

# The Performance of Metropolitan Area Industries

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**T**he economy of the metropolitan region centered around New York City went into a sharp decline at the end of the 1980s. That decline was linked to the national recession, which began in 1989. The economic losses in the region were more severe than in most other metropolitan areas. (The reasons are documented in an earlier paper, Drennan [1996].) The recovery of the region's economy has been slower than in most other regions as well. In the 1989-92 decline, the region lost 624,000 jobs, and in the recovery since 1992, the region has gained only 291,000 jobs, or less than half of those lost. But the aggregate employment numbers tell only part of the story. A more interesting, and less pessimistic, story is revealed in the earnings by sector and industry. Indeed, the aggregate earnings of the region are higher now, in real terms, than they were in 1988. That reflects higher productivity and, possibly, a shift in indus-

try composition from less productive to more productive industries.

In this paper, I analyze the performance of the region's industries over the recent economic decline and recovery. In the next section, I present the taxonomy of industries employed here. That taxonomy, adopted from international trade theory, displaces economic base theory, which sorts industries into basic (export) and nonbasic (local). The region's economy is compared with the national economy in the context of the taxonomy developed. I then present a model of regional economic growth based on trade, specialization, and agglomeration economies. That model, which seeks to explain growth of real per capita income, has been estimated with annual data for the region. The cross-section version of that model was developed in another paper (Drennan and Lobo 1996). A second model develops the exogenous character of the traded goods and services sector for aggregate regional growth. I conclude the paper by describing recent employment trends in the two-digit Standard Industrial Classification (SIC) industries of the region.

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## TRADED GOODS AND SERVICES INDUSTRIES: BROAD TRENDS

### INTERNATIONAL TRADE THEORY AND ECONOMIC BASE THEORY

International trade theory identifies two sectors in an economy: traded goods and services and nontraded goods and services. The first is subject to competition from other economies for both foreign markets and the local market. Changes in incomes, relative prices, demand, and exchange rates, both at home and abroad, affect the fortunes of the traded goods and services sector. The nontraded goods and services sector is not subject to competition from other economies and only produces for the local market. Wage levels in the nontraded goods and services sector, however, are determined by wages in the traded goods and services sector (Caves, Frankel, and Jones 1996).

Economic base theory applies to regions, states, or urban areas within a nation. Again, the economy is split into two sectors: basic and nonbasic. The basic sector is engaged in competition for markets beyond the home region and is affected by changes in incomes, relative prices, and demand in other markets as well as in the home market. The nonbasic sector is not subject to competition from other economies, and its growth or decline depends entirely on the fortunes of the basic sector through a Keynesian-type multiplier. The crudest form of the economic base model assumes that all goods production (manufacturing and mining, as well as agriculture in a region that is not just urban) is basic, while everything else is nonbasic. Although that assumption may have been roughly right when it was first promulgated (Haig 1928), it is now silly and wrong. Private higher education in Boston, financial services in New York, tourism in Las Vegas, and even retirement communities in Fort Lauderdale are major “basic” industries for those cities, drawing in large revenues from nonresidents.

A less crude form of the economic base model sorts industries into export and local based on location quotients. Any industry that has a higher share of regional output or employment than the national average share for that industry is classified as an export industry, while all other

industries are classified as local. Although that refinement recognizes the export possibility for service industries, it does not recognize the very real export possibility of industries in goods or services that are not specialties of the region. Nor does it recognize the possibility of growth through import substitution or decline through increased imports. The only exogenous growth force is the collection of export industries, a critical flaw (Richardson 1969). And even worse, according to one source, “in a national context it [economic base theory] is simply mercantilism” (Leven 1985).

The international trade model approach is not encumbered with those shortcomings. The classification of industries into traded goods and services and nontraded goods and services is determined by whether or not the industry’s output can be exported and imported. So all of manufacturing, mining, wholesale trade, and communications; some transportation; all finance, insurance, and real estate; and some services (health, education, law, and business services) are traded goods and services. Nontraded goods and services include construction, retail trade (with exceptions where tourism and business travelers are important), public utilities, local transportation, some services, and government (except in state capitals and Washington, D.C.).

### INDUSTRY CATEGORIES

In this paper, traded goods and services are split into three functional categories based on a taxonomy developed by Stanback and Noyelle (1983). Goods production and distribution include all activities of producing, transporting, and distributing goods, that is, all manufacturing, mining, wholesale trade, and rail, water, and truck transport. Producer services include services that are in large part intermediate—in other words, they sell more of their output to other producers than to final demand. There are twelve two-digit SIC industries included in this category: depository institutions (banks), nondepository financial institutions, securities and commodity brokers, insurance companies, insurance agents, real estate, investment firms, business services, motion pictures, legal services, engineering and management firms, and miscellaneous services. Consumer services are private health and private education.

Nontraded goods and services are also split into

three parts. The largest segment is local private goods and services, which include construction, local transportation, public utilities, retail trade (except eating and drinking places), personal services, repair services, social services, museums, and membership organizations. All government is the second part of nontraded goods and services. The third and smallest part of nontraded goods and services is ancillary services, which are services to business travelers and tourists: eating and drinking places, hotels, and amusement services.

Two industries that are included in local private goods and services should be included in producer services, but are excluded because of disclosure problems in pub-

lished data sources. Communication (telephone, television, and radio broadcasting) and air transportation are often not disclosed separately in metropolitan earnings data because they are dominated by a few large firms. Although this paper is about the largest metropolitan area, comparisons require a consistent set of industries in each category.

#### THE REGION AND THE NATION COMPARED

By measures of aggregate economic size, the region has been shrinking relative to the nation (Table 1). In 1969, the region had almost 10 percent of the U.S. population, but twenty-five years later it had 7.6 percent. Its share of national earnings slipped from almost 12 percent to 10 percent, and its share of national employment dropped from 10.5 percent to 7.4 percent in that period. But measures of living standards and productivity tell a different story. Per capita personal income in the region was 129 percent of the national average in 1969, and it was up to 134 percent in 1994. In between, it first dropped in the decade of the 1970s, to 118 percent, then rose sharply to 144 percent at the end of the 1980s before falling in the current downturn to 134 percent. Earnings per employee were 113 percent of the national average in 1969. They were slightly lower in 1979, but then shot up to 136 percent in 1989, and edged down to 135 percent in 1994. So the region may be smaller, but it is definitely not poorer than it was twenty-five years ago.

In terms of the three traded goods and services sectors, the region's shares of the national totals have been dropping. Goods production and distribution dropped from more than 11 percent in 1969 to less than 8 percent in 1994. Producer services dropped from 21 percent to below 17 percent, and consumer services from 12 percent to 11 percent. Comparing the region's share of national earnings with the shares for each sector, it becomes clear that the region is less specialized than the nation in goods production and distribution, decidedly more specialized than the nation in producer services, and about the same as the nation in consumer services.

The composition of the region's economy by the three traded goods and services sectors and the three non-traded goods and services sectors over twenty-five years is

Table 1  
THE REGION AND THE NATION, 1969-94

	1969	1979	1989	1994
<b>Population</b>				
CMSA (millions)	19.3	18.9	19.5	19.7
U.S. (millions)	201.3	224.6	246.8	260.3
CMSA/U.S.	9.6%	8.4%	7.9%	7.6%
<b>Per capita personal income</b>				
CMSA	\$4,912	\$10,680	\$23,851	\$29,021
U.S.	\$3,813	\$9,017	\$16,610	\$21,696
CMSA/U.S.	128.8%	118.4%	143.6%	133.8%
<b>Earnings</b>				
CMSA (billions)	\$73	\$149	\$336	\$409
U.S. (billions)	\$619	\$1,553	\$2,983	\$4,080
CMSA/U.S.	11.8%	9.6%	11.3%	10.0%
<b>Employment</b>				
CMSA (millions)	9.1	9.4	11.0	10.5
U.S. (millions)	87.0	109.0	133.0	141.0
CMSA/U.S.	10.5%	8.6%	8.3%	7.4%
<b>Earnings/employment</b>				
CMSA	\$8,022	\$15,851	\$30,545	\$38,952
U.S.	\$7,115	\$14,248	\$22,429	\$28,936
CMSA/U.S.	112.7%	111.3%	136.2%	134.6%
<b>Goods production and distribution earnings</b>				
CMSA (billions)	\$27	\$50	\$84	\$88
U.S. (billions)	\$236	\$572	\$943	\$1,130
CMSA/U.S.	11.4%	8.7%	8.9%	7.8%
<b>Producer services earnings</b>				
CMSA (billions)	\$13	\$31	\$93	\$125
U.S. (billions)	\$62	\$187	\$535	\$748
CMSA/U.S.	21.0%	16.6%	17.4%	16.7%
<b>Consumer services earnings</b>				
CMSA (billions)	\$4	\$11	\$30	\$45
U.S. (billions)	\$33	\$99	\$275	\$413
CMSA/U.S.	12.1%	11.1%	10.9%	10.9%

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Note: CMSA refers to the New York–New Jersey consolidated metropolitan statistical area.

shown in Table 2. The three traded goods and services sectors collectively exhibit remarkable stability in their share of total earnings, ranging from 61 to 62 percent of all earnings. If one believed in economic base theory, that would imply a long-run multiplier of 1.6 (1.00/0.61), which does not seem to be an implausible number. On the other hand, if one believed that goods production was the only source of export earnings, San Francisco would have a multiplier of 10 (1.00/0.10) and San Diego would have a multiplier of 2.5 (1.00/0.40) because of their very different shares of manufacturing earnings.

Although the collective share of traded goods and services in the region's economy has been stable, the shares by sector show a marked change in composition. In 1969, goods production and distribution was 37 percent of the region's earnings, and producer services was less than 18 percent. By 1994, goods production and distribution was down to 21 percent, while producer services was up to

almost 31 percent. Consumer services went from less than 6 percent to 11 percent in that twenty-five-year period. Even in the most recent period of economic decline, 1989-92, the producer services share rose from 28 percent to 31 percent, while the goods production and distribution share fell from 25 percent to 21 percent. The smallest of the three sectors, consumer services, rose from 6 percent of earnings in 1969 to 11 percent in 1994.

### TRADE, SPECIALIZATION, AND AGGLOMERATION ECONOMIES: A MODEL OF ECONOMIC GROWTH

#### A MODEL OF PER CAPITA INCOME GROWTH IN THE REGION

In Drennan and Lobo (1996), a formal model of economic growth is presented in which, as in Glaeser et al. (1992) and Glaeser, Scheinkman, and Shleifer (1995), metropolitan areas are treated as separate and open economies sharing common pools of capital. The productivity of labor in metropolitan area  $i$  at time  $t$  is a function of both location-specific externalities and industry-specific productivity determinants. In this paper, that model is adapted for one metropolitan area, the New York–New Jersey consolidated metropolitan statistical area (CMSA). Consequently, the observations are years rather than metropolitan areas. Per capita income in the region,  $Y_t$  is given by

$$(1) \quad Y_t = A_t f(GPD_t, PS_t, CS_t),$$

where  $f(\bullet)$  is a production function in which the arguments are earnings in each of the three traded goods and services sectors of the metropolitan area, that is, the industry-specific productivity determinants. Earnings are a better measure of labor inputs than employment because they reflect not only the quantity but also the quality of labor inputs. And unlike the standard Cobb-Douglas production function, it is not all labor in the place that determines the level of per capita income, but the labor in the traded goods and services sectors.

The location-specific productivity parameter,  $A_t$ , is intended to capture three factors. The first is agglomeration economies of localization or industry specialization

Table 2  
EARNINGS BY SECTOR, NEW YORK–NEW JERSEY CMSA,  
1969-94

Sector	Billions of Dollars			
	1969	1979	1989	1994
Goods production and distribution	27.4	50.0	83.7	83.7
Producer services	12.9	30.7	93.0	125.2
Consumer services	4.2	11.1	30.0	45.4
TOTAL TRADED GOODS AND SERVICES	44.5	91.8	206.7	254.3
Local private goods and services	17.5	32.9	72.7	84.6
Government	9.2	20.0	45.4	56.1
Ancillary services	2.1	4.3	11.2	13.9
TOTAL NONTRADED GOODS AND SERVICES	28.8	57.2	129.3	154.6
TOTAL EARNINGS	73.3	149.0	336.0	408.9
	Percent Share			
Goods production and distribution	37.4	33.6	24.9	20.5
Producer services	17.6	20.6	27.7	30.6
Consumer services	5.7	7.4	8.9	11.1
TOTAL TRADED GOODS AND SERVICES	60.7	61.6	61.5	62.2
Local private goods and services	23.9	22.1	21.6	20.7
Government	12.6	13.4	13.5	13.7
Ancillary services	2.9	2.9	3.3	3.4
TOTAL NONTRADED GOODS AND SERVICES	39.3	38.4	38.5	37.8
TOTAL EARNINGS	100.0	100.0	100.0	100.0

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Note: CMSA=consolidated metropolitan statistical area.

(Isard 1954; Henderson 1974), measured by the percentage of total earnings accounted for by each of the three traded goods and services sectors. The second is urbanization, or external scale economies (Marshall 1890; Hoover 1937; Chinitz 1961), measured by total population. And the third is the enhancement or diminution of the above two factors by the intensity of labor utilization, measured by the employment-to-population ratio. The growth rate of the  $A$  term is then

$$(2) \quad \frac{A_t}{A_0} = f\left(S_{j_0}, N_0, \frac{EPOP_t}{EPOP_0}\right),$$

where  $S_{j_0}$  denotes the initial share of aggregate earnings in the traded goods and services sector,  $N_0$  denotes total population in the initial period, and  $\frac{EPOP_t}{EPOP_0}$  denotes growth in the intensity of labor utilization, measured by the employment-to-population ratio.

In addition to the variables in the  $A$  term, the fully specified equation includes earnings in each of the three traded goods and services sectors plus initial per capita personal income to test for convergence or divergence of per capita income over time. The equation was estimated in logs of first differences for all variables except initial specialization in each of the three sectors, initial total population (the measure of urbanization economies of agglomeration), and initial per capita income.

The model has the functional form

$$(3) \quad Y_t = A_t GPD_t^{\beta_1} PS_t^{\beta_2} CS_t^{\beta_3},$$

which is rewritten in terms of growth as

$$(4) \quad \ln\left(\frac{Y_t}{Y_0}\right) = \ln\left(\frac{A_t}{A_0}\right) + \beta_1 \ln\left(\frac{GPD_t}{GPD_0}\right) + \beta_2 \ln\left(\frac{PS_t}{PS_0}\right) + \beta_3 \ln\left(\frac{CS_t}{CS_0}\right).$$

Equation 4 specifies that the rate at which metropolitan per capita income grows is determined by the location-specific factors represented in the  $A$  term (localization or specialization economies, urbanization or size of place economies, and the intensity of labor utilization) and by growth in earnings of the three traded goods and services sectors.

Equation 4 has been estimated for the New York–New Jersey CMSA using annual data for the period 1969–93. All dollar amounts have been deflated by the GDP implicit price deflator, with 1987=100. The estimated equation is presented in Table 3.

The smallest of the three traded goods and services sectors, consumer services, has been dropped from the equation because neither its growth variable nor its initial share variable is significant. The adjusted R-squared is 0.95, which is quite good for an annual growth equation. The Durbin-Watson statistic of 2.48 is not good, even after adding a first-order autoregressive term, AR(1).

The coefficients on the two earnings growth variables, producer services (LDRSPS) and goods production and distribution (LDRSGPD), are positive, as expected, and highly significant. The coefficient on the goods production and distribution variable is more than four times larger than the coefficient on the producer services variable— .316, compared with .072. So a 1 percent increase in

Table 3  
REAL PER CAPITA INCOME GROWTH  
Period (Adjusted): 1971–93

Variable	Coefficient and t-Statistic
Intercept	-4.436 (5.5)
LDRSPS	.072 (3.0)
LDRSGPD	0.316 (6.9)
LRSGPDSH (-1)	0.125 (4.7)
LRSPSSH (-1)	0.128 (4.6)
LDSEPOP	0.221 (2.9)
LRSPCPI (-1)	-0.031 (-0.6)
LSPOP (-1)	0.399 (5.9)
AR (1)	-0.461 (-2.2)
n	23
R-squared	0.954
Durbin-Watson statistic	2.48
F	58.1

Source: Author's calculations.

goods production and distribution earnings adds much more to real per capita income growth than a 1 percent increase in producer services earnings. However, for the time period covered, goods production and distribution real earnings increased in only eleven of the twenty-five years, while producer services real earnings increased in eighteen of the twenty-five years, and the percent increases tended to be much larger.

The coefficients on the shares of earnings in goods production and distribution and producer services in the prior year (LRSGPDSH-1 and LRSPSSH-1) are also positive and highly significant, indicating that greater specialization (economies of localization) in those two traded goods and services sectors adds to real per capita income growth. Interestingly, the coefficients are almost identical, .125 and .128, respectively.

The measure of growth in the intensity of labor utilization, LDSEPOP, also has a positive and highly significant coefficient. Given that that variable rose from 47.2 percent in 1969 to 56.7 percent in 1989, then dropped to 52.7 percent by 1993, it has doubtless been important in the growth of real per capita income. The coefficient on the prior year's per capita personal income is almost zero and not close to statistical significance ( $t=-0.64$ ). So, the prior year's level of per capita income has no effect on growth. The prior year's population, the measure of urbanization economies, has a large positive coefficient and is very significant ( $t=5.9$ ).

These results strongly support the hypotheses embodied in the metropolitan per capita income growth model developed above. However, I had anticipated that growth in producer services earnings and specialization in producer services would have added more to per capita income growth than goods production and distribution growth and specialization. But the case is almost the opposite, with goods production and distribution earnings growth having a coefficient more than four times larger than the producer services earnings growth variable, and the two specialization variables having almost identical coefficients. But given that goods production and distribution earnings fell in more years than they rose, the inference is that, to offset any given percentage decline in goods

production and distribution earnings, producer services earnings must rise by a much larger percent.

#### A MODEL OF AGGREGATE INCOME DETERMINATION IN THE REGION

The original, large-scale model that I developed (Drennan 1985) of the region and New York City has 250 equations. About 150 of those equations are stochastic; the rest are identities. The model estimates output (gross regional product and gross city product) and employment in each of fifty-three two-digit SIC industries for both the city and region. It was most recently reestimated with annual data for the period 1958-93. That model is an economic base model in which the fifty-three industries are sorted into export industries and local industries based on location quotients.

For this paper, I have developed an aggregated trade model in which the three traded goods and services sectors of the region are linked to national and international variables as well as to a relative price-level variable. The nontraded goods and services sector is then linked to the sum of the traded goods and services sectors with a lag. The substantive purpose is to show the viability of a causal model for the region in which the model structure is based on trade theory rather than on economic base theory.

The model equations are

1.  $GPD_t = f(X_t, I_t)$ ;
2.  $PS_t = g(X_t, I_t)$ ;
3.  $CS_t = h(X_t, I_t)$ ;
4.  $TGS_t = GPD_t + PS_t + CS_t$ ;
5.  $NTGS_t = k(TGS_{t-1}, L_t)$ ; and
6.  $RE_t = TGS_t + NTGS_t$ ,

where GPD is aggregate real earnings in the goods production and distribution sector of the region in year  $t$ ,  $PS$  and  $CS$  are the same for the other two traded goods and services sectors (producer services and consumer services),  $X$  is a vector of national variables, and  $I$  is a vector of international variables, not all of which appear in every equation.  $TGS$  is the sum of earnings in the three traded goods and services sectors.  $NTGS$  is earnings in all the nontraded goods and services industries, and  $L$  is a vector of local variables.  $RE$  is total earnings in the region, that is, the

sum of traded goods and services earnings and nontraded goods and services earnings.

All the dollar variables are in real 1987 dollars. The estimation period is 1969-93. All but one of the stochastic equations have been estimated in log form in order to estimate elasticities. A number of different estimated equations are shown for each of the three traded goods and services sectors to show that they each march to a different drummer. Table 4 presents the estimated equations for the three traded goods and services sectors in which there are only national variables. They are the log of the U.S. unemployment rate (LNUN), the log of the ratio of the consumer price index (CPI) for the region to the national CPI (LNSCPIUS, a measure of regional prices relative to national prices), and the log of U.S. GDP (LNGDP).

The goods production and distribution equation has an adjusted R-squared of only 0.78. Both the unemployment rate (LNUN) and the relative price variable (LNSCPIUS-2) have negative coefficients, as expected, and both are highly significant. However, the U.S. GDP variable has the wrong sign, negative, and it is significant. The coefficient indicates that a 1 percent rise in GDP leads to a -0.2 percent drop in the region's goods production and distribution sector.

*Table 4*  
TRADED GOODS AND SERVICES, DOMESTIC EQUATIONS  
Dependent Variables, Coefficients, and t-Statistics

Variable	LRSGPD	LRSPS	LRSCS
Intercept	20.1 (0.7)	-2.57 -(0.5)	2.72 (1.1)
LNUN	-0.215 -(8.5)	0.198 (2.4)	0.24 (1.8)
LNSCPIUS (-2)	-0.888 -(4.5)	-1.022 -(1.0)	3.133 (2.4)
LNGDP	-0.187 -(2.3)	2.42 (4.5)	1.63 (5.4)
AR (1)	-0.088 -(0.3)	0.93 (3.8)	0.767 (3.3)
AR (2)	0.547 (2.1)	-0.108 -(0.4)	-0.148 -(0.6)
n	23	23	23
R-squared	0.78	0.99	0.91
Durbin-Watson statistic	1.91	2.08	2.12
F	16.6	385	46

Source: Author's calculations.

The producer services equation has an adjusted R-squared of 0.99. The unemployment variable has the wrong sign, and it is significant. The relative price variable, lagged two years, has the right sign, negative, but it is not even close to statistical significance. The U.S. GDP variable has a positive coefficient, and it is highly significant. The coefficient indicates that a 1 percent rise in U.S. GDP results in a very large 2.4 percent rise in the region's producer services earnings. Clearly, the producer services sector is quite distinct from the goods production and distribution sector.

The consumer services equation has an adjusted R-squared of 0.91. Both the unemployment rate and the relative price variables have the wrong signs—positive. The unemployment rate variable is not quite significant, while the relative price variable is significant. The U.S. GDP variable has a positive, highly significant coefficient. The elasticity estimate, +1.6, is not as high as the producer services elasticity estimate of +2.4.

The second set of equations (Table 5) introduces some international variables, namely the trade-weighted

*Table 5*  
TRADED GOODS AND SERVICES, INTERNATIONAL EQUATIONS  
Dependent Variables, Coefficients, and t-Statistics

Variable	LRSGPD	LRSPS (1)	LRSPS (2)	LRSCS
Intercept	20.4 (34.7)	3.14 (0.96)	15.65 (16.4)	2.38 (0.6)
LNUN	-0.195 -(7.9)			0.164 (1.2)
LNSCPIUS (-2)	-1.08 -(4.7)			2.59 (1.6)
LNEUR	-0.196 -(3.1)	1.96 (5.1)		1.81 (4.3)
LEXCHRT	-0.065 -(1.5)	-0.186 -(1.4)	-0.297 -(1.7)	0.089 -(0.4)
LRSVEXP				0.376 (8.1)
AR(1)	-0.157 -(0.4)	1.33 (5.9)	0.803 (3.4)	0.694 (2.6)
AR(2)	0.466 (1.8)	-0.508 -(2.6)	-0.153 -(0.7)	-0.047 -(0.2)
n	23	23	23	23
R-squared	0.77	0.98	0.97	0.91
Durbin-Watson statistic	1.9	2.09	2.02	2.04
F	13.2	308	161	36.8

Source: Author's calculations.

exchange rate (LEXCHRT), the real GDP of the European members of the Organization for Economic Cooperation and Development (LNEUR), and the producer services exports of the United States (LRSVEXP). The goods production and distribution sector equation is no better than the domestic version, with an adjusted R-squared of 0.77. The unemployment rate and relative price variables are negative, as expected, and highly significant. The European GDP variable is negative and significant, as was the U.S. GDP variable, and the coefficients are almost identical (-0.20 compared with -0.19). The exchange rate variable is negative, as expected, but close to zero (-0.065) and insignificant.

Two equations are shown for the producer services sector. The first includes two independent variables: the exchange rate and the European GDP. The adjusted R-squared is 0.98, almost the same as in the domestic producer services equation. The coefficient on the exchange rate variable is negative, as expected, but not significant ( $t=-1.4$ ). However, it is three times larger than the exchange rate coefficient in the goods production and distribution equation, suggesting that the producer services sector is more sensitive to the exchange rate than the region's goods production and distribution sector. The coefficient on the European GDP variable is positive, as expected, and very significant. The coefficient indicates an elasticity of the region's producer services earnings to European GDP of +1.96, which is lower but similar in magnitude to its elasticity with respect to U.S. GDP of +2.4, as noted above.

In the second producer services sector equation, the European GDP variable is replaced by U.S. producer services exports. The adjusted R-squared is somewhat lower (0.97). The exchange rate variable continues to be negative and insignificant, but it is larger, -0.30, and less insignificant ( $t=-1.7$ ). The U.S. producer services export variable is positive and highly significant. The coefficient of +0.38 indicates that a 1 percent rise in producer services exports from the United States raises the region's producer services earnings by almost 0.4 percent. Given that U.S. exports of producer services were \$61 billion in 1995 and that the region's producer services earnings were \$125 billion in 1994 (Table 1), the latest figures available, then a

1 percent rise in those exports would be \$610 million. Such a hypothetical increase would induce a 0.38 percent rise in the region's producer services earnings, or a rise of \$475 million.

The consumer services equation with two international variables is no better than the domestic consumer services equation noted above. The only significant variable is the measure of aggregate demand, in this case the European GDP. In the domestic case, it is the U.S. GDP.

The last stochastic equation of this model, equation 5, relates the nontraded goods and services sector earnings to the traded goods and services sector earnings lagged one year and to the unemployment rate (Table 6). The first version of equation 5 is estimated in log form to estimate the elasticity. The adjusted R-squared is 0.96. The coefficient on the lagged value of the log of traded goods and services earnings, LRSTGS(-1), is +0.62 and it is highly significant ( $t=4.8$ ). That indicates that a 1 percent rise in traded goods and services earnings adds +0.62 percent to nontraded goods and services earnings the following year. The unemployment rate (LNUN) coefficient is negative, as expected, but it is not significant ( $t=-1.2$ ).

The second version of equation 5 is estimated in

Table 6  
NONTRADED GOODS AND SERVICES EQUATIONS

	Log Equation	Linear Equation	
	Dependent Variable: LRSNTGS	Dependent Variable: RSNTGS	
	Coefficient and t-statistic		Coefficient and t-statistic
Intercept	6.83 (2.8)	Intercept	47,498,240 (3.3)
LRSTGS (-1)	0.619 (4.8)	RSTGS (-1)	0.369 (4.4)
LNUN	-0.051 (-1.2)	UN	-633,747 (-1.1)
AR (1)	1.37 (6.8)	AR (1)	1.41 (7.0)
AR (2)	-0.607 (-3.1)	AR (2)	-0.604 (-3.0)
n	22	n	22
R-squared	0.96	R-squared	0.96
Durbin-Watson statistic	2.06	Durbin-Watson statistic	2.00
F	137	F	141

Source: Author's calculations.



linear form to estimate the multiplier,  $k$ , where  $k^*(traded\ goods\ and\ services\ earnings,\ lagged) = total\ earnings$ . The multiplier  $k$  should not be estimated directly by regressing total earnings on traded goods and services earnings because the left-hand variable includes the right-hand variable, and so the estimate would be biased. To avoid bias, I regress non-traded goods and services on traded goods and services. It can be shown that the resulting coefficient on the traded goods and services variable,  $b$ , is  $b=k-1$ , and so  $k=b+1$  (Drennan 1985).

The linear equation also has an R-squared of 0.96. The unemployment rate is again negative, but not significant ( $t=-1.1$ ). The lagged traded goods and services variable has a coefficient of +0.37, and it is significant ( $t=4.4$ ). Thus, the estimated multiplier  $k$  is 1.37, a more plausible multiplier than the popular magic number “2,” which has been bandied about for years.

The estimated elasticity of +0.62 and the estimated multiplier of 1.37 are consistent with each other. Using 1994 earnings data (Table 2), I find that a 1 percent rise in traded goods and services is \$2.54 billion. The elasticity of +0.62 percent indicates that nontraded goods and services would rise \$0.96 billion. The sum of the two gives an estimated rise in total earnings of \$3.50 billion. If we multiply the 1 percent rise in traded goods and services of \$2.54 billion by the estimated  $k$  of 1.37, the result is a rise in total earnings of \$3.48 billion—virtually the same as the rise using the elasticity estimate.

#### EMPLOYMENT TRENDS BY INDUSTRY

The appendix presents in table form employment for each of the two-digit SIC industries grouped by the functional sectors described above for each year from 1989 through 1996. The last year is estimated based on monthly data. Although I would prefer to show earnings data, having argued above that they are more revealing and optimistic, the latest earnings data are only available through 1994. Table 7 summarizes the employment data in the appendix by functional sector. The peak year 1989 is shown, along with the trough year 1992 and my estimates for 1996. The

Table 7  
EMPLOYMENT CHANGES IN THE REGION, 1989-96  
Thousands of Jobs

Sector	1989	1992	1996	1989-92	1992-96
Goods production and distribution	1,915	1,636	1,572	-279	-64
Producer services	1,794	1,625	1,723	-169	98
Finance and real estate	861	792	798	-69	6
Nonfinancial services	933	832	925	-101	93
Consumer services	773	843	931	70	88
TOTAL TRADED GOODS AND SERVICES	4,482	4,104	4,251	-378	147
Local private goods and services	2,131	1,951	2,090	-180	139
Government	1,364	1,334	1,286	-30	-48
Ancillary services	476	441	493	-35	52
TOTAL NONTRADED GOODS AND SERVICES	3,970	3,725	3,869	-245	144
TOTAL EMPLOYMENT	8,453	7,829	8,120	-624	291

Sources: Appendix; author's estimates for 1996.

traded goods and services sectors lost 378,000 jobs from 1989 to 1992. The largest decline was in goods production and distribution: a loss of 279,000 jobs, a 15 percent drop in three years. Producer services lost 169,000 jobs, while consumer services gained 70,000 jobs. In the recovery period, goods production and distribution employment dropped another 64,000 jobs, and consumer services continued to gain, adding 88,000 jobs. The partial recovery in producer services, up 98,000 jobs, reflects a divergence in the two parts of that sector. The finance and real estate part has had a very slight gain of 6,000 jobs since 1992, following a loss of 69,000 jobs from 1989 to 1992. But the non-financial part of producer services (business services, legal services, motion pictures, and other services) has recovered almost all of the 101,000 jobs lost.

Despite the enormous decline in employment from 1989 to 1992, followed by a large rise from 1992 to 1996, the share of employment in nontraded goods and services remains between 47 and 48 percent of all employment. That roughly accords with Henderson's findings for the United States and Brazil—50 to 60 percent of any urban labor force “must be engaged in production of goods and services which are inherently nontradable across cities” (Henderson 1988, p. 8).

## APPENDIX

### EMPLOYMENT BY INDUSTRY, NEW YORK-NEW JERSEY CMSA, 1989-96

Thousands of Jobs

Industries and Economic Groups	SIC	1989	1990	1991	1992	1993	1994	1995	1996
Mining	10-14	2.7	2.6	2.4	2.2	2.0	1.9	1.9	1.8
Lumber and wood products	24	8.0	7.4	6.7	5.3	5.1	5.0	4.9	4.8
Furniture and fixtures	25	19.8	18.6	15.4	13.2	13.7	13.4	13.2	13.0
Stone, clay, and glass products	32	13.8	12.9	10.6	9.9	9.6	9.4	9.2	9.1
Primary metal industries	33	24.1	22.8	21.6	20.3	19.8	19.4	19.1	18.8
Fabricated metal products	34	77.2	72.3	66.0	62.6	60.8	59.2	58.0	57.3
Industrial machinery	35	82.4	77.2	72.0	68.4	64.3	62.6	61.3	60.6
Electronic and electrical equipment	36	121.6	113.7	105.9	100.1	100.9	98.6	95.2	95.5
Transportation equipment	37	43.7	40.9	37.0	34.9	26.8	26.1	25.7	25.3
Instruments and related equipment	38	62.0	58.1	54.0	51.3	48.1	47.0	46.2	45.5
Miscellaneous manufacturing	39	54.7	51.3	47.3	45.9	46.1	45.0	44.2	43.6
Food and kindred products	20	65.4	62.8	59.6	56.6	53.5	52.2	51.3	50.5
Textile mill products	22	32.8	28.8	25.6	24.2	24.6	24.0	23.6	23.2
Apparel and related products	23	159.9	148.9	135.6	130.3	126.5	123.1	120.0	119.3
Paper and allied products	26	47.9	44.7	41.0	40.1	40.2	39.3	38.6	38.1
Printing and publishing	27	170.7	160.6	149.1	139.9	132.8	130.0	127.8	125.9
Chemicals and allied products	28	133.7	125.1	122.5	114.3	112.3	110.0	107.0	106.5
Other nondurable products	21, 29	11.4	10.0	8.7	8.0	7.5	4.3	4.2	4.2
Rubber and plastics products	30	39.4	36.8	32.9	31.2	31.8	31.3	30.8	30.3
Leather and leather products	31	15.7	14.7	11.7	10.9	11.1	11.0	10.8	10.7
Railroad transportation	40	11.2	10.8	10.4	10.4	9.8	9.4	9.4	9.2
Trucking and warehousing	42	86.4	90.6	88.1	83.4	86.0	88.0	89.0	87.9
Water and other transportation	44, 46	31.7	29.2	27.7	27.8	26.0	24.1	24.1	23.2
Wholesale trade	50, 51	598.9	583.8	560.1	545.0	538.0	545.3	554.0	567.8
TOTAL GOODS PRODUCTION AND DISTRIBUTION		1,915.1	1,824.6	1,711.9	1,636.2	1,597.3	1,579.6	1,569.6	1,572.2
Depository institutions	60	297.9	294.1	278.5	260.3	256.3	254.0	248.5	252.0
Nondepository institutions	61	21.9	22.8	21.4	21.4	21.8	22.1	22.0	21.7
Security brokers and services	62	161.9	154.1	143.0	144.4	149.0	160.0	158.0	158.0
Insurance carriers	63	158.8	160.7	157.2	153.5	152.0	151.5	148.5	150.4
Insurance agents and services	64	63.1	61.4	61.2	59.0	60.7	61.3	61.1	61.5
Real estate and miscellaneous financial	65, 67	157.8	156.8	151.8	153.7	152.4	153.4	152.8	154.0
Business services	73	515.9	499.7	450.9	434.0	452.1	463.0	475.1	490.0
Motion pictures	78	36.2	37.8	37.6	32.5	32.1	40.0	44.0	43.4
Legal services	81	110.7	113.5	107.5	104.8	105.0	105.0	107.8	109.0
Other services	84, 87	270.1	282.0	265.1	261.1	267.6	269.0	278.0	283.0
TOTAL PRODUCER SERVICES		1,794.3	1,782.9	1,674.2	1,624.7	1,649.0	1,679.3	1,695.8	1,723.0
Health services	80	579.3	603.7	628.4	651.1	686.2	702.0	725.0	743.0
Educational services	82	193.5	202.0	197.3	191.9	195.4	200.0	206.0	213.0
TOTAL CONSUMER SERVICES		772.8	805.7	825.7	843.0	881.6	902.0	931.0	956.0
TOTAL TRADED GOODS AND SERVICES		4,482.2	4,413.2	4,211.8	4,103.9	4,127.9	4,160.9	4,196.4	4,251.2

Sources: U.S. Department of Labor, Bureau of Labor Statistics; New York State Department of Labor; author's estimates for 1996.

Note: CMSA=consolidated metropolitan statistical area.

APPENDIX (CONTINUED)

EMPLOYMENT BY INDUSTRY, NEW YORK-NEW JERSEY CMSA, 1989-96  
Thousands of Jobs

Industries and Economic Groups	SIC	1989	1990	1991	1992	1993	1994	1995	1996
Construction	15-17	345.9	320.3	270.8	239.1	242.4	254.0	258.3	267.0
Local passenger transit	41	47.6	48.5	48.2	49.4	50.2	48.6	49.0	49.2
Electric, gas, and sanitary services	49	71.8	72.2	71.4	70.5	70.2	73.6	74.0	75.2
Air transportation	45	67.8	68.6	62.5	55.6	57.4	58.0	58.5	59.0
Transportation services	47	46.8	49.7	46.1	45.3	48.2	49.4	49.6	50.1
Communication	48	145.6	152.2	150.3	144.7	146.1	149.8	152.8	151.1
Retail trade, except eating	52-57	861.0	846.4	796.3	772.9	774.7	786.9	807.7	821.7
Personal services	72	87.2	86.8	82.9	81.8	83.5	84.5	86.7	88.0
Auto and miscellaneous repair services	75, 76	93.6	92.7	91.8	88.1	86.7	87.0	89.3	91.5
Social services	83	230.8	244.0	251.2	266.1	278.0	288.0	296.6	303.0
Nonprofit membership organizations	86	109.0	110.8	106.6	106.1	108.3	110.5	114.0	116.2
Residual		23.7	24.7	18.3	31.3	12.1	21.2	22.0	18.0
TOTAL LOCAL PRIVATE GOODS AND SERVICES		2,130.8	2,116.9	1,996.4	1,950.9	1,957.8	2,011.5	2,058.5	2,090.0
Federal government	91-97	154.5	151.5	150.5	150.1	149.0	148.5	148.2	147.2
State and local government	91-97	1,209.0	1,226.0	1,200.3	1,183.6	1,180.3	1,173.3	1,150.2	1,139.0
TOTAL GOVERNMENT		1,363.5	1,377.5	1,350.8	1,333.7	1,329.3	1,321.8	1,298.4	1,286.2
Eating and drinking places	58	335.6	332.8	308.6	303.4	306.7	314.5	323.0	328.7
Hotels and other lodging places	70	60.4	60.4	56.4	58.7	61.0	63.0	66.0	68.0
Amusement services	79	80.1	83.6	77.2	78.4	81.0	83.0	89.2	95.8
TOTAL ANCILLARY SERVICES		476.1	476.8	442.2	440.5	448.7	460.5	478.2	492.5
TOTAL NONTRADED GOODS AND SERVICES		3,970.4	3,971.2	3,789.4	3,725.1	3,735.8	3,793.8	3,835.1	3,868.7
TOTAL EMPLOYMENT		8,452.6	8,384.4	8,001.2	7,829.0	7,863.7	7,954.7	8,031.5	8,119.9

Note: CMSA=consolidated metropolitan statistical area.

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