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THE REAL EXCHANGE RATE AND EMPLOYMENT IN U.S. MANUFACTURING: STATE AND REGIONAL RESULTS

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ABSTRACT

In a series of earlier papers we have examined the impact of exchange rate movements on employment and output in the manufacturing sector, disaggregated by industry sector and by production and non-production workers. In this paper we examine the impact of exchange rate movements on manufacturing employment, disaggregated geographically, using census divisions, regions, states and SMSA's as the unit of analysis. Empirical estimates of employment changes are first presented for the four census regions, the nine census divisions, and the fifty states plus the District of Columbia. For the country as a whole, we estimate that movements in the real exchange rate led to the loss of about 1 million manufacturing jobs over this period.

We go on to examine in greater detail manufacturing employment in New York State, and report that exchange rate movements had a much larger impact in the areas outside of New York City than in the metropolitan area. This result is consistent with earlier work that found that employment in management or research is not as sensitive to exchange rate movements as employment in production processes.

The New York results are followed by an examination of manufacturing employment in five southern states with large rural populations. Some policy makers have expressed a concern that manufacturing employment in rural areas suffered more than in urban areas during the period of the dollar appreciation. We find that within these five states, the impact of the exchange rate on manufacturing employment in the non-SMSA areas was the same or less than was the case for employment within SMSA areas.

Finally, we use a multivariate model to explore why manufacturing employment is more sensitive to exchange rate movements in some states than in others. Factors which are associated with greater sensitivity of manufacturing employment to exchange rate movements are: the percent of the population living outside of SMSA areas, the level of production worker wages, and crude oil production. Factors that are associated with less sensitivity of manufacturing employment to exchange rate movements include the percent of the population with 4 years or more of college or per-capita expenditures on public secondary schools.

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The Real Exchange Rate and Employment In U.S. Manufacturing: State and Regional Results

I. Introduction

In the first half of this decade the U.S. dollar experienced a dramatic appreciation against foreign currencies, reaching a peak in the first quarter of 1985, and falling since. In a series of earlier papers [Branson and Love, 1986; Branson 1986; Branson and Love, 1987] we have examined the impact of exchange rate movements on employment and output in the manufacturing sector, disaggregated by industry sector and by production and non-production workers. In this paper we examine the impact of exchange rate movements on manufacturing employment, disaggregated geographically, using census divisions, regions, states and SMSA's as the unit of analysis.

In section II the econometric model and data are described, and in section III the empirical estimates of employment changes are presented for the four census regions, the nine census divisions, and the fifty states plus the District of Columbia. This includes a decomposition of the change in manufacturing employment from 1980 to 1985. For the country as a whole, we estimate that movements in the real exchange rate led to the loss of about 1 million manufacturing jobs over this period.

In section IV we examine in greater detail manufacturing employment in New York State, and report that exchange rate movements had a much larger impact in the areas outside of New York City than in the metropolitan area. This result is consistent with earlier work [Branson and Love, 1987] that found that employment in management or research is not as sensitive to exchange rate movements as employment in production processes.

The New York results are followed by Section V, which is an examination of manufacturing employment in five southern states with large rural populations. Many policy makers have expressed a concern that manufacturing employment in rural areas suffered more than in urban areas during the period of the dollar appreciation. We find that within these five states, the impact of the exchange rate on manufacturing employment in the non-SMSA areas was the same or less than was the case for employment within SMSA areas.

In Section VI we use a multivariate model to explore why manufacturing employment is more sensitive to exchange rate movements in some states than in others. Factors which are associated with greater sensitivity of manufacturing employment to exchange rate movements are: the percent of the population living outside of SMSA areas, the level of production worker wages, and crude oil production. Factors that are associated with less sensitivity of manufacturing employment to exchange rate movements include the percent of the population with 4 years or more of college or per-capita expenditures on public secondary schools. Once wages are controlled for, union membership is associated with less sensitivity of manufacturing employment to exchange rate movements, although this variable is only marginally significant. Factors that are not statistically significant include population growth and defense shipments or employment.

II. The Estimating Equation and Data

The theoretical basis for the estimating equation used below is described in detail in Branson and Love (1986;1987). A model of supply based on the product wage and demand based on income and relative home and foreign prices is used to derive the reduced form estimating equation described below. In our previous work that disaggregated manufacturing employment by industry we used the same estimating equation for each industry sector, ignoring special sectoral demand shocks and cost effects. The same approach is used here, where the one reduced form model is applied to all geographic areas.

The left-hand dependent variable is the natural logarithm of employment. The right-hand independent variables include a constant, three variables to capture secular, cyclical and structural changes in demand, and the real exchange rate. The secular and cyclical variables are time [TREND] and the natural logarithm of the national unemployment rate [LURT]. The structural variable is the natural logarithm of an index to measure the real price of energy [LRENGY]. The exchange rate variable is the natural logarithm of an index that measures the real U.S. trade-weighted exchange rate [LREX]. The form of the estimating equation is:

$$(5) \quad y_{it} = \beta_0 + \beta_1 t + \sum_{j=0}^{4} \beta_{2j} LURT_{t-j} + \sum_{k=0}^{4} \beta_{3k} LRENGY_{t-k} + \sum_{l=0}^{6} \beta_{4l} LREX_{t-l} + \varepsilon_t,$$

where:

y_{it} = the log of employment or output in sector i,

t = the TREND variable time,

LURT = the log of the U.S. unemployment rate,

LRENGY = the log of the relative price of energy,

LREX = the log of the real exchange rate index,

ε_t = the stochastic error term,

and the β's are the parameters to be estimated.

The data used to estimate equation (5) are quarterly. The equations are estimated over a period that begins in first quarter 1970 and ends in first quarter 1986. In Branson and Love (1987) we experimented with different estimation periods and concluded that 1970 - 1986 was most representative. The estimates are based on 65 observations and 46 degrees of freedom. The Beach-MacKinnon (1978) maximum likelihood procedure for correcting first order autocorrelation was used.

The source of the data on employment is the Bureau of Labor Statistics' (BLS) Employment and Earnings. The dependent variable is the natural logarithm of the number of employed workers. Unless noted otherwise, the estimates are for all workers in the manufacturing sector.

The exchange rate used here is the IMF index of relative unit labor costs, where an increase in the index is an appreciation of the dollar. The real energy index is the CPI-Urban index for energy divided by the CPI-Urban index for all consumer goods. The unemployment rate is for all workers. The exchange rate variable LREX includes the current observation plus six quarters of lagged observations. The real energy price LRENGY and the unemployment rate LURT variables both include the current value plus four quarters of lags.

Because the model is in log linear form, the estimated coefficients have simple economic interpretations. The coefficient for the TREND variable (t) is the estimated exponential rate of growth or decline in employment that occurs due to secular changes in income, tastes, comparative advantage, or technology. A coefficient for TREND of -.001 means that, holding everything else constant, employment will decline at the rate of 0.1 percent each quarter. The coefficients for the real exchange rate, the real price of energy, and the unemployment rate variables can be interpreted as elasticities. For example, a coefficient of -.3 for the real exchange rate variable LREX means that a 10 percent increase in the exchange rate will lead to a 3 percent decrease in the number of workers employed.

III. Estimates for States and Regions

Table S-1 reports the estimated coefficients of equation (5) for the 50 states plus the District of Columbia. The table reports the first order autocorrelation coefficient RHO, the coefficients for each of the independent variables, and a significance statistic. When independent variables are lagged, the coefficient represents the sum of all lagged coefficients. The significance measure [SIG] is the probability that the true value of the sum of the coefficients is zero, using a two-tailed t-test. The standard error [SE] for the sum of the exchange rate coefficients is also reported. In Table S-2, the results from Table S-1 are sorted by the size of the LREX coefficient. For the group as a whole, the LREX coefficient is negative for 45 states, and is positive for six others. The LREX coefficient is statistically significant in 36 cases, including 35 where the coefficient is negative, and one, the District of Columbia, where the sign is positive.

The variable TREND is negative in 15 cases and positive in 36. For 50 of the 51 cases the sign of the coefficient for the national unemployment rate [URATE] has the expected negative sign, although the size of this coefficient shows considerable variance across states.

The energy price variable is negative in 17 of the 51 cases, and statistically significant for 20 states. Of the twenty statistically significant cases, the coefficient is positive for 15. The statistically significant and positive energy coefficients are found both in states that are major energy producers such as Louisiana, Texas, Oklahoma, Wyoming, and Pennsylvania, and in states that are not, such as New York, Maryland, Washington, and Vermont. In some states the energy coefficient appears to represent the direct costs of higher energy inputs, such as for Michigan, where the coefficient is -.45 for a state that depends heavily upon the automobile industry, whereas in other states, such as New York or Vermont, the relationship is less obvious.

The estimated coefficients presented in Tables S-1 and S-2 provide one measure of the importance of the exchange rate to the manufacturing sector. These estimated elasticities give the percentage changes in employment that are predicted for a percentage change in the exchange rate. It is often helpful, however, to have estimates of the number of jobs that will be affected by exchange rate movements. Table S-3 provides these estimates.

Columns (c) and (d) in Table S-3 report the number of workers, in thousands, employed in manufacturing in each state in 1980 and 1985 respectively. For the country as a whole, employment in manufacturing declined from 20.4 million to 19.3 million, a loss of more than 1 million jobs. To decompose this employment change into the components attributed to the real exchange rate and other factors, the estimated model is used to predict the 1985 employment given historical values for the four independent variables, TREND, LRENGY, LURT, and LREX. These numbers are reported in Column (f).

Next, the predicted 1985 employment is recalculated four times, each time using the historical data for three of the series, but substituting the average 1980 values for the fourth independent variable. These new calculations represent the predicted value for employment, given the counter-factual case where the values for one of the independent variables remained at its 1980 level. The differences between the predictions based on the actual and the counter-factual values for the independent variables are the changes in employment that are attributed to the independent variables. These "components" of the change in employment are reported in columns (h), (i), (j) and (k), for each of the four independent variables. Column (l), which is labeled RESID, for the unexplained residual change, is the difference between the actual change, and the change attributed to the four independent variables[1].

Looking for a moment at column (k), we see that for the country as a whole, an estimated 1.1 million jobs were lost from 1980 to 1985 due to the appreciation of the dollar, representing about 5.7 percent of the 1985 employment in the manufacturing sector.

Among the individual states, the largest job losses are: 112 thousand for Texas, 101 thousand for Ohio, 98 thousand for Michigan, 97 thousand for Illinois, 79 thousand for California, and 74 thousand for Pennsylvania. As a percentage of the 1985 work force, the greatest estimated job losses were in North Dakota, 24.5 percent, Nevada, 19.2 percent, Wyoming, 17.3 percent, Kansas, 17.2 percent, and West Virginia, 17.2 percent, -- five states with large rural areas. Several large "rust belt" industrial states also experienced large percentage losses, including Ohio, 9 percent, Illinois, 9.9 percent, Indiana, 9.3 percent, Michigan, 10 percent, and Pennsylvania, 6.8 percent. Several industrial states from the North East were less affected than the nation as a whole by exchange rate movements, including Massachusetts, +.7 percent, New York, +1.1 percent, and New Jersey, -.3 percent.

In Tables R-1 and R-2 the same estimates are presented for manufacturing employment disaggregated by the four census regions and the nine census divisions. Among the census divisions, the largest exchange rate effect is found in the four central divisions [East North Central, West North Central, East South Central, and West South Central], while the smallest exchange rate effect was found in the three divisions on the Atlantic coast [New England, Middle Atlantic, and South Atlantic]. The differences in sensitivity to the real exchange rate are clearest among the regions, though. All four regions have significant negative coefficients, with North Central longest at -0.30, North East smallest at -0.04, and South and West in the middle at -0.17 and -0.13 respectively.

The regional distribution of employment changes and exchange rate effects are shown in Figures R-1 and R-2. These show, respectively, the percentage changes in manufacturing employment from 1980 to 1985, and the size of the estimated real exchange rate coefficient, by census division. Figure R-1 shows that employment losses were largest in the "rust belt," followed by the central states. Figure R-2 shows that the dollar appreciation was a major cause of this loss in the Great Lakes states from Ohio west, and in the central states. In New York and Pennsylvania, other factors were at work. Figure R-2 also shows that the dollar appreciation reduced manufacturing employment more in the central states than in the coastal and western states.

One possible explanation for the differences in exchange rate sensitivity across states is industry mix. Other differences among states may also be important, including labor market or geographic characteristics. To test for such factors, and to check for consistency with earlier results, we estimate models for regions and sectors <u>within</u> several states in sections IV and V. Finally, several models of the state exchange rate coefficient [LREX] are estimated in Section VI.

IV. NEW YORK STATE

New York is an interesting state for a number of reasons. The total number of manufacturing jobs in New York in 1985, 1.295 million ranks second behind California. Unlike California, however, and like several other large industrial states such as Illinois or Pennsylvania, New York experienced a large decline in manufacturing employment in the 1980s. From 1980 to 1985 New York lost about 150 thousand manufacturing jobs, or more than 10 percent of the 1980 New York manufacturing work force. Despite the fact that manufacturing employment declined sharply while the dollar appreciated, the estimated impact of the exchange rate on New York manufacturing employment was negligible. That is, for New York, the exchange rate coefficient, is .02, and not statistically different from zero.

The large decline in New York manufacturing employment and a small or zero estimated LREX coefficient are consistent if factors other than the exchange rate explain recent employment changes. For example, New York experienced declines in manufacturing employment for several years prior to the exchange rate appreciation. Hence, the negative trend of employment may have been independent of exchange rate movements. Moreover, industries that have fared well under the dollar appreciation, like print and publishing, are well represented in New York. Finally, as noted in our earlier work [Branson and Love, 1987], there is a significant difference between the impact of exchange rate movements on production workers and non-production workers. New York State, and New York City in particular, might be expected to house a higher proportion of non-production management employees than other states.

In Table NY-1 the estimated coefficients for the model of manufacturing employment in New York State are presented. Within the non-durable goods sector the exchange-rate coefficients for three of eight sectors, Food and Kindred Products, Tobacco Products, and Print and Publishing, are positive and statistically significant. Within the durable goods sector, five of seven sectors have exchange rate coefficients that are statistically significant, and four of them are negative. Table NY-2 provides the simulated decomposition of employment change, and Table NY-3 compares the estimated LREX coefficients for New York to those reported in our earlier work [Branson and Love, 1987], using national data. The national coefficients include those for all workers, production workers, and non-production workers. As noted above, the New York estimates are for all workers. Considering, for the moment, the national estimates for <u>all workers</u>, we can see that for many industries the coefficients for New York are substantially different from the national estimates, including changes in signs, although for the five industries where both the NY and the national coefficients are statistically significant, the signs are the same.

New York's two largest non-durable goods sectors in terms of employment, [Apparel and other Textile Products, Print and Publishing] have positive LREX coefficients. The three largest New York durable goods industries include two with negative coefficients [Non-Electrical Machinery, Instruments and Related Products] and one with a positive coefficient [Electrical Machinery]. Overall, the <u>industry mix</u> for New York does <u>not</u> seem to explain why New York manufacturing suffered less than other states from the dollar appreciation. Indeed, in 13 of 15 industries, the New York LREX coefficients are substantially more positive than is the case for the estimates for <u>all workers</u> for the nation as a whole.

Some of the difference appears to be related to the types of jobs that one would expect in New York. For example, for the Tobacco Manufactures, and Electrical and Electronic Equipment sectors, the New York LREX coefficients have a different sign from the national estimates for all workers, but the same sign for non-production workers. Moreover, for both sectors, the coefficients for New York and the national non-production workers are statistically significant and close in size.

In Table NY-4, New York manufacturing is disaggregated by region. The top row in the table provides the estimates for the state as a whole. The remainder of the table is broken up into areas that are in or out of the New York City or Long Island area. Within the areas that are not adjacent to New York City, the exchange rate coefficient is statistically significant four times, all of which are have a negative sign. New York City and Nassau-Suffolk counties (Long Island) have statistically significant LREX coefficients of .12 and .10, respectively. When the area outside of New York City and Nassau-Suffolk is aggregated, it has a statistically significant coefficient of -.11, virtually the mirror image of New York City and the adjacent areas.

The comparison between New York City and Long Island and the rest of the state, or what might be called the up-state vs. down-state disparity, may be due to the differences in the impact of exchange rate movements on production worker vs. non-production worker jobs. For New York, this might also be referred to as the "headquarters" factor, because many large manufacturing firms locate management offices and research centers in or near New York City.

V. FIVE SOUTHERN STATES: URBAN AND NON-URBAN AREAS

The New York results are suggestive concerning the role of urban areas. That fact that New York City has fared much better than the less urban up-state areas of New York state raises the possibility that urban areas in general may have been less effected than rural areas. Moreover, regional specialists who study rural economic development have expressed concern that the 1980-1985 dollar appreciation may have reversed a decade of rapid growth in manufacturing employment in rural communities, and may lead to severe dislocation problems as these areas have become more dependent upon manufacturing as farm employment declines. Whether or not the more recent decline in the value of the dollar will lead to a return of the growth rates in manufacturing employment that were seen in the 1970's is uncertain, and depends upon the hysteresis effects discussed in Branson and Love (1987).

In Table SMSA-1, the estimated equations for manufacturing employment for five southern states are presented, disaggregated by SMSA and non-SMSA areas. For each state, all SMSAs included on the BLS States and Regions: Employment and Earnings tape are examined, as are statewide aggregates for all manufacturing employees, and those working in SMSA areas and non-SMSA areas.

Comparison of the SMSA and NONSMSA rows for each state shows that, contrary to the results from New York, manufacturing employment in the more rural, or non-SMSA areas is no more sensitive to exchange rate movements that the more urban SMSA areas. On the other hand, all of the states in Table SMSA-1 are relatively more rural than New York as a whole, and every one of them has an overall exchange rate coefficient that is statistically significant and very negative, ranging from -.15 for Alabama to -.51 for West Virginia.

VI. A MODEL OF EXCHANGE RATE COEFFICIENTS DIFFERENCES

Another method of examining the differences between states is to estimate a multivariate model for the estimated parameter or parameters of interest. The explanatory variables are geographic, economic, or labor market characteristics that vary across states. We have chosen the following area characteristics for our model:

COLLEGE: the percent of the population with four or more years of college in 1980;

EDSPEND: the state per capita expenditures on public primary and secondary schools, in 1980;

NONSMSA: the percent of the population living outside of areas defined as Standard Metropolitan Statistical Areas by the Bureau of the Census in 1980;

OILPROD: the per capita production of crude oil in 1980;

HRWAGE: the average hourly wage for production workers, in 1981;

UNION: the percent of the work force that belongs to a collective bargaining union, in 1980;

GROWTH: the percent population growth, from 1970 to 1980;

DEF EMP: the percent of the population employed in a defense industry, in 1983;

DEF SHP: the per capita defense contract shipments in 1983.

The dependant variable in each across-state regression is the estimated exchange rate coefficient LREX, for all fifty states plus the District of Columbia. There is a potential problem of hetroscedasticity, as some LREX coefficients are estimated more precisely than others. To correct for this, we use the method of weighted least squares, choosing our weights to be the inverse of the estimated standard errors for the LREX coefficients, as suggested by Saxonhouse [1976, 1977]. To provide a unit free measure of the importance of different area characteristics, the dependent and all independent variables transformed into standard normal variables [Z scores]. That is, we have subtracted the mean and divided each variable by its standard deviation--so that each variable has a mean of zero and a standard deviation of one.

15 variations of the model were estimated, and the results are presented in Table S-4. For each model, a number of items are reported, including the R^2 adjusted for degrees of freedom, RBAR^2; the number of degrees of freedom, DOF; the coefficient for the explanatory variable, COEFF; and the T-Statistic, TSTAT, and significance level for the coefficient, SIG.

Each model includes a constant term, plus two or more other explanatory variables[2]. Since the left hand LREX coefficients are generally negative, a positive sign on the coefficient for the explanatory variables means that the variable is associated with a LREX coefficient that is less negative. That is, a positive sign means that a large value for the variable is associated with a state where manufacturing employment experiences less of an adverse impact from an appreciation of the dollar. If one makes the simplifying assumption that all manufactured goods are traded and gross substitutes for foreign manufactured goods, then a positive sign is associated with a state where manufacturing employment is less sensitive to foreign trade, while a negative sign is associated with more sensitivity to foreign trade.

The COLLEGE and EDSPEND variables are designed to measure the influence of education on the degree to which manufacturing employment is sensitive to foreign trade. The EDSPEND variable measures an input of the education system, the per capita expenditures on public primary and secondary schools. The COLLEGE variable measures an output of the education system, the percent of the population that are college graduates[3]. Both variables are proxies for a measure of the quality or training of the labor market, which in turn is an input to the manufacturing process. The education variables are interesting for a number of reasons. There is a strong presumption among policy makers that a highly educated work force is necessary to compete in the world economy. States with high levels of educational achievement are likely to be states where so-called "high tech" industries are located.

Either the COLLEGE or the EDSPEND variable is included in 14 of the 15 models estimated. In each case, the estimated coefficient is positive. For the variable COLLEGE, the coefficient ranges between .27 and .47, depending upon the model, and is statistically significant in all of the models, indicating that the results are very robust to model specification. The EDSPEND variable is used twice as an alternative to COLLEGE, and is statistically significant for one model but not for the other. There is a important interaction effect between the EDSPEND variable and the variable

NONSMSA, which measures the degree of urbanization in the state. That is, once the degree of urbanization is controlled for, EDSPEND is no longer statistically significant, suggesting that the two variables are collinear. The fraction of a state's work force that is college-educated reduces the sensitivity of its manufacturing employment to variations in the real exchange rate. This is consistent with the production vs. non-production worker differences found in Branson and Love (1987), and the up-state vs. down-state differential in New York.

The variable NONSMSA, which is a measure of the degree of how rural [non urban] the state is, is used in 11 models. The coefficient is negative in all 11 models, ranging from -.25 to -.48, and is statistically significant at the .05 level in ten models. Like the coefficient for COLLEGE, the NONSMSA coefficient is robust to model specification. The negative sign means that the more rural the state, the more sensitive manufacturing employment in the state is to foreign trade.

The variable HRWAGE is used in 12 models. It is negative and statistically significant at the .01 level in all 12 models, with values ranging from -.43 to -.66. The negative sign means that the higher the production-worker wages in a state, the greater the sensitivity of manufacturing employment is to foreign trade.

The variable UNION is used in 11 models. There are important interaction effects between the UNION variable and the HRWAGE and NONSMSA variables. In the one model where UNION is used <u>without</u> the HRWAGE variable, it is negative and not statistically significant. When included <u>with</u> the HRWAGE variable, the UNION coefficient is positive in all 10 cases. In those 10 cases, the variable UNION is statistically significant at the .05 level in three models where

NONSMSA is not included, and not statistically significant at the .05 in the seven cases where NONSMSA is included. This variable is marginally significant, however, in four of the seven models that included NONSMSA, with T-Statistics between 1.64 and 1.85 for P values of .07 to .11. The robustness of the sign of the UNION variable suggests that, controlling for wage levels, the higher the percentage of the work force belonging to a union, the less the sensitivity of employment to foreign trade. Possible explanations for this might be that high union membership reflects a more skilled work force that is not as easily displaced by foreign competition, or that union membership leads to political power and the ability to secure protection from foreign competition during periods of a currency appreciation. As noted above, however, the UNION coefficient is not statistically significant at the .05 level when the NONSMSA variable is included, and the sign changes when the level of production worker wages is not controlled for.

The variable GROWTH is used in three models, but is never statistically significant.

The variable OILPROD is used in three models, and is negative in all three cases, and statistically significant at the .05 level twice. In interpreting this variable it is worth noting that the BLS does not include mining employment in the manufacturing employment series, and that the LREX coefficient was estimated in a model that included a separate variable, LRENGY, to control for changes in the relative price of energy. A negative sign for this variable means that the greater the oil production in the state, the more sensitive is manufacturing employment to the strength of the dollar. Whether the demand for manufactured goods in those states is a function of the income from oil production, or the production processes of crude oil or its products, the negative sign of this coefficient is no surprise. Crude oil and petroleum products are traded commodities, and domestic prices are inversely related to the strength of the dollar.

The defense industry variable, DEF_EMP, is positive and statistically significant in model 10, which only includes HRWAGE and UNION as additional explanatory variables. When the variable COLLEGE is added, however, DEF_EMP losses all its explanatory power. The sign of the coefficient changes depending upon the specification of the model, and for all models that include COLLEGE, the DEF_EMP coefficient has very low t-Statistics. Likewise, the variable DEF_SHP has virtually no explanatory power at all in the models where it is tested. Other than signalling the skill or education level of the work-force, neither defense variable has explanatory power. Finally, the variable GROWTH, measured by population growth, is introduced in three models, and has insignificant coefficients each time.

Summary

The results for the NONSMSA variable in this section need to be reconciled with the urban-rural results in section V. In five southern states, the exchange-rate coefficients were not significant by different between urban (SMSA) and rural (NON SMSA) parts of the state. But across all states, the size of the (negative) coefficient is significantly positively related to the fraction of the state population living outside an SMSA. This suggests that there are strong urban-rural differences in other states than the five examined in section V. This is a topic we are now investigating.

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FOOTNOTES

1. The calculations reported in Table 2 are the average of quarterly values, simulated as described in the text. The predicted values for 1985 are based on lagged values for the independent variables, and calculations based on the summed lagged coefficients reported in Table 1 will lead to somewhat different answers than those in Table 2, which are based on the particular lag structure estimated by the model.

2. The non zero value of the constant is due to the fact that a weighted least squares technique was used, and also due to a truncation of the sample size where there are missing values for independent variables.

3. Although not necessarily the same education system as that of the state itself.

FILE: STATE TABLE S-1

STATE MANUFACTURING EMPLOYMENT

STATE	RHO	TREND	SE	SIG	LREX	SE	SIG	LURT	SE	SIG	LRENGY	SE	SIG
ALABAMA	0.29	0.0018	0.0005	0.00	-0.15	0.02	0.00	-0.19	0.02	0.00	0.04	0.06	0.53
ALASKA	-0.02	0.0024	0.0090	0.79	-0.54	0.41	0.19	-0.44	0.39	0.26	0.49	1.15	0.67
ARIZONA	0.92	0.0118	0.0012	0.00	-0.07	0.09	0.41	-0.38	0.05	0.00	0.34	0.14	0.02
ARKANSAS	0.54	0.0043	0.0009	0.00	-0.24	0.05	0.00	-0.16	0.04	0.00	-0.14	0.11	0.22
CALIFORNIA	0.31	0.0052	0.0007	0.00	-0.12	0.03	0.00	-0.29	0.03	0.00	0.31	0.08	0.00
COLORADO	0.82	0.0081	0.0012	0.00	-0.24	0.07	0.00	-0.20	0.05	0.00	0.08	0.15	0.59
CONNECTICUT	0.37	-0.0012	0.0005	0.01	-0.03	0.02	0.22	-0.26	0.02	0.00	0.38	0.06	0.00
DELAWARE	0.26	0.0005	0.0008	0.50	0.04	0.04	0.29	-0.19	0.03	0.00	0.12	0.10	0.22
DISTRICT OF COLUMBIA	0.62	-0.0027	0.0010	0.01	0.27	0.05	0.00	-0.15	0.04	0.00	0.12	0.13	0.38
FLORIDA	0.86	0.0079	0.0011	0.00	-0.00	0.07	0.98	-0.25	0.05	0.00	0.21	0.13	0.12
GEORGIA	0.43	0.0035	0.0005	0.00	0.01	0.03	0.56	-0.21	0.02	0.00	0.09	0.07	0.19
HAWAII	0.01	-0.0026	0.0021	0.23	-0.04	0.10	0.65	-0.13	0.09	0.16	0.13	0.27	0.64
IDAHO	0.47	0.0067	0.0015	0.00	-0.47	0.07	0.00	-0.13	0.07	0.05	-0.39	0.19	0.05
ILLINOIS	0.56	-0.0039	0.0006	0.00	-0.32	0.03	0.00	-0.26	0.03	0.00	-0.08	0.07	0.25
INDIANA	0.43	-0.0006	0.0006	0.32	-0.30	0.03	0.00	-0.28	0.03	0.00	-0.22	0.08	0.01
IOWA	0.47	-0.0006	0.0007	0.39	-0.47	0.03	0.00	-0.20	0.03	0.00	-0.05	0.09	0.53
KANSAS	0.63	0.0035	0.0008	0.00	-0.51	0.04	0.00	-0.27	0.04	0.00	0.10	0.11	0.36
KENTUCKY	0.60	0.0020	0.0007	0.01	-0.35	0.04	0.00	-0.17	0.03	0.00	-0.32	0.09	0.00
LOUISIANA	0.73	-0.0025	0.0012	0.04	-0.44	0.07	0.00	-0.16	0.05	0.00	0.36	0.15	0.02
MAINE	0.76	-0.0008	0.0011	0.46	0.00	0.06	0.94	-0.21	0.05	0.00	0.42	0.14	0.00
MARYLAND	0.42	-0.0028	0.0006	0.00	-0.04	0.03	0.20	-0.23	0.02	0.00	0.14	0.07	0.05
MASSACHUSETTS	0.51	0.0004	0.0005	0.39	0.02	0.03	0.36	-0.26	0.02	0.00	0.34	0.06	0.00
MICHIGAN	0.39	0.0016	0.0008	0.07	-0.36	0.04	0.00	-0.35	0.04	0.00	-0.45	0.11	0.00
MINNESOTA	0.18	0.0044	0.0008	0.00	-0.14	0.04	0.00	-0.28	0.03	0.00	0.07	0.10	0.50
MISSISSIPPI	0.64	0.0041	0.0008	0.00	-0.33	0.04	0.00	-0.11	0.04	0.00	-0.32	0.10	0.00
MISSOURI	0.23	0.0008	0.0004	0.06	-0.09	0.02	0.00	-0.23	0.02	0.00	-0.05	0.06	0.38
MONTANA	0.39	-0.0016	0.0019	0.42	-0.23	0.10	0.02	-0.18	0.09	0.04	0.04	0.25	0.86
NEBRASKA	0.38	0.0013	0.0005	0.02	-0.23	0.03	0.00	-0.21	0.02	0.00	0.06	0.07	0.41
NEVADA	0.67	0.0165	0.0013	0.00	-0.55	0.07	0.00	-0.33	0.06	0.00	0.03	0.17	0.88
NEW HAMPSHIRE	0.82	0.0056	0.0010	0.00	-0.03	0.07	0.64	-0.29	0.05	0.00	0.25	0.13	0.07
NEW JERSEY	0.42	-0.0027	0.0005	0.00	-0.00	0.02	0.87	-0.20	0.02	0.00	0.21	0.06	0.00
NEW MEXICO	0.65	0.0092	0.0012	0.00	-0.37	0.06	0.00	-0.06	0.05	0.25	-0.27	0.15	0.08
NEW YORK	0.24	-0.0052	0.0004	0.00	0.02	0.02	0.31	-0.23	0.02	0.00	0.31	0.06	0.00
NORTH CAROLINA	0.77	0.0030	0.0007	0.00	-0.08	0.04	0.06	-0.13	0.03	0.00	0.00	0.09	0.98
NORTH DAKOTA	0.83	0.0074	0.0022	0.00	-0.73	0.14	0.00	0.02	0.10	0.82	-0.41	0.29	0.16
OHIO	0.59	-0.0018	0.0006	0.01	-0.29	0.03	0.00	-0.28	0.03	0.00	-0.15	0.08	0.07
OKLAHOMA	0.87	0.0025	0.0011	0.02	-0.41	0.07	0.00	-0.20	0.04	0.00	0.32	0.13	0.02
OREGON	0.10	0.0032	0.0014	0.03	-0.35	0.06	0.00	-0.26	0.06	0.00	-0.06	0.18	0.72
PENNSYLVANIA	0.42	-0.0057	0.0004	0.00	-0.20	0.02	0.00	-0.23	0.02	0.00	0.18	0.05	0.00
RHODE ISLAND	0.00	-0.0008	0.0007	0.29	-0.23	0.03	0.00	-0.25	0.03	0.00	0.17	0.09	0.07
SOUTH CAROLINA	0.50	0.0007	0.0005	0.22	-0.19	0.03	0.00	-0.15	0.02	0.00	0.11	0.07	0.12
SOUTH DAKOTA	0.44	0.0100	0.0011	0.00	-0.33	0.06	0.00	-0.09	0.05	0.07	-0.17	0.14	0.24
TENNESSEE	0.62	0.0016	0.0007	0.03	-0.19	0.04	0.00	-0.17	0.03	0.00	-0.08	0.09	0.39
TEXAS	0.80	0.0037	0.0007	0.00	-0.34	0.04	0.00	-0.24	0.03	0.00	0.43	0.08	0.00
UTAH	0.31	0.0087	0.0008	0.00	-0.22	0.04	0.00	-0.17	0.03	0.00	0.12	0.10	0.24
VERMONT	0.72	0.0031	0.0008	0.00	-0.16	0.05	0.00	-0.34	0.04	0.00	0.44	0.11	0.00
VIRGINIA	0.56	0.0027	0.0006	0.00	-0.05	0.03	0.12	-0.10	0.03	0.00	0.00	0.07	0.97
WASHINGTON	0.35	0.0038	0.0009	0.00	-0.28	0.04	0.00	-0.39	0.04	0.00	0.40	0.11	0.00
WEST VIRGINIA	0.48	-0.0051	0.0007	0.00	-0.51	0.04	0.00	-0.20	0.03	0.00	-0.12	0.09	0.21
WISCONSIN	0.21	0.0019	0.0007	0.01	-0.33	0.03	0.00	-0.27	0.03	0.00	-0.05	0.09	0.56
WYOMING	0.22	-0.0025	0.0017	0.16	-0.54	0.08	0.00	-0.25	0.08	0.00	0.56	0.22	0.02

TABLE S-2

STATE MANUFACTURING EMPLOYMENT: SORTED BY LREX COEFFICIENT

STATE	RHO	TREND	SIG	LREX	SE	SIG	LURT	SIG	LRENGY	SIG
NORTH DAKOTA	0.83	0.0074	0.00	-0.73	0.14	0.00	0.02	0.82	-0.41	0.16
NEVADA	0.67	0.0165	0.00	-0.55	0.07	0.00	-0.33	0.00	0.03	0.88
ALASKA	-0.02	0.0024	0.79	-0.54	0.41	0.19	-0.44	0.26	0.49	0.67
WYOMING	0.22	-0.0025	0.16	-0.54	0.08	0.00	-0.25	0.00	0.56	0.02
WEST VIRGINIA	0.48	-0.0051	0.00	-0.51	0.04	0.00	-0.20	0.00	-0.12	0.21
KANSAS	0.63	0.0035	0.00	-0.51	0.04	0.00	-0.27	0.00	0.10	0.36
IOWA	0.47	-0.0006	0.39	-0.47	0.03	0.00	-0.20	0.00	-0.05	0.53
IDAHO	0.47	0.0067	0.00	-0.47	0.07	0.00	-0.13	0.05	-0.39	0.05
LOUISIANA	0.73	-0.0025	0.04	-0.44	0.07	0.00	-0.16	0.00	0.36	0.02
OKLAHOMA	0.87	0.0025	0.02	-0.41	0.07	0.00	-0.20	0.00	0.32	0.02
NEW MEXICO	0.65	0.0092	0.00	-0.37	0.06	0.00	-0.06	0.25	-0.27	0.08
MICHIGAN	0.39	0.0016	0.07	-0.36	0.04	0.00	-0.35	0.00	-0.45	0.00
KENTUCKY	0.60	0.0020	0.01	-0.35	0.04	0.00	-0.17	0.00	-0.32	0.00
OREGON	0.10	0.0032	0.03	-0.35	0.06	0.00	-0.26	0.00	-0.06	0.72
TEXAS	0.80	0.0037	0.00	-0.34	0.04	0.00	-0.24	0.00	0.43	0.00
WISCONSIN	0.21	0.0019	0.01	-0.33	0.03	0.00	-0.27	0.00	-0.05	0.56
MISSISSIPPI	0.64	0.0041	0.00	-0.33	0.04	0.00	-0.11	0.00	-0.32	0.00
SOUTH DAKOTA	0.44	0.0100	0.00	-0.33	0.06	0.00	-0.09	0.07	-0.17	0.24
ILLINOIS	0.56	-0.0039	0.00	-0.32	0.03	0.00	-0.26	0.00	-0.08	0.25
INDIANA	0.43	-0.0006	0.32	-0.30	0.03	0.00	-0.28	0.00	-0.22	0.01
OHIO	0.59	-0.0018	0.01	-0.29	0.03	0.00	-0.28	0.00	-0.15	0.07
WASHINGTON	0.35	0.0038	0.00	-0.28	0.04	0.00	-0.39	0.00	0.40	0.00
ARKANSAS	0.54	0.0043	0.00	-0.24	0.05	0.00	-0.16	0.00	-0.14	0.22
COLORADO	0.82	0.0081	0.00	-0.24	0.07	0.00	-0.20	0.00	0.08	0.59
RHODE ISLAND	0.00	-0.0008	0.29	-0.23	0.03	0.00	-0.25	0.00	0.17	0.07
MONTANA	0.39	-0.0016	0.42	-0.23	0.10	0.02	-0.18	0.04	0.04	0.86
NEBRASKA	0.38	0.0013	0.02	-0.23	0.03	0.00	-0.21	0.00	0.06	0.41
UTAH	0.31	0.0087	0.00	-0.22	0.04	0.00	-0.17	0.00	0.12	0.24
PENNSYLVANIA	0.42	-0.0057	0.00	-0.20	0.02	0.00	-0.23	0.00	0.18	0.00
SOUTH CAROLINA	0.50	0.0007	0.22	-0.19	0.03	0.00	-0.15	0.00	0.11	0.12
TENNESSEE	0.62	0.0016	0.03	-0.19	0.04	0.00	-0.17	0.00	-0.08	0.39
VERMONT	0.72	0.0031	0.00	-0.16	0.05	0.00	-0.34	0.00	0.44	0.00
ALABAMA	0.29	0.0018	0.00	-0.15	0.02	0.00	-0.19	0.00	0.04	0.53
MINNESOTA	0.18	0.0044	0.00	-0.14	0.04	0.00	-0.28	0.00	0.07	0.50
CALIFORNIA	0.31	0.0052	0.00	-0.12	0.03	0.00	-0.29	0.00	0.31	0.00
MISSOURI	0.23	0.0008	0.06	-0.09	0.02	0.00	-0.23	0.00	-0.05	0.38
NORTH CAROLINA	0.77	0.0030	0.00	-0.08	0.04	0.06	-0.13	0.00	0.00	0.98
ARIZONA	0.92	0.0118	0.00	-0.07	0.09	0.41	-0.38	0.00	0.34	0.02
VIRGINIA	0.56	0.0027	0.00	-0.05	0.03	0.12	-0.10	0.00	0.00	0.97
HAWAII	0.01	-0.0026	0.23	-0.04	0.10	0.65	-0.13	0.16	0.13	0.64
MARYLAND	0.42	-0.0028	0.00	-0.04	0.03	0.20	-0.23	0.00	0.14	0.05
NEW HAMPSHIRE	0.82	0.0056	0.00	-0.03	0.07	0.64	-0.29	0.00	0.25	0.07
CONNECTICUT	0.37	-0.0012	0.01	-0.03	0.02	0.22	-0.26	0.00	0.38	0.00
NEW JERSEY	0.42	-0.0027	0.00	-0.00	0.02	0.87	-0.20	0.00	0.21	0.00
FLORIDA	0.86	0.0079	0.00	-0.00	0.07	0.98	-0.25	0.00	0.21	0.12
MAINE	0.76	-0.0008	0.46	0.00	0.06	0.94	-0.21	0.00	0.42	0.00
GEORGIA	0.43	0.0035	0.00	0.01	0.03	0.56	-0.21	0.00	0.09	0.19
NEW YORK	0.24	-0.0052	0.00	0.02	0.02	0.31	-0.23	0.00	0.31	0.00
MASSACHUSETTS	0.51	0.0004	0.39	0.02	0.03	0.36	-0.26	0.00	0.34	0.00
DELAWARE	0.26	0.0005	0.50	0.04	0.04	0.29	-0.19	0.00	0.12	0.22
DISTRICT OF COLUMBIA	0.62	-0.0027	0.01	0.27	0.05	0.00	-0.15	0.00	0.12	0.38

TABLE S-3

STATE	ABV	EMPLOYMENT (in thousands) 1980	1985	CHANGE	PRED 1985	1985 PRED - ACTUAL	1980 TO 1985 EMPLOYMENT CHANGE DUE TO: TREND	ENERGY	URATE	EXCH	RESID*	EMPLOYMENT CHANGE DUE TO EXCH RATE AS PERCENT OF 1985 EMPLOYMENT
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
ALABAMA	AL	363	357	-7	358	1	13	-2	0	-16	-1	-4.6%
ALASKA	AK	13	12	-2	12	-0	1	-1	-0	-1	-1	-6.4%
ARIZONA	AZ	154	181	26	180	-0	38	-6	-1	-4	-1	-2.4%
ARKANSAS	AR	209	210	1	212	2	18	2	1	-16	-2	-7.8%
CALIFORNIA	CA	2018	2089	71	2117	27	210	-57	-7	-79	4	-3.8%
COLORADO	CO	180	193	13	196	3	29	-1	-0	-14	-1	-7.3%
CONNECTICUT	CT	441	411	-30	415	5	-11	-14	-1	-2	-2	-0.6%
DELAWARE	DE	71	72	1	71	-1	1	-1	-0	1	0	1.1%
DISTRICT OF COLUMBIA	DC	15	15	-0	15	-0	-1	-0	-0	1	-0	6.6%
FLORIDA	FL	456	515	59	517	2	76	-11	-0	-2	-4	-0.3%
GEORGIA	GA	519	554	35	557	3	38	-5	0	4	-2	0.7%
HAWAII	HI	24	22	-2	22	0	-1	-0	-0	0	-1	0.6%
IDAHO	ID	53	55	2	55	-0	7	2	0	-8	1	-14.0%
ILLINOIS	IL	1208	981	-227	981	0	-80	6	-2	-97	-53	-9.9%
INDIANA	IN	657	610	-47	613	3	-8	13	0	-57	5	-9.3%
IOWA	IA	245	205	-40	205	1	-2	0	-0	-33	-5	-16.0%
KANSAS	KS	191	174	-16	173	-1	12	-2	-0	-30	4	-17.2%
KENTUCKY	KY	276	256	-21	255	-0	10	7	-0	-30	-7	-11.8%
LOUISIANA	LA	214	178	-36	178	0	-9	-5	-0	-25	4	-14.3%
MAINE	ME	113	106	-7	109	3	-2	-4	-0	-1	-0	-0.6%
MARYLAND	MD	237	217	-20	218	1	-13	-3	-0	-2	-2	-0.8%
MASSACHUSETTS	MA	677	661	-16	668	7	6	-21	-1	5	-4	0.7%
MICHIGAN	MI	999	984	-15	981	-4	30	42	0	-98	11	-10.0%
MINNESOTA	MN	371	375	4	380	5	32	-3	-1	-15	-9	-4.0%
MISSISSIPPI	MS	222	221	-1	219	-2	17	6	1	-24	0	-11.1%
MISSOURI	MO	437	429	-8	434	4	7	2	-0	-11	-6	-2.5%
MONTANA	MT	24	22	-3	22	0	-1	-0	0	-1	-0	-5.7%
NEBRASKA	NE	96	89	-8	90	1	2	-1	-0	-7	-3	-7.3%
NEVADA	NV	19	22	3	22	0	6	0	-0	-4	1	-19.2%
NEW HAMPSHIRE	NH	117	123	6	125	2	13	-3	-0	-1	-3	-0.7%
NEW JERSEY	NJ	781	719	-62	726	7	-41	-14	-1	-2	-4	-0.3%
NEW MEXICO	NM	34	37	3	37	-0	6	1	0	-4	0	-11.5%
NEW YORK	NY	1445	1295	-150	1309	14	-145	-35	-2	15	17	1.1%
NORTH CAROLINA	NC	820	827	7	832	4	48	-2	0	-26	-13	-3.1%
NORTH DAKOTA	ND	16	15	-0	15	-0	2	1	-0	-4	1	-24.5%
OHIO	OH	1264	1123	-141	1122	-1	-40	15	-2	-101	-12	-9.0%
OKLAHOMA	OK	191	172	-19	172	-0	8	-5	-0	-23	0	-13.2%
OREGON	OR	215	200	-15	203	3	13	-0	0	-20	-8	-9.9%
PENNSYLVANIA	PA	1328	1090	-239	1091	1	-131	-18	-2	-74	-13	-6.8%
RHODE ISLAND	RI	128	120	-9	121	1	-2	-2	0	-7	1	-5.8%
SOUTH CAROLINA	SC	392	365	-27	369	4	5	-5	1	-23	-4	-6.4%
SOUTH DAKOTA	SD	26	27	1	28	1	5	0	0	-3	-1	-12.3%
TENNESSEE	TN	502	489	-13	490	1	16	3	1	-32	1	-6.6%
TEXAS	TX	1057	1005	-52	1011	6	72	-34	-4	-112	26	-11.1%
UTAH	UT	88	94	6	94	0	15	-1	-0	-8	-0	-8.1%
VERMONT	VT	51	50	-1	50	1	3	-2	-0	-2	0	-4.6%
VIRGINIA	VA	414	423	10	423	0	22	-1	0	-8	-4	-1.8%
WASHINGTON	WA	309	294	-15	299	5	22	-10	-2	-24	-1	-8.2%
WEST VIRGINIA	WV	117	90	-28	89	-0	-10	1	-0	-15	-4	-17.2%
WISCONSIN	WI	558	515	-43	518	3	20	2	-1	-54	-9	-10.5%
WYOMING	WY	10	8	-2	8	0	-0	-0	-0	-1	0	-17.3%
TOTALS		20368	19298	-1070	19411	113	326	-167	-25	-1098	-106	-5.7%

TABLE R-1

DEPENDENT VARIABLE IS LOG OF EMPLOYMENT [ALL WORKERS]
DATA ARE SEASONALLY ADJUSTED

MODEL: AR1(METHOD=MAXL) 70,1 86,1 DOF: 46
CONSTANT TREND LREX(0,6) LURT(0,4) LRENGY(0,4)

CENSUS DIVISION	STATES	RHO	TREND	SIG	LREX	SE	SIG	LURT	SIG	LRENGY	SIG
New England	Me,Nh,Vt,Ma,Ri,Ct	0.44	0.0001	0.84	-0.02	0.02	0.43	-0.26	0.00	0.36	0.00
Middle Atlantic	Ny,Nj,Pa	0.24	-0.0049	0.00	-0.06	0.02	0.00	-0.23	0.00	0.25	0.00
East North Central	Oh,In,Il,Mi,Wi	0.53	-0.0010	0.09	-0.31	0.03	0.00	-0.29	0.00	-0.20	0.01
West North Central	Mn,Io,Mo,Nd,Sd,Ne,Ks	0.29	0.0023	0.00	-0.24	0.02	0.00	-0.24	0.00	-0.02	0.80
South Atlantic	De,Md,Dc,Va,Wv,Nc,Sc,Ga,Fl	0.65	0.0026	0.00	-0.06	0.03	0.04	-0.17	0.00	0.07	0.26
East South Central	Ky,Tn,Al,Ms	0.52	0.0021	0.00	-0.23	0.03	0.00	-0.17	0.00	-0.13	0.09
West South Central	Ar,La,Ok,Tx	0.78	0.0029	0.00	-0.34	0.04	0.00	-0.22	0.00	0.34	0.00
Mountain	Mt,Id,Wy,Co,Nm,Az,Ut,Nv	0.51	0.0083	0.00	-0.17	0.04	0.00	-0.23	0.00	0.18	0.08
Pacific	Wa,Or,Ca,Ak,Hi	0.19	0.0047	0.00	-0.15	0.03	0.00	-0.30	0.00	0.30	0.00

CENSUS REGION	CENSUS DIVISION	RHO	TREND	SIG	LREX	SE	SIG	LURT	SIG	LRENGY	SIG
WEST	MT,PAC	0.19	0.01	0.00	-0.15	0.03	0.00	-0.29	0.00	0.29	0.00
NORTH CENTRAL	ENC,WNC	0.46	-0.00	0.57	-0.30	0.03	0.00	-0.28	0.00	-0.16	0.02
NORTH EAST	NE,MA	0.25	-0.00	0.00	-0.04	0.02	0.01	-0.24	0.00	0.29	0.00
SOUTH	SA,ESC,WSC	0.65	0.00	0.00	-0.17	0.03	0.00	-0.18	0.00	0.11	0.14

TABLE R-2

EMPLOYMENT CHANGE: ALL WORKERS
(EMPLOYMENT IN THOUSANDS)

CENSUS DIVISIONS	STATES	EMPLOYMENT 1980	EMPLOYMENT 1985	EMPLOYMENT CHANGE	EMPLOYMENT PRED 1985	EMPLOYMENT 1985 PRED - ACTUAL	1980 TO 1985 EMPLOYMENT CHANGE DUE TO: [1] TREND	ENERGY	URATE	EXCH	RESID*	EMPLOYMENT CHANGE DUE TO EXCH RATE AS PERCENT OF 1985 EMPLOYMENT
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
New England	Me,Nh,Vt,Ma,Ri,Ct	1526	1470	-56	1488	18	3	-48	-2	-5	-3	-0.4%
Middle Atlantic	Ny,Nj,Pa	3554	3104	-451	3125	21	-323	-70	-5	-60	6	-1.9%
East North Central	Oh,In,Il,Mi,Wi	4686	4214	-473	4215	1	-85	74	-5	-400	-56	-9.5%
West North Central	Mn,Io,Mo,Nd,Sd,Ne,Ks	1382	1315	-67	1325	10	59	0	-2	-102	-22	-7.7%
South Atlantic	De,Md,Dc,Va,Wv,Nc,Sc,Ga,Fl	3042	3079	37	3094	15	159	-26	1	-64	-32	-2.1%
East South Central	Ky,Tn,Al,Ms	1363	1323	-41	1322	-0	55	13	1	-103	-7	-7.8%
West South Central	Ar,La,Ok,Tx	1672	1566	-106	1574	8	87	-42	-4	-175	28	-11.2%
Mountain	Mt,Id,Wy,Co,Nm,Az,Ut,Nv	563	612	49	617	5	94	-11	-1	-35	1	-5.8%
Pacific	Wa,Or,Ca,Ak,Hi	2579	2617	38	2652	35	240	-70	-8	-120	-3	-4.6%
TOTALS:		20368	19298	-1070	19413	114	289	-180	-24	-1065	-89	-5.5%

CENSUS REGION	CENSUS DIVISIONS	1980	1985	CHANGE	PRED 1985	1985 PRED - ACTUAL	TREND	ENERGY	URATE	EXCH	RESID*	EMPLOYMENT
WEST	MT,PAC	3143	3229	86	3269	40	329	-85	-8	-150	1	-4.6%
NORTH CENTRAL	ENC,WNC	6068	5529	-539	5540	12	-32	77	-7	-499	-78	-9.0%
NORTH EAST	NE,MA	5081	4574	-507	4612	38	-332	-117	-6	-58	7	-1.3%
SOUTH	SA,ESC,WSC	6076	5967	-110	5989	22	290	-59	-2	-335	-3	-5.6%
TOTALS:		20368	19298	-1070	19410	112	255	-185	-24	-1042	-74	-5.4%

[1] CHANGE IN 1985 PREDICTED VALUE WHEN 1980 VALUES ARE USED

* EMPLOYMENT CHANGE FROM 1980 TO 1985 THAT IS NOT ATTRIBUTED TO THE FOUR VARIABLES

TABLE NY-1

DEPENDENT VARIABLE IS LOG OF EMPLOYMENT [ALL WORKERS]
DATA ARE SEASONALLY ADJUSTED

MODEL: AR1(METHOD=MAXL) 70,1 86,1 DOF: 46
CONSTANT TREND LREX(0,6) LURT(0,4) LRENGY(0,4)

	SIC	RHO	TREND	SIG	LREX	SE	SIG	LURT	SIG	LRENGY	SIG
			NON DURABLE GOODS								
MANUFACTURING		0.24	-0.005	0.00	0.02	0.02	0.31	-0.23	0.00	0.31	0.00
NON DURABLE GOODS											
FOOD AND KINDRED PRODUCTS	20	0.29	-0.008	0.00	0.13	0.06	0.03	-0.17	0.00	0.37	0.02
TOBACCO MANUFACTURES	21	0.85	-0.004	0.07	0.31	0.15	0.04	-0.22	0.02	0.92	0.00
TEXTILE MILL PRODUCTS	22	0.45	-0.009	0.00	-0.01	0.11	0.94	-0.04	0.64	-0.25	0.38
APPAREL & OTHER TEXTILE PROD	23	0.39	-0.012	0.00	0.01	0.04	0.76	-0.21	0.00	0.45	0.00
PAPER AND ALLIED PRODUCTS	26	0.89	-0.005	0.00	0.06	0.08	0.47	-0.18	0.00	0.25	0.07
PRINT AND PUBLISHING	27	0.86	-0.001	0.14	0.25	0.04	0.00	-0.14	0.00	0.19	0.01
CHEMICALS & ALLIED PRODUCTS	28	0.85	-0.005	0.00	0.03	0.05	0.56	-0.12	0.00	0.21	0.04
PETROLEUM AND COAL PRODUCTS	29	0.32	-0.013	0.00	0.04	0.10	0.72	0.11	0.24	0.06	0.83
DURABLE GOODS											
STONE, CLAY AND GLASS PROD	32	0.09	-0.008	0.00	-0.11	0.05	0.03	-0.23	0.00	0.37	0.01
PRIMARY METAL INDUSTRIES	33	0.59	-0.016	0.00	-0.58	0.07	0.00	-0.36	0.00	0.32	0.06
FABRICATED METAL PRODUCTS	34	0.39	-0.005	0.00	-0.05	0.03	0.18	-0.28	0.00	0.28	0.00
MACHINERY, EXCEPT ELECTRICAL	35	0.85	-0.002	0.01	-0.11	0.05	0.02	-0.28	0.00	0.34	0.00
ELECTRICAL & ELECTRONIC EQUIP	36	0.73	-0.001	0.16	0.14	0.04	0.00	-0.32	0.00	0.43	0.00
TRANSPORATION EQUIPMENT	37	0.28	-0.000	0.75	-0.24	0.06	0.00	-0.40	0.00	-0.26	0.08
INSTRUMENTS AND RELATED PROD	38	0.87	0.001	0.30	-0.10	0.06	0.12	-0.15	0.00	0.11	0.32

TABLE NY-2

DECOMPOSITION OF EMPLOYMENT CHANGE

DEPENDENT VARIABLE IS LOG OF EMPLOYMENT [ALL WORKERS]
DATA ARE SEASONALLY ADJUSTED

MODEL: AR1(METHOD=MAXL) 70,1 86,1
CONSTANT TREND LRL_ENGY(0,4) LURT(0,4) LREX(0,6)

	SIC	EMPLOYMENT (in hundreds) 1980	1985	CHANGE	PRED 1985	1985 PRED - ACTUAL	1980 TO 1985 EMPLOYMENT CHANGE DUE TO: [1] TREND	ENERGY	URATE	EXCH	RESID*	EXCHANGE RATE EMPLOYMENT CHANGE AS % OF 1985 BASE
MANUFACTURING		14451	12952	-1500	13095	143	-1449	-353	-15	148	170	1.1%
NON-DURABLE GOODS												
FOOD AND KINDRED PRODUCTS	20	901	793	-108	805	12	-144	-26	-1	41	22	5.2%
TOBACCO MANUFACTURES	21	29	27	-2	28	1	-2	-2	-0	3	-0	9.4%
TEXTILE MILL PRODUCTS	22	362	302	-60	298	-5	-60	4	2	-4	-2	-1.2%
APPAREL & OTHER TEXTILE PROD	23	1693	1345	-349	1365	20	-364	-50	2	12	52	0.9%
PAPER AND ALLIED PRODUCTS	26	506	442	-63	450	8	-50	-10	-1	7	-10	1.6%
PRINT AND PUBLISHING	27	1558	1603	45	1617	14	-28	-28	-2	124	-21	7.8%
CHEMICALS & ALLIED PRODUCTS	28	717	645	-72	645	0	-70	-12	-1	7	3	1.0%
PETROLEUM AND COAL PRODUCTS	29	68	51	-17	53	1	-16	-1	0	1	-2	1.8%
DURABLE GOODS												
STONE, CLAY AND GLASS PROD	32	383	301	-82	307	5	-50	-12	0	-14	-7	-4.5%
PRIMARY METAL INDUSTRIES	33	531	308	-223	314	6	-117	-10	-1	-60	-36	-19.3%
FABRICATED METAL PRODUCTS	34	818	714	-104	718	4	-73	-18	-1	-7	-4	-1.0%
MACHINERY, EXCEPT ELECTRICAL	35	1724	1531	-193	1550	19	-63	-47	-7	-49	-28	-3.2%
ELECTRICAL & ELECTRONIC EQUIP	36	1589	1572	-17	1601	29	-32	-59	-5	56	23	3.6%
TRANSPORATION EQUIPMENT	37	735	709	-26	700	-9	-5	18	-3	-38	1	-5.3%
INSTRUMENTS AND RELATED PROD	38	1293	1267	-26	1292	25	24	-10	-4	-29	-7	-2.3%

[1] CHANGE IN 1985 PREDICTED VALUE WHEN 1980 VALUES ARE USED
* RESD is the difference beetween the actual change and the change attributed to the four variables

TABLE NY-3

COMPARISON OF NEW YORK AND NATIONAL LREX COEFFICIENTS

		NEW YORK			NATIONAL ALL WORKERS			NATIONAL PRODUCTION WORKERS			NATIONAL NON PRODUCTION WORKERS		
	SIC	LREX	SE	SIG	LREX	SE	SIG	LREX	SE	SIG	LREX	SE	SIG
NON-DURABLE GOODS													
FOOD AND KINDRED PRODUCTS	20	0.13	0.06	0.03	-0.00	0.04	0.92	0.01	0.04	0.78	-0.03	0.03	0.34
TOBACCO MANUFACTURES	21	0.31	0.15	0.04	-0.07	0.06	0.27	-0.14	0.08	0.10	0.20	0.06	0.00
TEXTILE MILL PRODUCTS	22	-0.01	0.11	0.94	-0.16	0.03	0.00	-0.15	0.03	0.00	-0.20	0.04	0.00
APPAREL & OTHER TEXTILE PROD	23	0.01	0.04	0.76	-0.11	0.03	0.00	-0.09	0.03	0.01	-0.21	0.05	0.00
PAPER AND ALLIED PRODUCTS	26	0.06	0.08	0.47	0.00	0.03	0.91	0.03	0.03	0.26	-0.07	0.05	0.12
PRINT AND PUBLISHING	27	0.25	0.04	0.00	0.12	0.02	0.00	0.17	0.02	0.00	0.04	0.03	0.15
CHEMICALS & ALLIED PRODUCTS	28	0.03	0.05	0.56	-0.10	0.03	0.00	-0.13	0.03	0.00	-0.08	0.04	0.08
PETROLEUM AND COAL PRODUCTS	29	0.04	0.10	0.72	-0.25	0.06	0.00	-0.40	0.07	0.00	-0.06	0.08	0.47
DURABLE GOODS													
STONE, CLAY AND GLASS PROD	32	-0.11	0.05	0.03	-0.28	0.04	0.00	-0.31	0.04	0.00	-0.19	0.06	0.00
PRIMARY METAL INDUSTRIES	33	-0.58	0.07	0.00	-0.57	0.06	0.00	-0.62	0.06	0.00	-0.40	0.05	0.00
FABRICATED METAL PRODUCTS	34	-0.05	0.03	0.18	-0.29	0.03	0.00	-0.31	0.03	0.00	-0.21	0.03	0.00
MACHINERY, EXCEPT ELECTRICAL	35	-0.11	0.05	0.02	-0.41	0.03	0.00	-0.55	0.04	0.00	-0.20	0.03	0.00
ELECTRICAL & ELECTRONIC EQUIP	36	0.14	0.04	0.00	-0.03	0.05	0.53	-0.16	0.07	0.04	0.19	0.02	0.00
TRANSPORATION EQUIPMENT	37	-0.24	0.06	0.00	-0.19	0.04	0.00	-0.32	0.05	0.00	0.09	0.04	0.02
INSTRUMENTS AND RELATED PROD	38	-0.10	0.06	0.12	-0.15	0.04	0.00	-0.34	0.06	0.00	0.11	0.04	0.01

TABLE NY-4

NEW YORK REGIONAL MANUFACTURING EMPLOYMENT

DEPENDENT VARIABLE IS LOG OF MANUFACTURING EMPLOYMENT (ALL WORKERS)
DATA ARE SEASONALLY ADJUSTED

MODEL: AR1(METHOD=MAXL) 70,1 86,1 DOF: 46
CONSTANT TREND LREX(0,6) LURT(0,4) LRENGY(0,4)

CODE	RHO	TREND	SIG	LREX	SE	SIG	LURT	SIG	LRENGY	SIG
ALL MANUFACTURING 0000	0.24	-0.005	0.00	0.02	0.02	0.31	-0.23	0.00	0.31	0.00
NASSAU-SUFFOLK 5380	0.47	0.004	0.00	0.10	0.03	0.00	-0.25	0.00	0.29	0.00
NYC 5611	0.34	-0.011	0.00	0.12	0.03	0.00	-0.21	0.00	0.42	0.00
NOT NYC OR NASSAU-SUFFOLK	0.37	-0.003	0.00	-0.11	0.02	0.00	-0.23	0.00	0.21	0.00
ALBANY-SCHENECTADY-TROY 0160	0.69	-0.005	0.00	-0.13	0.06	0.05	-0.03	0.51	0.06	0.66
BINGHAMTON 0960	0.75	0.000	0.68	0.04	0.06	0.52	-0.27	0.00	0.18	0.17
BUFFALO 1280	0.68	-0.010	0.00	0.03	0.11	0.77	-0.40	0.00	-0.04	0.89
ELMIRA 2335	0.57	-0.015	0.00	-0.32	0.06	0.00	-0.20	0.00	0.61	0.00
MONROE COUNTY 5231	0.78	-0.000	0.81	-0.15	0.05	0.01	-0.20	0.00	0.18	0.11
ROCHESTER 6840	0.50	-0.000	0.79	-0.14	0.04	0.00	-0.18	0.00	0.20	0.07
ROCKLAND COUNTY 6901	0.82	0.002	0.03	0.03	0.06	0.60	-0.13	0.01	0.09	0.50
SYRACUSE 8160	0.66	0.000	0.96	-0.00	0.04	0.95	-0.27	0.00	0.10	0.32
UTICA-ROME 8680	0.73	-0.006	0.00	0.01	0.06	0.81	-0.22	0.00	0.17	0.24
WESTCHESTER COUNTY 8971	0.80	-0.001	0.37	-0.01	0.08	0.93	-0.27	0.00	0.40	0.03

TABLE NY-5

DECOMPOSITION OF MANUFACTURING EMPLOYMENT CHANGE

DEPENDENT VARIABLE IS LOG OF MANUFACTURING EMPLOYMENT [ALL WORKERS]
DATA ARE SEASONALLY ADJUSTED

MODEL: AR1(METHOD=MAXL) 70,1 86,1
CONSTANT TREND LRENGY(0,4) LURT(0,4) LREX(0,6)

MANUFACTURING EMPLOYMENT (in hundreds)

	CODE	1980	1985	CHANGE	PRED 1985	1985 PRED - ACTUAL	1980 TO 1985 EMPLOYMENT CHANGE DUE TO: [1] TREND	ENERGY	URATE	EXCH	RESID*	EXCHANGE RATE EMPLOYMENT CHANGE AS % OF 1985 BASE
ALL MANUFACTURING	0000	14451	12952	-1500	13095	143	-1449	-353	-15	148	170	1.1%
NASSAU-SUFFOLK	5380	1673	1808	135	1826	18	122	-46	-5	59	5	3.2%
NYC	5611	4957	4074	-883	4129	55	-1058	-152	2	175	150	4.3%
NOT NYC-NASSAU-SUFFOLK		7821	7069	-752	7141	72	-391	-132	-14	-215	-1	-3.0%
ALBANY-SCHENECTADY-TROY	0160	606	518	-88	517	-1	-59	-3	1	-25	-2	-4.9%
BINGHAMTON	0960	396	400	4	411	11	3	-6	-2	11	-2	2.6%
BUFFALO	1280	1010	785	-225	807	22	-172	-4	-3	9	-55	1.2%
ELMIRA	2335	113	72	-42	72	0	-25	-4	-0	-11	-2	-14.7%
MONROE COUNTY	5231	1348	1274	-74	1299	24	-6	-18	-4	-51	4	-4.0%
ROCHESTER	6840	1564	1482	-82	1504	22	-7	-24	-4	-53	5	-3.6%
ROCKLAND COUNTY	6901	157	159	2	161	2	7	-1	-0	1	-4	0.7%
SYRACUSE	8160	592	580	-11	586	5	-1	-6	-1	2	-6	0.4%
UTICA-ROME	8680	306	259	-47	264	4	-31	-5	-1	-0	-10	-0.2%
WESTCHESTER COUNTY	8971	740	688	-52	698	11	-18	-24	-2	2	-11	0.3%

[1] CHANGE IN 1985 PREDICTED VALUE WHEN 1980 VALUES ARE USED
* RESID is the difference between the actual change and the change attributed to the four variables

TABLE SMSA

MANUFACTURING EMPLOYMENT IN SELECTED SMSA AND NON SMSA AREAS

DEPENDENT VARIABLE IS LOG OF EMPLOYMENT
DATA ARE SEASONALLY ADJUSTED

MODEL: AR1(METHOD=MAXL) 70,1 86,1 DOF: 46
CONSTANT TREND LREX(0,6) LURT(0,4) LRENGY(0,4)

	CODE	RHO	TREND	SIG	LREX	SE	SIG	LURT	SIG	LRENGY	SIG
ALABAMA:	1000	0.29	0.0018	0.00	-0.15	0.02	0.00	-0.19	0.00	0.04	0.53
Birmingham	1100	0.69	-0.0019	0.09	-0.28	0.06	0.00	-0.22	0.00	-0.32	0.02
Huntsville	1344	0.69	0.0039	0.20	-0.62	0.16	0.00	-0.34	0.01	0.31	0.41
Mobile	1516	0.60	-0.0004	0.81	-0.51	0.09	0.00	-0.24	0.00	0.22	0.33
Montgomery	1524	0.38	0.0059	0.00	-0.12	0.04	0.00	-0.21	0.00	0.17	0.09
Tuscaloosa	1860	0.83	0.0002	0.92	-0.23	0.15	0.14	-0.09	0.40	-0.85	0.01
	SMSA	0.64	0.0004	0.73	-0.35	0.06	0.00	-0.24	0.00	-0.06	0.67
	NON SMSA	0.59	0.0032	0.00	-0.02	0.04	0.73	-0.14	0.00	0.06	0.58
ARKANSAS:	5000	0.54	0.0043	0.00	-0.24	0.05	0.00	-0.16	0.00	-0.14	0.22
Fort Smith	5272	0.59	0.0098	0.00	-0.36	0.10	0.00	-0.18	0.03	-0.79	0.00
Little-Rock-North Little Rock	5440	0.71	0.0004	0.80	0.02	0.08	0.85	-0.22	0.00	0.65	0.00
Pine Bluff	5624	0.82	-0.0004	0.80	-0.23	0.09	0.02	-0.19	0.00	0.11	0.55
	SMSA	0.24	0.0027	0.00	-0.27	0.04	0.00	-0.22	0.00	-0.10	0.30
	NON SMSA	0.57	0.0049	0.00	-0.24	0.06	0.00	-0.14	0.01	-0.16	0.26
MISSISSIPPI	28000	0.64	0.0041	0.00	-0.33	0.04	0.00	-0.11	0.00	-0.32	0.00
Jackson	28356	0.86	0.0051	0.01	-0.32	0.12	0.01	-0.13	0.10	0.06	0.80
	SMSA	0.86	0.0051	0.01	-0.32	0.12	0.01	-0.13	0.10	0.06	0.80
	NON SMSA	0.57	0.0040	0.00	-0.33	0.04	0.00	-0.12	0.00	-0.35	0.00
SOUTH CAROLINA	45000	0.50	0.0007	0.22	-0.19	0.03	0.00	-0.15	0.00	0.11	0.12
Charleston	45144	0.91	0.0035	0.08	-0.01	0.15	0.95	-0.28	0.00	0.26	0.30
Columbia	45176	0.64	0.0057	0.00	-0.13	0.05	0.01	-0.22	0.00	0.06	0.57
Greenville-Spartanburg	45316	0.45	0.0013	0.03	-0.23	0.03	0.00	-0.10	0.00	-0.05	0.50
	SMSA	0.32	0.0019	0.00	-0.19	0.02	0.00	-0.16	0.00	0.08	0.20
	NON SMSA	0.57	-0.0001	0.85	-0.19	0.03	0.00	-0.14	0.00	0.13	0.08
WEST VIGINIA	54000	0.48	-0.0051	0.00	-0.51	0.04	0.00	-0.20	0.00	-0.12	0.21
Charleston	54148	0.94	-0.0045	0.00	-0.47	0.11	0.00	-0.07	0.18	-0.33	0.06
Huntington-Ashland	54340	0.78	-0.0045	0.01	-0.60	0.09	0.00	-0.10	0.18	-0.22	0.29
Parkersburg-Marietta	54602	0.19	-0.0035	0.00	-0.21	0.06	0.00	-0.32	0.00	0.08	0.51
Wheeling	54900	0.56	-0.0114	0.00	-0.66	0.07	0.00	-0.21	0.00	0.01	0.97
	SMSA	0.33	-0.0054	0.00	-0.63	0.04	0.00	-0.22	0.00	-0.14	0.10
	NON SMSA	0.09	-0.0069	0.00	-0.33	0.08	0.00	-0.38	0.00	0.12	0.46

TABLE S-4

FACTORS THAT EXPLAIN STATE DIFFERENCES IN LREX COEFFICIENT

MODEL	RBAR^2	DOF		CONSTANT	COLLEGE	EDSPEND	NONSMSA	HRWAGE	UNION	GROWTH	OILPROD	DEF_EMP	DEF_SHP
1	0.42	48	COEFF	0.22	0.34		-0.30						
			TSTAT		2.92		-2.27						
			SIG		0.01		0.03						
2	0.60	47	COEFF	0.17	0.32		-0.40	-0.43					
			TSTAT		3.28		-3.59	-4.78					
			SIG		0.00		0.00	0.00					
3	0.38	46	COEFF	0.21	0.27		-0.39		-0.11				
			TSTAT		2.05		-2.52		-1.07				
			SIG		0.05		0.02		0.29				
4	0.61	45	COEFF	0.14	0.33		-0.29	-0.56	0.19				
			TSTAT		3.11		-2.31	-5.22	1.85				
			SIG		0.00		0.03	0.00	0.07				
5	0.57	46	COEFF	0.08	0.47			-0.60	0.32				
			TSTAT		5.31			-5.40	3.41				
			SIG		0.00			0.00	0.00				
6	0.36	46	COEFF	0.24		0.36		-0.66	0.28				
			TSTAT			2.02		-4.73	2.44				
			SIG			0.05		0.00	0.02				
7	0.53	45	COEFF	0.09		0.16	-0.48	-0.56	0.09				
			TSTAT			0.97	-4.20	-4.59	0.86				
			SIG			0.33	0.00	0.00	0.40				
8	0.62	44	COEFF	0.08	0.32		-0.29	-0.53	0.11	-0.18			
			TSTAT		3.08		-2.33	-4.89	0.88	-1.39			
			SIG		0.00		0.02	0.00	0.38	0.17			
9	0.63	44	COEFF	-0.04	0.35		-0.26	-0.53	0.17		-1.08		
			TSTAT		3.37		-2.11	-5.08	1.64		-1.94		
			SIG		0.00		0.04	0.00	0.11		0.06		
10	0.42	42	COEFF	0.15				-0.51	0.28			0.24	
			TSTAT					-3.81	2.51			2.78	
			SIG					0.00	0.02			0.01	
11	0.32	43	COEFF	0.31	0.37							0.11	
			TSTAT		2.45							0.92	
			SIG		0.02							0.36	
12	0.60	40	COEFF	0.15	0.36		-0.28	-0.57	0.20			-0.04	
			TSTAT		2.73		-2.09	-4.96	1.81			-0.40	
			SIG		0.01		0.04	0.00	0.08			0.69	

TABLE S-4, CON'T

FACTORS THAT EXPLAIN STATE DIFFERENCES IN LREX COEFFICIENT

MODEL	RBAR^2	DOF		CONSTANT	COLLEGE	EDSPEND	NONSMSA	HRWAGE	UNION	GROWTH	OILPROD	DEF_EMP	DEF_SHP
13	0.70	38	COEFF	-0.15	0.41		-0.25	-0.53	0.09	-0.14	-1.60	-0.08	
			TSTAT		3.20		-1.91	-4.77	0.76	-1.03	-2.06	-0.82	
			SIG		0.00		0.06	0.00	0.45	0.31	0.05	0.42	
15	0.61	39	COEFF	0.15	0.32		-0.30	-0.55	0.18				0.00
			TSTAT		2.58		-2.22	-4.89	1.69				0.02
			SIG		0.01		0.03	0.00	0.10				0.98
16	0.70	37	COEFF	-0.15	0.35		-0.26	-0.51	0.13	-0.02	-1.75		-0.01
			TSTAT		2.94		-1.99	-4.72	1.07	-0.11	-2.24		-0.15
			SIG		0.01		0.05	0.00	0.29	0.91	0.03		0.88

VARIABLE:

RBAR^2 = regression R^2 adjusted for degrees of freedom
COLLEGE = percent of population with 4 years of more of college
EDSPEND = 1983 per capita expenditures on public schools
NONSMSA = percent of the population living in non-SMSA's
HRWAGE = average hourly manufacturing wage for production workers
UNION = percent of the workforce in a labor union
GROWTH = percentage population growth from 1970 to 1980
OILPROD = per capita oil production in 1980
DEF_EMP = percent of the population employed in defense industries in 1983
DEF_SHP = 1983 shipments to defense related agencies, divided by population.

FIGURE R-1

PERCENTAGE CHANGE IN MANUFACTURING EMPLOYMENT

1980 TO 1985

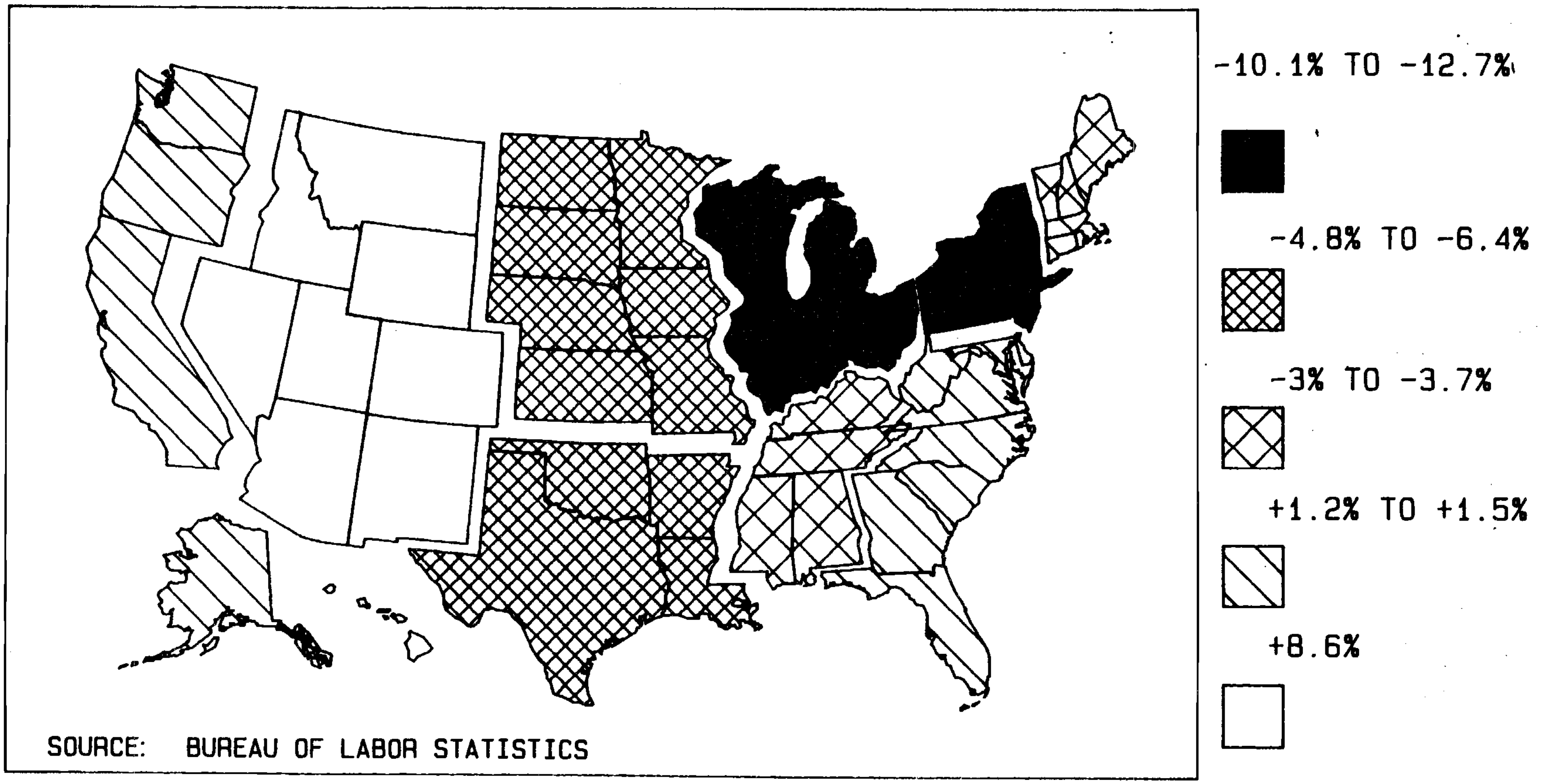
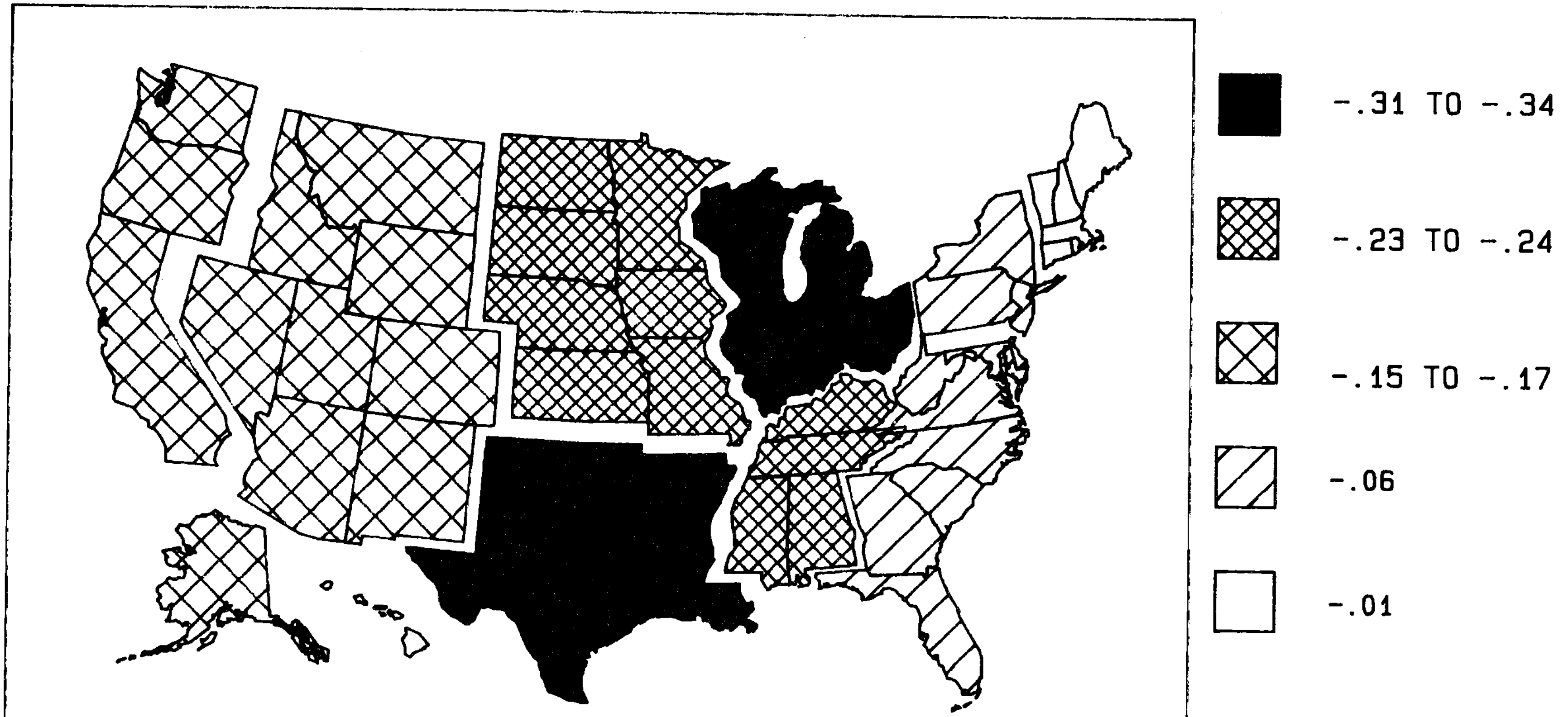


FIGURE A-2

EXCHANGE RATE COEFFICIENT BY CENSUS DIVISION

ELASTICITY OF MANUFACTURING EMPLOYMENT

WITH RESPECT TO CHANGES IN REAL EXCHANGE RATE



SOURCE: TABLE A-1

FIGURE S-1

PERCENTAGE CHANGE IN MANUFACTURING EMPLOYMENT 1980 TO 1985

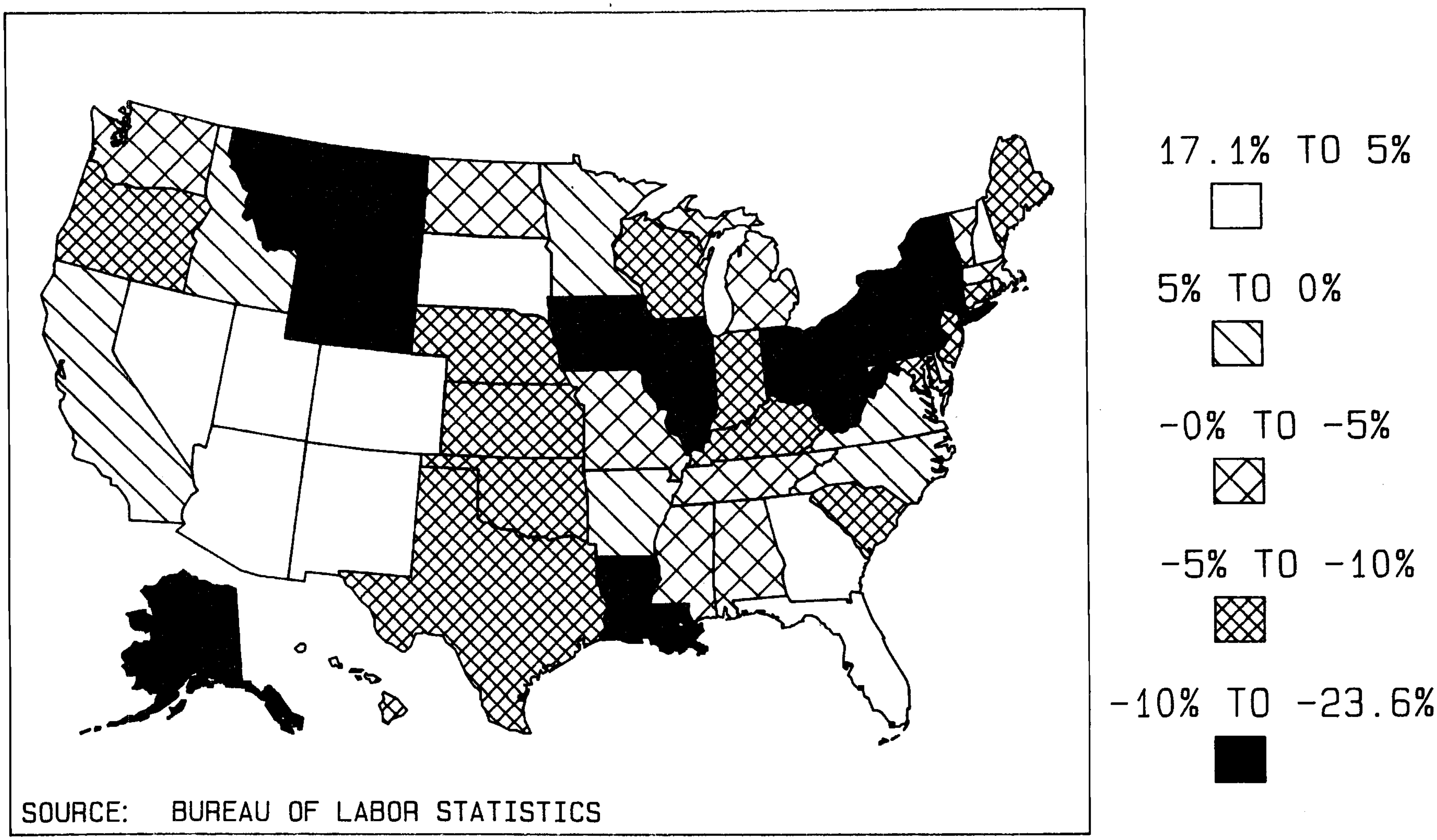
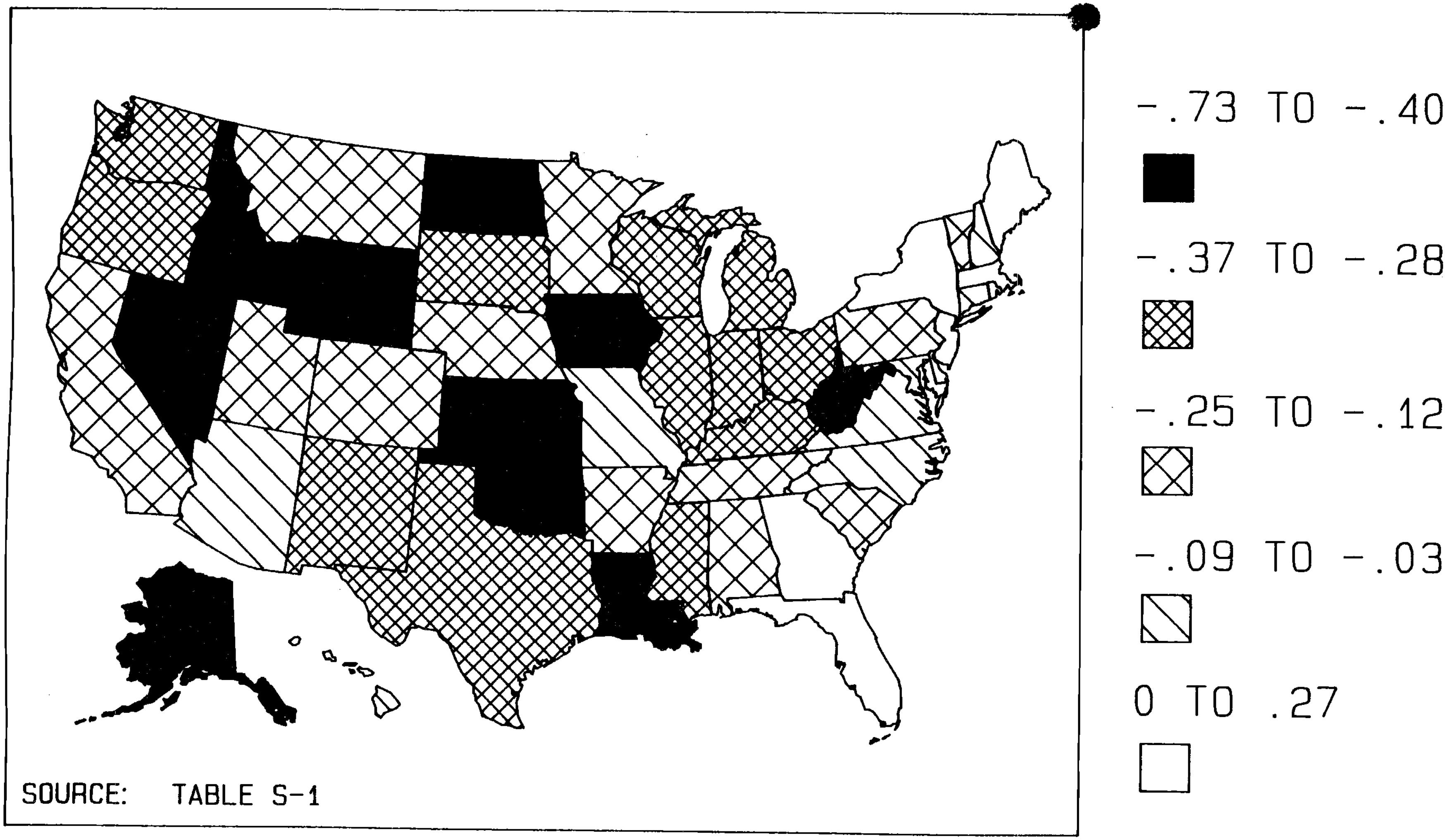


FIGURE S-2

EXCHANGE RATE COEFFICIENT BY STATE

ELASTICITY OF MANUFACTURING EMPLOYMENT
WITH RESPECT TO CHANGES IN REAL EXCHANGE RATE



SOURCE: TABLE S-1