Sources of New York Employment Fluctuations

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New York's economy depends heavily on developments elsewhere in the United States, usually contracting when the rest of the nation is in a recession and expanding when the nation is growing rapidly. It is far from a lockstep relationship, however. In some episodes, such as the 1970s, the region fared considerably worse than the United States. In other periods, such as the early 1980s, it performed better than the nation.

This paper investigates employment fluctuations in the New York metropolitan area with the goal of understanding the similarities and differences between the region and the rest of the nation. The investigation has two parts. The first part describes cyclical movements and long-run shifts in regional employment and compares them with employment fluctuations in the nation as a whole. The second part quantifies the relative importance of aggregate, industry-specific, and region-specific factors in explaining the region's fluctuations.

The investigation focuses on two key industries: manufacturing, and the finance, insurance, and real estate (FIRE) sector. Much of the persistent job loss in the region has been in these two industries—first, with the exodus of manufacturing jobs in the 1970s, and more recently, with the restructuring of financial services in the late 1980s.[1] One potentially important implication of the evolution of employment shares is a change in the region's response to aggregate factors. As New York's employment base shifts from highly cyclical manufacturing jobs to relatively acyclical financial services, one would expect changes in the relationship between the region and the nation like those documented by McCarthy and Steindel (1996).

To assess the importance of these factors, we use a statistical model that can, by virtue of its factor structure, attribute New York employment fluctuations to readily interpretable aggregate, industry-specific, and regional fac-

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tors. Our approach also relates the region's response to aggregate and industry shocks to its industry mix, allowing us to characterize changes in the behavior of regional employment resulting from changes in its employment base.

Our results reveal some significant changes in the region's relationship to the rest of the nation. While New York employment shares a strong cyclical component with U.S. employment, the region has experienced major shifts in its trend growth rate: the largest are associated with negative shocks in the mid-1970s and the late 1980s. Some of these can be traced to specific industries, such as the FIRE-related weakness in the late 1980s. Others, such as the stagnation in the mid-1970s, seem to be due primarily to region-specific factors. At the same time, the region's declining reliance on cyclical industries has made the region's fortunes less closely tied to those of the nation.

TRENDS AND CYCLES IN THE NEW YORK ECONOMY

The quarterly growth (at quarterly rates) of national and regional employment and their decomposition into trend and cyclical components appear in Chart 1. The regional payroll employment figures used here and elsewhere in the paper are taken from the data set compiled by McCarthy and Steindel (1996). As in their paper, the New York metropolitan area refers to the New York City, Nassau-Suffolk, Duchess County, Jersey City, Bergen-Passaic, Newark, Middlesex-Somerset-Hunterdon, Monmouth-Ocean, Trenton, and New Haven-Bridgeport-Stamford-Danbury-Waterbury metropolitan statistical areas. Further details on the data set construction appear in their paper. U.S. employment data by industry are taken from the payroll employment survey. All data are seasonally adjusted.

These decompositions utilize a classification of economic fluctuations dating back to Burns and Mitchell (1946): fluctuations lasting between six and thirty-two quarters are defined as "cyclical," while those lasting more than thirty-two quarters are defined as "trend" components. Very short-run fluctuations lasting less than six quarters (the "irregular" component) are ignored. The decompositions are obtained using the frequency-domain filters discussed in Baxter and King (1995).[2] Although the data cover the period from first-quarter 1958 to third-quarter 1995, three years' data are lost at each endpoint.[3]

Employment and its trend-cycle decomposition appear in Chart 1.[4] The top panel plots employment growth in the nation and in the New York metropolitan area. The cyclical component plotted in the bottom panel illustrates the strong comovement of New York and national employment growth at business-cycle frequencies. The two series exhibit similar timing and amplitude, although the region's fluctuations have a larger variance pre-1969 and a lower variance in the 1980s. There is much more of a discrepancy in the long-run movements, plotted in the middle panel. Regional employment experienced two major long-run declines, one in the 1970s and the other in the mid-to-late 1980s, that are significantly stronger than those occurring in the national economy. This is consistent with the variation in the estimated elasticities of regional to national employment documented in McCarthy and Steindel (1996)—particularly its weakening in samples beginning in early 1970 and its strengthening in the 1980s. Table 1 also shows that the correlation of the cyclical components is about twice as high as that of the trend components.

Another way to compare the behavior of the national and the regional employment growth is to look at their ratio. Chart 2 isolates, with the same decomposition by frequency, cyclical versus long-run movements in that ratio. The plot points document the strength of the region's secular decline in spite of the two cyclical peaks in the late 1960s and early 1980s.

The trend-cycle decompositions suggest that

Table 1
CORRELATIONS BETWEEN NEW YORK AND U.S. EMPLOYMENT GROWTH

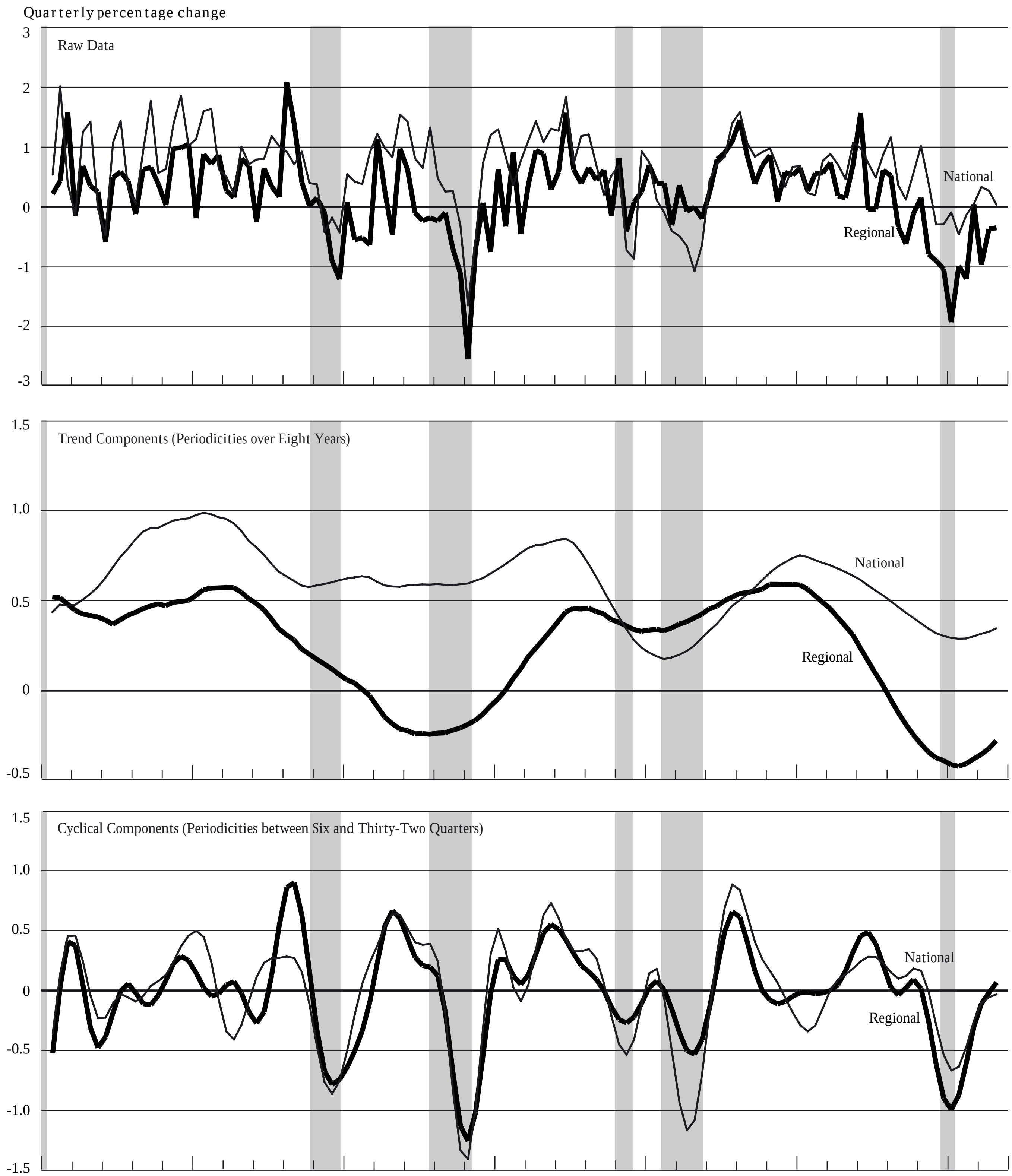
Unfiltered Data	Cyclical Component	Trend Component
0.55	0.86	0.42

Sources: Bureau of Labor Statistics; McCarthy and Steindel (1996); authors' calculations.

Notes: Results are based on quarterly data from first-quarter 1958 through third-quarter 1995. The cyclical component corresponds to periodicities between six and thirty-two quarters, the trend component to periodicities greater than thirty-two quarters.

Chart 1

Regional and National Employment Growth

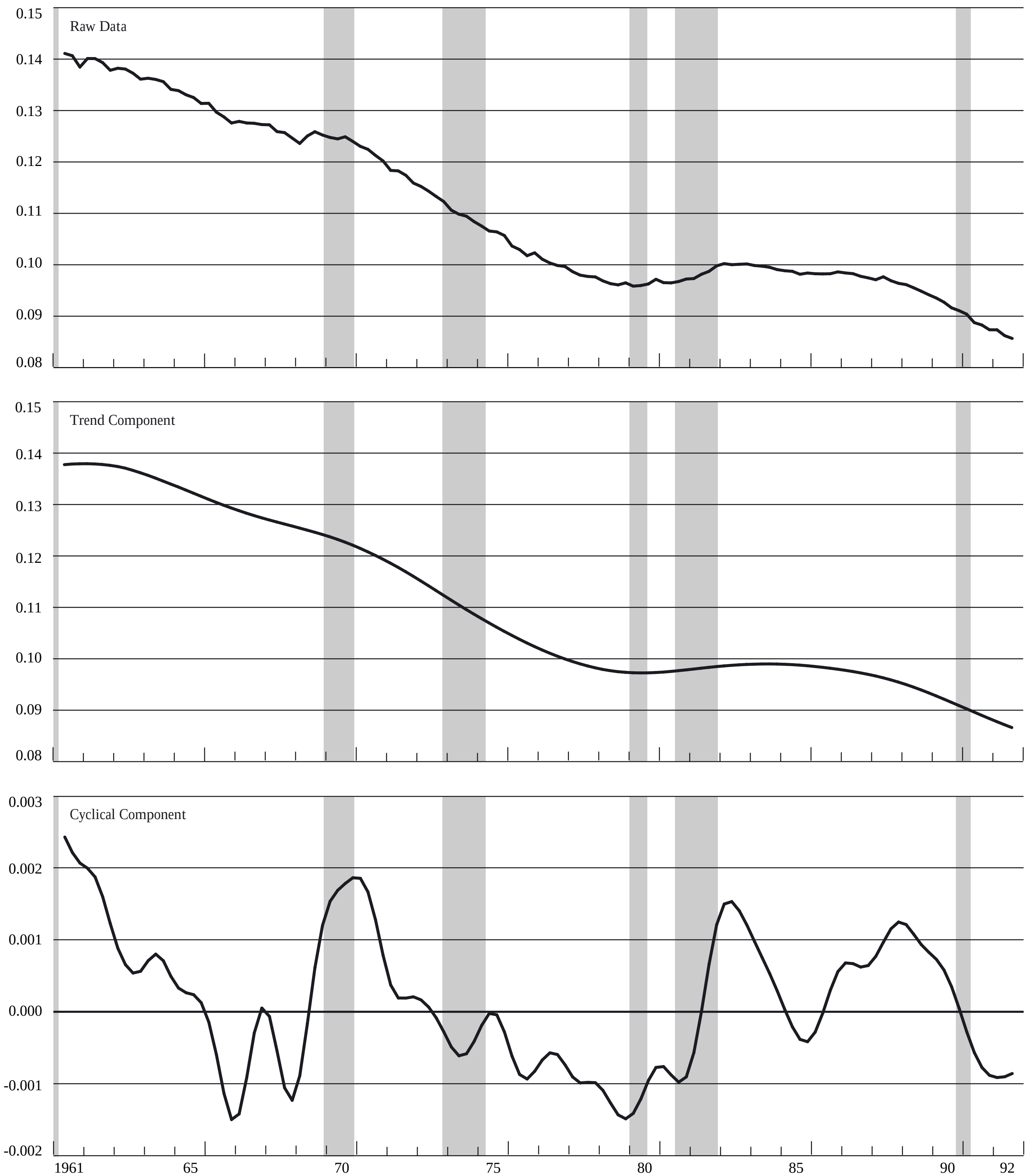


Sources: Bureau of Labor Statistics; McCarthy and Steindel (1996); authors' calculations.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

Chart 2

Ratio of Regional to National Employment



Sources: Bureau of Labor Statistics; McCarthy and Steindel (1996); authors' calculations.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

research on discrepancies between New York and U.S. economic performance needs to account for *persistent* shifts in the region's employment and to address the possible role of industrial composition in those shifts. The following questions are particularly relevant: Has sectoral employment become more concentrated in industries exhibiting a persistent response to aggregate shocks? Or are the industries overrepresented in the region themselves subject to persistent fluctuations? Moreover, are there any common features in the slowdowns of the 1967-75 and the 1985-90 periods?

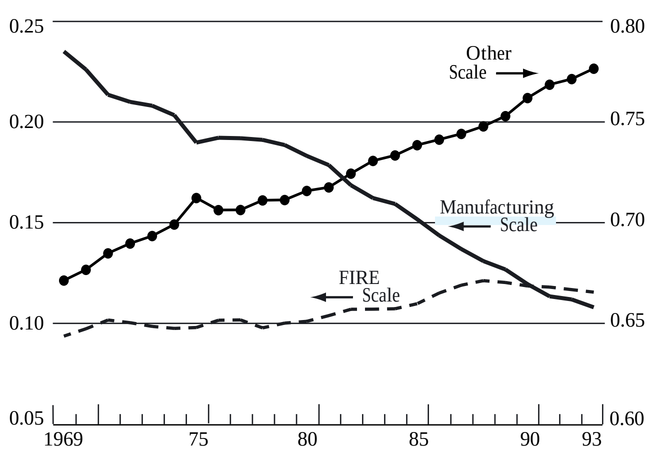
As noted above, manufacturing and FIRE have played an especially large role in persistent shifts in regional employment. Manufacturing's share of regional employment declined from roughly 24 to 19 percent between 1969 and 1975 (Chart 3). Over the same period, FIRE grew from 9 to 10 percent.[5] Manufacturing also declined nationally, but at a slower pace, and FIRE grew at a faster pace nationally than in the region. The result is that New York's share of both manufacturing and FIRE employment declined (Chart 4).

How did employment by industry behave over this period? Employment growth in the FIRE, manufacturing, and "other" (total employment less manufacturing and FIRE) sectors is plotted in Chart 5. The employment growth rate is strongly procyclical in all industries, with the highest cyclical variability in manufacturing. However, in manufacturing, low-frequency components contribute substantially to the variability of employment, particularly in the 1967-70 and 1979-81 periods. A long-run shift is apparent in the FIRE industry post-1985.

This analysis suggests that industry-specific shocks, of a structural character and more persistent nature, may be at the core of the two major downturns in the New York region in the 1970s and mid-to-late 1980s.[6] We turn therefore to a more structured analysis of the employment patterns in the New York metropolitan area with the objective of disentangling the role of industry factors among aggregate and region-specific factors.

Chart 3

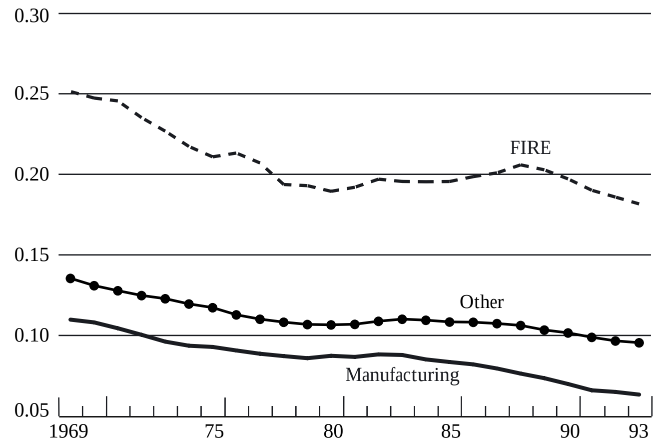
Share of Industries in New York Employment



Source: Hughes and Seneca (1996).

Chart 4

New York's Share of U.S. Employment by Industry



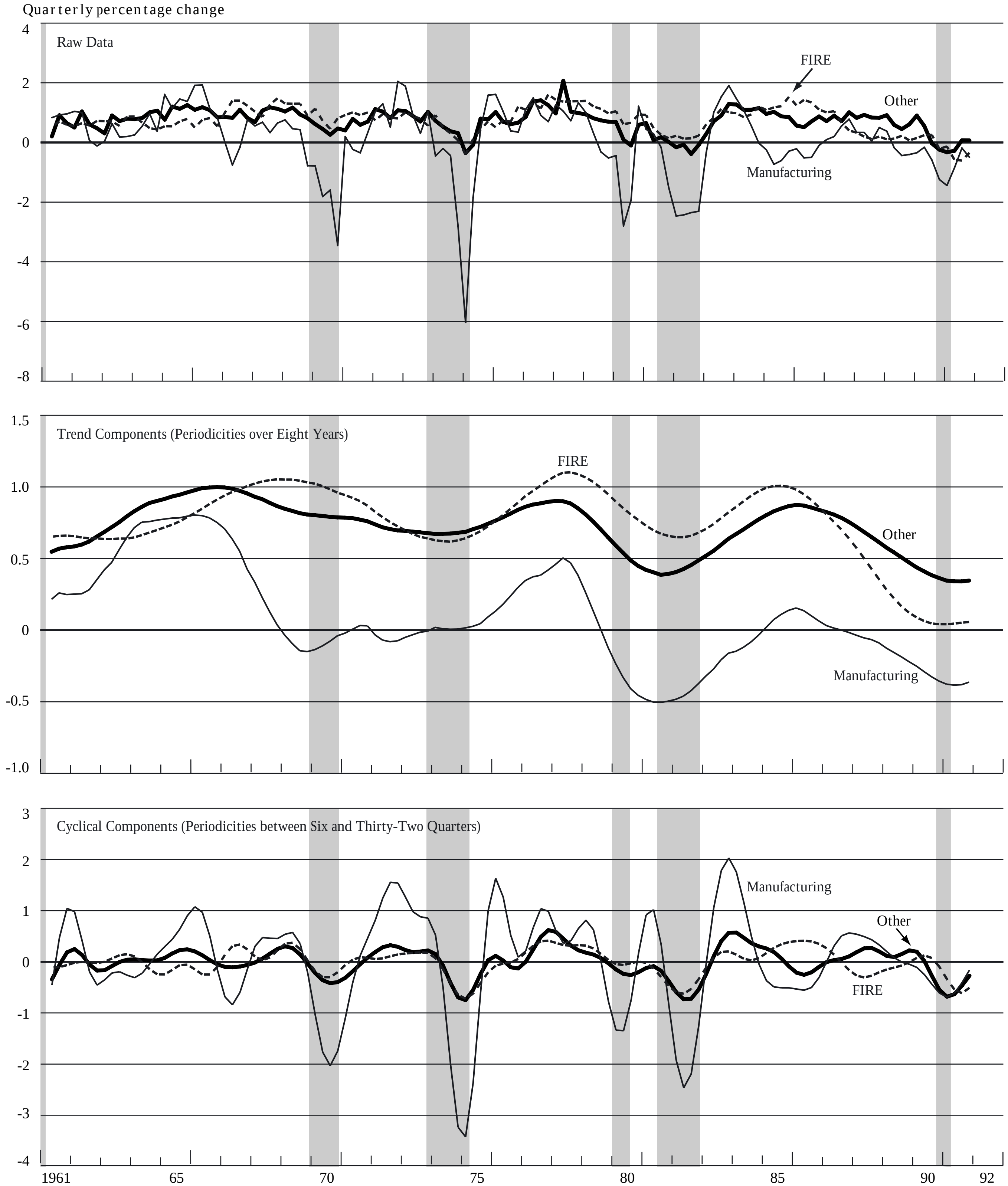
Sources: Hughes and Seneca (1996); Bureau of Labor Statistics.

Assessing Aggregate, Industry, and Regional Factors

The goal of this section is to describe the sources of fluctuations in New York employment. We consider three distinct sources: aggregate, industry, and regional shocks. Aggregate shocks would include factors that affect the macroeconomy—monetary policy, for example, or anything else responsible for business cycles.[7] Industry shocks are disturbances associated with specific industries: in this analysis, shocks to the manufacturing and FIRE sectors. Finally, regional shocks represent factors not associated with a specific industry or with overall employment in the United States.

Chart 5

Industry Employment Growth



Sources: Bureau of Labor Statistics; authors' calculations.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

To separate the common aggregate component from industry- and region-specific factors, we use a version of a dynamic factor model. Factor models lend themselves well to regional analysis, where they have been used in a variety of applications. One of the earliest was that of Engle and Watson (1981) in their analysis of regional wage fluctuations. Our framework closely resembles the models of Norrbin and Schlagenhauf (1988), Altonji and Ham (1990), and Clark (forthcoming). Some similarities and differences between our approach and theirs are highlighted below.

This approach models industry and regional fluctuations as a function of a set of latent variables. The observed covariance between employment growth in different industries is attributed to an unobserved *common factor*, which we associate with the aggregate source of fluctuations. Differences in sensitivities to the aggregate shock are captured through distinct *loadings* on the common factor. The idiosyncratic factors—in this case, the industry- and region-specific shocks—are assumed to have no contemporaneous effect outside the industry or sector in which they originated.

An important difference between the factor approach and the vector autoregressions (VARs) used by McCarthy and Steindel (1996) and others (such as Blanchard and Katz [1992]) is that the factor approach avoids the recursive error structure characteristic of most VARs. In that framework, the error in the equation describing overall U.S. employment is typically interpreted as the "aggregate" shock, even though it may also be affected by industry and regional shocks. Factor models can allow for a more natural separation between aggregate, industry, and regional shocks although, like VARs, they impose restrictions on the contemporaneous feedback between regions and industries.[8]

THE MODEL

The model in its most general form involves employment in each of k different industries and n different regions.[9] Let $y_{i,r,t}$ represent log employment in industry i, region r, at time t. Employment growth for industry i in region r is assumed to obey

$$(1) \qquad \Delta y_{i,r,t} = \mu_{i,r} + \gamma^c_{i,r} c_t + \gamma^z_{i,r} z_{i,t} + \gamma^g_{i,r} g_{r,t},$$

where c_t, $z_{i,t}$, and $g_{r,t}$ are unobserved aggregate, industry, and regional factors, respectively. The z and g terms are assumed to be uncorrelated with one another, so that any comovement between employment across sectors and regions is the result of the common aggregate factor. The γ coefficients represent the sensitivity of employment to each factor (the factor loadings). The constant term $\mu_{i,r}$ allows for trends in employment shares.

Unfortunately, the lack of consistent quarterly time series on employment by industry in the New York metropolitan area means that unlike Norrbin and Schlagenhauf (1988), we cannot work directly with the disaggregated model in equation 1. Instead, we use time series employment data by industry in the nation as a whole and total employment in the New York region. This leads to an aggregated version of the model similar to the one developed by Clark (forthcoming).

Deriving the relationship between disaggregated industry-region employment and total employment by industry and region simply involves aggregating across industries and regions. Letting $y_{i,t}$ and $y_{r,t}$ represent the logarithms of industry and regional employment at time t, employment growth (the difference in logs) in each region and industry (approximately) equals the weighted average of the underlying region-industry-specific growth rates:

$$\Delta y_{r,t} \approx \sum_i a_{i,r,t} \Delta y_{i,r,t} \text{ and}$$

$$\Delta y_{i,t} \approx \sum_r b_{i,r,t} \Delta y_{i,r,t} \quad .$$

The weights $a_{i,r,t}$ and $b_{i,r,t}$ are the relevant employment shares: $a_{i,r,t}$ represents industry i's share of employment in region r, $Y_{i,r,t} / \Sigma^k_{i=1} Y_{i,r,t}$, and $b_{i,r,t}$ represents region r's share of employment in industry i, $Y_{i,r,t} / \Sigma^n_{r=1} Y_{i,r,t}$. The shares are interpolated from the annual data compiled by Hughes and Seneca (1996), shown earlier in Charts 3 and 4.

These relationships allow us to write the model in terms of total employment by industry and region. Multiplying equation 1 by the relevant employment shares and summing across regions yields

$$\Delta y_{i,t} = \sum_r b_{i,r,t} \mu_{i,r,t} + c_t \sum_r b_{i,r,t} \gamma^c_{i,r} + z_{i,t} \sum_r b_{i,r,t} \gamma^z_{i,r} + \sum_r b_{i,r,t} \gamma^g_{i,r} g_{r,t} \quad ,$$

and similarly aggregating across industries yields

$$\Delta y_{r,t} = \sum_i a_{i,r,t}\mu_{i,r} + c_t \sum_i a_{i,r,t}\gamma^c{}_{i,r} + \sum_i a_{i,r,t}\gamma^z{}_{i,r} z_{i,t} + g_{r,t}\sum_i a_{i,r,t}\gamma^g{}_{i,r} \ .$$

In the absence of any restrictions, this would yield an underidentified model—one with more parameters than could be estimated using only industry and regional employment data. To reduce the number of parameters, we make the following three natural (but restrictive) assumptions:

Assumption 1. *The response of industry i employment to the aggregate factor is the same in each region:* $\gamma^c_{i,r} = \gamma^c_{i,s} = \gamma^c_i$ *for different regions, r and s.*

Assumption 2. *The response of industry i employment to sectoral shocks is the same in each region:* $\gamma^z_{i,r} = \gamma^z_{i,s} = \gamma^z_i$ *for different regions, r and s. Normalize* $\gamma^z_i = 1$.

Assumption 3. *The response of region r employment to region-specific shocks is the same across industries:* $\gamma^g_{i,r} = \gamma^g_{j,r} = \gamma^g_r$ *for different industries, i and j. Normalize* $\gamma^g_r = 1$.

The cost of these assumptions is to rule out any heterogeneity across regions for a given industry or across industries for a given region. For example, assumptions 1 and 2 say that the response of manufacturing employment to aggregate and manufacturing-specific shocks will be the same in New York as it is in the rest of the nation. Similarly, assumption 3 says that a shock to the region will affect all industries in proportion to their share of New York employment. One important implication of assumption 1 is that regions differ in their response to aggregate factors because of differences in their industry mix. This feature will be used to assess changes in the linkage between New York and the rest of the nation.

One innocuous assumption is required merely for the sake of convenience. We assume that the mean growth rate of employment in industry *i* and region *r* is the sum of an industry-specific growth rate, μ_i, and a region-specific term, μ_r, representing the region's growth rate relative to that of the nation, so that $\Sigma^n_{r=1} b_{i,r,t}\mu_r = 0$. These assumptions—plus the fact that $\Sigma^n_{r=1} b_{i,r,t} = \Sigma^k_{i=1} a_{i,r,t} = 1$—let us simplify the sectoral and regional employment equations:

$$(2) \qquad \Delta y_{i,t} = \mu_i + \gamma^c_i c_t + z_{i,t} + \sum_r b_{i,r,t} g_{r,t}$$

$$\Delta y_{r,t} = \sum_i a_{i,r,t}\mu_i + \mu_r + c_t \sum_i a_{i,r,t}\gamma^c{}_i + \sum_i a_{i,r,t} z_{i,t} + g_{r,t} \ .$$

This last equation illustrates the three ways in which changes in industry mix may affect regional employment. First, the aggregate sensitivity of employment fluctuations is a weighted average of industry factor loadings, $\Sigma_i a_{i,r,t}\gamma^c_{i,r}$. Any time variation in the region's industry mix will therefore change the aggregate sensitivity of regional employment. Second, the industry-specific shocks, z_i, affect the region directly to the extent that the industry is a source of employment in the region. Finally, the trend in regional employment includes the weighted average of the growth rates of the industries represented in the region, $\Sigma_i a_{i,r,t}\mu_i$. Therefore, as the sectoral composition of the region's employment changes, so too will the trend in its employment.

As noted above, our analysis will focus on three industries (manufacturing, FIRE, and "other") and two regions (New York and the "rest of the United States"). Because the sum of employment across regions equals the sum of employment across industries, one of these five equations is redundant. Consequently, we drop the equation for the "rest of the United States" employment.[10] In addition, rather than attempt to identify two distinct regional shocks, we drop the shock corresponding to the "rest of the United States" and interpret the New York shock, $g_{N,t}$, as a factor affecting the region's employment growth *relative* to that of the nation as a whole. Finally, the factor loading for "other" employment is normalized to 1.0. This leaves the system:

$$(3) \qquad \Delta y_{1,t} = \mu_1 + \gamma^c_1 c_t + z_{1,t} + b_{1,N,t} g_{N,t}$$

$$(4) \qquad \Delta y_{2,t} = \mu_2 + \gamma^c_2 c_t + z_{2,t} + b_{2,N,t} g_{N,t}$$

$$(5) \qquad \Delta y_{3,t} = \mu_3 + c_t + z_{3,t} + b_{3,N,t} g_{N,t}$$

$$(6) \quad \Delta y_{N,t} = \sum_i a_{i,N,t}\mu_i + \mu_N + c_t \sum_i a_{i,N,t}\gamma^c_i + \sum_i a_{i,N,t} z_{i,t} + g_{N,t} \ ,$$

where the 1, 2, and 3 subscripts represent manufacturing, FIRE, and "other" industries, respectively, and the N subscript denotes New York.

There are two possible ways to introduce dynamics into the model. One is to include lagged industry and regional employment growth (Δy_i and Δy_N) on the right-hand side of equations 3-6 to capture propagation and any feedback (occurring with a lag) between industries and regions. A second approach is to build dynamics into the unobserved factors themselves by modeling them as autoregressive processes.

The results reported in Table 2 use two specifications that incorporate these two approaches to differing degrees. In Model I, as in Norrbin and Schlagenhauf (1988), the common aggregate component is assumed to follow a second-order autoregressive process, $(1 - \rho_1 L - \rho_2 L^2)c_t = \varepsilon^c_t$. The second-order process allows the c_t factor to exhibit cyclical behavior (depending on the estimates of ρ_1 and ρ_2). The $z_{i,t}$ and $g_{r,t}$ terms were allowed to follow first-order autoregressive processes with coefficients ϕi and ϕ_N. Only the FIRE and New York shocks exhibited statistically significant serial correlation, however, so ϕ_1 and ϕ_3 were subsequently set to zero. In this version, two lags of regional and industry employment growth are included as explanatory variables.

Following Clark (forthcoming), Model II relies entirely on lagged regional and industry employment growth for its dynamics; the aggregate, industry, and regional shocks are all assumed to be uncorrelated. Four lags of employment growth are included as explanatory variables.

The model is estimated via maximum likelihood, using the Kalman filter to evaluate the likelihood function. The availability of annual regional employment data by industry for the computation of employment shares limits our analysis to the 1969-93 sample. Details on using the Kalman filter in the estimation of unobserved components models appear in Harvey (1989).

Table 2
PARAMETER ESTIMATES

Parameter	Model I Estimate	Model I Standard Error	Model II Estimate	Model II Standard Error
Standard deviation of shocks				
Aggregate (ε^c)	0.63	0.33	0.78	0.16
Manufacturing (z_1)	2.70	0.51	2.48	0.29
FIRE (z_2)	0.83	0.11	0.81	0.07
Other (z_3)	0.57	0.29	0.64	0.13
New York (g_N)	1.97	0.23	1.87	0.10
Factor loadings				
Manufacturing (γ^c_1)	2.60	1.25	3.01	0.86
FIRE (γ^c_2)	0.55	0.46	0.57	0.22
Other	1	—	1	—
Autoregressive coefficients				
Aggregate, lag 1 (ρ_1)	1.29	0.48	—	—
Aggregate, lag 2 (ρ_2)	-0.46	0.42	—	—
FIRE (ϕ_2)	0.56	0.22	—	—
New York (ϕ_N)	0.82	0.11	—	—

Source: Authors' calculations.

Notes: Results are based on the model in equation 3, estimated via maximum likelihood on quarterly data from first-quarter 1969 through fourth-quarter 1993. Estimated constants and coefficients on lagged employment growth are not reported.

RESULTS

MODEL ESTIMATES

Estimates of the model's key parameters for both specifications appear in Table 2. The estimated factor loadings confirm standard views on industries' relative sensitivities to aggregate shocks. With an estimated γ^c of 2.60 in the Model I specification, manufacturing exhibits a much larger sensitivity to the aggregate component than does "other" employment, whose factor loading was normalized to 1.0. By contrast, FIRE's coefficient is only 0.55, making it significantly less sensitive to the aggregate shock. The estimates for the alternative specification are highly similar.

Not only does manufacturing exhibit a greater sensitivity to aggregate fluctuations, but it is also characterized by larger idiosyncratic shocks. In Model I, the standard deviation of manufacturing shocks is 2.70 (in units of an annualized percentage growth rate), compared with 0.83 for FIRE and 0.57 for "other" employment. (Again, the results from Model II are very similar.) Another interesting feature of the New York shocks is their high degree of autocorrelation, reflected in the ϕ_N estimate of 0.82. This suggests that region-specific factors have highly persistent effects on the local economy, outlasting the effects of aggregate or industry shocks.

New York's sensitivity to the underlying aggregate factor is plotted in Chart 6, using the Model I specification. This coefficient is a weighted average of the factor loadings of the region's industries, $\Sigma_i a_{i,N,t}\gamma_i^c$, and it varies over time with changes in the $a_{i,N,t}$ weights.[11] The fact that it is always greater than 1.0 simply means that the region's employment is more sensitive to aggregate fluctuations than it would be if all employment fell into the "other" category. The downward trend reflects the region's shift from cyclically sensitive manufacturing industries. This trend parallels a similar decline in the analogous coefficient for the United States, where manufacturing employment also fell steadily. However, because of its smaller manufacturing share, New York employment has always been less sensitive to aggregate fluctuations than has the nation's employment.

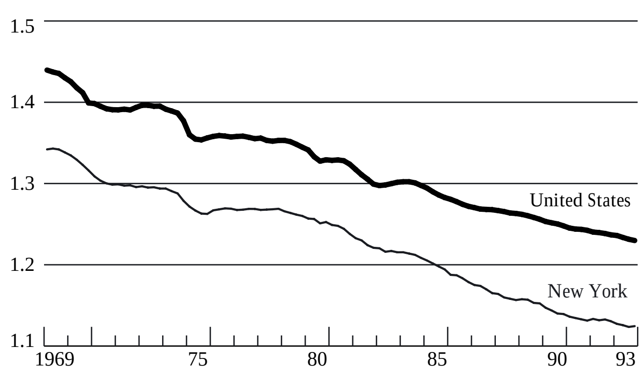
SOURCES OF EMPLOYMENT FLUCTUATIONS

How do aggregate, industry, and regional shocks account for fluctuations in New York area employment? Although it is difficult to tell directly from the parameter estimates, those estimates can be used to decompose the variance of New York employment into the shares attributable to the various shocks. The decomposition for the four-quarter horizon appears in Table 3.[12]

Because the region's sensitivity to aggregate and industry shocks is allowed to vary over time, the table presents the decomposition corresponding to the industry mix

Chart 6

Sensitivity of New York and U.S. Employment to Aggregate Fluctuations



Source: Authors' calculations.

Table 3

VARIANCE DECOMPOSITION OF NEW YORK EMPLOYMENT GROWTH

	Shocks' Contribution to the Variance of New York Employment at Four-Quarter Horizon				
		Industry			
Year	Aggregate	Manufacturing	FIRE	Other	New York
Model I					
1969	37	4	5	1	53
1993	36	2	6	2	54
Model II					
1969	36	7	8	4	45
1993	34	4	9	5	47

Source: Authors' calculations.

Notes: Figures are in percentages. Results are based on the model in equation 3, estimated via maximum likelihood on quarterly data from first-quarter 1969 through fourth-quarter 1993. Estimated constants and coefficients on lagged employment growth are not reported.

prevailing at the beginning and at the end of the sample. Comparing the two years shows that developments in the nation have become marginally less important for the region's economy, with the variance share attributable to the aggregate shock declining slightly in both specifications. There has also been a slight increase in the relative importance of region-specific factors. On average, industry shocks have not played a particularly large role in New York's fluctuations; manufacturing's already small contribution declines from 1969 to 1993, while FIRE's rises slightly.[13]

How have these factors contributed to the region's fluctuations during specific episodes? To answer this question, Chart 7 plots the shocks' contributions over time, using the Model I specification. Each of the five panels shows the path of New York employment attributable to each shock in turn (that is, setting each of the other four shocks to zero). The black line in each panel is actual employment growth; the blue line represents that shock's contribution.

The variance decomposition's assessment of the five shocks' relative importance is confirmed here. As shown in panel A, aggregate shocks account for a large share of New York employment fluctuations—especially those associated with business cycles. Panel B confirms manufacturing's small contribution. Only in the 1974-75 recession does the industry make a visible impact on the region. The contribution of "other" shocks, shown in panel D, is also small.

While shocks to FIRE employment have not played a particularly large role on average, they have figured prominently during certain episodes. As shown in panel C, financial services' contribution to New York employment growth was distinctly positive in the late 1970s. By contrast, the sector represented a major drag on the region's growth from 1987 through 1990, exacerbating the effects of the aggregate downturn.

A significant share of New York employment fluctuations remains unexplained by aggregate and industry factors, however. This residual is attributed to the New York shocks, shown in panel E. It appears that New York was hit by persistent adverse shocks in the 1970s—shocks evidently unrelated to any aggregate or industry-specific weakness. (In fact, except for the 1974-75 recession, the aggregate contribution was positive for most of the decade.) Adverse regional shocks also played some role in New York's lackluster performance in the early 1990s. Interestingly, the aggregate contraction during the 1981-82 recession was largely offset by positive regional factors. The result was that while total employment in the United States fell sharply in that episode, New York employment basically held steady.

Conclusion

This paper presented two complementary ways of describing the relationship between New York and national employment fluctuations and assessing the role of aggregate, industry, and regional factors.

We found that the region and the nation move together closely at cyclical frequencies. There appears to be some decrease in the magnitude of the region's response to aggregate fluctuations, consistent with the declining share of cyclically sensitive industries in the region.

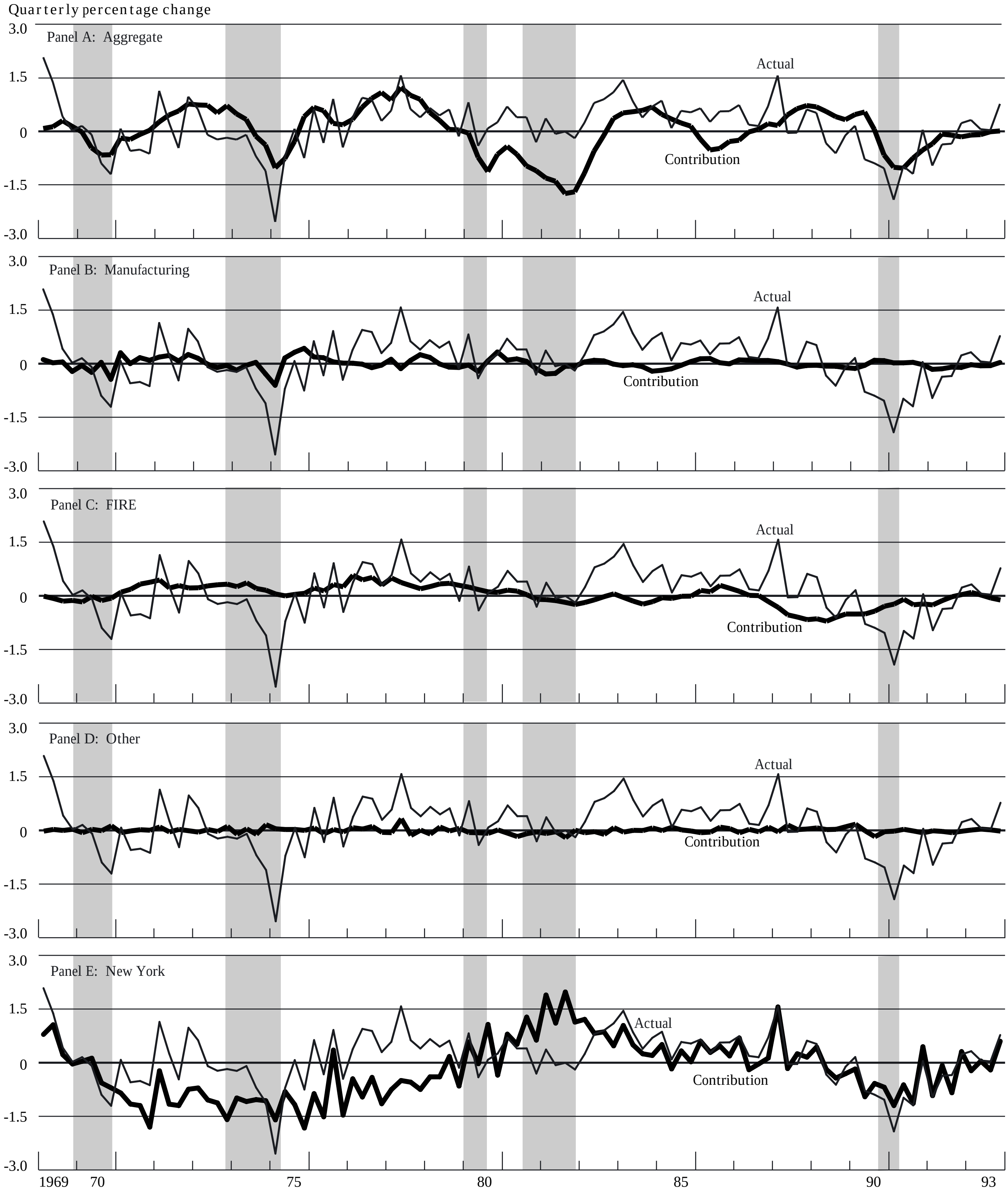
At lower frequencies (longer horizons), New York follows the nation much less closely. During the mid-1970s, the region's persistent stagnation seems to be attributable to region-specific factors. In the late 1980s and early 1990s, much of New York's slow growth can be traced to weakness in the financial services industry. By contrast, Wall Street has been credited with leading the region's recovery over the past two years (for example, see Levy [1996]).[14]

The analysis presented here begs the question of exactly what those shocks represent. While employment data alone do not permit us to address this question, the analysis suggests three possibilities. One is that regional shocks capture the effects of factors that *literally* affect only the New York metropolitan area. Examples might include natural disasters or New York's 1975 fiscal crisis.

Another possibility is that the New York shocks are picking up the effects of regional heterogeneity within a given industry—heterogeneity that is ruled out by the aggregation assumptions used in the model. For example, cities with an older industrial base tended to suffer more

Chart 7

Contributions of Shocks to New York Employment Growth



Source: Authors' calculations.

Note: Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

during manufacturing downturns, as the older, marginal plants were typically the first to close. The region-specific shock corresponding to Broadway's woes in the mid-1970s—a factor cited by Netzer (1997)—can be thought of as resulting from heterogeneity within the entertainment industry. (Presumably, Hollywood was not similarly affected.)

A third potential source of region-specific shocks is differences in the regional representation of industries lumped into the "other" category. For example, if wholesale trade employment made up a larger share of New York's employment than of other regions' employment, shocks to that industry would have a disproportionate effect on the metropolitan economy—but a relatively small effect on "other" employment for the nation as a whole. The very broad aggregation scheme used may therefore lead the model to attribute too much to region-specific shocks.

Although the analysis presented here could not identify the *causes* of New York employment fluctuations, the results can be used to characterize the nature of those fluctuations. To move from this characterization to an understanding of the fluctuations' causes will require going from a purely statistical to a microeconomic analysis.

ENDNOTES

1. This restructuring is documented and discussed in Orr (1997).

2. The trend component is generated by applying a low-pass filter, which eliminates frequencies higher than $\pi/16$, while the cyclical component is generated by a band-pass filter, which eliminates all frequencies between $\pi/6$ and $\pi/32$.

3. The frequency-domain filters are implemented in the time domain by using a two-sided moving-average filter. The ideal filter's moving-average weights are truncated at twelve leads and lags; hence the loss of three years of quarterly data. Baxter and King (1995) discuss the properties of the filters for different approximation lags.

4. Here, "national" is defined as U.S. *minus* New York employment.

5. Data are from Hughes and Seneca (1996).

6. This hypothesis does not necessarily contradict the McCarthy and Steindel (1996) findings that regional factors were behind the persistence of the slump in the 1970s, while national factors were to blame for the 1990s. In their bivariate vector autoregression, an industrial shock is identified as an aggregate shock if it hits the region and the rest of the U.S. economy at the same time, but it is identified as a regional shock if it affects the rest of the United States with a lag.

7. Since they are not constrained to have no long-run effects, the aggregate shocks may represent things other than purely cyclical phenomena.

8. Campbell and Kuttner (1996) discuss this issue in the context of industry-specific reallocation shocks.

9. In this application, $k = 3$ (manufacturing, FIRE, and "other") and $n = 2$ (New York and the rest of the United States).

10. Noting that the sum of employment across industries does not equal the sum across regions, Clark (forthcoming) retains the full set of equations.

11. This measure bears a resemblance to the elasticity of regional to national employment reported by McCarthy and Steindel (1996). The two measures are not directly comparable, however, because employment growth in the United States as a whole is not a "pure" measure of the aggregate shock.

12. Although the results for longer horizons are similar to those reported, region-specific shocks account for a greater share of New York employment fluctuations at shorter horizons.

13. Manufacturing's small contribution is only partly due to its modest share of area employment, however. With the aggregate shock accounting for 59 percent of the variance of manufacturing employment growth, a relatively small role is played by idiosyncratic manufacturing shocks.

14. Unfortunately, the data used in this study end in 1993, so it is not possible to assess the recent contribution of financial services.

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