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Donald H. Dutkowsky
Syracuse University

James Follain
Syracuse University

Seth Giertz
University of Texas at Austin

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Donald H. Dutkowsky, James Follain, Seth Giertz

Center for Policy Research
Maxwell School of Citizenship and Public Affairs
Syracuse University
Syracuse, New York 13244-1020

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I. Introduction

The purpose of the research described in this report is to produce an econometric model of the Upstate New York economy and two metropolitan areas within it—Albany and Syracuse. The model is intended to satisfy three main criteria. First, the model should be capable of capturing the dynamic nature of the local economy. This simply reflects the widely held belief that the local economy's response to various external forces and policies is unlikely to be immediate. Second, the model ought to be capable of generating short-run forecasts. In particular, quarterly forecasts for one or two years are preferred to long-run forecasts. This is done in order to be most useful to the planning purposes of Niagara Mohawk. Third, the model is to be developed and maintained by economists knowledgeable of the local economy and estimated specifically for the local economies using locally available data.

Econometric models capable of satisfying these criteria fall into two broad categories. One category of models—the structural approach—has its origins in rather traditional macroeconomic and structural models of small, open economies. The structural approach is highly specific about the factors that affect economic performance and the channels through which the factors affect economic performance. This approach also offers the opportunity to link certain measures of economic performance to specific policy variables. Indeed, structural models have produced many fundamental insights about regional economic growth. For example, some of the work has shown how labor migration into or out of a region is affected by wages within the region relative to those in other parts of the country. They have also been used frequently to develop policies to combat environmental problems, assess economic development strategies, and address other types of questions about the local economy.

A prominent example of this approach in the area of regional economics is the REMI model (Treyz 1995). Indeed, the REMI model played a prominent role in a recent study of the economic and fiscal impacts of the remediation of Onondaga Lake in Syracuse. Felt, Follain, and McCoskey (1997) analyze a version of the REMI model specifically calibrated to the Onondaga County economy, which is the largest county inside the Syracuse MSA. They produce a forecast of the local economic activity for the next 40 years. Duncombe, Felt, Follain, and Jump (1997) also employ the REMI model to analyze the impact of various plans to improve the quality of Onondaga Lake.

Despite the insights generated by the structural approach it has been the subject of numerous critiques in recent years. Several problems are highlighted in these critiques. First, structural models typically neglect advances in modern macroeconomics regarding the role of expectations. This problem is particularly acute in studies of the determination of important asset prices such as housing and land prices. Second, the linkage between government policies and economic activity is sometimes quite simplistic. For example, the impact of tax policies are often reduced to changes in the marginal cost of, say, investment; inframarginal changes are much harder to incorporate. Third, and, possibly, most importantly, data availability at the regional level is insufficient to estimate state of the art structural models. The best example of this is the absence of gross regional or county output, but there are many other examples as well, e.g. exports and imports. As a consequence, these data limitations lead to regional structural econometric models with serious gaps between what is desirable and what is possible to estimate.

Criticisms such as these and new substantive developments in time-series econometrics have led to the development of new approaches to the modeling of regional economic growth. Relative to the traditional models, these impose less structure and emphasize the importance of dynamic relationships among regions. A particularly good example of the application of this approach to regional time-series data is a recent paper by McCarthy and Steindel (1997); their focus is on the New York Metropolitan area. Other good examples include a recent study by Gerald Carlino and Robert DeFina (1997) of the differential regional effects of monetary policy and a major study by Blanchard and Katz (1992) of employment patterns among states.

The approach employed in this research builds upon some of these recent developments. The primary goal is to develop and estimate a new time-series model for the three subregions of the New York State economy: the Albany Metropolitan statistical area (MSA); the Syracuse MSA; and, Upstate New York (New York State less the portion of the New York MSA inside New York State). Attention is focused on two variables readily available at these levels: employment and personal income. We seek to determine the nature of the dynamic relationship between local employment and employment in the rest of the nation. Once estimated the model can be used to estimate the response of the local economy to an unexpected shock to the level of employment outside of the area. By estimating the time-series models for different time periods and subregions of New York State, the model is capable of yielding insights about the variation in this response over time and among regions of New York State.

Although insightful and a good first step for the development of a comprehensive econometric forecasting model, the time-series approach employed is relatively silent about the specific reasons for the response or its variation over time and among subregions. In other words, the approach describes what happens, but it does not explain the reasons for the response. Indeed, the local economy is influenced by a variety of specific factors, too many to be captured in what we consider to be a first-round attempt to build a time-series econometric model of the local economy.

Because of the largely atheoretical nature of the time-series approach employed, some additional work is done to examine one particular aspect of the regional economy thought to be both quantitatively important and capable of yielding interesting insights about the future direction of the regional economy. This component of the research investigates the relationship between housing prices and labor markets.

Most regional economic models focus upon growth in local market conditions such as wage rates, employment, and the unemployment rate. One of the main reasons for this focus is data availability, but such an approach surely overstates the importance of labor markets as an equilibrating mechanism within the local economy. Other critical markets are the market for land and closely related market for housing. Unfortunately, indices of land prices are not available at the MSA level; neither are indices of housing prices at the MSA level available for the MSAs in New York State for a long period of time. However, quarterly indices of the price of owner-occupied, single family housing have recently become available for states and selected MSAs back to 1980. Fannie Mae, Freddie Mac, and their new regulator, the Office of Federal Housing Enterprise Oversight (OFHEO), have developed them using actual market transactions and a repeated sales statistical technique. Dreiman and Follain (1998) use the MSA indices in their study of the supply elasticity of housing. Follain and Calhoun (1996) employ the technique used to compute the price indices in their study of multifamily price indices.

Our approach hopes to exploit the fact that growth rates in housing prices reflect both a response to current local economic conditions and a prediction of future economic activity. The first is an obvious statement and reflects the strong and historically documented positive relationship between economic growth and the demand for housing. The second one is a bit less obvious but may be just as true. Namely, the current value of housing prices reflects consumer expectations of future economic growth; higher expected economic growth increases the current asset price of land, which is a critical component of the price of housing. The extent of this relationship depends upon the degree to which consumers and builders are forward looking. Obviously, accurately predicting the future is difficult for even the most rational of consumers and builders, but surely some of the variation in housing prices from year to year is telling us something about what we expect to happen in the future. Clayton (1997) summarizes some of the approaches used to address this issue and some recent evidence. This approach is explored using state quarterly data on housing prices and nonfarm employment for the period 1980:1 to 1997:4.

The rest of the paper is divided into five parts. The next section surveys some relevant literature about the New York economy and highlights the web sight built for the project. In Section III the data sources and several stylized facts revealed by the data are described and discussed. The fourth section presents the results of the VAR estimation. The relationship between housing prices and employment is then discussed in Section V. Finally, Section IV presents employment forecasts for the Upstate economy and the two MSAs.

II. Literature Survey and Web Site

The introduction refers to several strands of literature relevant to the general topic of this report. This section focuses attention on some additional literature of more direct relevance to the Upstate New York economy. The first is the only comprehensive study of the New York State economy in recent years that has come to our attention; this is the book by Roy Bahl and William Duncombe. Some aspects of the book are highlighted below. A second set of papers was recently completed by the Center for Policy Research of Syracuse University as part of its study of the economic and fiscal impact of various plans to improve the quality of Onondaga Lake in Syracuse, New York. These included short-run and long-run forecasts of the Onondaga County economy and a detailed analysis of recent demographic and economic trends in Onondaga County. Some of the main results of these papers are highlighted below. The final part of our literature survey is a brief summary of a web site developed for this project. The web site includes a variety of hyperlinks to data sources, think tanks, governmental organizations, and other information about the New York economy.

Bahl and Duncombe's Study of New York State

In reviewing the literature on New York State and its economies, we look primarily to Bahl and Duncombe (1991). With regard to employment and personal income, Bahl and Duncombe note many of the trends that we discuss in the next section. They discuss New York's absolute decline in employment during the 1970s as well as its rise in the 1980s—noting that the rise in the 1980s was still poor relative to national performance. During the 1970s, they observe a deconcentration of employment from metropolitan to nonmetropolitan areas. This situation reverses itself in the 1980s, but they note that employment within metropolitan areas becomes less concentrated during this period. Also noted, is a shift in the industrial mix away from manufacturing towards services and trade. In response to the New York's poor employment performance, the State government played a greater role in promoting new industries. Bahl and Duncombe conclude that these efforts were largely unsuccessful.

An interesting point noted in their book is the State's dependence on external shocks. They note that, while not necessarily having a large impact on the state as a whole,[1] fluctuations in the value of the dollar have a large impact on export related employment and output. Export related manufacturing employment within New York State fell by 11.8 percent between 1981 and 1983 as the dollar gained strength (relative to European currencies). On the other hand, as dollar dropped in value from 1983 to 1986, exported related manufacturing employment grew by 4.6 percent (even as overall manufacturing employment in the state declined).

In addition to employment and personal income, Bahl and Duncombe also analyze population trends. They find New York's declining population relative to the nation to be similar to its employment performance. New York experienced absolute declines in population throughout much of the 1970s and modest growth during the 1980s. This growth was still well below the national average though. They expect this trend to continue. One obvious result of this trend is less political influence in Washington.

Also observed with regard to demographics are changes in the age distribution, racial composition, and family structures. The median age of the population has risen from 30.3 in 1970 to 34.0 in 1989. Those under 25 years of age are projected to fall from 44 percent of the population in 1970 to 31.5 percent in 2000 while those over 65 are expected to rise from 10.5 percent to 14.4 percent over this same period. This change is due to a combination of factors, but the out migration of the young appears to be one of the major factors.[2] From 1973 to 1979, the state lost an average of 140,000 persons per year. During the 1980s, the losses were down to about 40,000 per year.

In terms of racial diversity, New York was 13.2 percent nonwhite in 1970 and 18.3 percent nonwhite by 1985. In absolute terms, the white population actually declined slightly during the 1970s and 1980s. The decline in the younger age groups has been greater for whites than for other groups. Along with these changes has been an increase in the gap between adult and child poverty rates. In addition to substantial differences in the geographic distribution (minorities make up a much larger share of the New York MSA’s population than they do for the Upstate), age distribution, and economic conditions of New York’s various ethnic groups, there are also large differences in the family structure. In 1980, 50 percent of black families were headed by a single parent. The number for whites and Hispanics were 40 percent and 15 percent respectively. Bahl and Duncombe note that for blacks this high rate is due much more to parents never marrying as opposed to those that are married and then divorced or widowed.

Bahl and Duncombe also note the importance of foreign immigration to New York's population. New York receives 80 to 100,000 new immigrants each year—second only to California. The share of New York's population made up of immigrants has been growing. In 1987, immigrants made up 36 percent of the population; this number is projected to be at 56 percent by 2000.

Duncombe (1992) represents the latest chapter in the Metropolitan Studies Program's long history of concern with the New York State's economic and fiscal climate. Beyond the specific objective of analyzing the state's economic performance, the author uses this study as a vehicle to provide a great deal of data that may be useful to others concerned with the economies of the state and its subregions.

While the analysis presented here contains comparisons of New York's aggregate economic performance with the nation and northeastern states, it differs from similar efforts in several respects. First, this paper presents a more detailed picture of the New York economy and seeks to identify the factors underlying change. Thus, it looks at changes in household composition, birth rates, and migration patterns to ferret out the source of population growth. In the case of employment, the author provides detailed evidence on structural change, identifies growing and declining industries in the 1980s, and examines how these industries have fared in the early 1990s. The sources of income growth are analyzed, as well as evidence presented on the impact of structural changes on income distribution and poverty.

The second major contribution of this paper is the extensive data it provides on substate areas in New York. New York is composed of many different economies, which are both unique and are closely linked together. The tables provided in the text and appendix constitute the beginning of what should be included in a comprehensive data base on the New York economy. This data is presented here to facilitate the efforts of those interested in detailed analysis of the state's subareas.

Focus on Onondaga County

As noted above, the Center for Policy Research has recently examined the Onondaga County economy and made forecasts of its economic and fiscal future. One paper by Duncombe and Wong (1997) describes the last three decades as a time of transition for the economy of Onondaga County. After its poor performance in the 1970s, it rebounded during most of the

1980s. Since then the county economy has stagnated and even declined in key sectors. This report probes behind these aggregate trends to shed light on the nature of the changing county economy. To put these trends in perspective, the county's performance is compared to that of other metropolitan areas and regions in New York State and several fast growing metropolitan areas in the South. Understanding the reasons for Onondaga County's current economic status can help county policymakers shape future infrastructure investment and social and economic development policy. The picture that emerges from this analysis is one of pessimism for the prospects of Onondaga County's economy regaining the growth pattern of the 1980s in the next decade.

Felt, Follain, and McCoskey (1997) use the REMI model to analyze and forecast the Onondaga County economy. The report was structured around five major questions:

- *Do Alternative Measures of Local Economic Performance Always Move in the Same Direction?* The REMI model allows us to look at three different ways to measure economic performance: output, personal income and employment. The authors find that while output and personal income tend to move closely, employment sometimes does not. This makes the choice of measurement of economic performance important.

- *How Has the Composition of Output and Employment Changed?* The authors find that the make-up of the county's economy is undergoing a shift away from manufacturing as the main source of output and employment to the services industry. Manufacturing is still extremely important to the economy, comprising 35 percent of the total output of the county in 1994. However, employment in manufacturing has been dropping at an average rate of 1.9 percent a year since 1969. In contrast, employment in the service sector has grown an average of 3.5 percent a year since 1969.

- *What Are the Major Sources of Imports and Exports and How Have Trade Patterns Changed?* Onondaga County exports totaled $8.54 billion in 1994 with most of these going to the rest of New York State and the rest of the world. Only a very small fraction of total exports goes to the rest of the MSA and this share has actually declined over the past six years. The distribution of the source of imports is very similar with most of the imports coming from the rest of the state and the world. The trade gap (exports-imports) has declined in recent years mainly due to a slight increase in the fraction of total expenditures purchased locally, which is called the regional purchasing coefficient (RPC) in the REMI model. This increase, however, is mainly due to the general shift in the economy towards the service sector, which has a higher coefficient than the manufacturing sector. There has been little change in the percentages purchased locally by the different sectors.

- *How Has the Value of Real Estate Changed?* Two separate series are examined, one which examines the value of all real estate subject to the property tax and one which focuses on owner-occupied housing. There has been an increase in the value of all property subject to the property tax, according to the series compiled by the New York State Board of Equalization. However, looking at the weighted repeat sales index compiled jointly by Fannie Mae and Freddie Mac, we find little change in the price of owner-occupied housing.

- *What Are the Primary Factors that Drive the Onondaga County Economy?* There are three primary forces that drive the economy: i) The external economy: employment and real disposable income in Onondaga County are highly correlated with movements in these variables for the United States economy, although Onondaga's share of the national aggregates has declined steadily since 1969. Onondaga County's share of the national population has declined more substantially and is much less correlated with movements in the United States population; ii) The profitability of local firms relative to the national average: The profitability of local firms is close to or above the national average in most areas. Labor productivity is 30 percent higher than the national average, but fuel costs are much higher than the national average; iii) Migration into and out of the county. For the last two decades, more people have left the county than have moved here which has major effects on the supply of labor. The REMI model indicates that, on average, the real after tax is below what is available in the rest of the nation; furthermore, worker's in Onondaga County require an 18.3 percent higher real, after-tax wage to live in Onondaga County.

The other major portion of the paper provides a forecast of the Onondaga County economy from now until the year 2035. This forecast can be broken into two parts, a short-run forecast that runs into the early part of the 21st century and a long-run forecast that runs from the early part of the next century until the end of the forecast period. The short-run forecast for the county is somewhat more prosperous than compared to the early 1990s. Real income growth through the end of the decade is predicted to be twice the rate of growth during the early 1990s. However, long run prospects for the county are somewhat less encouraging. Growth in employment is expected to be half the growth rate experienced from 1969-1994 and a similar pattern emerges for real disposable income.

Web Site

In order to help keep track of the State's economic performance, we have developed a web site dedicated to New York State. The site is located at: http://www.maxwell.syr.edu/maxpages/faculty/follain/resources/nystate. The site provides links to other sites with information on New York State and its many localities. The site is divided into four main areas:

- Sources of Data,
- Relevant Literature,
- Sources of Information, and
- Helpful Contacts.

Each is discussed in turn.

The ***Sources of Data*** page provides links to a number of state and federal web sites that have employment and income data for the United States and each of the 50 states plus Washington, DC. Additionally, data is available by county and for many of the regions and MSAs within New York State.

The ***Relevant Literature*** page has links to a number papers which focus on different parts of the New York State economy. Several of the papers deal with issues unique to the Syracuse MSA. Other papers deal primarily with Downstate, but they employ techniques similar to those employed in our research. Most of the papers can be downloaded over the web.

The ***Sources of Information*** page offers numerous sites with information on New York State and its regions. Sites range from the Statistical Abstract and the Federal Reserve sites to the City of Syracuse Homepage and Biz Day (which offers links to most of news services that deal with New York State).

Finally, the site has a page with contacts to people with expertise in working with the employment and income data as well as people at the various government agencies that deal with the New York economy.

III. Data and Stylized Facts

Our definitions for regions are derived from the Office of Management and Budget (OMB) classifications. The United States definition covers the whole nation. (For the VARs, data from the area of interest is subtracted from the United States data.) Our definition of Upstate is all of the counties in New York State less the counties in the New York PMSA. (We refer to the New York PMSA as Downstate.) As defined by the OMB, the New York PMSA encompasses Bronx, Kings, New York, Putnam, Queens, Richmond, Rockland, and Westchester Counties. For the Syracuse and Albany-Schenectady-Troy MSAs (which we simply refer to as the Albany MSA), we again use the OMB's definition. The Syracuse MSA includes Onondaga, Madison, Oswego, and Cayuga counties. Cayuga was just added to the MSA in 1988. This addition creates a discontinuity in our data set, which we adjust for by adding a dummy variable. The Albany MSA includes Albany, Montgomery, Rensselaer, Saratoga, Schenectady, and Schoharie counties. As with the Syracuse MSA, the Albany MSA has a couple of discontinuities due to minor definitional changes taking effect in 1975 and 1988. These are accounted for by adding an Albany dummy variable for these two years.

In order to measure the relationship between the economies, we focus on time series data on employment for each of the regions. There are a number sources for employment data from which we have to choose. For example, ES-202, Establishment, Monthly Household Employment, and County Business Patterns data are available. ES-202 provides the most comprehensive employment information. The data are broken down by industry and by county. The Bureau of Labor Statistics (BLS) works with employment securities agencies in each of the 50 States, Washington, DC, and the territories in order to compile the data. The data are provided on a quarterly basis for employees covered by state unemployment insurance (UI) and

Unemployment Compensation for Federal Employees (UCFE). This amounts to nearly all of nonagricultural employees and about half of those employed in agriculture.[3]

An alternative to the ES-202 data is the Monthly Household Employment data. This data set is compiled as part of the Current Population Survey (CPS) and is available by county or by metropolitan area. As distinct from the other employment data sets, the CPS is based on households and focuses on workers as opposed to industries. Consequently, this employment data is based on where workers *live* and *not* where they work.

A third alternative is the County Business Patterns (CPB) data. With the CPB, states provide data on employees by county. Employees covered by the Federal Insurance Contributions Act (FICA) are included in the data. Employees outside of FICA are not included. Thus, excluded are a number of government workers, and some self-employed individuals (i.e., farmers, etc.).

Yet, another employment data source is the Current Employment Statistics' (CES) establishment data. Similar to the ES-202, this data is based on a survey of business establishments. Approximately 390,000 establishments are in the survey. The numbers are compiled on a monthly basis and are released more timely than the ES-202. Since the establishment data is based on a much smaller sample size than the ES-202,[4] measurement error becomes more of a problem. This problem is lessened though, due to yearly revisions that are made to the establishment data once the ES-202 is available for comparison.

There are many similarities between the data sets, but for our purposes, the establishment and ES-202 are the most appropriate. We favor the establishment data primarily because it is released in a more timely fashion. Both the ES-202 and the establishment provide data based on where employment is located as opposed to where workers live. They also provide the best coverage—covering all nonfarm industries. A comparison of the two data sets illustrates their similarities (see Figure III-1). Over the past 20 years, the two data sets follow identical trends with only a slight difference between the two data sets. We obtained the data through the Bureau of Labor Statistics (BLS) web site.

For our personal income and wage & salary data, we look to the Bureau of Economic Analysis' (BEA) Regional Accounts Data. The data covers the years from 1969 through 1996. (1996 data was not available for Syracuse personal income.) The data are available by state, county, and metropolitan area and thus can easily be matched with the employment data. The BEA defines personal income as, "the sum of wage and salary disbursements, other labor income, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and transfer payments to persons, less personal contributions for social insurance." Wages and salaries are by far the largest component of personal income. Over the past thirty years, its importance (relative to personal income) has declined somewhat. Furthermore, its importance differs greatly between regions. (This is illustrated in Figure III-2.) For example, for Upstate, wages and salaries have fallen to below 50 percent of personal income, while for Downstate the value has also dropped recently, but is still hovering around 65 percent.

In addition to the regional and national employment data, data is obtained on several other variables in order to enhance our understanding of the regions. As discussed later, these variables are added to the VARs assuming an exogenous relationship. For employment, we obtained establishment data on overall New York State employment as well as state employment located in the Syracuse MSA. In addition to employment data, we thought data on national defense spending and the Canadian/United States exchange rate might be of some importance. Upstate New York's economy is bolstered by spending on bases and the location of military personnel in the region. Over the years, as national defense spending has changed, it is likely that the benefits Upstate receives from this spending have changed as well. The Canadian/United States exchange rate was added in an attempt to measure the influence that trade with Canada may have on the Upstate regions. Descriptive statistics for these exogenous variables are provided in Table III-1.

The quarterly data on national defense spending was obtained from the BEA National Income and Product Accounts. To convert the data into real terms, we adjusted the numbers by the Producer Price Index (PPI) which was obtained from the St. Louis Federal Reserve's Federal Reserve Economic Data (FRED) web site. The exchange rate data is also from the FRED site. We were able to access exchange rates going back to 1971 (before which rates were more or less fixed). Exchange rates before 1971 are assumed equal to one.

Stylized Facts

Before performing more sophisticated empirical analysis, we plot the raw data to get a general idea of trends experienced by the Albany and Syracuse MSAs; both absolute numbers as well as shares relative to the nation are used. A first point that jumps out from the raw data is that **areas within New York State have performed far worse than the nation as a whole with regard to employment growth for at least the past four decades**. Downstate and the Upstate regions had similar trends up until 1970. From 1958 to 1970, Syracuse's employment share (relative to the nation) fell by a little over 8 percent, Albany's by a little over 12 percent and Downstate's by over 20 percent. Beginning in 1970, Downstate went into a nosedive while the Upstate regions continued with their gradual decline. From 1971 through 1997, Syracuse's employment share fell by over 20 percent, Albany's by nearly 17 percent, and Downstate's by a whopping 43 percent. For the entire period, Syracuse and Albany's employment shares each fell by slightly over 26.5 percent while Downstate's fell by over 56 percent. These points are illustrated in Figure III-3, which plots Albany, Syracuse, and Downstate employment relative to national employment for the years 1958 through 1997. Also plotted from 1974 through 1997 is New York CMSA employment less Downstate employment.[5] This measure is used as a proxy for employment in the New York City metropolitan area that is outside of New York State.

Although (at least in terms of employment growth) the Downstate area clearly performed the worst in the state, the portion of New York MSA located in adjoining states (NY-MSAAS) performed far better than any of the areas in New York State. In fact, since 1974 Albany and Syracuse employment shares have fallen between 15 and 17 percent while Downstate and NY-MSAAS shares have fallen by a little over 33 percent and a little over 7 percent respectively. This is quite a contrast. Several possible explanations come to mind. One is that during this time, businesses relocated to adjoining states (bringing employees with them) where taxes and government regulations are less burdensome. Another possibility is that these adjoining areas increased in population as New York City grew and as methods of transportation improved; this may have lead to new markets for employees. Likely, it is some combination of these and many other factors.

In addition to poor employment performance, **the state's performance with regard to personal income and wages and salaries has been sub-par when compared to the nation.** For personal income and wages and salaries performance was especially poor until the mid-to-late 1970s. At this time, the situation reversed itself. Personal income rose modestly relative to the nation while wages and salaries (personal income's largest component) rose at a slightly faster rate. From 1969 to 1995, personal income shares relative to the nation fell by over 26 percent for Downstate. But from 1981 to 1995 Downstate's share actually increased by 1.5 percent. Personal income for Downstate peaked around 1988 and then began to decline; wages and salaries also peaked at this time, but remained relatively steady into the early 1990s.

With regard to income measures, Albany and Syracuse did not do too poorly during the 1980s and early 1990s (especially when compared with employment). From 1969 to 1995, personal income shares relative to the nation fell by over 22 percent for Syracuse and by over 15 percent for Albany. However, from 1981 to 1995, the decline was just 8 percent decline for

Syracuse while Albany broke even. Albany peaked a little earlier than Syracuse. Both metropolitan areas have experienced decline in 1994 and 1995.

A closer look at absolute numbers for the 1990s shows that **Albany and Syracuse are currently recovering from earlier employment slumps**. Albany and Syracuse employment both dropped sharply during the early 1990s bottoming out around 1992. Each MSA lost well over 11,000 jobs. This is illustrated in Figure II-5. In 1992, Syracuse started to see slow but steady employment gains while Albany's employment surged surpassing its 1990 level by 1994. Syracuse's employment was still increasing through 1997, but it was still below its 1990 high.[6] Albany's recent employment trends are much more volatile. After its 1994 peak, it had another employment slump lasting through 1996; it managed to regain the 1995-96 losses in another surge in 1997.

The absolute employment trends for Downstate during the 1990s are very similar to Syracuse's, but on a much larger scale. After peaking in 1989, employment plummeted until 1992 at which time a slow but steady recovery began. From 1990 through 1992, Syracuse's employment share fell by 3.7 percent while Downstate's fell by 7.8 percent. From 1993 through 1997, Syracuse's employment share rose by 1.3 percent while Downstate's share rose by 3.7 percent. The similarities between Syracuse and Downstate can be seen in Figure III-6.

One of the most striking differences between Downstate and the Upstate regions is the bifurcation between employment and the income measures that occurred Downstate beginning in the early 1980s. (This was seen earlier in Figure III-4 and presents itself again in Figures III-7 and III-8.) This bifurcation reflects the region's poor employment growth, but at the same time shows that the people who are working Downstate are becoming relatively wealthier. Figure III-7 plots the various regions' personal income divided by employment relative to national employment divided by national income.[7] This can be thought of as a proxy for per capita (or per employee) incomes. This shows Syracuse's ratio declining from six points above the national average in 1969 to just about the national average in 1996. Albany, on the other hand, falls from the national average to about 6.5 points below it in 1996. These movements are miniscule when compared to Downstate, which went from the national average in 1969 to over 133 percent of the national average in 1995. Figure III-8 suggests that Downstate wages and salaries did not really take-off until 1987, but the other components of personal income started their rise in 1981.

This downstate phenomenon is suggestive of several possible scenarios. One is that many low-skilled jobs were lost while high-skilled workers enjoyed large wage increases. Another possibility could be that even more low-skilled jobs were lost, but some were replaced by high-skilled jobs. Another scenario would have jobs staying in the larger metropolitan area, but moving across state lines where taxes and regulations may be may be more lenient. It is also not clear whether this relative decline in jobs was "voluntary" or "involuntary." Were workers laid off and then left the area because job prospects were so poor or were job prospects decent, but opportunities in other parts of the country appeared more fruitful?

The figures in the section provide interesting insights into New York's regions, but it is important to be cautious when drawing conclusions based solely on these figures. It is possible for apparent growth or decline to be deceiving and it is not always clear what is the appropriate measure of growth. In a closed economy, per capita income growth may be a very good measure of economic growth. This may not be so for regions in an open economy like the United States. Suppose, for example, a negative shock to low skilled labor were to hit the Downstate region. In response to this shock, many low skilled workers may migrate to areas that offer more promising employment. The result of this hypothetical negative shock is a rising per capita income for Downstate. Interpreting this rise in income as positive economic growth would be misleading. For this case, employment would be a better measure to look at.

Employment, by itself, can also be deceiving. For example, employment growth consisting of low paying part-time jobs along with many full-time workers involuntarily moving to part-time work, would be far different from a situation from one where many stable high-paying jobs are created. Simply looking at the raw data, though, we cannot observe the difference between these two scenarios.

IV. VAR Results

The strategy employed involves the estimation of various systems of equations using the time-series technique known as VAR, vector auto regression. The systems are either two or three equations. The two-equation system includes one of the three local economies—Albany, Syracuse, and Upstate—and the national economy (less the local economy). The three-equation system includes one of the three local economies, the downstate economy, and the national economy (less the local economy and downstate). Both two and three-equation VARs are estimated using quarterly employment data.

The basic VAR system includes one equation for each endogenous variable in the system. The explanatory variables include lags of each endogenous variable and other exogenous variables in the system. The endogenous variables are assumed stationary, which means that the random error terms in the model do not follow a random walk. We typically employ differences in the natural logarithms, i.e., quarterly growth rates, as the endogenous variables in the basic VAR because ADF (augmented Dickey-Fuller) tests indicate that the logs of the *levels* variables are generally nonstationary. The same tests indicate that the differences in logs are stationary.

A VAR system is a system of nonlinear difference equations. The purpose of the VAR model is to capture interactions between the variables in the system. This is particularly valuable in the identification of the dynamic nature of the relationship. Another important aspect of a VAR relative to traditional structural econometric models is the lack of thorough economic structure. The endogenous variables are assumed to depend upon one another in a rather general and dynamic way. They are also affected by the exogenous variables in the model, but the exogenous variables are not influenced by the endogenous variables.

The estimated coefficients of a VAR are often difficult to interpret because they are usually part of a complex and highly nonlinear system of difference equations. As a result, the preferred way to interpret the estimates of a VAR system is to compute and analyze the impulse response function. The impulse response function is the forward solution of the VAR model holding all exogenous variables constant. It is stimulated by a one standard deviation shock (the impulse) to the random error terms in each equation in the system. Typically, the model is solved for 10 to 20 periods in the future. The solution indicates how one endogenous variable responds to an increase in the other endogenous variable taking into account the interaction between the endogenous variables and the covariance matrix among the random error terms in the system. In this sense, the impulse response is truly an attempt to solve the model and measure the response of the variables in the system *holding all else equal.*

Example. Consider the specification of the two-equation system for Albany and the United States with just two lags. The VAR system is written in growth rates as:

$$dlog(E_a)_t = a + b_1\, dlog(E_a)_{t-1} + b_2\, dlog(E_a)_{t-2} + b_3\, dlog(E_{us})_{t-1} + b_4\, dlog(E_{us})_{t-2} + gX(t) + \varepsilon_{at}$$

$$dlog(E_{us})_t = a + c_1\, dlog(E_a)_{t-1} + c_2\, dlog(E_a)_{t-2} + c_3\, dlog(E_{us})_{t-1} + c_4\, dlog(E_{us})_{t-2} + gX(t) + \varepsilon_{\mathrm{ust}}$$

The exogenous variables in the system are represented by X(t) and its coefficient vector by g. Each equation in the model is estimated by OLS. Once estimated the model is solved simultaneously to yield the impulse response function. The impulse response measures the change over time in each dependent variable generated by a one standard deviation increase in the error terms (ε_{at} and $\varepsilon_{\mathrm{ust}}$) for each equation. Hamilton (1994) describes the solution.

VAR with VEC. The basic VAR can be augmented to include any long-run relationship thought to pertain to the variables in the system. We estimate a VAR with such a term, which is referred to as the vector error correction variable. It is designed to capture the influence of being far or close to the long-run equilibrium relationship among the variables in the system. The specific relationship we incorporate in the VEC posits a long-run relationship between the local economy and the national economy. In essence, we seek to know whether the local economy represents a fixed share of the national economy and whether departures from this long-run relationship help in the prediction of short-run movements in the endogenous variables in the system. The VEC version of this VAR model includes one other term—called the error correction term. It equals $\log(E_{us}) - c - k \log(E_a)$. The coefficient of this term (γ) indicates the responsiveness of employment in each area to departures from this long-run equilibrium relationship. ***c, k, and γ are estimated in this approach.***

For example, assume that Syracuse represents 0.5 of 1 percent of the national economy over the very long-run or steady state and it suddenly increases to 0.6 due to a new contract by a large local employer. The VEC model posits that this departure will set in motion forces to move the economy back to its long-run share over time. These forces include migration and changes in wages in prices in Syracuse relative to other parts of the world. Of course, none of the other forces is modeled explicitly; rather one interprets the VEC as a proxy for these forces.

Results for the Two-Equation Systems

A variety of statistics from the VAR and VEC estimation are summarized in Table IV-1 for each of the three regions examined: Albany; Syracuse; and Upstate New York. The Akaike criterion is used to identify the number of lags in the VAR models; we settle upon six quarters. The adjusted R^2 statistics indicate that the VAR models explain the bulk of the variation in employment growth rates in the local economies.

Other exogenous variables can and are included in a VAR. Indeed, the specific VAR results presented in this section include several. The exogenous variables include three seasonal dummy variables; these are quite important and always included. Three other exogenous variables are also included: national defense expenditures in real terms; government employment at the local level; and, the exchange rate between the United States and Canadian dollars. The coefficients of these other variables are usually the expected signs, but they are usually small and not highly significant. Furthermore, we have estimated the model with and without such exogenous variables and the basic conclusions do not change. As a result, the coefficients of these three exogenous variables are not discussed below, but are available in the appendix.

The critical information generated by the VAR is the impulse response function. This function indicates the cumulative responsiveness of a dependent variable in the system to a shock in one of the variables in the system; the time path of the response is also given. Two graphs of the impulse response functions are presented for each area. One shows the response of the local area's employment growth, e.g., Albany, to a one-standard deviation shock in the national employment growth rate. The second shows the response of the national employment growth rate to the same shock. These are included in Figures IV-1, IV-2, and IV-3. Key aspects of the impulse responses are summarized in Table IV-1.

Albany. Consider, first, the responsiveness of employment growth in Albany and the United States (less Albany) to a one standard deviation increase to employment growth in the rest of the nation (column 1, row 1). A one standard deviation shock to the national employment picture equals .0038 (column 2), or about 0.4 of 1 percent higher growth rate in period t. Albany's response is about 60 percent of this in the period following the shock (0.00235) (column 1 of Table 1). The response increases over the next seven quarters to 0.386 of 1 percent. That is, Albany's growth rate increases by about 100 percent of the initial increase in the national growth rate. Furthermore, the bulk of the growth in the Albany economy is realized in the first two quarters. Note, however, that shock to the United States employment growth rate triggers additional growth in United States employment. The shock to the United States economy leads to a cumulative increase in employment growth in the United States to about 1 percent

(0.00947). Therefore, the cumulative response of the Albany economy to the cumulative growth in the United States economy is only about 40 percent. Regardless of the metric employed, the Albany economy's response to a national shock is less than proportionate to the growth in the United States economy.

The VEC results for Albany reveal a different and more explosive pattern of response for Albany. The response of Albany's employment growth rate increases over time. The first period is about that estimated in the VAR model, but after two years the VEC response is 20 times larger than that found in the VAR. This probably results because an inappropriate error correction term is included in the model. In fact, the cointegration test suggests that the logs of Albany employment and United States employment are not cointegrated. That is, there does not appear to be a long-run or equilibrium relationship between the two variables. The error correction term has a positive coefficient (0.0139), but it is only statistically insignificant.

Syracuse. Employment in Syracuse appears to be more responsive to national shocks. The response in the first year is nearly two-thirds larger than Albany's. The Syracuse response more than doubles over the next seven quarters. As in the case of Albany, however, the cumulative response in Syracuse is still less than the cumulative response in the United States over two years (0.00868 versus 0.00984).

The VEC results for Albany and Syracuse are similar. The VEC results suggest that the model is explosive. The long-run relationship is either nonexistent or too small to pick up with these data.

Upstate. The quantitative response of the Upstate economy is closer to that of Syracuse. The first period response of Upstate employment growth to the United States shock is about 90 percent in the first period. The ratios of the two cumulative responses is close to unity; that is, a 1 percent increase in the United States employment growth rate tends to generate a similar response in Upstate New York. About 60 percent occur in the first two quarters and the rest happens in the next six quarters.

Do the Patterns of Responses Change over Time?

In an effort to shed light on this question, the same models are estimated for two different time-periods: 1959:1 to 1980:4; and 1981:1-1998:1 (see Tables IV-2 and IV-3). The absolute magnitudes of the responses do show variation, but it is important to standardize by the size of the United States shocks, which vary among the various periods. A one standard deviation shock to the United States economy (less the local areas) for the period 1959-1980 ranges from 0.004 to 0.0049; the shock for the post-1980 period is about half that size. In order to take this difference into account, it is important to look at the ratios of the response of an area to the size of the shock. This analysis reveals a striking pattern.

Response of Local Economy to United States Shocks

	Albany		Syracuse		Upstate	
All years in sample	0.607	0.408	0.865	0.882	0.895	0.956
1959:1 to 1980:4	0.584	0.481	0.917	1.077	1.001	1.127
1981:1 to 1998:1	0.502	0.584	0.312	0.608	0.504	0.694

Namely, Syracuse and the Upstate economy have become substantially less responsive since 1981. A one standard deviation shock to the United States employment growth rate tended to increase employment growth in Syracuse by about the same rate prior to 1981.; this held whether one examines the first period response (0.917) or the response after eight quarters (1.077). Since then the impact of a national shock on the local economy appears to be much smaller, 0.312 and 0.608, respectively. The same basic pattern holds for the Upstate economy. The only exception is the government-employment dominated Albany area. One can and future research should speculate and investigate the causes of this pattern.

The VEC results for the two periods are presented in Tables IV-2 and IV-3 for completeness, but they do not tell an interesting story. They seem to exhibit the same explosive effects obtained for the full sample. More research is needed to identify error correction terms for this system.

Three-Equation System Results

The three-equation system is designed to incorporate another potentially important component of the relevant external economy: downstate New York. The results of the estimation of a three-equation VAR are contained in Table IV-4. Two main conclusions emerge from this analysis. First, the impulse responses of the local economies are not much changed by the introduction of the downstate economy into the VAR system. Consider, for example, the responses of employment growth in Albany to a national shock in the three-equation system (column 1 of Table IV-4) to those from the two-equation system (column 1 of Table IV-1). They are nearly identical. The same applies to Upstate. Syracuse exhibits slightly larger differences than found in one, but this is partly attributable to the fact that Table IV-1 is estimated using data since 1955 whereas the results in Table IV-4 are based upon data since 1959.

Second, the downstate economy appears to play a minor role in the economies of Albany, Syracuse, and, in general, Upstate New York. This result is supported by examining the responses of the three areas to shocks in the downstate employment growth rate. So, for example, a shock to the downstate employment growth rate actually decreases employment in Albany in the first period following the shock by -0.049 of 1 percent. The negative sign is not the main point; rather the small size of the effect is the result of interest. The response does not change much after eight periods. Nor does this conclusion differ much in either Syracuse or Upstate. Again, this econometric result begs for more analysis and investigation, but it does tend to place the onus on those who argue in favor of a strong connection between upstate and downstate economies to offer compelling evidence of the connection.

Personal Income. Additional econometric analysis was conducted of the relationship between local area personal income and United States personal income. Two and three-equation AR and VEC models were estimated using annual data from 1969 to 1995. Unfortunately, this analysis yielded few interesting insights or evidence of a strong connection between the local and the national economies. Perhaps such a negative result is worth reporting; however, we choose to de-emphasize it because we suspect it may be driven more by the relatively limited number of observations and the frequency of the data (annual vs. quarterly). Future research projects may want to investigate this in more depth or using different approaches.

Conclusions of VAR Estimation

Four aspects of the results are worth emphasizing. First, an increase in the employment growth rate of the national economy has a positive impact on the local economies of Albany, Syracuse, and Upstate; however, the local responses tend to be less than proportionate. Albany's response is the smallest while the responses of Syracuse and Upstate are quite similar (see Table IV-1).

Second, the responses of Syracuse and Upstate to national shocks appear to be substantially smaller since 1980 than they were prior to this period. Although one can speculate about the causes of this decline, the approach used in this report (VAR) is better at identifying the magnitude of the change rather than identifying its root cause. More research is needed for this (see Tables IV-2 and 3).

Third, the downstate economy does not appear to be a strong driving force of the upstate economies. This conclusion follows from analysis of the estimates of the three-equation VAR with a local economy, downstate, and the rest of the nation reveal a negligible (see Table IV-4).

Fourth, error correction models and analysis of the impulse response functions do not reveal a strong and stable long-run relationship running from the local economies to the national economies. The direction of the effect is decidedly one-sided. This conclusion is interesting in itself, but it is particularly relevant to one of the goals of this analysis; that is, produce short-run forecasts of the local economies using time-series techniques. The results suggest that a quite reasonable forecasting model can be developed by ignoring the possible simultaneity between the local and national economies. Instead, a forecasting model can be developed in a top-down manner. First, generate an estimate of the national economy. Second, use this information and a single-equation VAR of the local economy to forecast future local employment growth. This approach and the results of its application are discussed in more detail below.

V. Housing Prices and Employment Growth

The purpose of this portion of the study is to examine an aspect of the relationship between housing price appreciation and employment growth. Some of the movement in housing prices is surely driven by unexpected growth in employment; that is, housing prices are partially a reflection of current economic activity. However, prices are also a reflection of expectations of future economic activity because they are, in theory, the present value of expected future income. As such, they may serve as a predictor of future economic activity. Several models are investigated to shed light on the strength of this aspect of the relationship between employment growth and housing price appreciation.

The remainder of this section is divided into four parts. A model is developed to show how housing price appreciation may be a predictor of employment growth in the next part. The next one discusses the data employed in the analysis and several stylized facts that emerge from the analysis of trends and descriptive statistics. The third part discusses the econometric strategy employed. The estimation results are presented and discussed in the final part of this section.

Housing Price Appreciation as a Predictor of Employment Growth

The basic idea underlying this portion of the study is captured by the manipulation of two equations. It follows the logic used by Hamilton (1994) and others to explain how stock market prices may serve as predictors of corporate dividends. The first equation simply states that the price of housing is the present discounted value of future expected rental income; that is,

$$P_t = \sum_{i=1}^{\infty} E(R_{t+i})/(1+r)^i \qquad \textbf{(V-1)}$$

where P_t is the asset price of housing; $E(R_{t+i})$ is the expected rental value of the house in year t+i; and r is the discount rate. Expected future rents are not directly observable, but we do believe they will bear some relationship to expected future housing demand. Larger demand ought to generate larger future rents, all else equal.

Of course, the exact relationship between expected future rents and expected future demand depends upon the quality of the proxy for future demand, the manner in which these expectations are formed, and the supply elasticity of housing. This study makes no attempt to sort out these exact relationships; rather it simply assumes that higher expected levels of employment lead to higher expected future rents.

The second equation posits a simple model of employment. Assume that employment follows this process:

$$EMP_t = EMP_0 + u_t + \delta u_{t-1} + v_t \qquad \textbf{(V-2)}$$

where EMP_t represents employment in year t; EMP_0 represents the baseline level of employment; u_t and v_t are independent error terms (one might be generated by local shocks and the other by national shocks, for example); and δ is the correlation between u_t and u_{t-1}. This formulation captures a sense of persistence among employment trends; that is, unusual events tend to have effects over multiple periods. Investors are assumed to know past values of both u and v and EMP_0. As a consequence, they can make a forecast of future employment as follows:

$$E(EMP_{t+i}) = EMP_0 + \delta\, u_{t-1} \text{ if } i = 1\text{; otherwise, } E(EMP_t) = EMP_0. \qquad \textbf{(V-3)}$$

Substitution of this relationship into the equation for the price of housing above yields the following revised equation for price:

$$P_t \;=\; EMP_0/r \;+\; \delta\, u_t \,/\, (1 + r) \qquad \textbf{(V-4)}$$

Now note that this equation implies that $\delta\; u_{t\text{-}1} = (1{+}r)P_{t\text{-}1} \;-\; (1{+}r)EMP_0/r$. Inserting this last relationship into the forecast of employment yields the critical relationship for our purposes; that is,

$$EMP_t \;=\; \text{-}EMP_0/r + (1{+}r)P_{t\text{-}1} + u_t + v_t \qquad \textbf{(V-5)}$$

The key point is that employment levels are predicted by lagged values of housing prices, if employment and housing rents are closely related and if unexpected shocks to employment trends tend to have persistent effects over time. We further adjust this relationship by putting it in terms of growth rates but the logic is the same. That is, growth rates in employment are predicted by lagged growth rates in housing price appreciation plus unobserved error terms.

Now, of course, this is a highly stylized model. The employment process is surely more complex than the one posited. As noted above, there are also several unspecified links between expected growth in employment and expected future rents. The exact nature of the lag structure is also quite simplistic. Nonetheless, the basic idea is demonstrated. If the price of housing is a reflection of expected future rents, then deviations in employment growth rates from its long-term trend ought to bear some relationship to lagged growth rates in housing prices. This is so because lagged housing price appreciation embodies expectations about the expected path of employment growth.

The empirical analysis that follows focuses on testing the hypothesis that lagged values of real housing price appreciation add to the predictive power of an equation that explains employment growth. A distinction between causation and prediction is important to make at this point. The previous model does not posit that housing price appreciation *causes* employment growth. Rather it says that housing price appreciation helps to predict employment growth. This is what we examine below.

Stylized Facts about Employment Growth and Housing Price Appreciation

Indices of the price of owner-occupied housing have been developed by the Office of Federal Housing Enterprise Oversight (OFHEO) in recent years. These indices employ the weighted-repeat sales (WRS) method. In essence, all house sales involving a mortgage purchased by Fannie Mae or Freddie Mac are used to compute rates of housing price appreciation among many areas within the United States. The indices have been developed for the United States, each Census division, each state, the District of Columbia, and a large number of metropolitan areas. Full documentation of the indices is contained in OFHEO (1998).

Our analysis uses both the national index and the indices for each of the 50 states and the District of Columbia. These are available on a quarterly basis from 1980:1 through 1998:1.

We decided not to pursue estimation of the model using housing price indices developed specifically for Syracuse and Albany. The price index data have proven to be highly volatile before 1985 for small and medium sized MSAs. The cause of the volatility is the small sample sizes available for index construction. Furthermore, a recent policy change makes it difficult to obtain the MSA indices whereas the state indices are available to the public.

The quarterly growth rate in nonagricultural employment in the United States averaged about 0.4 of 1 percent during the period of 1980:1 to 1998:1 (see Table V-1). On an annual basis, employment growth was about 1.7 percent. Employment in New York was about one-third of the national growth rate. It was the lowest among the five largest states (in terms of 1998 employment levels)—California, Florida, Illinois, New York, and Texas. Indeed, it had the third lowest employment growth rate among the 50 states. Only West Virginia, Wyoming and the District of Columbia had lower employment growth rates during this period. Other statistics in Table V-1 suggest that employment growth in New York is more volatile than the national average and among the five largest states. For example, both the range (0.0257 to -0.0445) and the standard deviation (0.0175) of the quarterly growth rates are larger for New York than for the other states.

The average quarterly growth rate in housing prices for the entire country was just over one percent per year between 1980 and 1998; compounded annually this translates into an average annual rate of 4.3 percent. Adjusted for inflation, however, real housing price appreciation for the United States as a whole was negligible for this period (0.06 of 1 percent on average) (see Table V-1). New York's annual growth rate in housing prices was larger than that for the rest of the nation (1.5 percent per quarter in nominal terms and 0.61 of 1 percent in real terms). It was also ahead of the other largest states: California; Florida; Illinois; and, Texas. New York also had the most volatile housing price appreciation; the quarterly standard deviation was more than triple the national average.

The pattern of employment growth and real housing price appreciation are apparent in Figures V-1 and Figure V-2. Relatively speaking, employment growth was steadier than housing price appreciation for the nation as a whole, except for the seasonal pattern in employment growth. Real housing price appreciation was sharply negative in the first part of the 1980s and rebounded sharply in the latter half. A downward pattern began in the late 1980s. Although real housing price appreciation has rebounded in the past few years, real prices are still below their peak values for the nation as a whole. Although a relationship may exist between housing price appreciation and employment growth, a simply comparison of trends in the United States aggregate data does not yield firm insights.

A much closer relationship does seem to hold for New York State, especially for the period 1980 to 1995. Employment growth was most significant from 1983 to 1989. Housing price appreciation was quite strong during this period as well. Note, too, that housing price appreciation peaked a year or more in advance of the peak in employment. Since the peak in housing price appreciation in 1988, real housing prices in New York have plummeted by about

40 percent. Most of that decline occurred before 1995; real housing prices in New York have been relatively unchanged for the past two years. Employment growth declined sharply in the early 1990s and just after the beginning of the housing price decline. It has rebounded but employment in New York is still below its peak period.

Estimation Strategy

Although the graphs and descriptive statistics are insightful and suggestive, they are unable to identify a precise relationship between housing price appreciation and employment growth. To do this an econometric model must be developed and estimated. The approach taken in this report builds on the model discussed above. Namely, lagged values of real housing price appreciation ought to be predictors of employment growth if the discounted cash flow model is true. This does not mean that real housing price appreciation *causes* employment to grow, but rather real housing price appreciation is a *predictor* of employment growth.

A test of the predictive power of real housing price appreciation to explain employment growth is built upon the Granger causality test. According to this approach, the coefficients of lagged housing price appreciation ought to be significantly different than zero. The generic equation to be estimated explains growth rates in employment as a function of lags in the growth rate of employment, lags in the growth rate of real housing appreciation, and a set of exogenous variables. The null hypothesis is that each of the coefficients of the lagged housing appreciation terms equals zero. The Wald statistic is used to test this null hypothesis.

More precisely, consider the following model of employment growth:

$$d\log(EMP)_t = \sum_{i=1}^{k} \alpha_k d\log(EMP_{t-i}) + \sum_{i=1}^{k} \beta_k d\log(P_{t-i}) + \sum_{i=1}^{s} \delta_i X_k \qquad \textbf{(V-6)}$$

The explanatory variables include k lags of employment growth and k lags of real housing price appreciation; in addition, s exogenous variables are included in the model. The null hypothesis is that $\beta_1 = \beta_2 = \beta_3 = \ldots = \beta_k = 0$.

The exogenous variables selected for this model are intended to control for the many forces that influence movements in employment. One set is the one used in the previous section—growth in employment outside of the state. Another is a function of interest rates; the 30-year Treasury bond rate and the gap between the 30-year rate and the 1-year rate are used. The impact of interest rates on employment is surely complex; there are both output and substitution effects at play. Nonetheless, these variables are probably capable of capturing some of the many and complex effects of macroeconomic variables on local economic activity.[8] In addition, three seasonal dummy variables are included. Descriptive statistics of these variables are in Table V-1.

Note that the basic specification is essentially the same used in VAR analysis presented in the previous section. Indeed, a Granger causality test can be viewed as a test of whether coefficients of certain lagged variables in a VAR are significantly different than zero. As such, the approach in this section of the report can be seen as an extension of the VAR model to include the effects of housing prices.

Results

The first version of the model is estimated with data for New York State. Although Albany, Syracuse, and Upstate New York are the primary areas of interest to Niagara Mohawk, data limitations noted above make this the smallest local area for which this model can be tested. Additional variations of the model are estimated using poled time-series and cross-section data for various groups of states. Three distinct groups of states are examined: all 50 states and the District of Columbia; the 21 largest states in terms of employment in 1998; and the five largest states in terms of 1998 employment. In each case, the estimates of the model, the Wald test of the null hypothesis, and the predictions of the model are produced.

Estimation of Model for NEW YORK State

The explanatory power of the model estimated with only New York State data is quite high (adjusted R^2 = .97); see Table V-2. Keep in mind that the model is estimated with only 68 observations. The Durbin-Watson statistic suggests that problems of autocorrelation are adequately handled by the lag structure embedded in the model. The standard error of the equation is 0.35 of 1 percent per quarter, which is over twice the average quarterly growth rate for the dependent variable.

The critical coefficients in this analysis are those associated with the lagged values of real housing price appreciation. The first and fourth lagged terms are modestly significant; the other two are insignificant. The first coefficient equals 0.0335 and sum of the coefficients is about 0.043. These estimates and the coefficients of lagged employment growth imply both a short-term and a long-term elasticity of employment growth with respect to real house appreciation. The short-run elasticity is simply the coefficient of the first lagged real house price appreciation term; therefore, the results indicate that a ten percentage point increase in the real appreciation rate of housing predicts an increase in employment growth of about 0.34 of 1 percent in contemporaneous employment growth. The long-run elasticity is the sum of the coefficients of the lagged price terms divided by one minus the sum of the coefficients of the lagged employment growth terms. This equals about 0.21. Thus, a 10 percent increase in the real growth rate of housing price appreciation predicts a 2.1 percent increase in the quarterly growth rate in employment.

The results of the Wald test though do not reject the null hypothesis that each of the lagged housing price appreciation coefficients is zero. The F statistic (0.92) and the Chi-square statistic (3.67) are both below the rejection level of the null hypothesis at the 5-percent significance level. The relationship is stronger in the later models with a cross-section of states.

It is possible that more detailed housing data—e.g., separate data for Upstate and Downstate—would be more informative.

The other coefficients in the model are also of interest. The coefficients of lagged employment growth are generally significant and large; they sum to about 0.8. The connection between local employment growth and the national growth rate in employment is less strong; in fact, the sum of the coefficients on the national level is less than zero. Interest rates appear to play only a small role; an increase in the 30-year Treasury rate by 1 percent reduces quarterly employment growth by 0.043 of 1 percent. (The t-statistic for this measure is very low though.) Lastly, the seasonality of employment trends is confirmed; the spring quarter (quarter 2) is associated with significantly higher (2.77 percent) growth than the other quarters.

The model is solved in order to assess its predictive power and the predictions (NYEMPF) plotted against actual levels of employment (NYEMP); see Figure V-3. The actual and predicted values move closely together until around 1991, although the actual values are consistently above the predicted values. In 1991 or so, the actual values fall off much more sharply than the predicted values. Only recently do the actual and predicted values converge. This is consistent with the unexpectedly large and negative response of the New York economy to the 1991-1992 recession. The state economy has still not fully recovered from that shock and is just now returning to its pre-recession employment levels. This particular comparison suggests that the New York economy has arrived at or is nearing the return to its long-run steady state path. It also suggests that the early 1990s represented to some extent a payback for the above trend growth rates of the mid-1980s.

Estimation of Model for Groups of States

All 50 States and the District of Columbia with State Fixed Effects. The same model is estimated using pooled time-series and cross-section data for all 50 states and the District of Columbia; see Table V-3. The dependent variable is the state's quarterly employment growth rate. All of the independent variables except the interest rate and seasonal terms are state specific. For example, the lagged values of the state growth rate are independent variables; also, the United States employment growth rate represents growth in United States employment less growth in the particular state. The housing price appreciation rates represent housing price appreciation in the state less the growth in the United States consumer price index. State fixed effect coefficients are introduced to control for the myriad of factors unique to each state that affects its employment growth.

The overall model performance is strong. The adjusted R^2 is 0.91 and the standard error of the regression is 0.007, which is twice that for the model based solely upon New York State data. The Durbin-Watson statistic is a respectable 1.78. The model is estimated to take account of heteroscedasticity, although the basic results are not highly sensitive to this procedure.

The lagged housing price appreciation terms are highly significant and (except for the fourth lag) larger than those obtained using only New York data. The sum of the coefficients is about 0.055 and the coefficient of the first lagged term is 0.017. Using the coefficients of the lagged employment growth coefficients as before implies a short-run elasticity of 0.017 and a long-run elasticity of 0.13. The Wald test is conclusive and supportive of a role for real housing price appreciation in the prediction of employment growth. The F (18.01) and chi-square (72.04) statistics reject the null hypothesis at the one-percent levels of significance.

The impact of lagged employment growth in the state is similar to the New York pattern. The sum of the coefficients is smaller while the second quarter lag has the largest coefficient; all of the coefficients are significant. The lagged United States (less state) employment growth rates are also similar to those for New York; the sum is slightly positive and the signs of the lagged terms vary substantially. The seasonal terms are significant; employment growth is lowest in the first and third quarter and highest in the second quarter. Interest rates are found to have the same basic impact as in the New York model, although the magnitudes differ. A 1-percent increase in the long-term interest rate reduces employment growth by just 0.009 of 1 percent per quarter. An increase in the short-term interest rate has a larger and opposite effect.

The pooled estimates generate another set of coefficients worthy of note. These are the state fixed-effects, which are, in essence, constant terms specific to each state. Although significance tests for each of these fixed effects are not available, their ranking does generate an interesting insight about New York State. New York State has the third lowest fixed effect; that is, the quarterly growth rate in employment 0.0026 (0.26 of 1 percent) absent movement in any of the explanatory variables. Only the District of Columbia and Wyoming have lower fixed effect terms. The highest steady state quarterly growth rates are found in Nevada (0.72 percent), Arizona (0.64 percent), Utah (0.60 percent), and Florida (0.56 percent)

The actual residuals based upon the pooled data for New York State are expected to be larger than in a model specifically calibrated to New York data. However, the precision of the coefficient estimates and the confidence in the underlying model ought to benefit from the larger number of observations used to estimate the basic model. Indeed, the comparisons of the actual and predicted employment levels for New York State based upon the pooled data bear this out; see Figure V-4. The fundamental pattern observed with the New York model is also obtained with the pooled model. That is, the model does a solid job of tracking movements in actual employment. The decline in the predicted value occurs at about the same time the actual level declines; however, as with the New York model, the pooled model underestimates growth in the mid-1980s and overestimates growth in the early 1990s.

Largest Twenty One States. The results based upon the largest 21 states are generally consistent with the previous results; see Table V-4. The coefficients of lagged housing price appreciation rates are positive and significant; the Wald tests again reject the null hypothesis. The fixed effect term reveals that New York State has the lowest constant term among this group. (In fact, the fixed effect is slightly negative.) The predictions of the model seem to do a little better in the 1980s and a little worse in the 1990s. Interestingly, the models based upon the pooled data both suggest that New York State ought to be close to reaching its previous "predicted" peak (Figure V-5).

Largest Five States. The results based upon using data from only the largest five states are also largely consistent with the New York model and the other pooled models, but there are a few interesting differences worth noting; see Table V-5. The first quarter lagged price term is significant and the Wald test rejects the null hypothesis; their sum is above that for New York only but below that for the larger pools. The seasonal patterns are confirmed. New York has the lowest fixed effect term; it is actually negative in this model. As with the New York State model, the long-term interest rate has only a small impact; in fact, it seems negligible. A 1 percent increase in the long-term rate reduces quarterly employment growth by 0.005 of 1 percent. Short-term rates continue to display a modestly significant and positive impact.

Perhaps the most interesting difference is the performance of the predictions; see Figure V-6. The model appears to track actual employment growth much better in the 1990s than the other models. It predicts that employment levels in 1998 return to their previous "predicted" peak. However, the model does a worse job in the 1980s. Like the previous models, this one underestimates the growth in the 1980s, but the gap is larger. Obviously, the underprediction of the boom of the 1980s by this model was not unique to New York State.

VI. Forecasting

This section uses the employment data discussed in Section III plus DRI national employment forecasts (from Standard & Poor's) in order to calculate projected employment for Upstate New York as well as the Albany and Syracuse MSAs.

Procedure

All models are estimated using actual data for the sample period 1959:4-1998:1. The forecast period is for 1998:2-2000:1. All estimated equations include seasonal dummy variables.

- Obtain forecasts of national employment growth for 1998:2-2000:1 by estimating the simple autoregressive model:

  $$\Delta \log usemp_t = \theta + \textstyle\sum_{i=1}^{6} \alpha_i \Delta \log usemp_{t-i} + \varepsilon_t .$$

  where *usemp* denotes aggregate United States employment. The forecasts are dynamic, i.e., the prediction for 1998:2 helps to make up the forecast for 1998:3, etc.

- Obtain forecasts of Upstate New York employment growth for 1998:2-2000:1 by estimating the model:

  $$\Delta \log upemp_t = \theta + \textstyle\sum_{i=1}^{6} \alpha_i \Delta \log (usemp_{t-i} - upemp_{t-i}) + \sum_{i=1}^{6} {}_{i} \Delta \log upemp_{t-i} + \varepsilon_t ,$$

  where *upemp* refers to Upstate New York employment. In this model, the α parameters describe "echo effects" of the national economy on Upstate New York. The β parameters portray persistence in the pattern of employment for Upstate New York. Predictions for Upstate New York use the forecasts of national employment determined in step (1) along with dynamic predictions of the Upstate values.

- Obtain forecasts of Albany and Syracuse employment. For illustration, I use Albany; Syracuse follows the same procedure. Estimate the model:

  $$\Delta \log albemp_t = \theta + \textstyle\sum_{i=1}^{6} \alpha_i \Delta \log (usemp_{t-i} - upemp_{t-i}) + \sum_{i=1}^{6} {}_{i} \Delta \log (upemp_{t-i} - albemp_{t-i})$$
  $$+ \textstyle\sum_{i=1}^{6} \pi_i \Delta \log albemp_{t-i} + \varepsilon_t ,$$

  where *albemp* denotes employment for the Albany area. Note that both the Albany and Syracuse equations contain a dummy variable pertaining to measurement differences in the SMSA during the sample period (*adummy* for Albany and *sdummy* for Syracuse).

In this model, the alpha parameters describe echo effects due to the national economy. The β parameters portray echo effects stemming from employment developments in Upstate New York. The pi parameters pick up employment persistence from the particular area.

Forecasts for employment growth in Albany are based upon forecasts of national and Upstate employment from the previous two steps.

Estimation Results

Estimated equations appear in Tables 1-4. All models fit reasonably well and are clear of serial correlation. Seasonality has a significant effect in all estimated equations.

Highlights of estimation findings:

Upstate NEW YORK. National employment has a strong positive echo effect early, but becomes negative for further lags**.** Upstate New York employment has a strong positive persistence effect at the fourth quarter lag, most likely reflecting seasonal influences. All other persistence effects are small.

Albany. National employment developments again have a strongly positive echo effect early, but becomes negative for further lags. Upstate New York echo effects are negligible for recent lags. However, they become positive and economically meaningful beginning in the fourth quarter lag. Local persistence effects are small and insignificant, aside from a negative effect for the first quarter lag.

Syracuse. National employment developments again have a strongly positive echo effect early, but becomes negative for further lags. Upstate New York echo effects are negligible for recent lags. However, they become positive in the third and fourth quarter lags, with the fourth quarter effect the strongest. Local persistence effects are negligible throughout.

To further analyze the findings reflecting echo effects, we use measures of short-run and long-run elasticity. Short-run elasticity (e_{sr}) equals the estimated coefficient on the first quarter lag. For example, in the model for Upstate New York, short-run elasticity with respect to national developments equals α_1.

Long-run elasticity signifies more permanent effects. To illustrate how the measure is computed, consider the estimated model for Upstate New York employment. Long-run elasticity comes from assuming that employment growth has reached its long-run equilibrium. This implies that $\Delta\log \text{usemp}_t = \Delta\log \text{usemp}_{t-1} = ... = \Delta\log \text{usemp}_{t-6} = \Delta\log \text{usemp*}$. Similarly,

$\Delta \log$ upemp$_t$ = $\Delta \log$ upemp$_{t-1}$ = ... = $\Delta \log$ upemp$_{t-6}$ = $\Delta \log$ upemp*. Substituting these relationships into the model and doing some algebra yields the formula for long-run elasticity (e_{lr}) of National employment on Upstate employment, given by:

$$e_{lr} = \frac{\sum_{i=1}^{6} \alpha_i}{1 - \sum_{i=1}^{6} \ _i}.$$

The tables below present estimated short-run and long-run elasticities of echo effects.

	Upstate	**Albany**	**Syracuse**
	Short-Run "Echo" Elasticities		
National	0.73030	0.79937	0.92900
Upstate	---	-0.23525	-0.17856
	Long-Run "Echo" Elastiticies		
National	-0.12223	-0.23488	-0.15981
Upstate	---	0.72540	0.79965

Key Findings

National effects have a strongly positive short-term effect on Upstate and local employment. The effect of the national economy, though, is transient. The long-run elasticity is small and even negative in all cases. The negative estimate may reflect the emigration from New York due to the geographical unevenness of the national recovery, particularly in the 1990s.

Upstate New York effects have a small and possibly negative short-run influence on Albany and Syracuse. However, Upstate New York employment has a strongly positive long-term influence on the employment of Albany and Syracuse.

The overall estimation results call for **state-level policies** to expand employment in New York—either through growth of existing businesses or attracting new firms—to improve the employment picture of Albany and Syracuse.

Forecasts of Employment

Given the procedure described in the previous section, we generate forecasts of employment for the eight quarters 1998:2-2000:1. Forecasts of employment growth appear in the following table. Graphs of forecasts for employment growth and employment levels are reported as Figures 1(a)-1(b) through Figures 4(a)-4(b).

Employment Growth: Recent Performance and Forecasts

Period	National	Upstate New York	Albany	Syracuse
1995	**0.01966**	**0.00142**	**-0.01794**	**-0.00455**
1996	**0.02117**	**0.00420**	**-0.00046**	**0.00909**
1997	**0.02398**	**0.01168**	**0.01566**	**0.00290**
1998:1	-0.00817	-0.02581	-0.02648	-0.02668
1998:2	0.02637	0.03291	0.02952	0.02584
1998:3	0.00423	0.00261	-0.00148	0.00068
1998:4	0.01416	0.01286	0.01467	0.02255
1998	**0.03658**	**0.02257**	**0.01623**	**0.02239**
1999:1	-0.01209	-0.02803	-0.02377	-0.02921
1999:2	0.02256	0.02916	0.02426	0.02154
1999:3	0.00178	0.00091	-0.00238	-0.00179
1999:4	0.01191	0.01108	0.01267	0.02060
1999	**0.02416**	**0.01311**	**0.01078**	**0.01114**
2000:1	-0.01488	-0.02982	-0.02437	-0.03107

Observations for 1995-97 and 1998:1 are actual data. Annual employment growth forecasts (in bold) come from summing the four quarter forecasts within the year.

Key Results. Seasonality plays a significant role in all cases. Employment typically drops in the first quarter, increases in the second and fourth quarters, and stays level in the third quarter. National forecasts for 1998 are highly optimistic, due to the strong recent performance of United States employment growth (including 1998:1). Upstate New York projects strong employment growth for 1998, which will decline in 1999 approximately to the 1997 performance. Upstate New York employment growth will remain less than the rest of the United States.

Albany projects 1998 employment growth similar to 1997. Growth will be lower in 1999. Annual growth forecasts for 1998 and 1999 are less than Upstate New York and the United States.

Syracuse projections follow closely those of Upstate New York. Relative to the stagnation of the recent past, 1998 forecasts indicate strong employment growth. Growth, though, will tail off in 1999. Like Upstate New York, Syracuse employment growth remains smaller than the national pattern.

We investigated to see how robust the New York State forecasts are to the highly (most likely overly) optimistic projection of United States employment growth. This was done by rescaling the quarterly national forecasts to have United States employment growth grow at 2.4 percent annually (similar to the 1997 performance). These forecasts appear in the following table.

Employment Growth: Recent Performance and Forecasts
National Employment Growth for 1998 adn1999 = 2.4 Percent

Period	National	Upstate New York	Albany	Syracuse
1995	**0.01966**	**0.00142**	**-0.01794**	**-0.00455**
1996	**0.02117**	**0.00420**	**-0.00046**	**0.00909**
1997	**0.02398**	**0.01168**	**0.01566**	**0.00290**
1998:1	-0.00817	-0.02581	-0.02648	-0.02668
1998:2	0.02218	0.03291	0.02952	0.02584
1998:3	0.00003	-0.00299	-0.00761	-0.00644
1998:4	0.00996	0.01281	0.01592	0.02275
1998	**0.02400**	**0.01692**	**0.01135**	**0.01547**
1999:1	-0.01213	-0.03170	-0.02761	-0.03141
1999:2	0.02252	0.03350	0.03112	0.02429
1999:3	0.00174	-0.00145	-0.00654	-0.00256
1999:4	0.01187	0.01351	0.01843	0.02247
1999	**0.02400**	**0.01386**	**0.01540**	**0.01279**
2000:1	-0.01488	-0.03186	-0.02918	-0.03183

Key Results. In general, 1998 forecasts are lower than the previous set. But 1999 forecasts show little change. This reflects the transient nature of national employment on Upstate New York, Albany, and Syracuse. Upstate New York projects stronger employment growth in 1998 and 1999 relative to the recent past. In both years, though, it remains less than the rest of the United States. Albany projects 1998 employment growth slower to 1997. Growth will be somewhat higher in 1999. Annual growth forecasts for 1998 and 1999 are less than the United States.

Syracuse projections follow closely those of Upstate New York. Relative to the stagnation of the recent past, 1998 forecasts indicate strong employment growth. Growth, though, will tail off in 1999. Like Upstate New York, Syracuse employment growth remains smaller than the national pattern.

We also generated forecasts for Upstate New York, Albany, and Syracuse given DRI quarterly forecasts of United States employment growth for 1998-2000 (we converted their growth forecasts for the same quarter of two consecutive years to quarter-to-quarter forecasts). Based upon the procedure described on pp. 1-2, simply bypass step (1) and substitute in the DRI projections. These forecasts appear in the following table.

Employment Growth: Recent Performance and Forecasts
DRI Forecasts for National Employment Growth

Period	National	Upstate New York	Albany	Syracuse
1995	**0.01966**	**0.00142**	**-0.01794**	**-0.00455**
1996	**0.02117**	**0.00420**	**-0.00046**	**0.00909**
1997	**0.02398**	**0.01168**	**0.01566**	**0.00290**
1998:1	-0.00817	-0.02581	-0.02648	-0.02668
1998:2	0.01212	0.03291	0.02952	0.02584
1998:3	-0.00114	-0.00815	-0.01326	-0.01302
1998:4	0.01419	0.01043	0.01454	0.01999
1998	**0.01699**	**0.00938**	**0.00433**	**0.00613**
1999:1	-0.01317	-0.02893	-0.02386	-0.02551
1999:2	0.01012	0.03536	0.03373	0.02483
1999:3	0.00087	-0.01019	-0.01676	-0.01546
1999:4	0.02319	0.01122	0.01874	0.02330
1999	**0.02100**	**0.00746**	**0.01185**	**0.00716**
2000:1	-0.01417	-0.02284	-0.01842	-0.01660
2000:2	0.00812	0.03889	0.03477	0.02591
2000:3	-0.00514	-0.01264	-0.02071	-0.02094
2000:4	0.02219	0.00144	0.00855	0.01584
2000	**0.01100**	**0.00485**	**0.00419**	**0.00422**

Key Results. In general, 1998-2000 forecasts are lower than the previous set, in part reflecting the relatively pessimistic DRI forecasts for national employment. Forecasts for Upstate New York, Albany, and Syracuse more closely reflect their recent experience. All three New York regions project positive employment growth, but lower than the corresponding national projections.

Seasonal influences appear to be more pronounced. Decreases are projected in the third quarter as well as the first quarter. Upstate New York, Albany, and Syracuse tend to forecast relatively large third-quarter drops.

Upstate New York projects progressively weaker annual employment growth for 1998-2000. All three projected growth rates are less than 1 percent.

Albany projects slow 1998 employment growth relative to 1997. For 1999, growth will be somewhat higher, similar to 1997. Annual growth forecasts are less than the United States. Syracuse projections for 1999-2000 follow closely those of Upstate New York. Syracuse projects lower employment growth than Upstate New York in 1998. Forecasts call for positive employment growth, but less than 1 percent.

Endnotes

1. Bahl and Duncombe note that in recent years New York State has been responsible for 9 percent of U.S. GDP, but just 6 percent of the value of exports

2. New York's birth rate is below the national average. Bahl and Duncombe note that forecasts are very sensitive to projected birth rates.

3. The ES-202 program is a product of the Social Security Act of 1935. Data collection began in 1938 to ensure that states where in compliance with the national UI program. Its initial coverage was limited to private firms that employ eight or more people for at least 20 weeks out of the year. Throughout the 1950s coverage steadily increased. In 1972, state universities, colleges, and hospitals were added. In 1978, coverage was extended to cover most other employees with the exception of agricultural firms employing fewer than 10 people for at least 33 weeks out of the year and having quarterly payrolls below $20,000. Also exempt are employers who pay less than $1,000 quarterly to domestic workers. Employee counts are based on the pay period, which includes the 12th day of the month. "In 1994, UI and UCFE covered over 112 million jobs, or over 96 percent of total wage and salary civilian jobs. Covered workers received $3.0 trillion in pay, or 92.5 percent of the wage and salary component of national income."

4. The ES-202 receives data on nearly 98 percent of nonfarm employees.

5. New York CMSA data was not available before 1974.

6. Note, this is using the current definition for the Syracuse MSA which includes Cayuga County. Other graphs in this paper that show employment prior to 1988 follow the pre-1988 definition, which excludes Cayuga County.

7. Thus, a value of one (or 100 percent) implies that a region is exactly at the national average.

8. Bosner-Neal and Morley (1997) present strong evidence that the yield spread is a good predictor of real economic activity.

Table III-1

Descriptive Statistics for Exogenous Variables

	Canadian-US Exchange Rate ($CA/$US)	National Defense Expenditures	New York State Government Employment	New York State Government Employment in Syracuse MSA	Canadian-US Exchange Rate -- All Years ($CA/$US)
Mean	1.1201	2.2941	1040.5264	41.9941	1.1381
Median	1.0142	2.1739	1128.3500	46.0833	1.0814
Maximum	1.4089	3.3559	1503.5670	61.5000	1.4089
Minimum	0.9654	1.5245	439.4000	18.5667	0.9498
Std.Dev.	0.1434	0.5431	320.9384	13.3275	0.1376
Skewness	0.6561	0.4474	-0.2121	-0.2605	0.4669
Kurtosis	1.9121	1.9219	1.4831	1.7963	1.9825

Table IV-1

2 Equation System Statistics

	Albany				Syracuse				Upstate			
	VAR		VEC		VAR		VEC		VAR		VEC	
Cumulative Response to US Shock after t periods	**Albany**	**US**	**Albany**	**US**	**Syracuse**	**US**	**Syracuse**	**US**	**Upstate**	**US**	**Upstate**	**US**
1	0.00235	0.00387	0.00239	0.00385	0.00368	0.00426	0.00364	0.00425	0.00341	0.00381	0.00335	0.0038
2	0.00346	0.00715	0.00586	0.01099	0.00642	0.00825	0.0099	0.01248	0.00602	0.00704	0.00924	0.01079
4	0.00429	0.00848	0.01412	0.02748	0.00888	0.00988	0.02621	0.03187	0.00851	0.00935	0.02477	0.02836
8	0.00386	0.00947	0.03338	0.05748	0.00868	0.00984	0.06294	0.07462	0.01022	0.01069	0.06462	0.07157
Mean:												
US	0.005487				0.0053				0.005557			
Local	0.003815				0.003871				0.003599			
Std. Dev:												
US	0.015299				0.015832				0.01504			
Local	0.018255				0.02232				0.02326			
Adj. R^2												
Local	0.82865		0.82788		0.88313		0.8864		0.9523		0.9535	
Akaike	-14.9399		-14.9032		-14.937		-14.9273		-16.401		-16.384	
Cointegrating Relationship	log(USEmployment - Local Employment*) = C + a_{local}*log(Local Employment)											
a_{local}			1.18028				1.3226				1.7118	
Constant			4.46011				3.9944				2.5815	
VEC Term												
Coefficient in Local Equation			0.0139				0.03516				0.01299	
t statistic			0.6364				2.239				2.0842	
Sample Period	1959 through 1997				1955 through 1997			1959 through 1997				

Table IV-2

2 Equation System Statistics: Pre-1981

	Albany				Syracuse				Upstate			
	VAR		**VEC**		**VAR**		**VEC**		**VAR**		**VEC**	
Cumulative Response to a US Shock after t periods	**Albany**	**US**	**Albany**	**US**	**Syracuse**	**US**	**Syracuse**	**US**	**Upstate**	**US**	**Upstate**	**US**
1	0.00239	0.00409	0.00253	0.00408	0.00446	0.00486	0.00447	0.004862	0.00433	0.00432	0.00425	0.00431
2	0.0039	0.00713	0.00666	0.01119	0.00763	0.00919	0.01205	0.014053	0.00721	0.00767	0.01141	0.01197
4	0.00424	0.00789	0.01641	0.02668	0.01038	0.01029	0.03155	0.0384	0.00916	0.00933	0.02887	0.03007
8	0.00366	0.00759	0.03647	0.06213	0.00957	0.00888	0.07337	0.079814	0.00981	0.00871	0.07178	0.07034
Mean:												
US	0.006238				0.005865				0.006309			
Local	0.004294				0.003887				0.004382			
Std. Dev:												
US	0.016287				0.017096				0.01601			
Local	0.018058				0.022735				0.024907			
Adj. R^2												
Local	0.79708		0.8154		0.855		0.8583		0.9413		0.9434	
Akaike	-14.3933		-14.4453		-14.288		-14.26		15.8805		-15.874	
Cointegrating Relationship	log(USEmployment - Local Employment*) = C + a_{local}*log(Local Employment)											
a_{local}			1.3248				1.5063				0.6839	
Constant			3.6256				3.0202				5.6482	
VEC Term												
Coefficient in Local Equation			0.27468				0.06982				-0.02	
t statistic			2.72636				1.6388				-1.865	
Sample Period	1959 through 1980				1959 through 1980			1959 through 1980				

Table IV-3 2 Equation System Statistics: Post-1980												
	Albany				**Syracuse**				**Upstate**			
	VAR		**VEC**		**VAR**		**VEC**		**VAR**		**VEC**	
Cumulative Response to a US Shock after t periods	**Albany**	**US**	**Albany**	**US**	**Syracuse**	**US**	**Syracuse**	**US**	**Upstate**	**US**	**Upstate**	**US**
1	0.00112	0.00223	0.00115	0.00218	0.00073	0.00234	0.00078	0.00234	0.00113	0.00224	0.00126	0.00212
2	0.00322	0.00503	0.00435	0.00699	0.00367	0.00521	0.00455	0.00754	0.00334	0.00491	0.00466	0.00659
4	0.0065	0.00851	0.01547	0.0213	0.00641	0.00868	0.01655	0.02318	0.00593	0.0079	0.01489	0.01894
8	0.00598	0.01023	0.03843	0.05712	0.00621	0.01021	0.04405	0.06342	0.00617	0.00889	0.03846	0.04781
Mean:												
US	0.004311				0.004309				0.004378			
Local	0.00298				0.003365				0.002384			
Std. Dev:												
US	0.01399				0.01399				0.0138			
Local	0.01832				0.02203				0.021			
Adj. R^2												
Local	0.9345		0.9332		0.9502		0.9526		0.9788		0.9784	
Akaike	-16.5609		-16.5		-16.318		-16.284		-17.588		-17.646	
Cointegrating Relationship	log(USEmployment - Local Employment*) = C + a_{local}*log(Local Employment)											
a_{local}			0.809				5.663				0.0612	
Constant			6.703				0.173				0.0873	
VEC Term												
Coefficient in Local Equation			-0.00114				0.0026				-0.0035	
t statistic			-0.04557				1.9044				-0.5273	
Sample Period	1980 through 1997				1980 through 1997				1980 through 1997			

Table IV-4

3 Equation System Statistics

	Albany				Syracuse				Upstate			
Shock to:	**US**	**Downstate**	**US**		**US**	**Downstate**	**US**		**US**	**Downstate**	**US**	
Cumulative Response after t periods of:	**Albany**		**US**		**Syracuse**		**US**		**Upstate**		**US**	
1	0.00237	-0.00049	0.00381		0.00373	0.000489	0.00386		0.00316	0.001013	0.00371	
2	0.00352	0.000125	0.00694		0.00664	0.000476	0.00717		0.00575	0.000961	0.00677	
4	0.00424	0.000247	0.00816		0.00905	0.000581	0.00935		0.00839	0.002135	0.00929	
8	0.00358	0.000164	0.00863		0.00964	0.001384	0.01035		0.01015	0.003106	0.01061	
Mean:												
US	0.005753				0.005751				0.005837			
Downstate	0.00032				0.00032				0.00032			
Local	0.0003815				0.004047				0.003599			
Std. Dev of:												
US	0.01543				0.015415				0.01516			
Downstate	0.014696				0.014696				0.014696			
Local	0.018255				0.02219				0.02326			
Adj. R^2												
Local	0.82574				0.8838				0.9546			
Akaike	-22.8377				-22.931				-24.302			
Sample Period	1959 through 1997				1959 through 1997				1959 through 1997			

Table V-1
Descriptive Statistics for Employment Growth

	US (USEMP)	California (CA)	Florida (FL)	Illinois (IL)	New York (NYEMP)	Texas (TX)
Mean	0.0043	0.0043	0.0086	0.0023	0.0015	0.0058
Median	0.0045	0.0047	0.0075	0.0051	0.0039	0.0068
Maximum	0.0278	0.0231	0.0380	0.0304	0.0257	0.0250
Minimum	-0.0298	-0.0232	-0.0221	-0.0331	-0.0445	-0.0167
Std.Dev.	0.0148	0.0115	0.0152	0.0157	0.0175	0.0109
Skewness	-0.3848	-0.4013	0.0364	-0.4583	-0.5945	-0.2538
Kurtosis	2.0790	2.4155	2.1381	2.4448	2.3097	1.9853

Descriptive Statistics for Real Housing Price Appreciation

	US	California	Florida	Illinois	New York (NYHP)	Texas
Mean	0.0006	0.0011	-0.0012	0.0007	0.0061	-0.0041
Median	0.0007	-0.0027	-0.0008	0.0024	0.0004	-0.0024
Maximum	0.0269	0.0651	0.0785	0.0363	0.1377	0.0304
Minimum	-0.0291	-0.0390	-0.0643	-0.0557	-0.0845	-0.0581
Std.Dev.	0.0107	0.0212	0.0190	0.0150	0.0374	0.0144
Skewness	-0.3666	0.7265	0.2651	-1.6678	0.8094	-0.5688
Kurtosis	3.1944	3.2439	8.0520	7.2543	4.6991	5.1036

Descriptive Statistics for Other Variables in the Model

	TB30	TB1YR	D(TB30-TB1YR)	DLOG(CPI)
Mean	9.042639	7.706667	0.039028	0.009977
Median	8.485	7.185	0.05	0.008311
Maximum	14.14	16.32	2.48	0.036081
Minimum	5.88	3.38	-2.44	-0.002138
Std. Dev.	2.271825	3.040667	0.640209	0.00645
Skewness	0.700676	0.871079	0.69928	1.570793
Kurtosis	2.349462	3.259268	9.396078	6.448033

Table V-2: Estimates for New York State

Dependent Variable: DLOG(NYEMP)
Method: Least Squares
Date: 08/01/98 Time: 03:17
Sample(adjusted): 1981:2 1998:1
Included observations: 68 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.0069	0.0080	-0.8601	0.3938
DLOG(NYEMP(-1))	0.1729	0.1891	0.9146	0.3648
DLOG(NYEMP(-2))	0.1118	0.1686	0.6628	0.5105
DLOG(NYEMP(-3))	-0.1079	0.1607	-0.6714	0.5050
DLOG(NYEMP(-4))	0.6164	0.1787	3.4500	0.0011
DLOG(USLNYE(-1))	0.3699	0.2633	1.4048	0.1663
DLOG(USLNYE(-2))	0.3238	0.2972	1.0896	0.2811
DLOG(USLNYE(-3))	-0.3128	0.2721	-1.1497	0.2557
DLOG(USLNYE(-4))	-0.4525	0.2266	-1.9968	0.0513
TB30	-0.0001	0.0003	-0.3511	0.7270
TB30-TB1YR	0.0003	0.0005	0.6650	0.5091
@SEAS(1)	-0.0081	0.0135	-0.6031	0.5491
@SEAS(2)	0.0295	0.0051	5.7806	0.0000
@SEAS(3)	0.0084	0.0142	0.5938	0.5553
DLOG(NYHP(-1)/CPI(-1))	0.0335	0.0177	1.8899	0.0646
DLOG(NYHP(-2)/CPI(-2))	-0.0041	0.0171	-0.2408	0.8107
DLOG(NYHP(-3)/CPI(-3))	-0.0102	0.0170	-0.5990	0.5519
DLOG(NYHP(-4)/CPI(-4))	0.0235	0.0167	1.4067	0.1657

R-squared	0.9709	Mean dependent var	0.0016
Adjusted R-squared	0.9611	S.D. dependent var	0.0178
S.E. of regression	0.0035	Akaike info criterion	-8.2411
Sum squared resid	0.0006	Schwarz criterion	-7.6536
Log likelihood	298.1986	F-statistic	98.2554
Durbin-Watson stat	2.0076	Prob(F-statistic)	0.0000

Table V-3: Estimates for 50 States

Dependent Variable: DLOG(?EMP)
Method: GLS (Cross Section Weights)
Date: 07/31/98 Time: 16:58
Sample: 1981:2 1998:1
Included observations: 68
Total panel (balanced) observations 3468

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(?EMP(-1))	-0.0245	0.0113	-2.1726	0.0299
DLOG(?EMP(-2))	-0.0970	0.0113	-8.6041	0.0000
DLOG(?EMP(-3))	-0.0486	0.0112	-4.3570	0.0000
DLOG(?EMP(-4))	0.7593	0.0112	68.0824	0.0000
DLOG(USL?E(-1))	0.6971	0.0379	18.4039	0.0000
DLOG(USL?E(-2))	0.2329	0.0456	5.1136	0.0000
DLOG(USL?E(-3))	-0.1636	0.0453	-3.6125	0.0003
DLOG(USL?E(-4))	-0.7526	0.0355	-21.1973	0.0000
@SEAS(1)	-0.0246	0.0028	-8.7344	0.0000
@SEAS(2)	0.0275	0.0011	26.0320	0.0000
@SEAS(3)	-0.0120	0.0029	-4.1420	0.0000
(TB30)	-0.0001	0.0001	-1.7730	0.0763
(TB30-TB1YR)	0.0004	0.0001	4.6986	0.0000
DLOG(?HP(-1)/CPI(-1))	0.0171	0.0031	5.5788	0.0000
DLOG(?HP(-2)/CPI(-2))	0.0213	0.0032	6.6012	0.0000
DLOG(?HP(-3)/CPI(-3))	0.0054	0.0032	1.6870	0.0917
DLOG(?HP(-4)/CPI(-4))	0.0108	0.0030	3.6068	0.0003
Fixed Effects				
AK--C	0.004327			
AL--C	0.004345			
AR--C	0.004962			
AZ--C	0.006438			
CA--C	0.004154			
CO--C	0.004979			
CT--C	0.002992			
DC--C	0.001762			
DE--C	0.004921			
FL--C	0.0056			
GA--C	0.005399			
HI--C	0.003405			
IA--C	0.004354			
ID--C	0.005213			
IL--C	0.003842			
IN--C	0.004336			
KS--C	0.004501			
KY--C	0.004644			
LA--C	0.003184			
MA--C	0.003074			
MD--C	0.003998			
ME--C	0.003952			
MI--C	0.004354			

MN--C	0.004597
MO--C	0.004251
MS--C	0.004528
MT--C	0.003924
NC--C	0.005023
ND--C	0.003998
NE--C	0.004791
NH--C	0.004509
NJ--C	0.00328
NM--C	0.004547
NV--C	0.007165
NY--C	0.002558
OH--C	0.003892
OK--C	0.003318
OR--C	0.005044
PA--C	0.003129
RI--C	0.002806
SC--C	0.004658
SD--C	0.004965
TN--C	0.004805
TX--C	0.004551
UT--C	0.005962
VA--C	0.004727
VT--C	0.003975
WA--C	0.004985
WI--C	0.004634
WV--C	0.003225
WY--C	0.002043

Weighted Statistics

R-squared	0.907424	Mean dependent var	0.005774
Adjusted R-squared	0.905599	S.D. dependent var	0.023683
S.E. of regression	0.007276	Sum squared resid	0.180021
Log likelihood	14669.65	F-statistic	2082.904
Durbin-Watson stat	1.776534	Prob(F-statistic)	0

Unweighted Statistics

R-squared	0.891094	Mean dependent var	0.004809
Adjusted R-squared	0.888947	S.D. dependent var	0.022078
S.E. of regression	0.007357	Sum squared resid	0.184051
Durbin-Watson stat	1.772932		

Table V-4: Estimates for 21 Largest States

Dependent Variable: DLOG(?EMP)
Method: GLS (Cross Section Weights)
Date: 07/31/98 Time: 17:29
Sample: 1981:2 1998:1
Included observations: 68
Total panel (balanced) observations 1428

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(?EMP(-1))	0.0009	0.0190	0.0454	0.9638
DLOG(?EMP(-2))	-0.0876	0.0190	-4.6209	0.0000
DLOG(?EMP(-3))	-0.0458	0.0188	-2.4346	0.0150
DLOG(?EMP(-4))	0.7211	0.0186	38.7140	0.0000
DLOG(USL?E(-1))	0.6716	0.0506	13.2634	0.0000
DLOG(USL?E(-2))	0.3154	0.0599	5.2619	0.0000
DLOG(USL?E(-3))	-0.2396	0.0599	-3.9977	0.0001
DLOG(USL?E(-4))	-0.7337	0.0477	-15.3957	0.0000
@SEAS(1)	-0.0208	0.0037	-5.5684	0.0000
@SEAS(2)	0.0295	0.0014	21.1511	0.0000
@SEAS(3)	-0.0071	0.0038	-1.8428	0.0656
(TB30)	0.0000	0.0001	-0.7224	0.4702
(TB30-TB1YR)	0.0005	0.0001	3.6538	0.0003
DLOG(?HP(-1)/CPI(-1	0.0364	0.0055	6.5942	0.0000
DLOG(?HP(-2)/CPI(-2	0.0144	0.0056	2.5858	0.0098
DLOG(?HP(-3)/CPI(-3	0.0024	0.0055	0.4276	0.6690
DLOG(?HP(-4)/CPI(-4	0.0184	0.0054	3.3863	0.0007
Fixed Effects				
CA--C	0.001049			
TX--C	0.001559			
NY--C	-0.000625			
FL--C	0.002549			
IL--C	0.000706			
PA--C	1.10E-06			
OH--C	0.000783			
MI--C	0.001219			
NJ--C	0.000132			
NC--C	0.001903			
GA--C	0.002295			
VA--C	0.001626			
MA--C	-0.000135			
IN--C	0.001235			
WI--C	0.001522			
MO--C	0.001168			
TN--C	0.001689			
WA--C	0.001841			
MN--C	0.00151			
AZ--C	0.003385			
CO--C	0.001877			

Weighted Statistics

R-squared	0.92213	Mean dependent var	0.005163
Adjusted R-squared	0.920057	S.D. dependent var	0.018822
S.E. of regression	0.005322	Sum squared resid	0.039366
Log likelihood	5882.671	F-statistic	1028.768
Durbin-Watson stat	1.78945	Prob(F-statistic)	0

Unweighted Statistics

R-squared	0.907015	Mean dependent var	0.005075
Adjusted R-squared	0.90454	S.D. dependent var	0.017284
S.E. of regression	0.00534	Sum squared resid	0.039641
Durbin-Watson stat	1.741512		

Table V-5: Estimates for 5 Largest States

Dependent Variable: DLOG(?EMP)
Method: GLS (Cross Section Weights)
Date: 08/01/98 Time: 03:15
Sample: 1981:2 1998:1
Included observations: 68
Total panel (balanced) observations 340

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(?EMP(-1))	0.0132	0.0358	0.3679	0.7132
DLOG(?EMP(-2))	-0.0798	0.0356	-2.2403	0.0257
DLOG(?EMP(-3))	-0.0905	0.0352	-2.5688	0.0106
DLOG(?EMP(-4))	0.7686	0.0354	21.7403	0.0000
DLOG(USL?E(-1))	0.6728	0.0958	7.0206	0.0000
DLOG(USL?E(-2))	0.4173	0.1147	3.6376	0.0003
DLOG(USL?E(-3))	-0.2040	0.1156	-1.7654	0.0784
DLOG(USL?E(-4))	-0.6405	0.0918	-6.9761	0.0000
@SEAS(1)	-0.0144	0.0073	-1.9616	0.0507
@SEAS(2)	0.0283	0.0027	10.4306	0.0000
@SEAS(3)	-0.0017	0.0075	-0.2285	0.8194
(TB30)	0.0000	0.0001	-0.3585	0.7202
(TB30-TB1YR)	0.0003	0.0002	1.0632	0.2885
DLOG(?HP(-1)/CPI(-1))	0.0386	0.0127	3.0499	0.0025
DLOG(?HP(-2)/CPI(-2))	0.0068	0.0130	0.5210	0.6027
DLOG(?HP(-3)/CPI(-3))	-0.0049	0.0124	-0.3928	0.6947
DLOG(?HP(-4)/CPI(-4))	0.0002	0.0121	0.0197	0.9843
Fixed Effects				
CA--C	-0.002445			
FL--C	-0.001061			
IL--C	-0.002758			
NY--C	-0.003971			
TX--C	-0.002128			

Weighted Statistics

R-squared	0.911965	Mean dependent var	0.004545
Adjusted R-squared	0.906151	S.D. dependent var	0.016093
S.E. of regression	0.00493	Sum squared resid	0.007729
Log likelihood	1363.565	F-statistic	205.8871
Durbin-Watson stat	1.502251	Prob(F-statistic)	0

Unweighted Statistics

R-squared	0.890106	Mean dependent var	0.004566
Adjusted R-squared	0.882849	S.D. dependent var	0.01457
S.E. of regression	0.004987	Sum squared resid	0.007908
Durbin-Watson stat	1.374967		

FIGURE III-1: ES-202 Employment Data v. Establishment Data

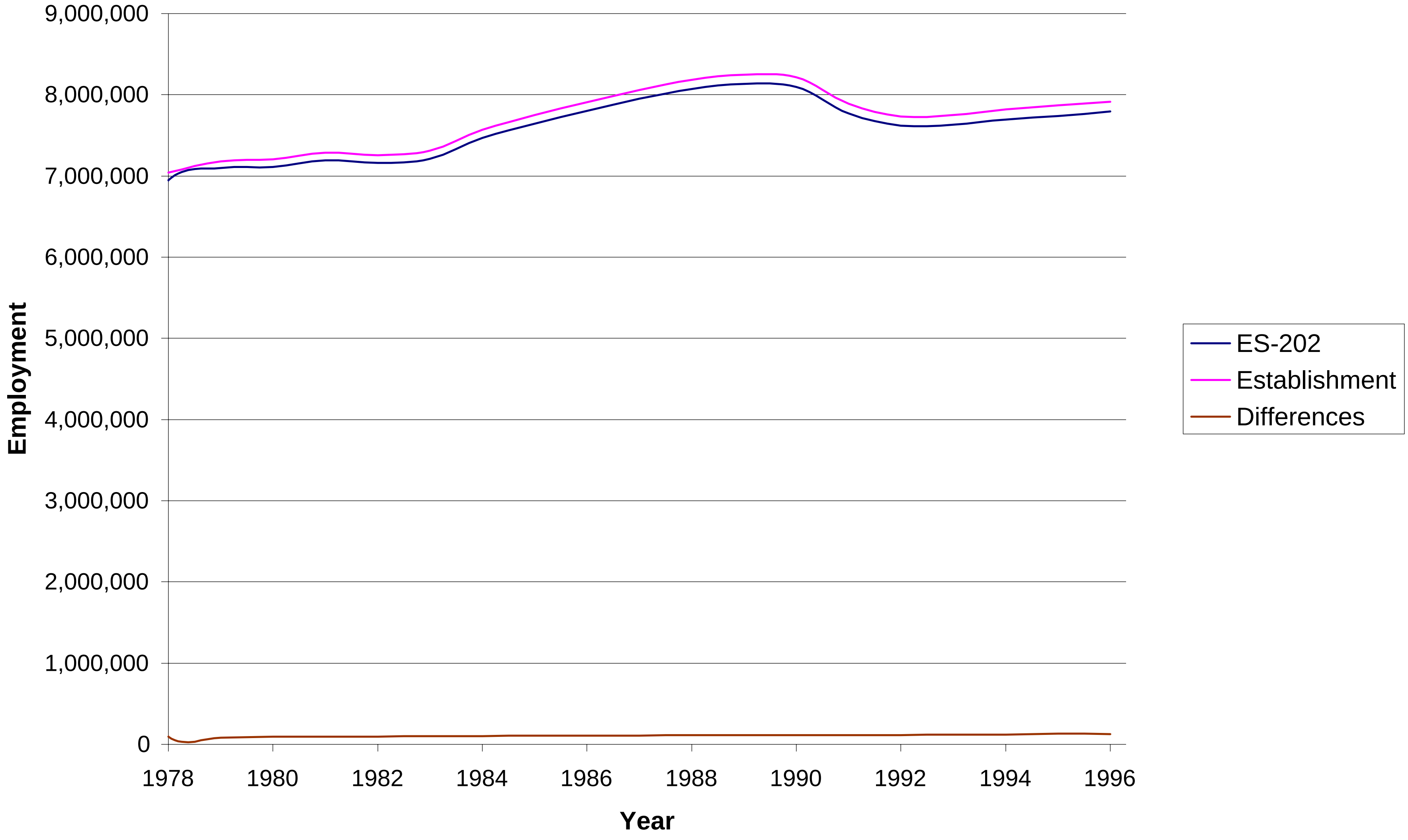


FIGURE III-2: Wages & Salaries Relative to Personal Income

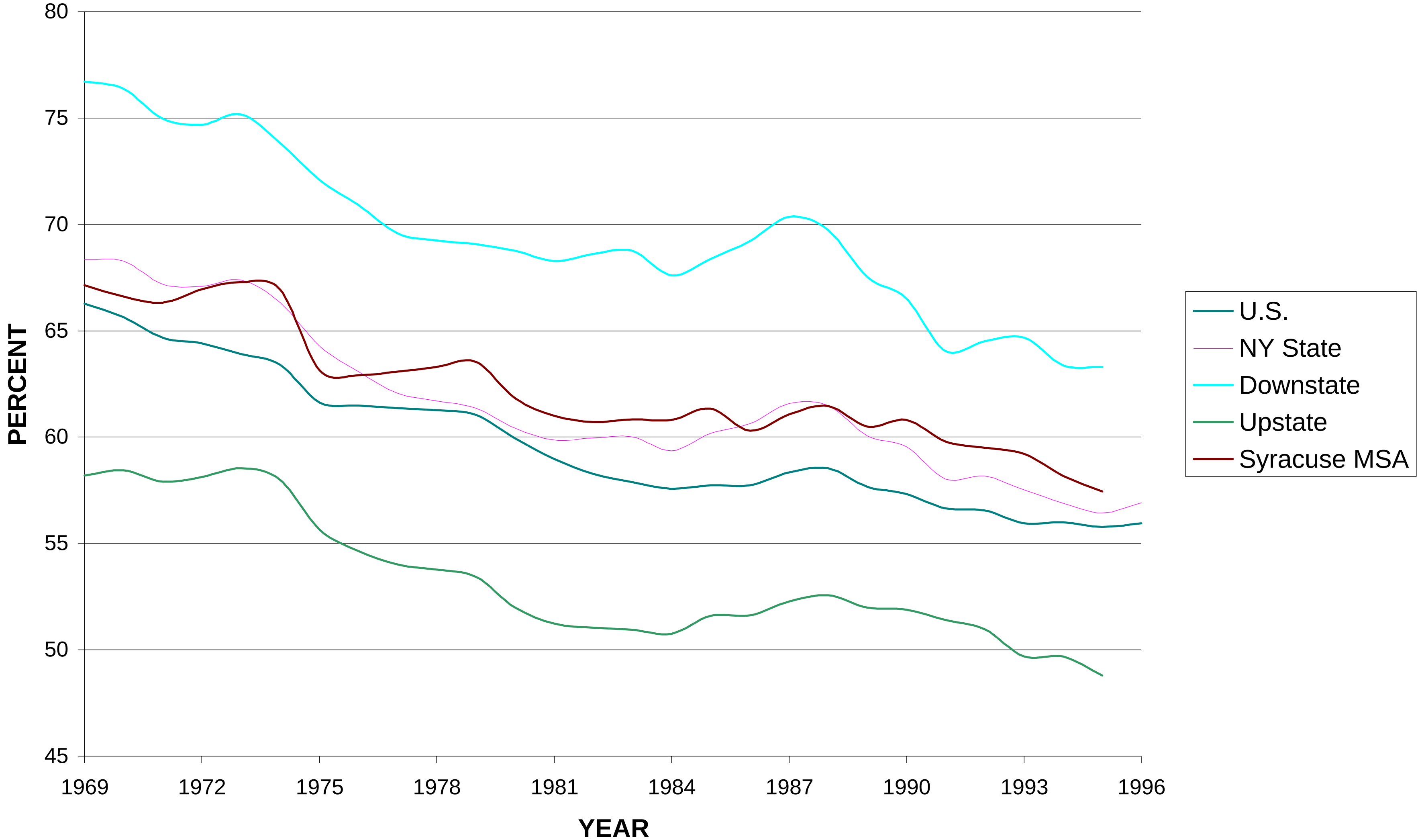
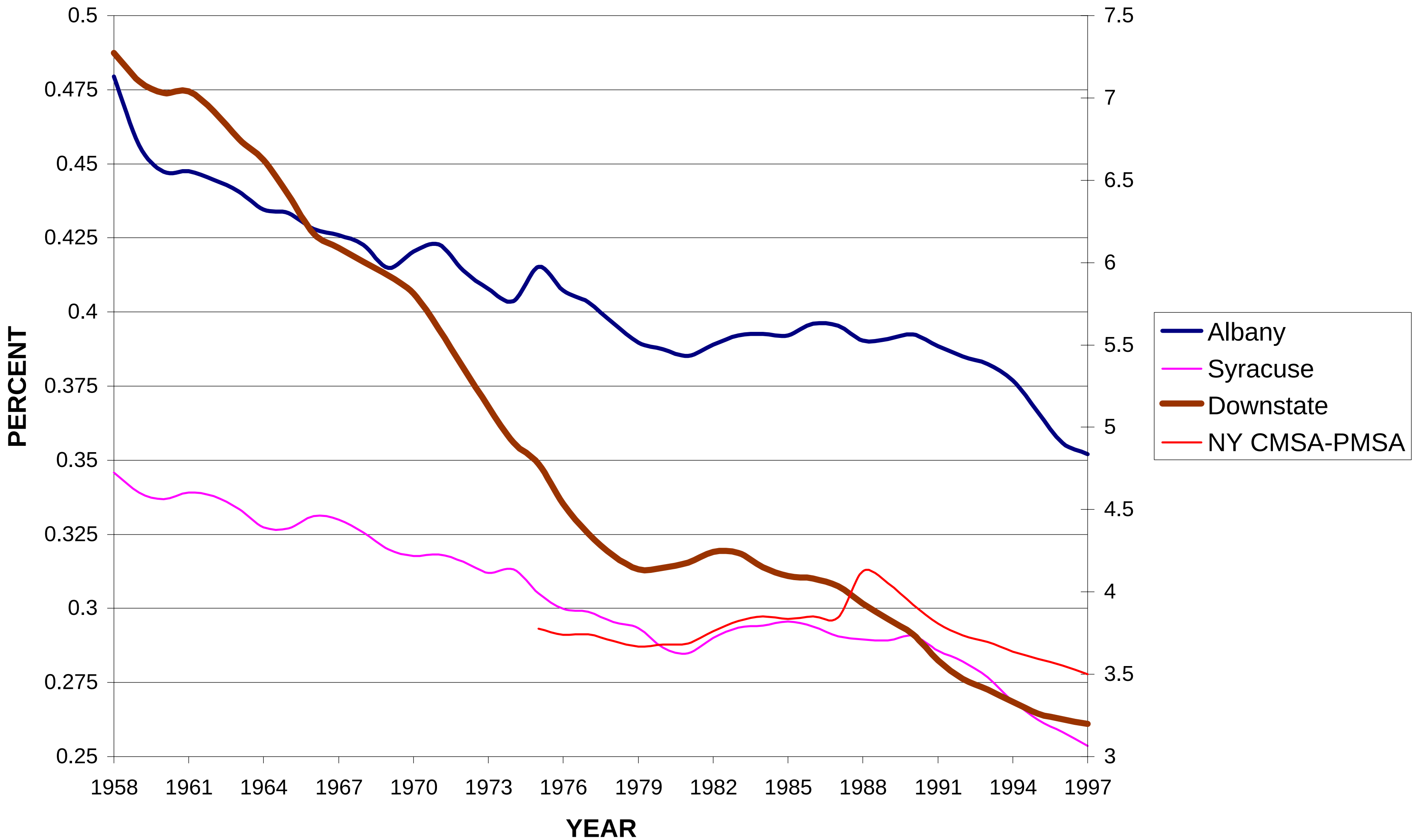
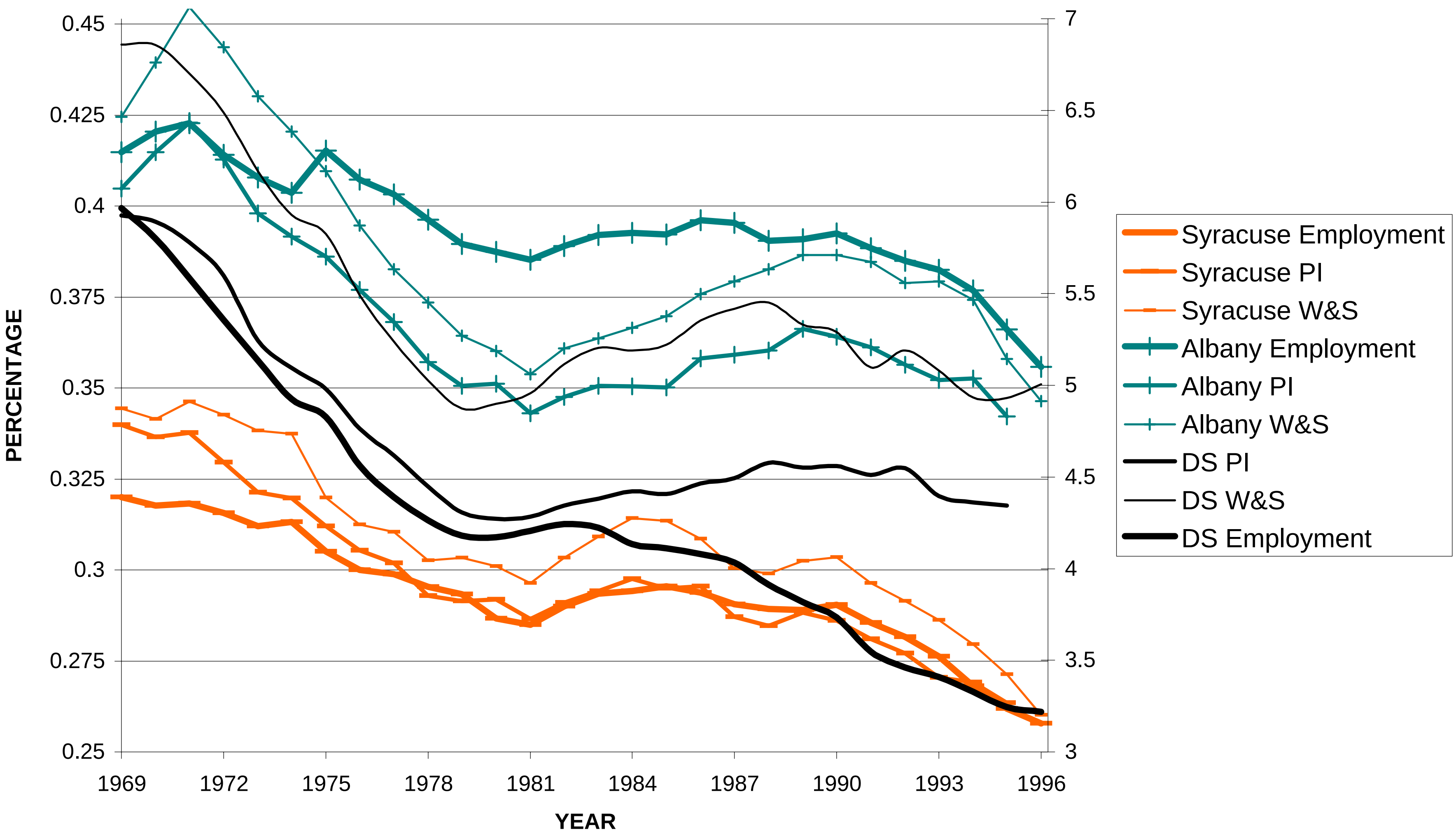


FIGURE III-3: Employment Relative to the Nation



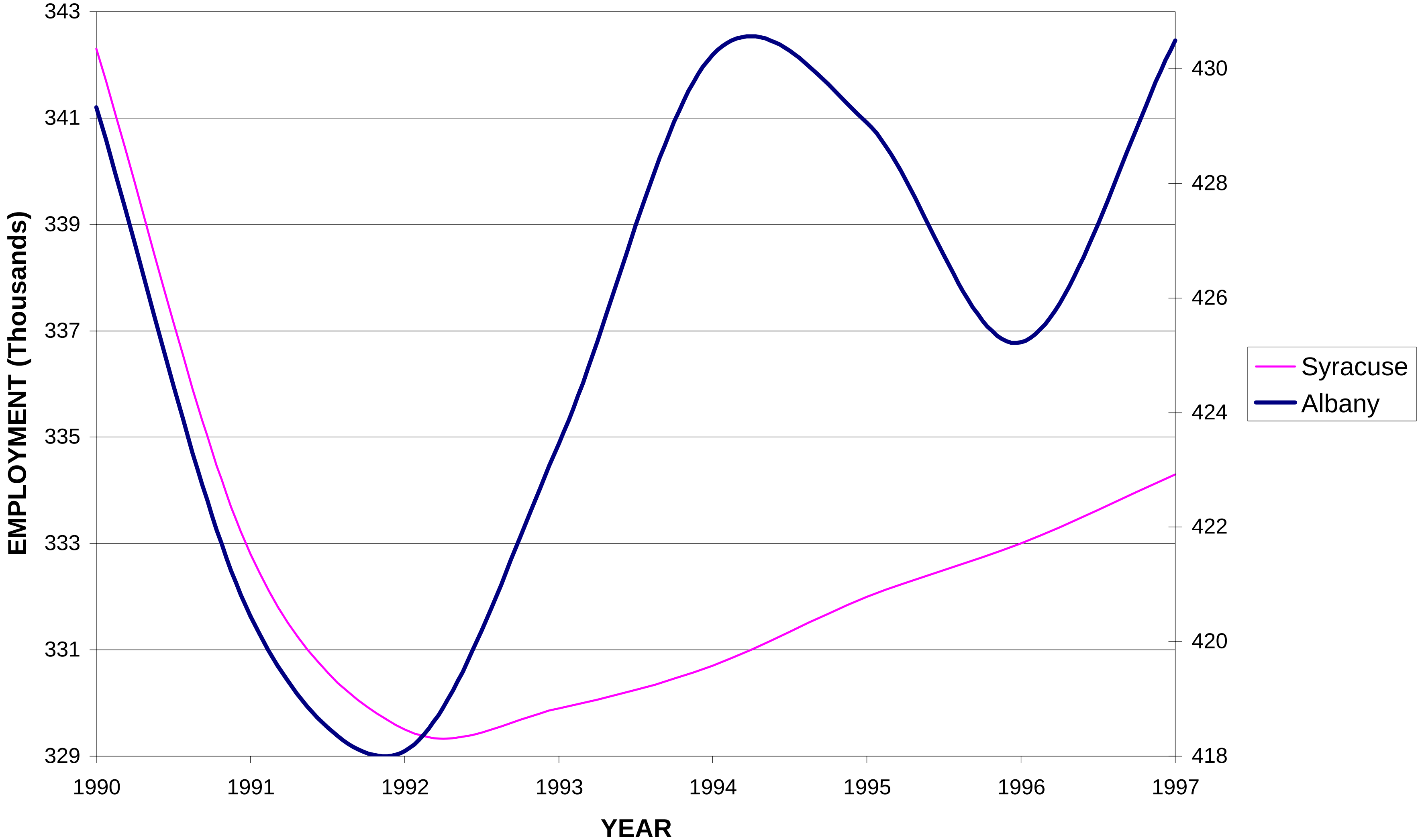
Downstate and the NY CMSA less the NY PMSA is measured on the right-hand axis while the Albany and Syracuse measures are on the left-hand axis.

FIGURE III-4: Employment, Personal Income, and Wages & Salaries Relative to the Nation



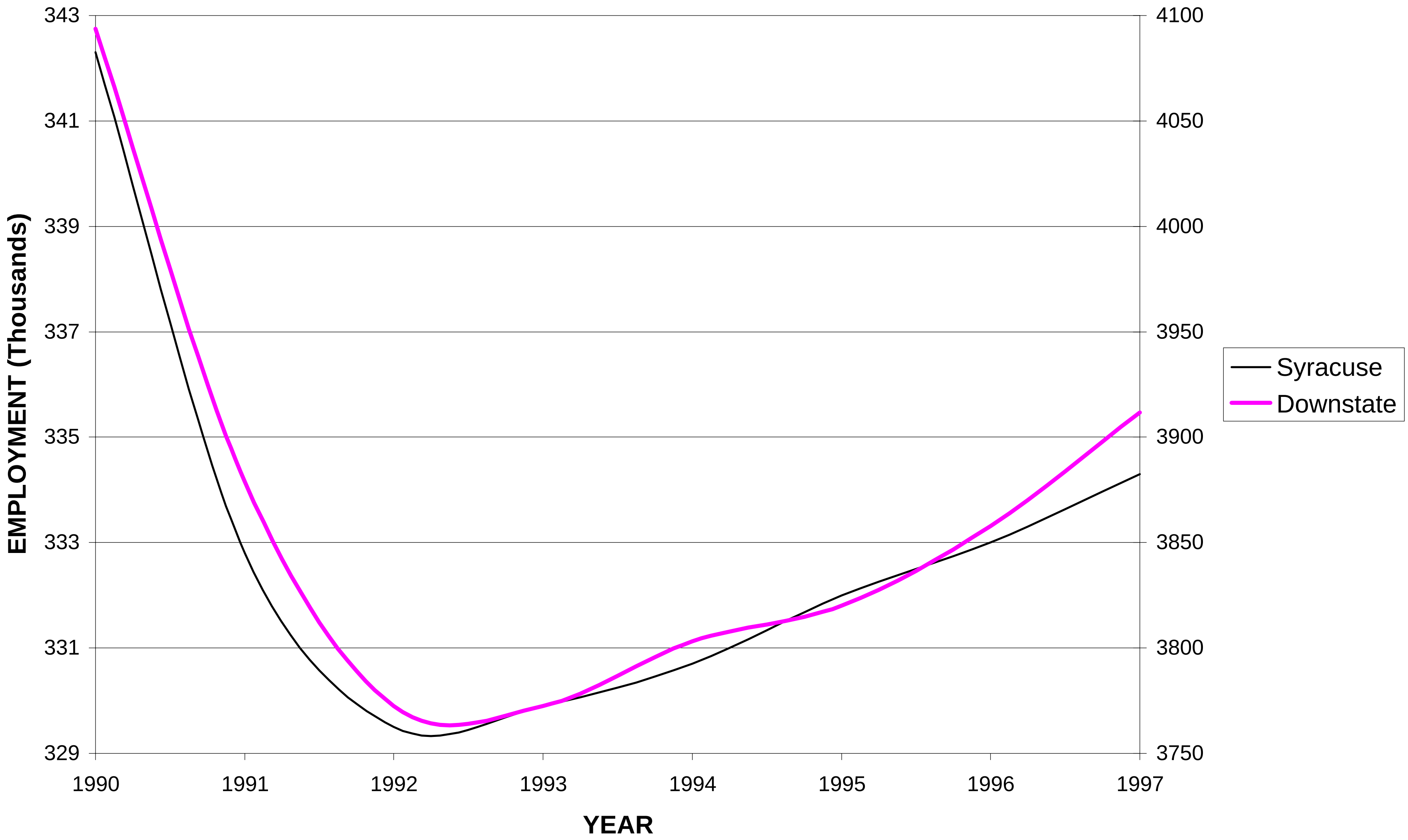
Measures for Syracuse and Albany appear on the left-hand axis while measures for Downstate are on the right-hand axis.

FIGURE III-5: Absolute Employment since 1990



Syracuse employment is plotted along the right-hand axis while Albany employment is plotted along the left-hand axis.

FIGURE III-6: Absolute Employment since 1990



Syracuse employment is plotted along the left-hand axis while Downstate employment is plotted along the right-hand axis.

FIGURE III-7: Personal Income Relative to Employment

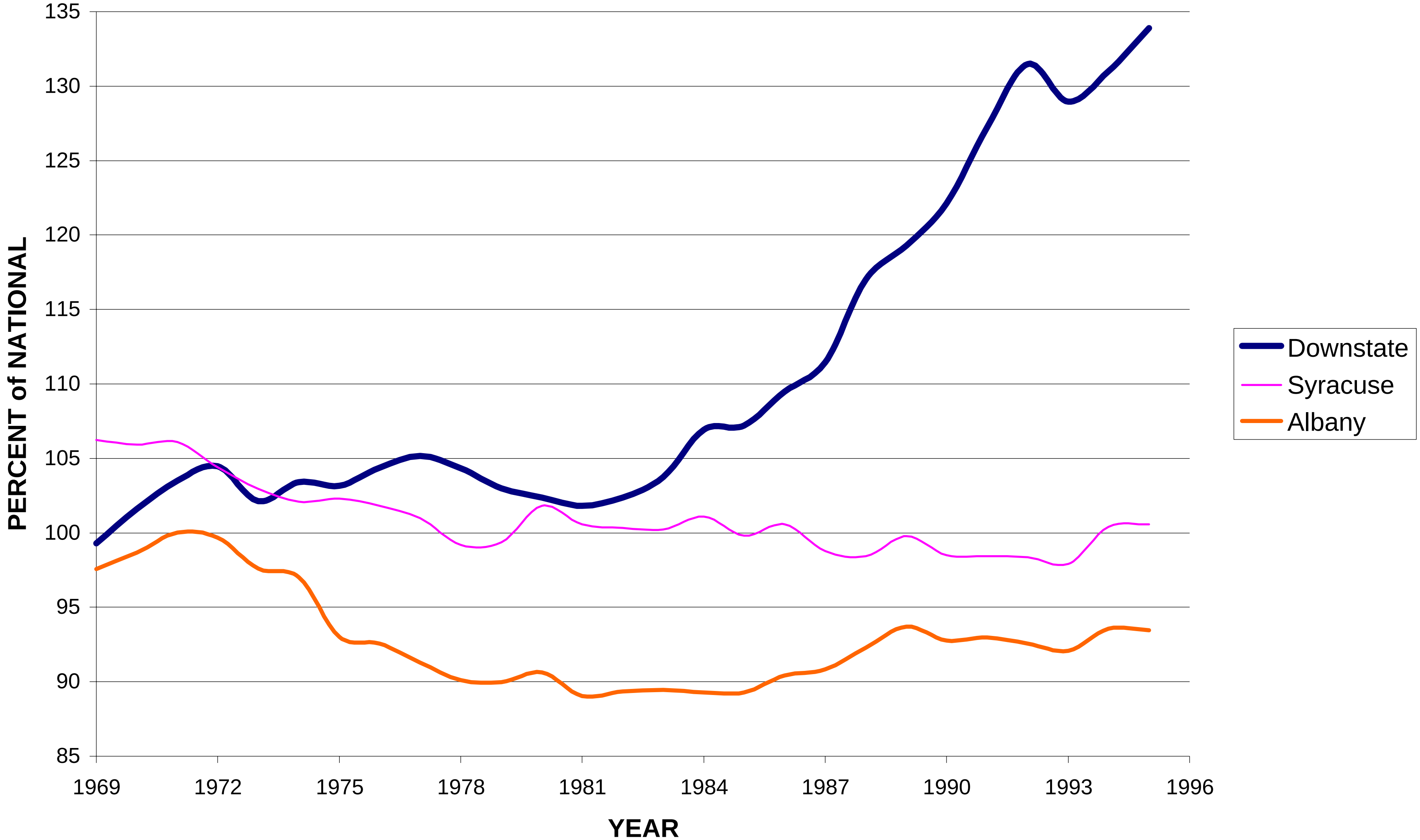
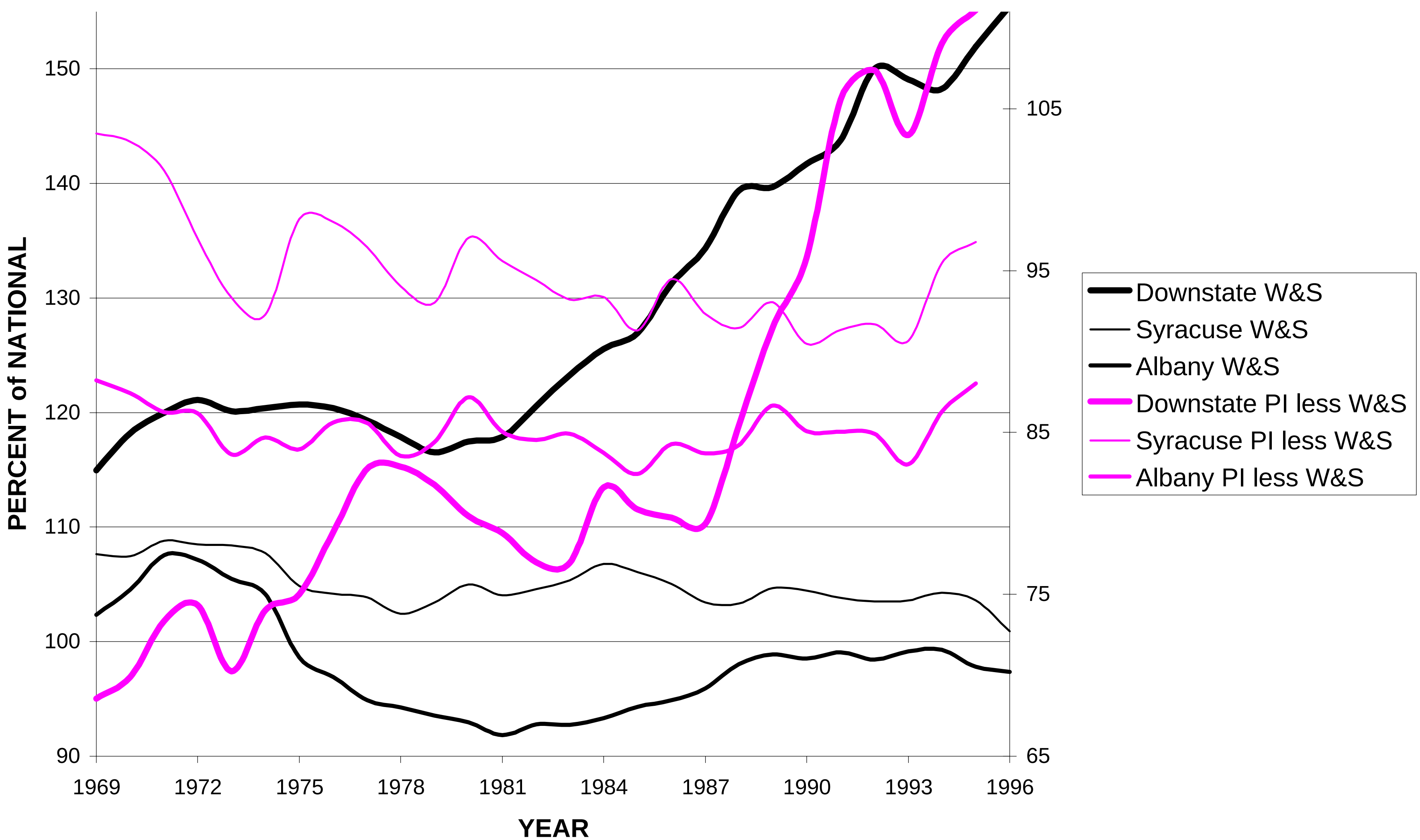
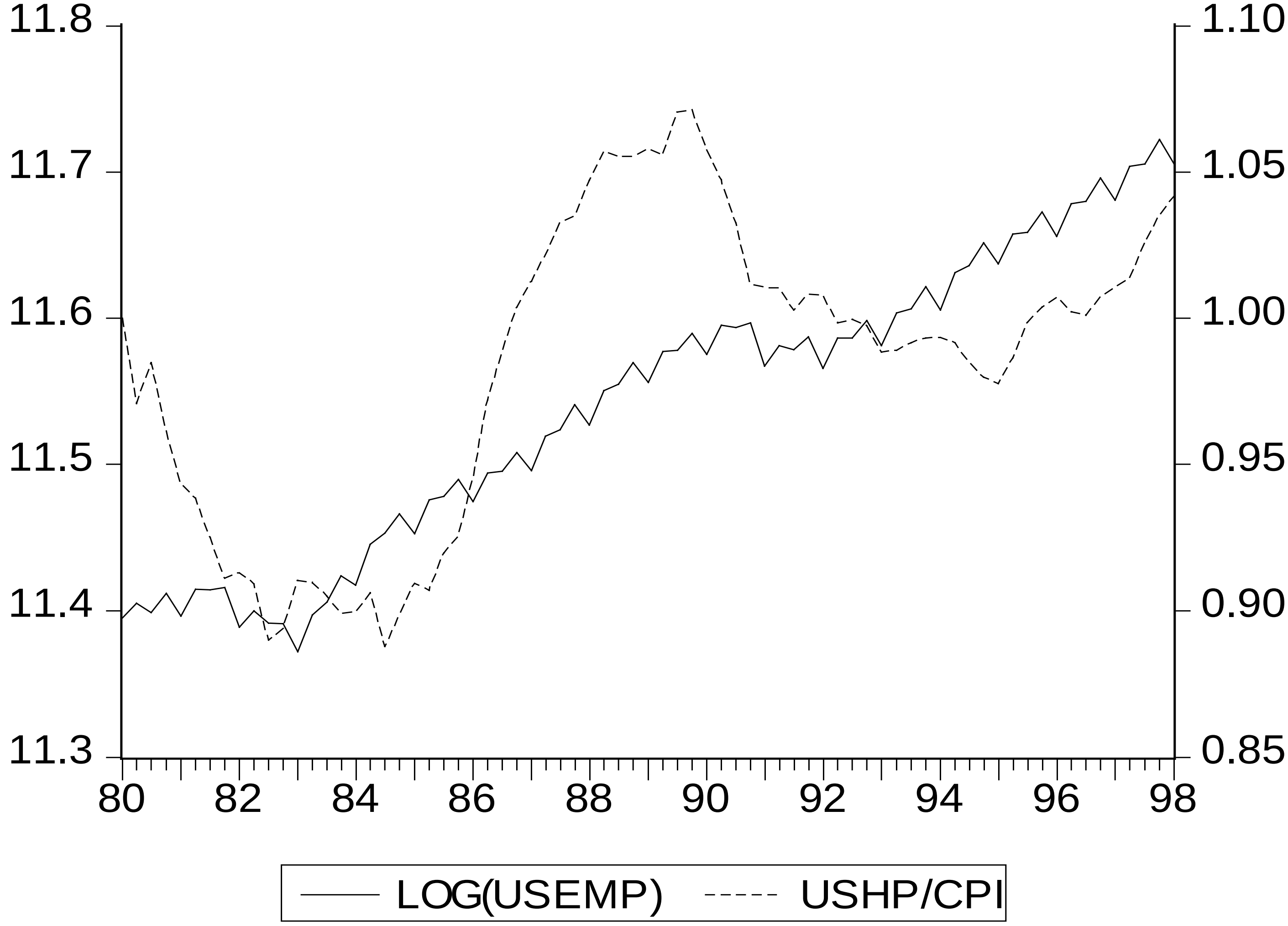


FIGURE III-8: Wages & Salaries Relative to Employment

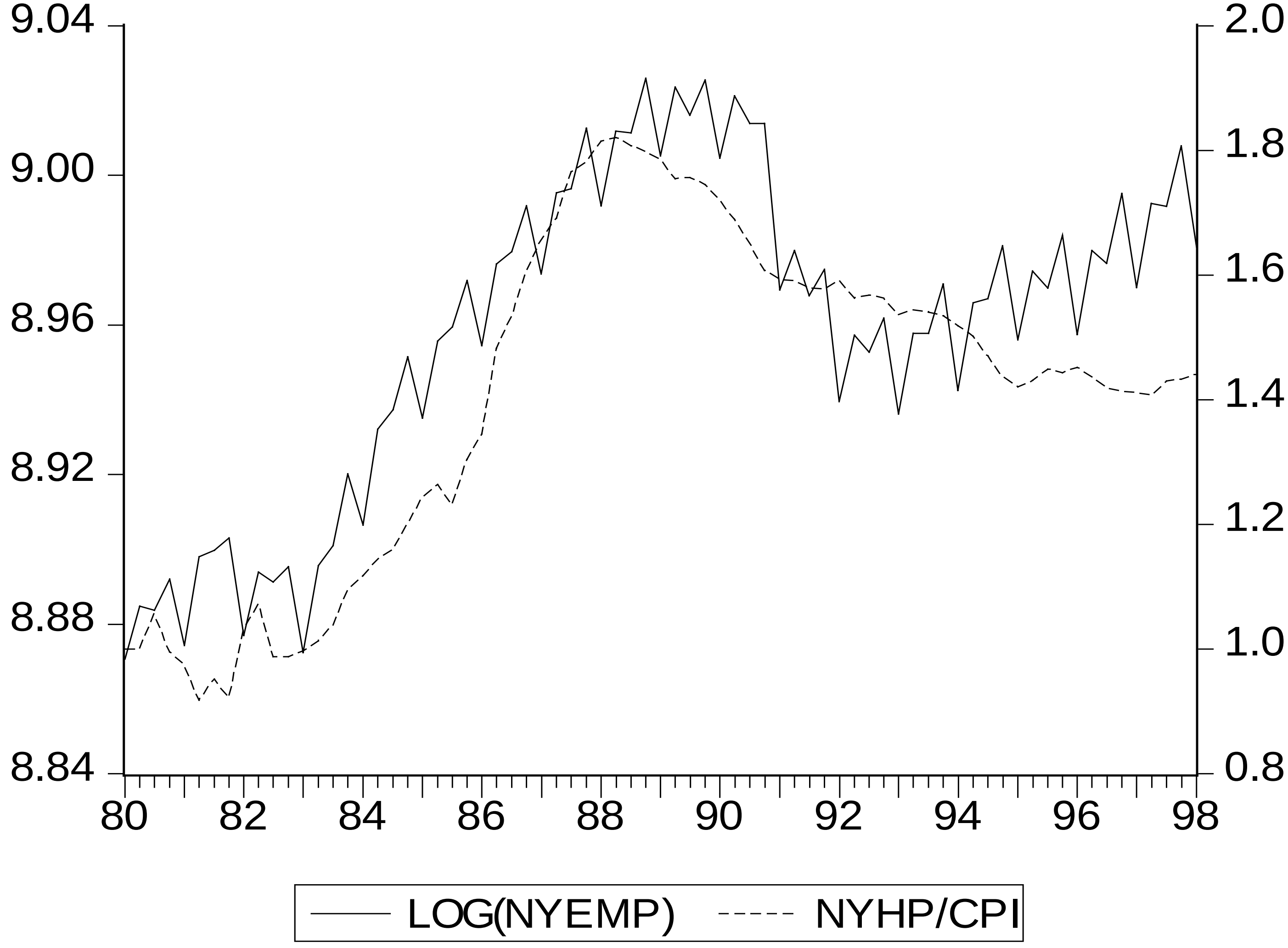


Syracuse and Albany measures are plotted using the left-hand axis while Downstate measures are plotted using the right-hand axis.

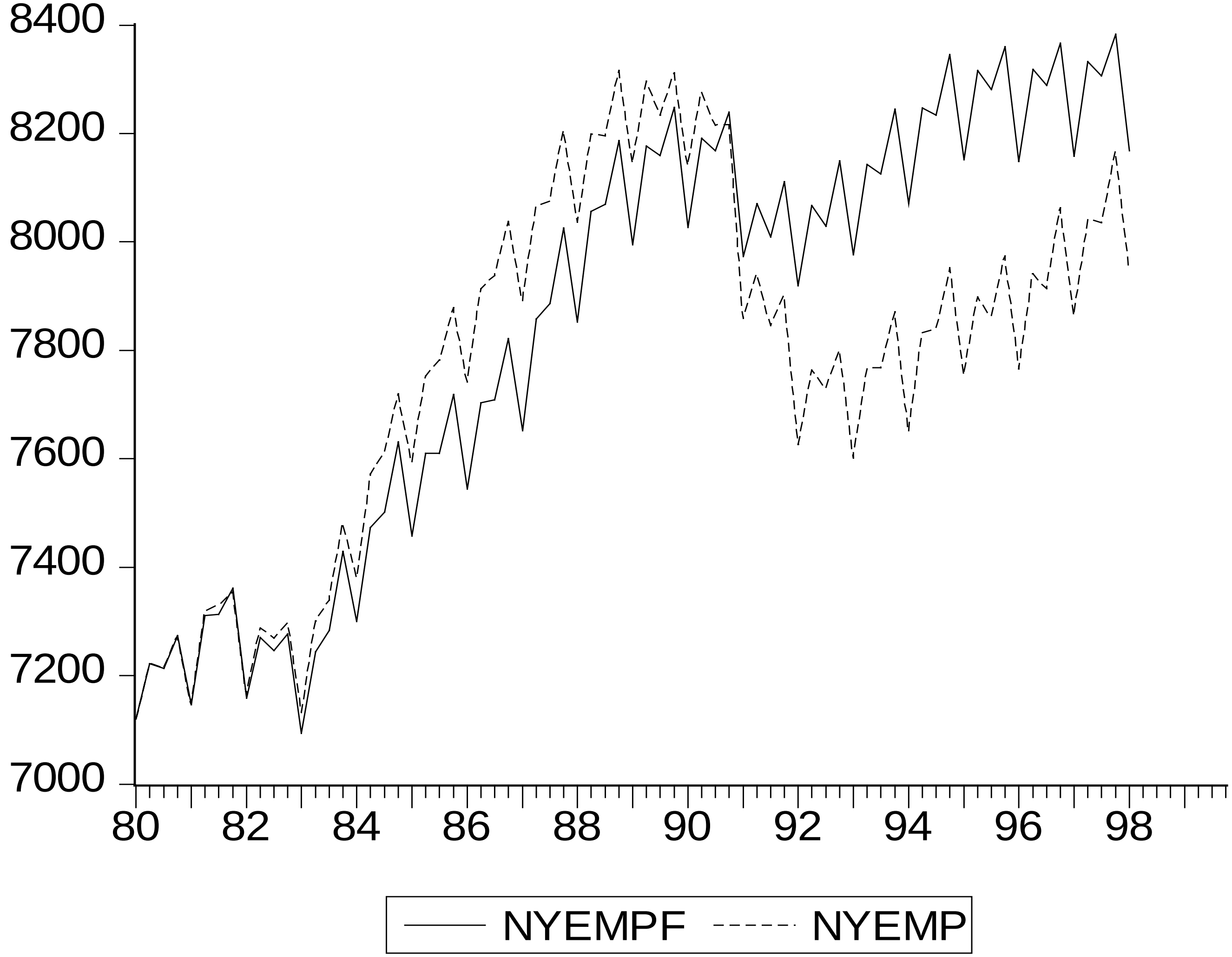
US Employment (logs) and Real US Housing
Price Index (1980=100)
Figure V-1



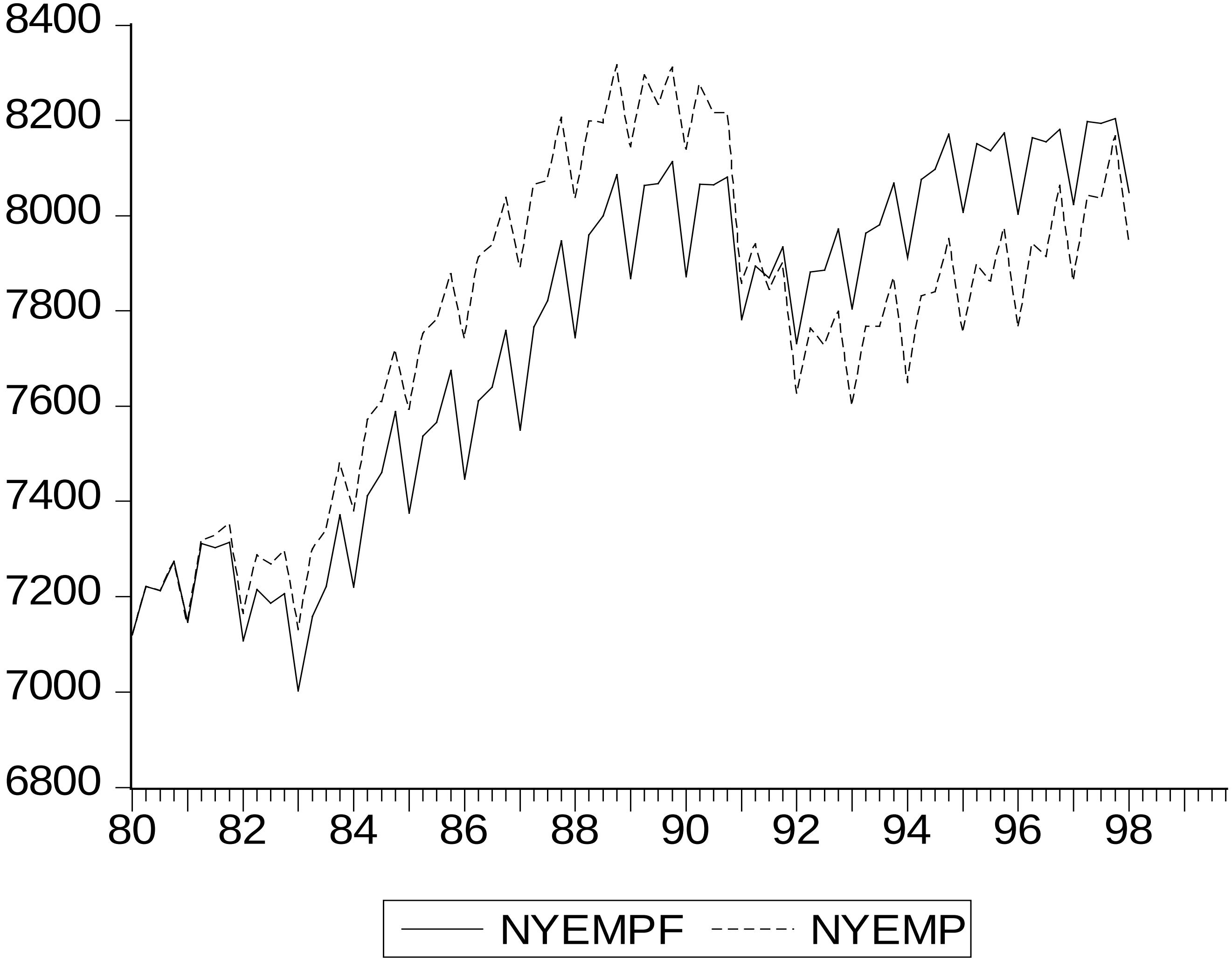
NY Employment (logs) and Real NY
Housing Prices (1980=100)
Figure V-2

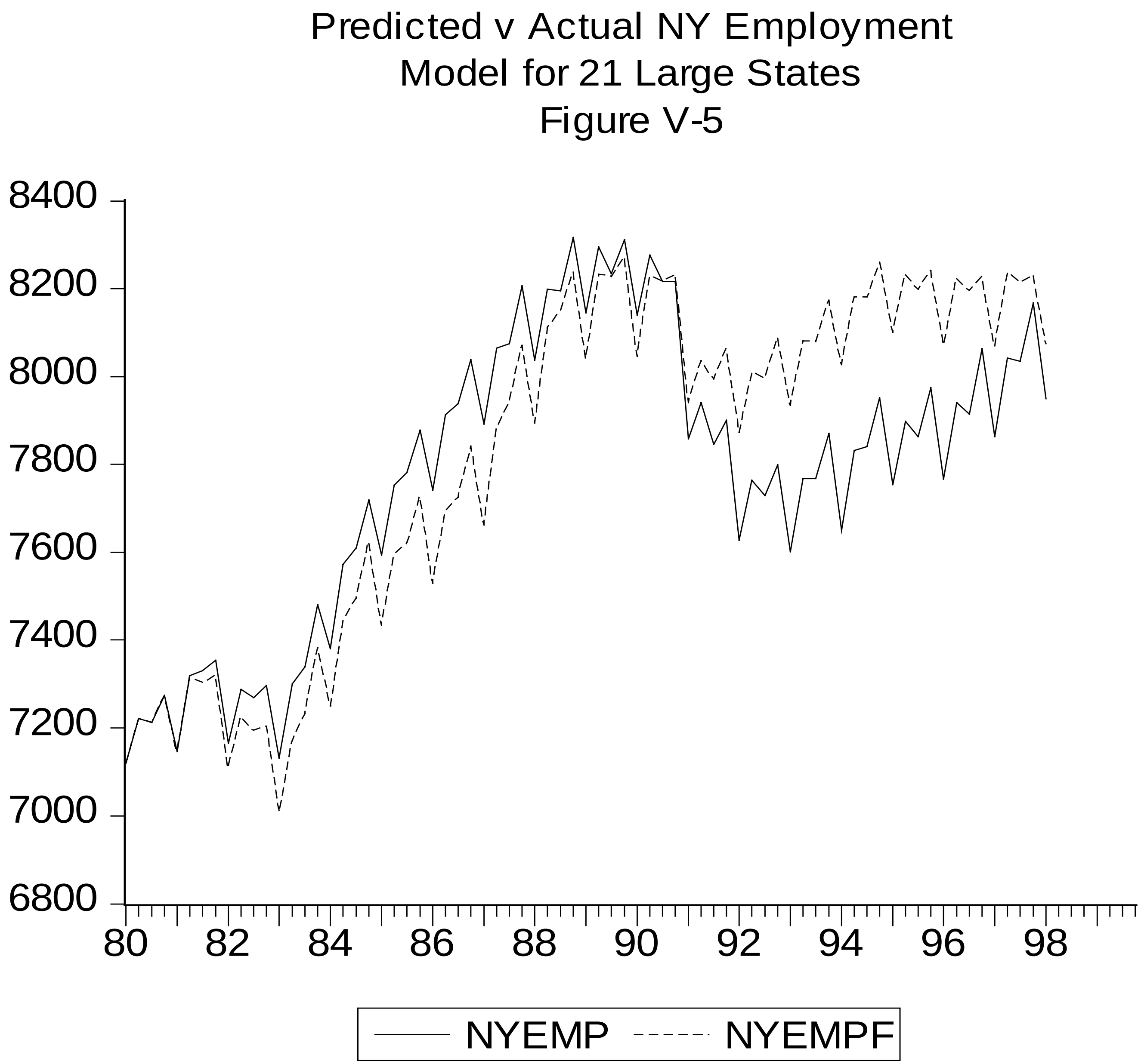


Predicted v Actual NY Employment
NY State Model
Figure V-3

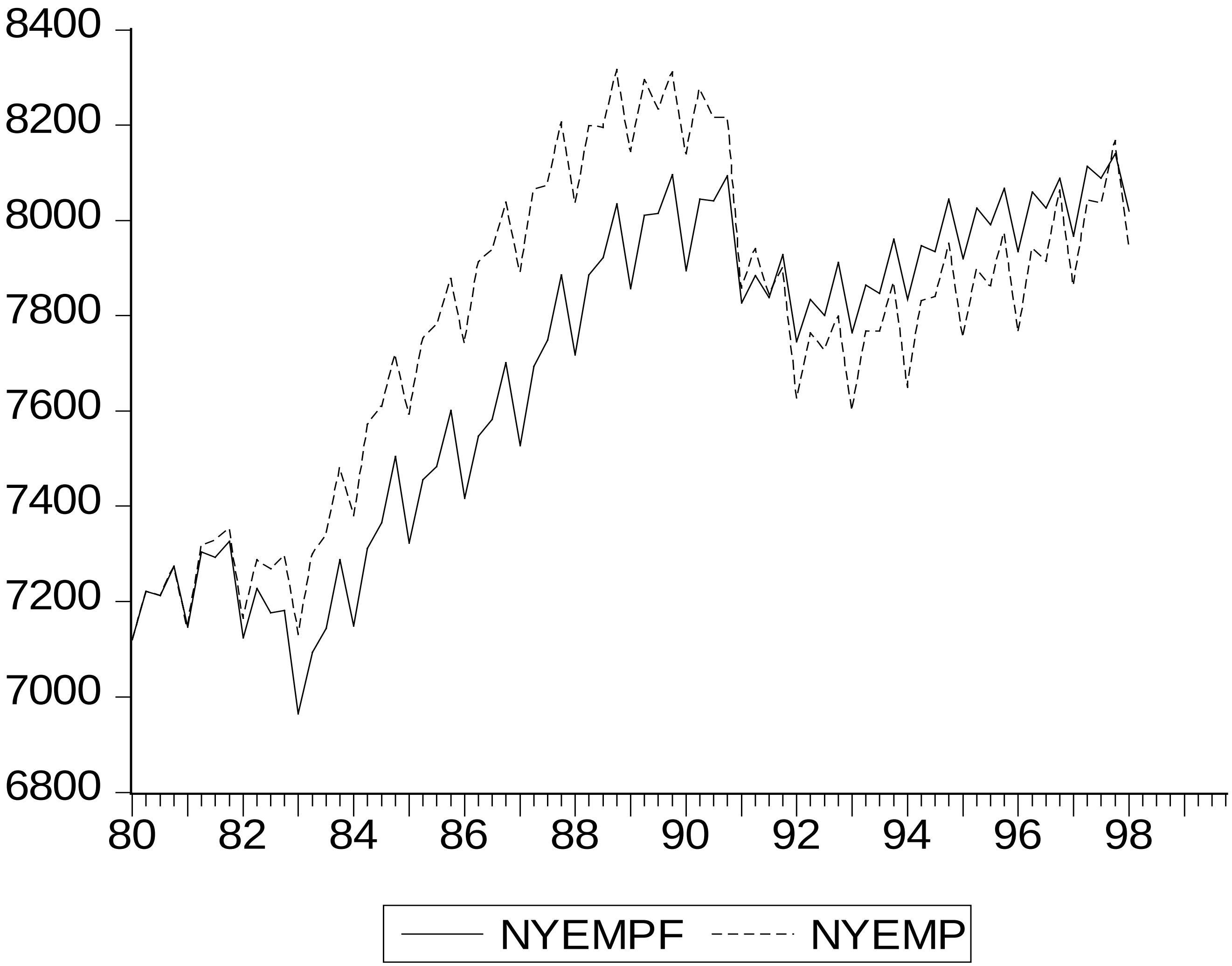


Predicted v Actual NY Employment
50 State Model
Figure V-4




Predicted v Actual NY Employment
Model for 21 Large States
Figure V-5
8400
8200
8000
7800
7600
7400
7200
7000
6800
80
82
84
86
88
90
92
94
96
98
NYEMP
NYEMPF

Predicted v Actual NY Employment
5 State Model
Figure V-6



MN--C	0.004597
MO--C	0.004251
MS--C	0.004528
MT--C	0.003924
NC--C	0.005023
ND--C	0.003998
NE--C	0.004791
NH--C	0.004509
NJ--C	0.00328
NM--C	0.004547
NV--C	0.007165
NY--C	0.002558
OH--C	0.003892
OK--C	0.003318
OR--C	0.005044
PA--C	0.003129
RI--C	0.002806
SC--C	0.004658
SD--C	0.004965
TN--C	0.004805
TX--C	0.004551
UT--C	0.005962
VA--C	0.004727
VT--C	0.003975
WA--C	0.004985
WI--C	0.004634
WV--C	0.003225
WY--C	0.002043

Weighted Statistics

R-squared	0.907424	Mean dependent var	0.005774
Adjusted R-squared	0.905599	S.D. dependent var	0.023683
S.E. of regression	0.007276	Sum squared resid	0.180021
Log likelihood	14669.65	F-statistic	2082.904
Durbin-Watson stat	1.776534	Prob(F-statistic)	0

Unweighted Statistics

R-squared	0.891094	Mean dependent var	0.004809
Adjusted R-squared	0.888947	S.D. dependent var	0.022078
S.E. of regression	0.007357	Sum squared resid	0.184051
Durbin-Watson stat	1.772932		

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