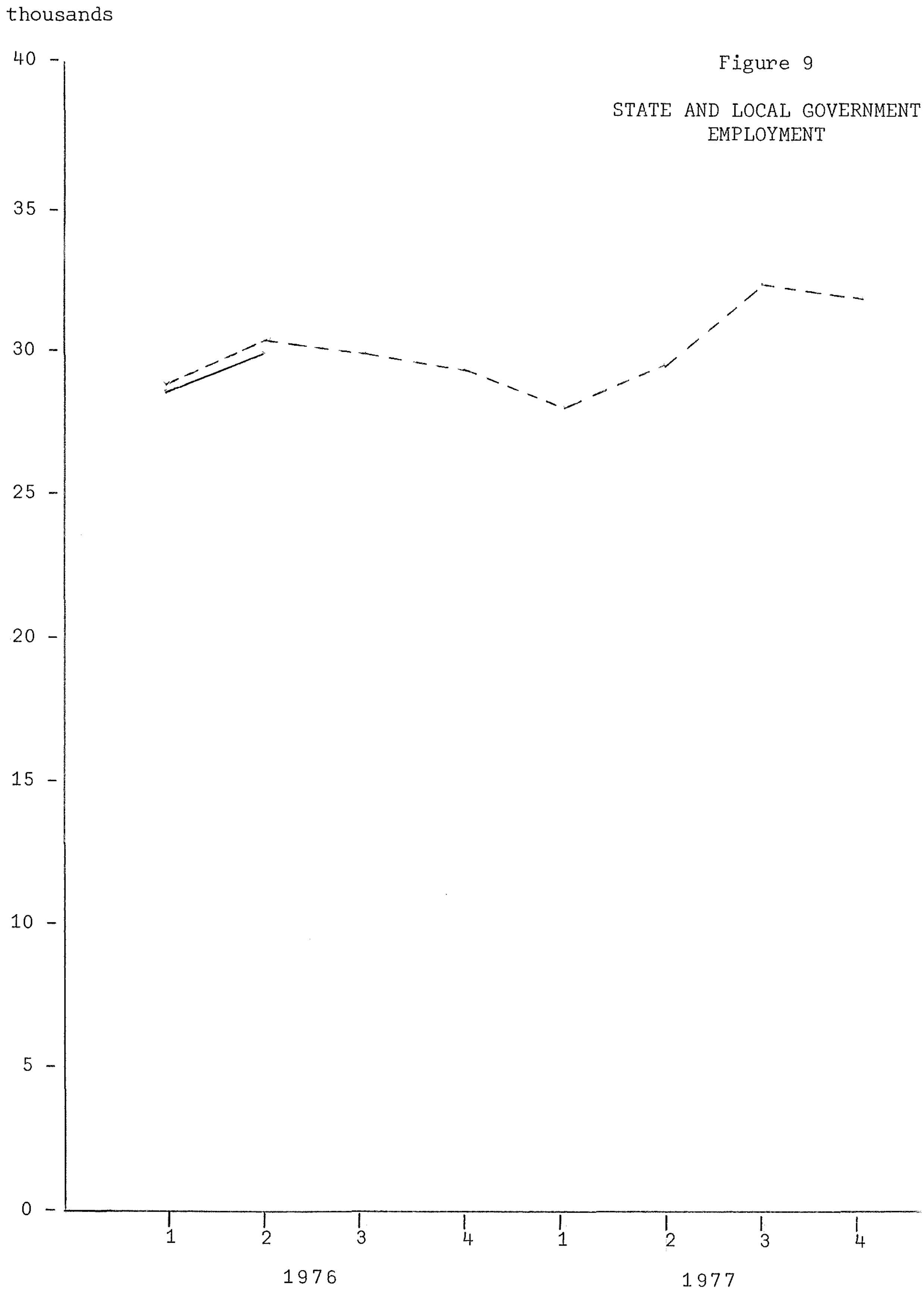
FINANCE, INSURANCE, AND REAL ESTATE EMPLOYMENT



Solid line - preliminary 1976 data
Dotted line - forecast

Figure 9

STATE AND LOCAL GOVERNMENT EMPLOYMENT



Solid line - preliminary 1976 data
Dotted line - forecast

4. Description and Background of I.S.E.R.'s Quarterly Econometric Model*

Beginning in 1978, the state of Alaska will receive almost one billion dollars per year in royalties and taxes from Prudhoe Bay oil production. The long-term consequences of this massive flow of "petrodollars" have been studied by the Institute of Social and Economic Research at the University of Alaska for the past three years. Several long-run policy-oriented econometric models of the state have been constructed. These models are driven by resource development scenarios which project the employment and revenue impacts of further development of Alaska's petroleum resources, and by state expenditures, a key policy variable which, given the massive "petrodollar" flows, can be manipulated by policymakers with major effects on the economy.**

Long-term models of Alaska's economy tend to show relatively smooth and steady growth. Yet quite recent experience is demonstrating once again the "boom-bust" nature of the Alaska economy. In order to capture the short-run characteristics of the Alaska economy, a quarterly econometric model has been constructed and

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*A more detailed and technical discussion of model construction, estimation, and testing is contained in Daniel A. Seiver, "A Quarterly Model of the Alaska Economy," February, 1977. This model was created using the TROLL system of the National Bureau of Economic Research, Inc.

**These models are described in detail in David T. Kresge, "Alaska's Growth to 1990," Alaska Review of Business and Economic Conditions, vol. 13, no. 1, January, 1976.

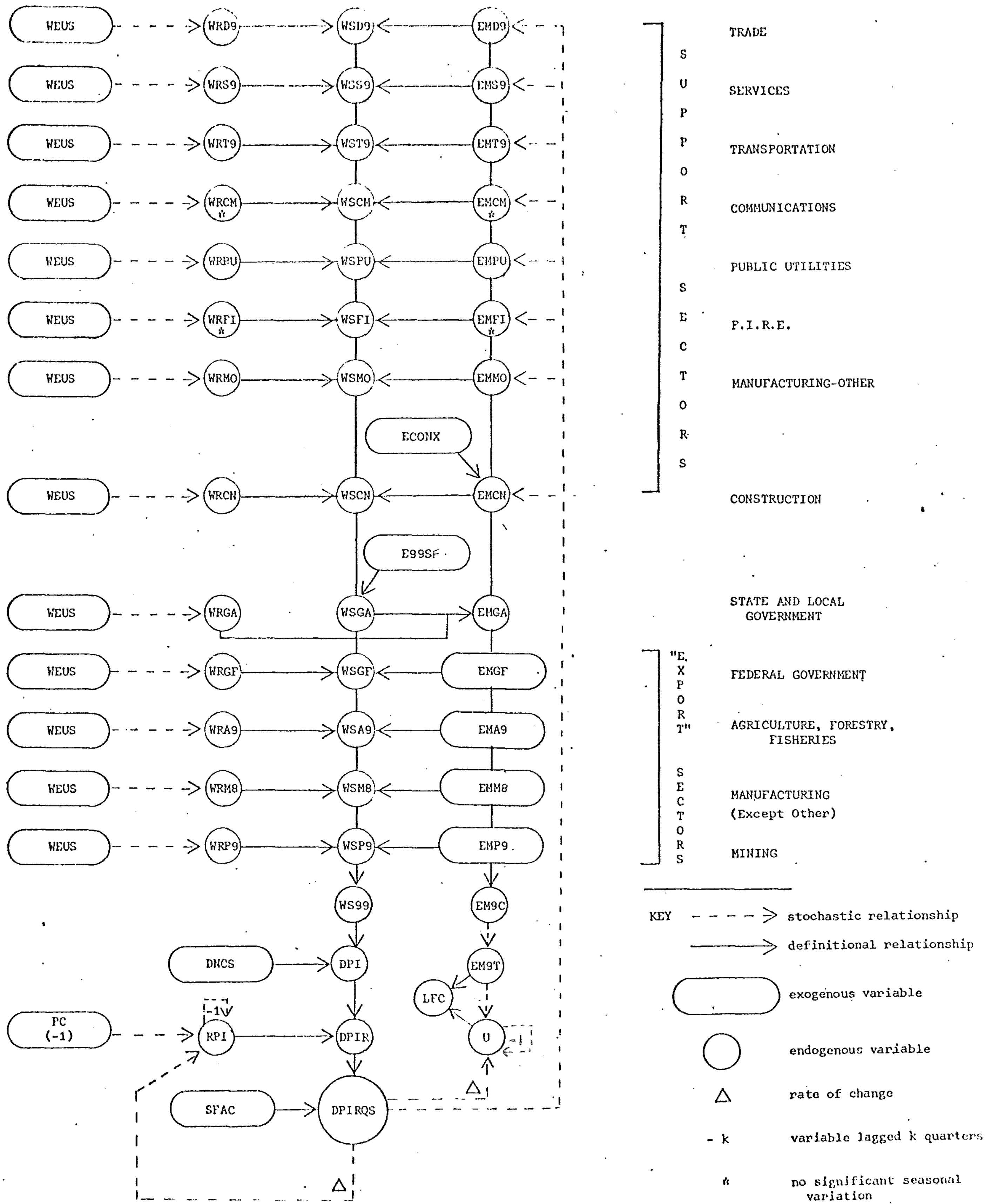
has been tested against historical data, and used for the forecast discussed above.

The structure of the model is diagrammed in Figure 10. The symbolic notation can be decoded by referring to the symbol dictionary on page . All "Q" suffixes have been deleted from Figure 10 to simplify the diagram.

Employment in Alaska's support sectors is a function of local demand, which is measured by real disposable personal income (DPIRQS). Almost all the demand-employment relations contain seasonal dummies, reflecting the highly seasonal nature of the Alaska economy. Those variables which do <u>not</u> exhibit seasonal variation are marked with an asterisk.* Several support sector employment equations have slightly differing specifications. During the historical period, much of the communications network was turned over to private industry by the Federal government, and a special dummy has been added to the communications employment equation to account for this transfer. The transport sector, particularly trucking and air transport, has been exogenously affected by oil development and pipeline construction: a special dummy has been added to the transport employment equation to capture this effect. During the pipeline construction boom, construction employment has a large exogenous component (ECONXQ) which is forecasted separately based on periodic

*Appendix A lists all the equations in the model and contains regression results for all stochastic equations.

Figure 10. ALASKA QUARTERLY MODEL



SYMBOL DICTIONARY

Sector	Symbol	Sector	Symbol
Ag., For., Fish.	A9	Manufacturing (except other)	M8
Communications	CM	Mining	P9
Construction	CN	Public Utilities	PU
Federal Government	GF	Services	S9
Federal Military	GM	State and Local Government	SL
F.I.R.E.	FI	Trade	D9
Manufacturing (Other)	MO	Transport	T9

OTHER VARIABLES

Symbol	Name	Symbol	Name
DNCSQ	Federal Payment for Alaska Native Claims Settlement Act	PC	U.S.C.P.I.
		RPIQ	Alaska Relative Price Index
DPIQ	Disposable Personal Income	S(i)	Seasonal Dummy for ith Quarter (i-1,2,3)
DPIRQ	Real Disposable Personal Income	SFAC	Seasonal Adjustment Factors
DPIRQS	DPIRQ Seasonally Adjusted	UQ	Unemployment
E99SFQ	State Government Non-Capital Expenditures	URATE	Unemployment Rate
		WEUSQ	U.S. Average Weekly Earnings
ECONXQ	Exogenous Construction Employment	WS99Q	Total Wages and Salaries
EM9CQ	Civilian Employment		
LFCQ	Civilian Labor Force		

VARIABLE PREFIXES

Coefficient - C	Wage Rate - WR	Rate of Change - DEL (Δ)
Employment - EM	Wages and Salaries - WS	

Example: EMD9Q

employment (EM) → trade (D9) → quarterly (Q) employment and employment projection reports obtained from the pipeline construction consortium. The endogenous component of construction is estimated first, using the standard support sector specification, and then exogenous construction employment is added to determine total construction employment.

Wage rates (average earnings per quarter) in the support sectors are functions of U.S. quarterly average weekly earnings (WEUSQ). Most of the historical variation in support sector wage rates can be explained with this variable and seasonal dummy variables. However, the pipeline construction boom has had a major impact on all wage rates in Alaska. To capture this effect, a dummy variable, ECONXQ/EMCNQ, has been added to most wage rate equations.

The "export" sectors of the model have exogenously determined employment levels, but endogenously determined wage rates. Federal government employment has changed relatively little over the historical period. Most of the manufacturing employment in Alaska consists of food (fish) processing (45 percent of 1975 manufacturing employment) and lumber and paper manufacturing (35 percent of 1975 manufacturing employment). Most lumber and paper output is exported to Japan, and food processing employment depends crucially on the sizes of the relevant harvests of fish. It is thus not feasible to tie what manufacturing employment Alaska does have to the national economy. The remainder of manufacturing employment is responsive to local demand and is treated as a support sector.

Agriculture, forestry, and fisheries is a heterogenous sector for which employment is also determined outside the model. Alaska has almost no agriculture. Forestry employment is heavily dependent on supply management considerations, and fisheries employment depends on supply considerations also. Total employment in agriculture, forestry, and fisheries comprises less than one percent of total civilian employment.

Mining employment in Alaska is essentially petroleum employment, which is not sensitive to either local or national aggregate demand conditions. Independent projections of mining employment are contained in the resource development scenarios of I.S.E.R.'s long-run models.

The state and local government sector is the policy sector of this model. Most of the variation in state and in local government wages and salaries can be explained by fiscal year state non-capital expenditures. Thus, altering the level of the state budget has a direct impact on wages and salaries in the government sector, and thus has an indirect impact on support sector employment. Employment in the state and local government sector is defined as the ratio of wages and salaries to the wage rate, which is determined by U.S. earnings. I.S.E.R. has estimated state non-capital expenditures for fiscal year 1977 at $740 million and fiscal 1978, $900 million, which reflects the first receipts of "petrodollars."

An estimate of Federal military employment is subtracted from the sum of sector employment totals to determine total civilian wage and salary employment. Total wages and salaries is similarly the sum of all sectors' wages and salaries. Disposable personal income is determined by the relationship between wages and salaries and disposable personal income estimated on an annual basis. Disposable personal income is then deflated by an Alaska relative price index (RPIQ) to determine real disposable personal income, and this quantity is then seasonally adjusted, based on historical seasonal adjustment factors. The use of seasonally adjusted disposable personal income in the support sector employment equations provides an unambiguous interpretation of the seasonal dummy variables in those equations.

The Alaska relative price index is a regionally weighted function of the Anchorage, Alaska, consumer price index, with an adjustment made to reflect the difference in the level of prices between Alaska and the rest of the United States. Since Alaska produces almost no consumer or producer goods, much of the variation in Alaska prices can be explained by U.S. prices. Since 1961, Alaska prices have risen more slowly than U.S. prices, reflecting reductions in transport costs and scale economies. The recent boom in Alaska has shown, however, that local demand conditions can affect prices. Thus, the price level equation contains a proxy for the rate of growth of local demand. In addition, in a quarterly model, it is appropriate to specify a lagged response of Alaska prices to U.S. prices. The assumed geometric lag structure gives the familiar lagged dependent variable on the right-hand side; in addition, the regression was improved by lagging the U.S.C.P.I. by one quarter.

The modeling of the state's labor market has been a difficult task. No estimates of quarterly state population are available, and interpolations are misleading since there is an important seasonal component in net interstate migration to Alaska. Population is, therefore, not an input in the determination of the labor force. Labor force is defined as the sum of total employment and unemployment. Total employment is essentially civilian wage and salary employment adjusted for self-employed and multiple job holders and is thus a function of EM9CQ. Unemployment is a function of employment, seasonal dummies, the rate of growth of employment, a special dummy to account for a change in data collection methodology, and the level of unemployment in the previous quarter.

The quarterly model has been estimated by ordinary least squares regression. The historical period begins with 1965:1 and ends with 1975:4.

Historical simulations have been run for the 1966:1 to 1975:4 period, years of rapid but uneven growth in the Alaska economy, culminating with a sharp spurt induced by pipeline construction. Figures 11 to 15 graph the simulated results for the historical period against the actual data, for five key variables in the model. Table 1 lists the measures of "goodness of fit" for each variable determined within the model. These measures can show how well the model "tracks" the historical period.

The true test of a forecast model, however, is its ability to forecast beyond the historical data. The preliminary data for 1976:1 and 1976:2 (see Figures 1-9) indicate that the model can pass this most rigorous test.

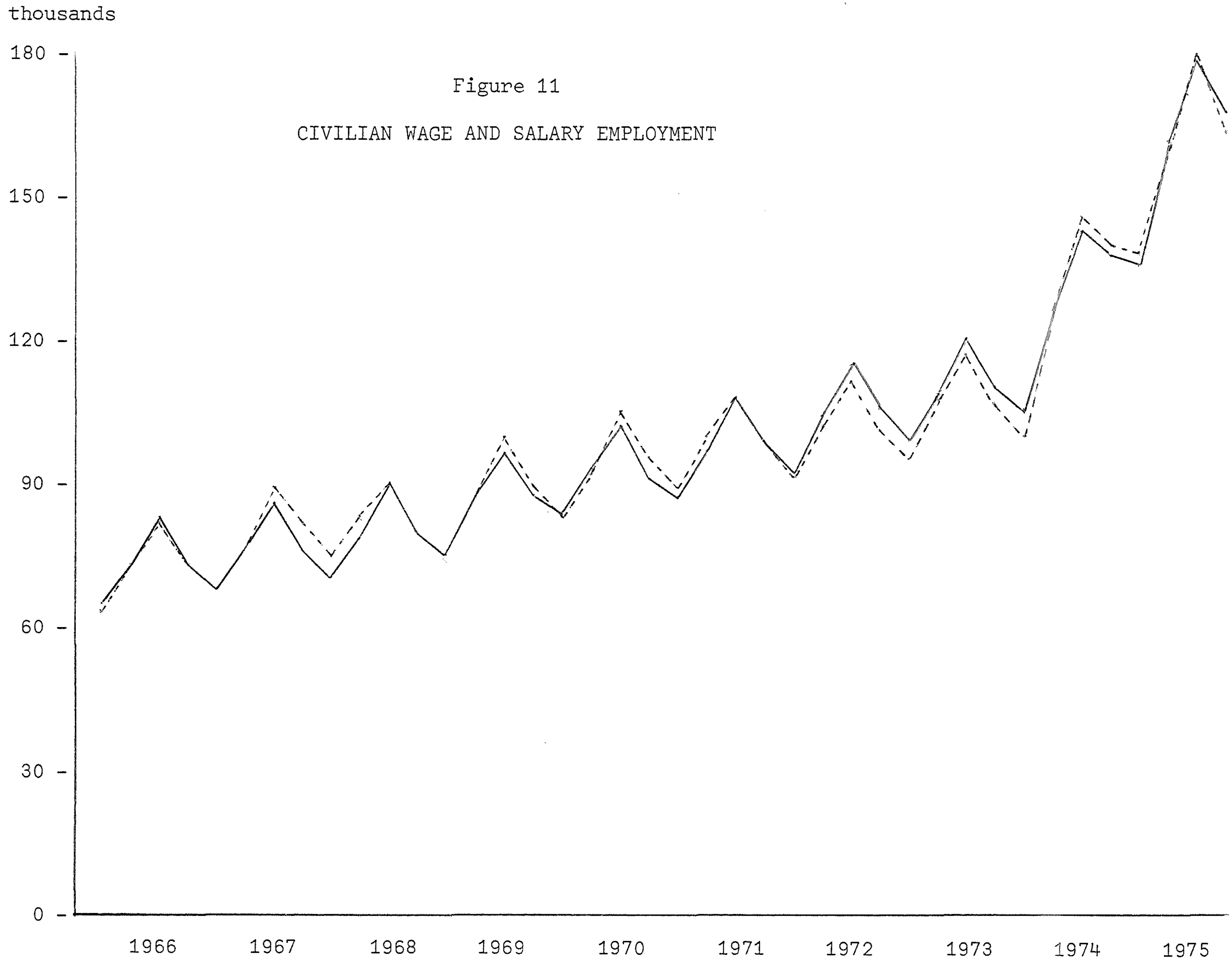


Figure 11

CIVILIAN WAGE AND SALARY EMPLOYMENT

Solid line - actual data
Dotted line - simulated results

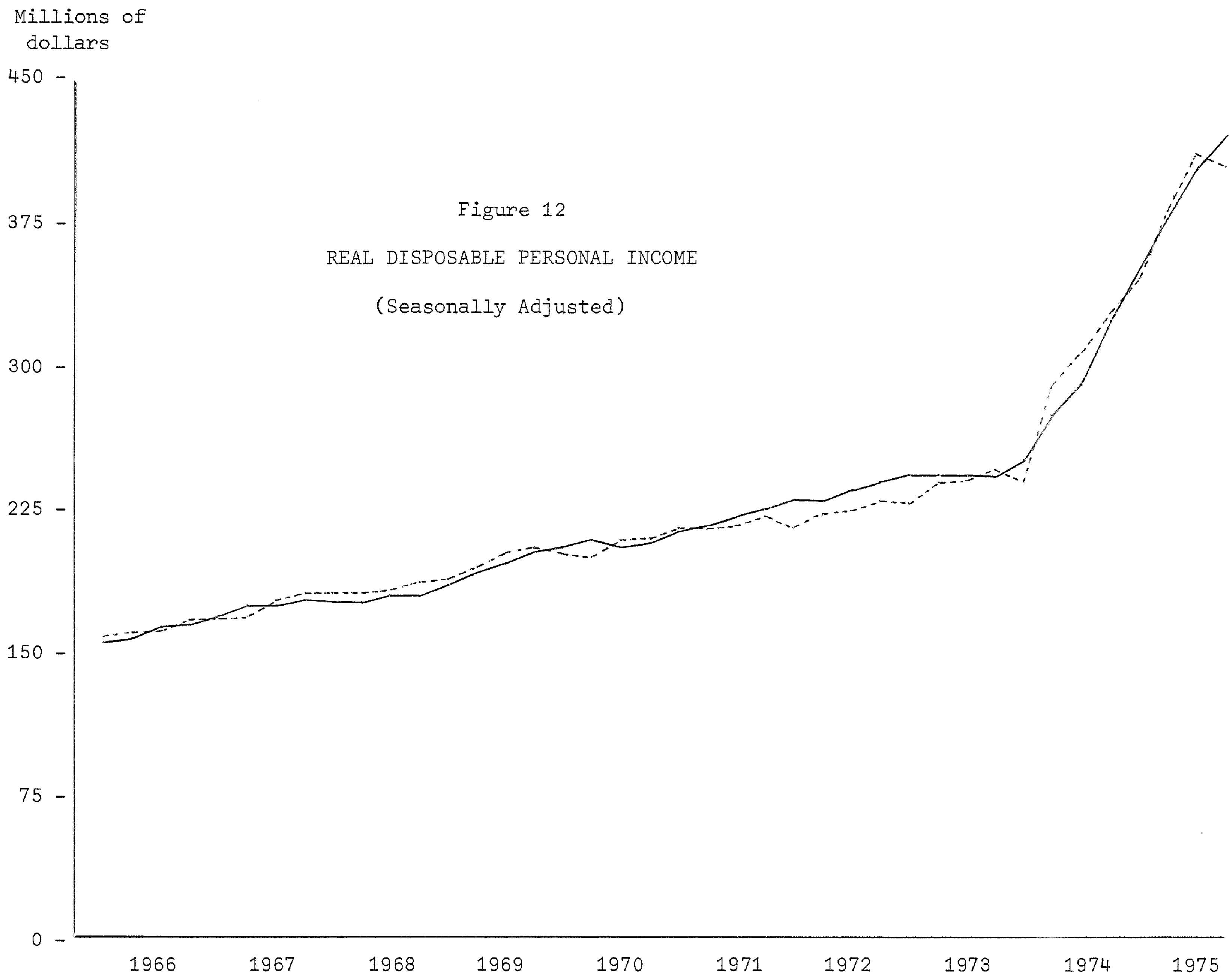
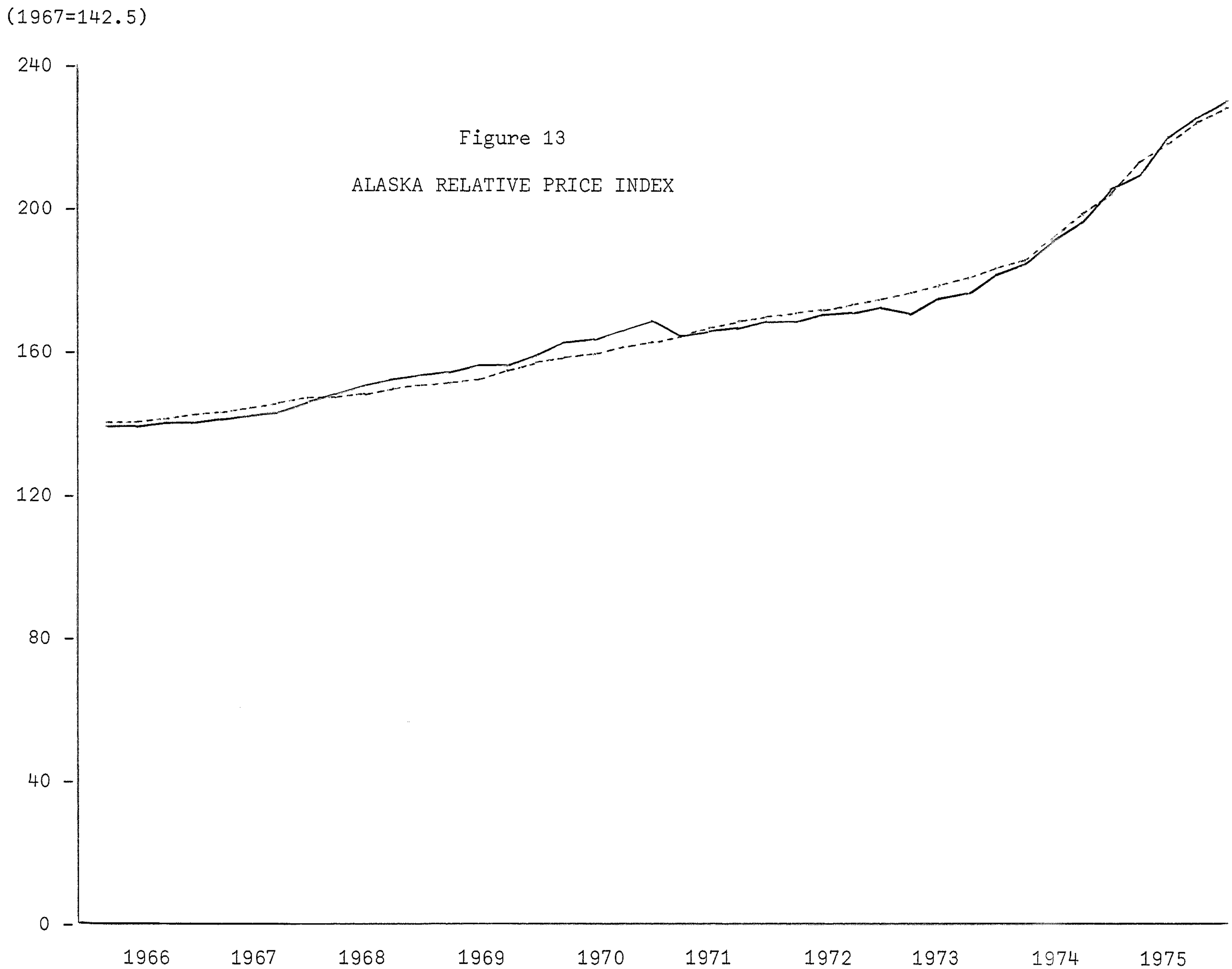


Figure 12

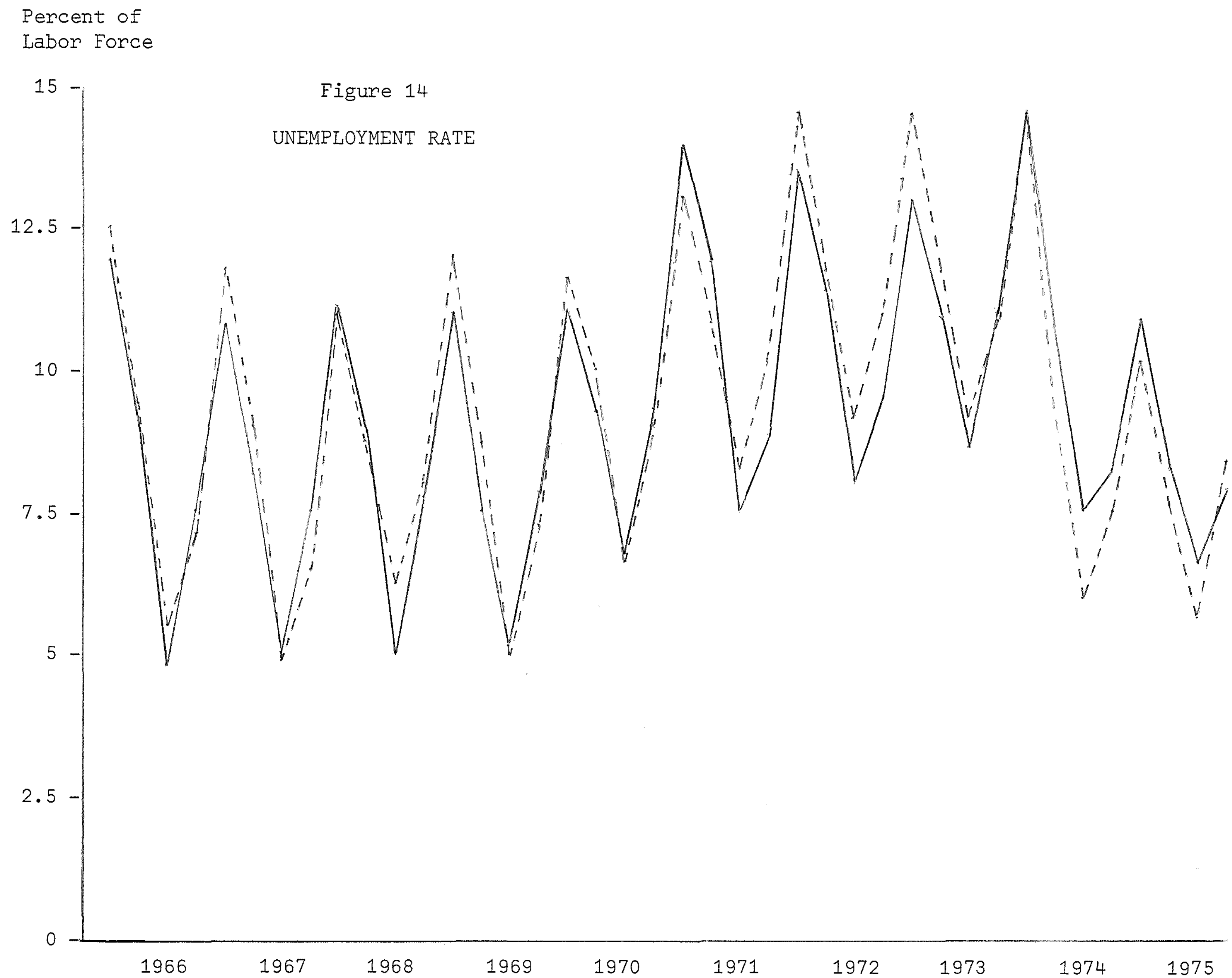
REAL DISPOSABLE PERSONAL INCOME

(Seasonally Adjusted)

Solid line - actual data
Dotted line - simulated results



Solid line - actual data
Dotted line - simulated results



Solid line - actual data
Dotted line - simulated results

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Dotted line - simulated results

ALASKA ECONOMIC FORECAST FOR 1977

APPENDIX

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Alaska Economic Forecast for 1977

APPENDIX

1. Model Equations

2. Stochastic Regressions

1. Model Equations

```
 1:   RPIQ = CRPIA+CRPIB*PC(-1)+CRPIC*DEL(4 : DPIRQS)+CRPID*RPIQ(-1)
 2:   PI1Q == 1.33718*WS99Q**0.98361
 3:   PIQ == PI1Q+DNCSQ
 4:   PIBARQ == PIQ*100./RPIQ
 5:   DPIQ == EXP(0.30764+0.93156*LOG(PIQ))
 6:   DPIRQ == 100*DPIQ/RPIQ
 7:   DPIRQS = DPIRQ/SFAC
 8:   LOG(WRM8Q) = CM8WA+CM8WB*LOG(WEUSQ)+CM8WC*S1+CM8WD*S2+CM8WE*S3+CM8WF*(ECONXQ/EMCNQ)
 9:   WSM8Q == EMM8Q*WRM8Q
10:   LOG(WRGFQ) = CGFWA+CGFWB*LOG(WEUSQ)
11:   WSGFQ == EMGFQ*WRGFQ
12:   LOG(WRP9Q) = CP9WA+CP9WB*LOG(WEUSQ)+CP9WC*S1+CP9WD*S2+CP9WE*S3+CP9WF*(ECONXQ/EMCNQ)
13:   WSP9Q == EMP9Q*WRP9Q
14:   LOG(WRA9Q) = CA9WA+CA9WB*LOG(WEUSQ)+CA9WC*S1+CA9WD*S2+CA9WE*S3
15:   WSA9Q == EMA9Q*WRA9Q
```

```
16:     EMCMQ = CCMA+CCMB*DPIRQS+CCMC*DUMMY
17:     LOG(WRCMQ) = CCMWA+CCMWB*LOG(WEUSQ)+CCMWC*S1+CCMWD*S2+CCMWE*S3+CCMWF*(ECONXQ/EMCNQ)
18:     WSCMQ == EMCMQ*WRCMQ
19:     EMPUQ = CPUA+CPUB*DPIRQS+CPUC*S1+CPUD*S2+CPUE*S3
20:     LOG(WRPUQ) = CPUWA+CPUWB*LOG(WEUSQ)+CPUWC*S1+CPUWD*S2+CPUWE*S3+CPUWF*(ECONXQ/EMCNQ)
21:     WSPUQ == EMPUQ*WRPUQ
22:     LOG(WRFIQ) = CFIWA+CFIWB*LOG(WEUSQ)+CFIWC*S1+CFIWD*S2+CFIWE*S3+CFIWF*(ECONXQ/EMCNQ)
23:     EMFIQ = CFIA+CFIB*DPIRQS+CFIC*DPIRQS**2
24:     WSFIQ == EMFIQ*WRFIQ
25:     EMCN1Q = CCNA+CCNB*DPIRQS+CCNC*S1+CCNE*S3+CCNF*BOOM
26:     LOG(WRCNQ) = CCNWA+CCNWB*LOG(WEUSQ)+CCNWC*S1+CCNWD*S2+CCNWE*S3+CCNWF*(ECONXQ/EMCNQ)
27:     EMCNQ = EMCN1Q+ECONXQ
28:     WSCNQ == EMCNQ*WRCNQ
29:     EMMOQ = CMOA+CMOB*DPIRQS+CMOC*S1+CMOD*S2+CMOE*S3+CMOF*DPIRQS**2
30:     LOG(WRMOQ) = CMOWA+CMOWB*LOG(WEUSQ)+CMOWC*S1+CMOWE*S3+CMOWF*(ECONXQ/EMCNQ)
31:     WSMOQ == EMMOQ*WRMOQ
32:     EMD9Q = CD9A+CD9B*DPIRQS+CD9C*S1+CD9E*S3+CD9F*DPIRQS**2
33:     LOG(WRD9Q) = CD9WA+CD9WB*LOG(WEUSQ)+CD9WC*S1+CD9WD*S2+CD9WE*S3+CD9WF*(ECONXQ/EMCNQ)
```

```
34:    WSD9Q == EMD9Q*WRD9Q
35:    EMT9Q = CT9A+CT9B*DPIRQS+CT9C*S1+CT9D*S2+CT9E*S3+CT9F*OIL
36:    LOG(WRT9Q) = CT9WA+CT9WB*LOG(WEUSQ)+CT9WD*S2+CT9WE*OIL+CT9WF*(ECONXQ/EMCNQ)
37:    WST9Q == EMT9Q*WRT9Q
38:    EMS9Q = CS9A+CS9B*DPIRQS+CS9D*S1+CS9E*S2+CS9F*S3+CS9G*DPIRQS**2
39:    LOG(WRS9Q) = CS9WA+CS9WB*LOG(WEUSQ)+CS9WC*S1+CS9WD*S2+CS9WE*S3+CS9WF*(ECONXQ/EMCNQ)
40:    WSS9Q == EMS9Q*WRS9Q
41:    LOG(WSSLQ) = CSLA+CSLB*LOG(E99SFQ)+CSLC*S1+CSLD*S2+CSLE*S3
42:    LOG(WRSLQ) = CSLWA+CSLWB*LOG(WEUSQ)+CSLWC*S1+CSLWD*S2+CSLWE*S3
43:    EMSLQ = WSSLQ/WRSLQ
44:    EM991Q == EMP9Q+EMCNQ+EMM8Q+EMMOQ+EMT9Q+EMCMQ+EMPUQ+EMD9Q+EMFIQ+EMS9Q+EMGFQ+EMSLQ+EMA9Q
45:    WS99Q = WSP9Q+WSCNQ+WSM8Q+WSMOQ+WST9Q+WSCMQ+WSPUQ+WSD9Q+WSFIQ+WSS9Q+WSGFQ+WSSLQ+WSA9Q
46:    EM9CQ = EM991Q-EMGMQ
47:    EM9TQ = C9TA+C9TB*EM9CQ+C9TC*S1+C9TD*S2+C9TE*S3
48:    UQ = CUA+CUB*EM9CQ+CUD*S1+CUE*S2+CUG*DEL(1 : EM9CQ)+CUC*UDUMMY+CUF*UQ(-1)
49:    LFCQ = EM9TQ+UQ
50:    URATE = UQ/LFCQ
```

VARIABLES	USED IN EQUATIONS												
DPIQ	5	6											
DPIRQ	6	7											
DPIRQS	1	7	16	19	23	25	29	32	35	38			
EMCMQ	16	18	44										
EMCNQ	8	12	17	20	22	26	27	28	30	33	36	39	44
EMCN1Q	25	27											
EMD9Q	32	34	44										
EMFIQ	23	24	44										
EMMOQ	29	31	44										
EMPUQ	19	21	44										
EMSLQ	43	44											
EMS9Q	38	40	44										
EMT9Q	35	37	44										
EM9CQ	46	47	48										
EM9TQ	47	49											
EM991Q	44	46											
LFCQ	49	50											
PIBARQ	4												
PIQ	3	4	5										
PI1Q	2	3											
RPIQ	1	4	6										
UQ	48	49	50										
URATE	50												
WRA9Q	14	15											
WRCMQ	17	18											
WRCNQ	26	28											
WRD9Q	33	34											
WRFIQ	22	24											
WRGFQ	10	11											
WRMOQ	30	31											
WRM8Q	8	9											
WRPUQ	20	21											
WRP9Q	12	13											
WRSLQ	42	43											
WRS9Q	39	40											
WRT9Q	36	37											
WSA9Q	15	45											
WSCMQ	18	45											
WSCNQ	28	45											
WSD9Q	34	45											
WSFIQ	24	45											
WSGFQ	11	45											
WSMOQ	31	45											
WSM8Q	9	45											
WSPUQ	21	45											
WSP9Q	13	45											
WSSLQ	41	43	45										
WSS9Q	40	45											
WST9Q	37	45											
WS99Q	2	45											

2. Stochastic Regressions

```
1:  RPIQ = CRPIA+CRPIB*PC(-1)+CRPIC*DEL(4 : DPIRQS)+CRPID*RPIQ(-1)

NOB = 40      NOVAR = 4
RANGE =  1966 1 TO 1975 4
RSQ =    0.9954       CRSQ =    0.99502      F(3/36) =  2598.230
SER =    1.6938       SSR =    103.287       DW(0) =  2.08
```

COEF	VALUE	ST ER	T-STAT
CRPIA	6.84937	4.63539	1.47762
CRPIB	0.30838	0.09582	3.21836
CRPIC	0.06397	0.01723	3.71260
CRPID	0.74014	0.09245	8.00547

8: LOG(WRM8Q) = CM8WA+CM8WB*LOG(WEUSQ)+CM8WC*S1+CM8WD*S2+CM8WE*S3+CM8WF*(ECONXQ/EMCNQ)

```
NOB = 44      NOVAR = 6
RANGE =  1965 1 TO 1975 4
RSQ =    0.91411      CRSQ =    0.90281      F(5/38) =     80.888
SER =    0.0605       SSR =      0.139       DW(0) =   1.83
```

COEF	VALUE	ST ER	T-STAT
CM8WA	-3.20933	0.32403	-9.90430
CM8WB	0.86196	0.06782	12.70980
CM8WC	-0.06185	0.02594	-2.38452
CM8WD	-0.03274	0.02587	-1.26521
CM8WE	0.02758	0.02581	1.06881
CM8WF	0.18617	0.07895	2.35804

10: LOG(WRGFQ) = CGFWA+CGFWB*LOG(WEUSQ)

```
NOB = 44      NOVAR = 2
RANGE =  1965 1 TO 1975 4
RSQ =    0.96773      CRSQ =    0.96696      F(1/42) =   1259.600
SER =    0.0474       SSR = 9.420E-02       DW(0) =   0.44
```

COEF	VALUE	ST ER	T-STAT
CGFWA	-6.01295	0.18934	-31.75710
CGFWB	1.39726	0.03937	35.49060

12: LOG(WRP9Q) = CP9WA+CP9WB*LOG(WEUSQ)+CP9WC*S1+CP9WD*S2+CP9WE*S3+CP9WF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.9499 CRSQ = 0.94331 F(5/38) = 144.109
SER = 0.0593 SSR = 0.134 DW(0) = 0.69

COEF	VALUE	ST ER	T-STAT
CP9WA	-3.58452	0.31761	-11.28600
CP9WB	1.05648	0.06647	15.89330
CP9WC	-0.04699	0.02542	-1.84839
CP9WD	-0.09489	0.02536	-3.74164
CP9WE	-0.08967	0.02530	-3.54500
CP9WF	0.38794	0.07739	5.01297

14: LOG(WRA9Q) = CA9WA+CA9WB*LOG(WEUSQ)+CA9WC*S1+CA9WD*S2+CA9WE*S3

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.75823 CRSQ = 0.73344 F(4/39) = 30.578
SER = 0.1818 SSR = 1.289 DW(0) = 1.31

COEF	VALUE	ST ER	T-STAT
CA9WA	-5.66450	0.73633	-7.69289
CA9WB	1.42204	0.15209	9.35031
CA9WC	-0.26813	0.07790	-3.44217
CA9WD	-0.19630	0.07766	-2.52788
CA9WE	0.05451	0.07751	0.70323

16: EMCMQ = CCMA+CCMB*DPIRQS+CCMC*DUMMY

NOB = 44 NOVAR = 3
RANGE = 1965 1 TO 1975 4
RSQ = 0.95179 CRSQ = 0.94943 F(2/41) = 404.687
SER = 0.1205 SSR = 0.595 DW(0) = 0.57

COEF	VALUE	ST ER	T-STAT
CCMA	2.06157	0.11246	18.33090
CCMB	0.00281	4.01454E-04	6.99253
CCMC	-0.73700	0.05298	-13.91190

17: LOG(WRCMQ) = CCMWA+CCMWB*LOG(WEUSQ)+CCMWC*S1+CCMWD*S2+CCMWE*S3+CCMWF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.87323 CRSQ = 0.85654 F(5/38) = 52.349
SER = 0.0619 SSR = 0.145 DW(0) = 1.42

COEF	VALUE	ST ER	T-STAT
CCMWA	-0.99387	0.33116	-3.00117
CCMWB	0.49774	0.06931	7.18136
CCMWC	-0.10944	0.02651	-4.12865
CCMWD	-0.06093	0.02644	-2.30419
CCMWE	-0.03852	0.02638	-1.46033
CCMWF	0.41379	0.08069	5.12823

19: EMPUQ = CPUA+CPUB*DPIRQS+CPUC*S1+CPUD*S2+CPUE*S3

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.80744 CRSQ = 0.78769 F(4/39) = 40.884
SER = 0.0730 SSR = 0.208 DW(0) = 0.23

COEF	VALUE	ST ER	T-STAT
CPUA	0.40249	0.04453	9.03907
CPUB	0.00205	1.68621E-04	12.17890
CPUC	-0.04922	0.03132	-1.57148
CPUD	-0.01203	0.03122	-0.38524
CPUE	0.03744	0.03116	1.20133

20: LOG(WRPUQ) = CPUWA+CPUWB*LOG(WEUSQ)+CPUWC*S1+CPUWD*S2+CPUWE*S3+CPUWF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.98325 CRSQ = 0.98104 F(5/38) = 446.102
SER = 0.0350 SSR = 4.652E-02 DW(0) = 2.00

COEF	VALUE	ST ER	T-STAT
CPUWA	-4.05653	0.18733	-21.65420
CPUWB	1.10120	0.03921	28.08650
CPUWC	-0.03379	0.01500	-2.25365
CPUWD	-0.04658	0.01496	-3.11401
CPUWE	-0.02279	0.01492	-1.52770
CPUWF	0.41334	0.04564	9.05570

22: LOG(WRFIQ) = CFIWA+CFIWB*LOG(WEUSQ)+CFIWC*S1+CFIWD*S2+CFIWE*S3+CFIWF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.98476 CRSQ = 0.98275 F(5/38) = 490.924
SER = 0.0246 SSR = 2.301E-02 DW(0) = 1.48

COEF	VALUE	ST ER	T-STAT
CFIWA	-3.64423	0.13175	-27.65970
CFIWB	0.94031	0.02757	34.10010
CFIWC	-0.05619	0.01055	-5.32784
CFIWD	-0.07232	0.01052	-6.87461
CFIWE	-0.08505	0.01049	-8.10496
CFIWF	0.08544	0.03210	2.66137

23: EMFIQ = CFIA+CFIB*DPIRQS+CFIC*DPIRQS**2

NOB = 44 NOVAR = 3
RANGE = 1965 1 TO 1975 4
RSQ = 0.96008 CRSQ = 0.95813 F(2/41) = 492.964
SER = 0.2535 SSR = 2.635 DW(0) = 0.62

COEF	VALUE	ST ER	T-STAT
CFIA	-2.15244	0.48667	-4.42280
CFIB	0.03082	0.00388	7.93641
CFIC	-2.35410E-05	7.14172E-06	-3.29626

25: EMCN1Q = CCNA+CCNB*DPIRQS+CCNC*S1+CCNE*S3+CCNF*BOOM

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.97882 CRSQ = 0.97665 F(4/39) = 450.651
SER = 0.4883 SSR = 9.300 DW(0) = 1.40

COEF	VALUE	ST ER	T-STAT
CCNA	2.33448	0.43995	5.30621
CCNB	0.02339	0.00212	11.01840
CCNC	-2.76581	0.18101	-15.27990
CCNE	2.47366	0.18128	13.64570
CCNF	2.67796	0.40664	6.58555

26: LOG(WRCNQ) = CCNWA+CCNWB*LOG(WEUSQ)+CCNWC*S1+CCNWD*S2+CCNWE*S3+CCNWF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.95606 CRSQ = 0.95028 F(5/38) = 165.372
SER = 0.0658 SSR = 0.164 DW(0) = 1.09

COEF	VALUE	ST ER	T-STAT
CCNWA	-2.47747	0.35209	-7.03655
CCNWB	0.83080	0.07369	11.27430
CCNWC	-0.10912	0.02818	-3.87164
CCNWD	-0.05986	0.02811	-2.12928
CCNWE	0.03591	0.02804	1.28055
CCNWF	0.96404	0.08579	11.23760

29: EMMOQ = CMOA+CMOB*DPIRQS+CMOC*S1+CMOD*S2+CMOE*S3+CMOF*DPIRQS**2

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.96686 CRSQ = 0.9625 F(5/38) = 221.728
SER = 0.0682 SSR = 0.177 DW(0) = 0.86

COEF	VALUE	ST ER	T-STAT
CMOA	-0.92163	0.13178	-6.99349
CMOB	0.01455	0.00104	13.92760
CMOC	-0.11649	0.02926	-3.98113
CMOD	0.08869	0.02917	3.04032
CMOE	0.14528	0.02910	4.99205
CMOF	-1.83648E-05	1.92295E-06	-9.55029

30: LOG(WRMOQ) = CMOWA+CMOWB*LOG(WEUSQ)+CMOWC*S1+CMOWE*S3+CMOWF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.95828 CRSQ = 0.954 F(4/39) = 223.954
SER = 0.0473 SSR = 8.711E-02 DW(0) = 1.27

COEF	VALUE	ST ER	T-STAT
CMOWA	-3.50690	0.25147	-13.94540
CMOWB	0.94916	0.05283	17.96790
CMOWC	-0.07327	0.01752	-4.18204
CMOWE	0.04389	0.01746	2.51356
CMOWF	0.29149	0.06161	4.73100

32: EMD9Q = CD9A+CD9B*DPIRQS+CD9C*S1+CD9E*S3+CD9F*DPIRQS**2

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.99291 CRSQ = 0.99219 F(4/39) = 1365.950
SER = 0.4243 SSR = 7.021 DW(0) = 0.95

COEF	VALUE	ST ER	T-STAT
CD9A	-8.64591	0.81678	-10.58540
CD9B	0.14500	0.00650	22.31050
CD9C	-1.07791	0.15724	-6.85510
CD9E	0.63946	0.15668	4.08134
CD9F	-1.40039E-04	1.19551E-05	-11.71380

33: LOG(WRD9Q) = CD9WA+CD9WB*LOG(WEUSQ)+CD9WC*S1+CD9WD*S2+CD9WE*S3+CD9WF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.98132 CRSQ = 0.97886 F(5/38) = 399.285
SER = 0.0236 SSR = 2.109E-02 DW(0) = 1.07

COEF	VALUE	ST ER	T-STAT
CD9WA	-2.26164	0.12612	-17.93230
CD9WB	0.63488	0.02640	24.05170
CD9WC	-0.03935	0.01010	-3.89762
CD9WD	-0.05060	0.01007	-5.02462
CD9WE	-0.04207	0.01004	-4.18779
CD9WF	0.34697	0.03073	11.29100

35: EMT9Q = CT9A+CT9B*DPIRQS+CT9C*S1+CT9D*S2+CT9E*S3+CT9F*OIL

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.98296 CRSQ = 0.98072 F(5/38) = 438.521
SER = 0.2961 SSR = 3.332 DW(0) = 0.98

COEF	VALUE	ST ER	T-STAT
CT9A	0.15475	0.19582	0.79026
CT9B	0.02729	8.35889E-04	32.65070
CT9C	-0.53098	0.12733	-4.17019
CT9D	0.43527	0.12669	3.43577
CT9E	0.96244	0.12639	7.61509
CT9F	0.74263	0.12658	5.86677

36: LOG(WRT9Q) = CT9WA+CT9WB*LOG(WEUSQ)+CT9WD*S2+CT9WE*OIL+CT9WF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.97776 CRSQ = 0.97547 F(4/39) = 428.575
SER = 0.0435 SSR = 7.371E-02 DW(0) = 1.12

COEF	VALUE	ST ER	T-STAT
CT9WA	-3.67630	0.23145	-15.88380
CT9WB	0.96782	0.04859	19.91940
CT9WD	-0.03998	0.01529	-2.61428
CT9WE	0.05552	0.01953	2.84257
CT9WF	0.66875	0.06622	10.09880

38: EMS9Q = CS9A+CS9B*DPIRQS+CS9D*S1+CS9E*S2+CS9F*S3+CS9G*DPIRQS**2

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.99139 CRSQ = 0.99025 F(5/38) = 874.832
SER = 0.4703 SSR = 8.405 DW(0) = 0.51

COEF	VALUE	ST ER	T-STAT
CS9A	-10.50400	0.90898	-11.55580
CS9B	0.13076	0.00721	18.14170
CS9D	-0.13974	0.20183	-0.69237
CS9E	0.55894	0.20120	2.77799
CS9F	0.70215	0.20073	3.49793
CS9G	-1.12182E-04	1.32636E-05	-8.45786

39: LOG(WRS9Q) = CS9WA+CS9WB*LOG(WEUSQ)+CS9WC*S1+CS9WD*S2+CS9WE*S3+CS9WF*(ECONXQ/EMCNQ)

NOB = 44 NOVAR = 6
RANGE = 1965 1 TO 1975 4
RSQ = 0.9833 CRSQ = 0.98111 F(5/38) = 447.578
SER = 0.0339 SSR = 4.354E-02 DW(0) = 1.30

COEF	VALUE	ST ER	T-STAT
CS9WA	-3.62342	0.18124	-19.99190
CS9WB	0.89530	0.03793	23.60190
CS9WC	-0.04314	0.01451	-2.97334
CS9WD	-0.03589	0.01447	-2.48014
CS9WE	-0.01193	0.01444	-0.82642
CS9WF	0.62992	0.04416	14.26410

41: LOG(WSSLQ) = CSLA+CSLB*LOG(E99SFQ)+CSLC*S1+CSLD*S2+CSLE*S3

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.9806 CRSQ = 0.97861 F(4/39) = 492.932
SER = 0.0728 SSR = 0.206 DW(0) = 1.16

COEF	VALUE	ST ER	T-STAT
CSLA	-0.86161	0.11074	-7.78029
CSLB	0.86122	0.01951	44.13200
CSLC	-0.00282	0.03119	-0.09052
CSLD	0.05730	0.03119	1.83702
CSLE	-0.03952	0.03103	-1.27366

42: LOG(WRSLQ) = CSLWA+CSLWB*LOG(WEUSQ)+CSLWC*S1+CSLWD*S2+CSLWE*S3

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.9713 CRSQ = 0.96835 F(4/39) = 329.916
SER = 0.0390 SSR = 5.937E-02 DW(0) = 1.34

COEF	VALUE	ST ER	T-STAT
CSLWA	-4.71968	0.15806	-29.85960
CSLWB	1.17888	0.03265	36.11000
CSLWC	-0.00172	0.01672	-0.10308
CSLWD	-0.00300	0.01667	-0.18012
CSLWE	-0.04288	0.01664	-2.57730

47: EM9TQ = C9TA+C9TB*EM9CQ+C9TC*S1+C9TD*S2+C9TE*S3

NOB = 44 NOVAR = 5
RANGE = 1965 1 TO 1975 4
RSQ = 0.99944 CRSQ = 0.99938 F(4/39) = 1.74E+04
SER = 0.6818 SSR = 18.131 DW(0) = 1.00

COEF	VALUE	ST ER	T-STAT
C9TA	7.80090	0.44170	17.66120
C9TB	0.97578	0.00392	248.95000
C9TC	-0.72997	0.29583	-2.46752
C9TD	0.50567	0.29081	1.73885
C9TE	1.69913	0.29315	5.79609

48: UQ = CUA+CUB*EM9CQ+CUD*S1+CUE*S2+CUG*DEL(1 : EM9CQ)+CUC*UDUMMY+CUF*UQ(-1)

NOB = 43 NOVAR = 7
RANGE = 1965 2 TO 1975 4
RSQ = 0.97343 CRSQ = 0.969 F(6/36) = 219.821
SER = 0.6677 SSR = 16.051 DW(0) = 1.72

COEF	VALUE	ST ER	T-STAT
CUA	-1.28867	0.93050	-1.38492
CUB	0.02660	0.00741	3.59031
CUD	3.57561	0.28881	12.38070
CUE	1.85662	0.36000	5.15731
CUG	-0.19669	0.01720	-11.43780
CUC	-0.58747	0.45416	-1.29354
CUF	0.82821	0.09097	9.10469
