FEDERAL RESERVE BANK OF ST. LOUIS

JULY 1970

REVIEW

CONTENTS

Vol. 52, No. 7

Inflation and Its Cure

by NORMAN N. BOWSHER

PRICES HAVE INCREASED ever more rapidly since 1965, and in the past year overall prices have risen more than 5 per cent. The inflation has redistributed income and wealth and contributed to inefficiency. The Government began taking actions in mid-1968 designed to restrain inflation. Since eliminating inflation, by necessity, involves costs, a course of gradual correction has been followed with the objective of holding such costs to a tolerable level.

In this article, recent developments are reviewed with the objective of throwing some light on: 1) progress made in reducing inflation; 2) costs of adjusting to the inflation; and 3) costs generated by the struggle to reduce the inflation.

As in two previous articles in this *Review*, the current situation is compared with three earlier periods of economic correction.[1] August 1969 is used here as a tentative beginning for the current adjustment, since it is the middle of the quarter when output of goods and services was greatest. Developments since August are compared with developments in the corresponding periods after the July 1953, July 1957, and May 1960 peaks, as selected by the National Bureau of Economic Research. These three earlier periods were quite mild corrections judged in the light of longer experience in modern economic history.

Progress Against Inflation

Inflation has proceeded at a faster and faster rate since 1964. Overall prices, which had been rising less than 1½ per cent a year in the early 1960's, increased 2 per cent in 1965, 3.5 per cent in 1966 and 1967, 4 per cent in 1968, and 5 per cent in 1969. The acceleration of price advance reflected a rise in total spending for goods and services at an average 8 per cent annual rate from late 1964 to late 1969, or roughly double the rise in production capacity. The excessive rise in total spending was fostered by generally expansive fiscal and monetary actions from 1964 through 1968.[2]

From the third quarter last year to the second quarter this year, overall prices rose at an estimated 5.3 per cent annual rate, even faster than the 5 per cent increase in the previous year. To many, this is evidence that the struggle against inflation has failed. However, prices respond to many factors, including lagged effects of previous excesses, and since the current period of correction follows about four years of growing inflationary pressures, some temporary continued acceleration of price rises was to be expected.

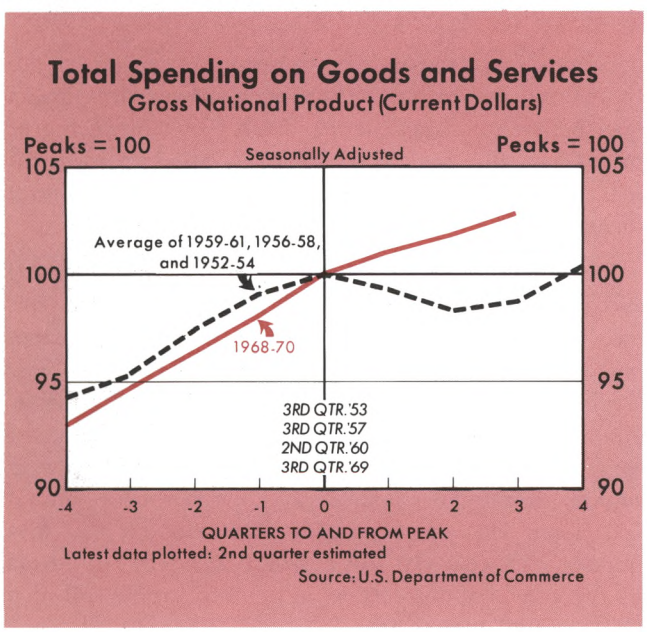
As inflation intensifies, it becomes more resistant to corrective measures, and prices continue to rise for a period after excessive "demand-pull" pressures on resources and prices are removed. In the year before the three previous business cycle peaks, prices rose an average of 2 per cent. In the first two quarters of the correction periods, prices rose at an average 2.3 per cent annual rate. Thereafter, the rate of price rise began moderating. The strong upward thrust of prices during the initial phase of restrained spending growth may reflect the fact that spending, although dampened, may nevertheless be excessive for a few

[1] "Downturn Remains Mild," this *Review* (June 1970), pp. 2-7, and "Extent of the Slowdown," this *Review* (March 1970), pp. 2-5 and 14-16.

[2] "1968-Year of Inflation," this *Review* (December 1968), pp. 3-14.

months. Further, many prices and wages do not adjust immediately in the presence of unduly large demand pressures. This may be due to inertia, lack of knowledge of real costs, public opinion, regulations, contracts, or a money illusion. These lagging price adjustments place "cost-push" forces on other prices when they do occur. Consequently, success in the struggle against inflation, once it has been permitted to gain momentum, takes time.

A quick dampening of inflation is even less likely now than in the 1953-54, 1957-58 or 1960-61 periods for several reasons: the upward thrust of prices has been much stronger than during the earlier periods; policies to resist inflation have been milder; and their impact on spending has been less. Total spending on goods and services has slowed only moderately since the third quarter of last year to an estimated 4 per cent annual rate of increase. In sharp contrast, spending declined at a 2 per cent average rate in the corresponding periods of the three previous adjustments.



Other developments also reflect the gradualism of the recent approach to resisting inflation. Retail sales rose at an estimated 4 per cent annual rate from August to May, a slightly greater rate than in the previous year. In the corresponding nine months after the three previous peaks, retail sales declined at a 2 per cent average rate. Personal income, likewise, has slowed little since last August in marked contrast to earlier experiences.

With growth of total spending held to rates approximating growth in the nation's productive capacity, progress is probably being made at reducing inflationary pressures. Comparisons with previous experiences, when inflation was less ingrained and when anti-inflationary measures were pursued more aggressively, indicate that a substantial reduction of the current inflation will take a long time. According to estimates of this bank, if the gradual approach to resisting inflation is continued, substantial price stability may not be achieved for three more years.[3]

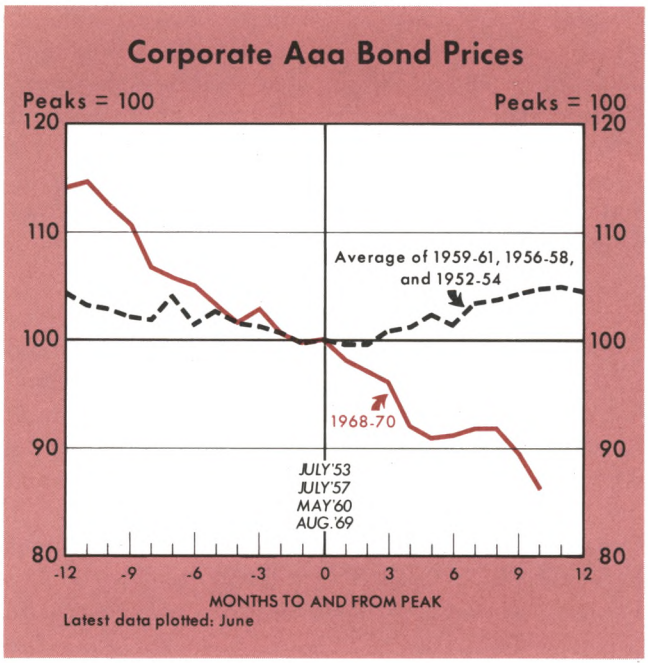
Costs of Adjusting to Inflation

The costs of inflation have been substantial and far-reaching. Some have suggested that once inflation becomes fully anticipated and provided for in all contracts and other transactions, its cost would be very light, perhaps even zero. However, the current inflation has not been fully anticipated, and while some adjustments to it have been made, many others have not. As a result, the inflation has had, and is likely to continue to have, severe consequences. In brief, inflation reduces the value of money and other dollar-denominated assets relative to the value of other assets, causing a redistribution of wealth and income. The process of adapting to higher and higher rates of inflation, given existing contracts, laws, and other rigidities, causes inefficiencies, inequities, and interruptions to production.

Some costs that society has suffered in the process of adjusting to higher and higher rates of inflation have been incorrectly labeled a cost of resisting inflation. One example is the capital loss experienced by some bondholders in recent years. Some have said interest rates have been increased (bond prices lowered) in an attempt to reduce the excessive spending by making credit more costly and difficult to obtain. It has been suggested that this raising of interest rates has proceeded so rapidly that it has fostered fears of a liquidity squeeze or money panic.

However, most of the rise in interest rates (decline in bond prices) since the mid-1960's has probably been a result of a market adjustment to higher and higher price expectations. With inflationary anticipations, lenders seek to protect the purchasing power of funds by raising rates, while borrowers pay higher rates, expecting to repay in depreciated dollars. If both borrower and lender expect 5 per cent inflation during the period of the loan, and funds are worth a real 4 per cent, the interest rate stated in the contract will be 9 per cent, and existing 4 per cent bonds will

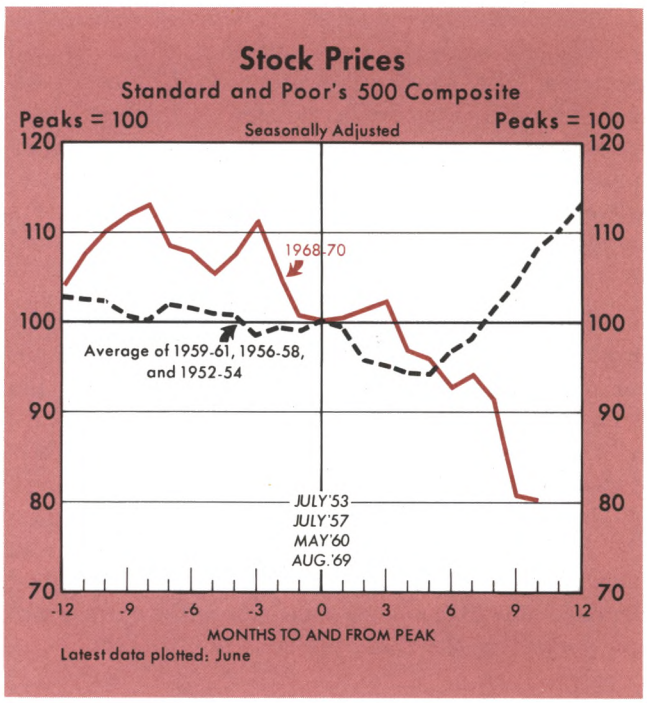
[3]For a discussion of the procedure used to derive these estimates, see "A Monetarist Model for Economic Stabilization," this *Review* (April 1970), pp. 7-25, and the "Quarterly Economic Trends" release of this Bank.



fall in market price sufficiently to yield 9 per cent a year to maturity.[4]

Prices of highest-grade seasoned corporate bonds declined (yields rose) 14 per cent from last August to June. In the corresponding ten-month periods of the three earlier adjustments, these bond prices rose 5 per cent on average. Monetary restraint was actually greater in the three earlier periods, as measured by a slower injection of bank reserves and money. A major difference between the recent situation and the earlier periods is that price expectations have apparently continued to be revised upward, while at similar stages of earlier cycles, when smaller inflations were more aggressively resisted, price expectations had already begun to be revised downward.

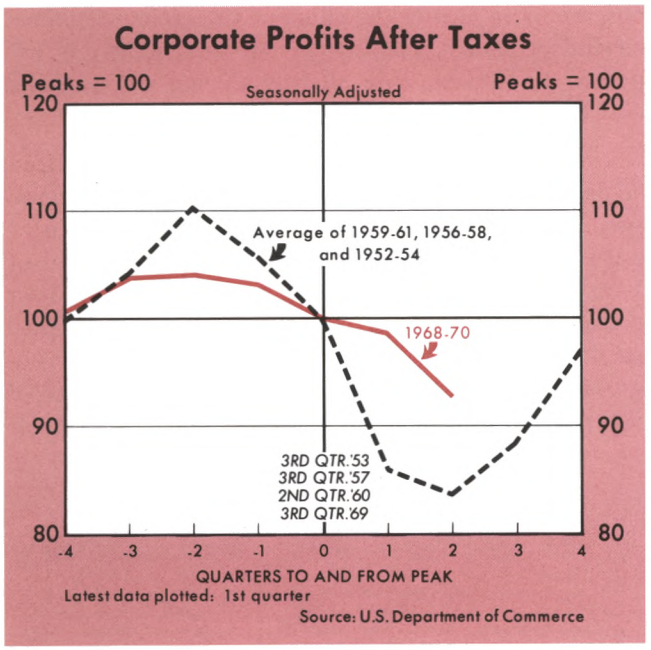
Stock prices have nearly paralleled the pattern of bond prices, and possibly for the same reason. As investors revise their inflationary expectations upward, the return anticipated from dividends and stock appreciation increases. When inflationary expectations go up from, say, 2 per cent a year to 5 per cent, and yields on bonds go up from, say, 6 per cent a year to 9 per cent, long-run expected stock returns (dividends plus appreciation) may go up from, say, 9 per cent a year to 12 per cent. Because of contracts, regulations, inertia, and other rigidities which restrain corporations from maximizing returns on capital in the short run, part of this adjustment for existing stocks may be accomplished in the market by a lowering of prices. In the long run, however, stock prices will reflect the inflated cost of resources going into capital formation.



From last August to June, stock prices (Standard and Poor's 500 Composite) fell 20 per cent. After ten months of the three previous recessions, stock prices had already risen an average 9 per cent above their levels at the business cycle peaks. The sharply different experience apparently cannot be fully explained by a weaker business situation this time. Corporate profits after taxes declined at a 14 per cent annual rate from the third quarter last year to the first quarter this year. In the corresponding two quarters in the previous corrections, corporate profits fell at a 28 per cent average rate.

Stocks and bonds are not the only assets that are affected in value by rising inflation and inflationary expectations, but more attention is given to these markets because of widespread availability of frequent quotations. The value of mortgages and other debts have declined similarly. The purchasing power of most pensions has been reduced. Also, lessors (unless protected by escalators) have suffered a decline in real estate values. On the other hand, inflation has given windfall gains to debtors and holders of some other types of assets, contributing to inequities among individuals.

[4] "Interest Rates and Price Level Changes, 1952-69," this *Review* (December 1969), pp. 18-38. This example ignores the income tax consideration for both lender and borrower; actually with the assumptions of 4 per cent real return and 5 per cent anticipated inflation, the market rate would be higher than 9 per cent.



Costs in Reducing Inflation

Once inflationary expectations become strong, it is difficult and costly to extinguish them. Commitments made on the expectation of continued inflation become more difficult to fulfill if the inflation is less than anticipated. When excessive spending is dampened, many prices do not move quickly to their equilibrium levels, and declines in production and employment result. As noted above, growth of total spending has slowed since last August to about the trend rate of growth in capacity. Since overall prices have continued to rise rapidly, there have been cutbacks in output and production.

The recent slowdown in production is a cost necessary to limit price increases. If spending growth continues to be appropriately limited, prices gradually will rise more slowly, and production will improve as prices rise less rapidly.

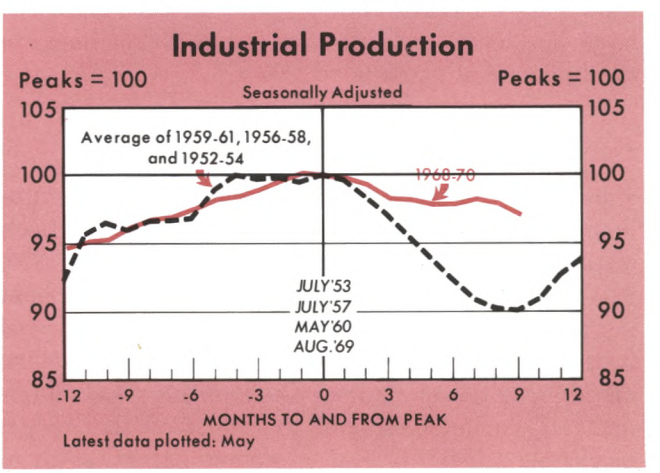
It may be, however, that much of the adjustment in production to date has merely been a transitional cost to a fuller anticipation of the inflation. In the initial stages of accelerating inflation, economic activity receives a stimulus. Individuals and businesses with greater money balances than they desire to hold increase their spending even at higher prices, the greater spending causes businessmen to revise upward their profit expectations, and investment is expanded. However, since total spending is excessive, prices are bid up. Costs are higher and profits lower than expected in real terms. As a result, when the rate of inflation becomes more fully anticipated, its stimulative effects diminish, and growth rates of spending, production and employment slow to their trend rates, or even below for a brief adjustment period. In the following discussion an attempt is made to gain some insight into the magnitude of production cutbacks, without attempting to judge whether they are a result of an adjustment to a higher rate of inflation or are a result of a burden assumed to place downward pressure on prices.

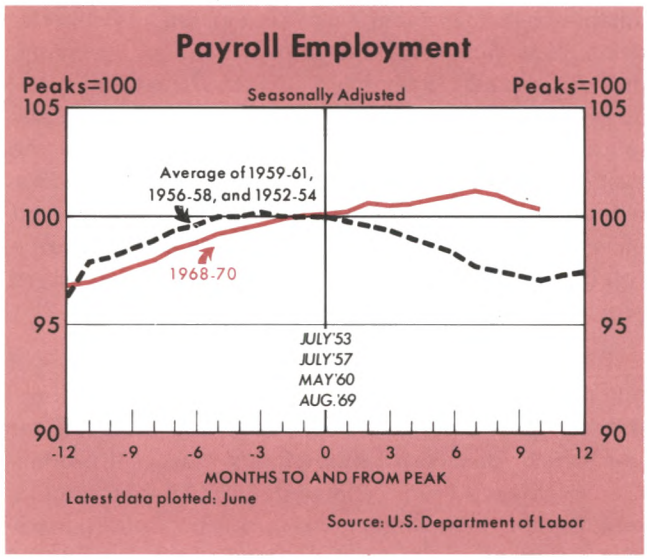
Total real output, like total spending, has reacted much less since last summer than during the three previous periods of correction. From the third quarter last year to the second quarter this year, real production declined at an estimated 1.3 per cent annual rate. In the first three quarters of previous periods of adjustment, real output declined at an average 3.4 per cent rate.

Industrial production, like total real product, has changed much less than in the three recessions. The decline in industrial production at a 4 per cent rate from last August to May was much less than during the first nine months of any of the previous periods of adjustment, when production fell at an average 14 per cent rate.

Employment trends have been stronger in late 1969 and early 1970 than following the upper turning points of the three earlier cycles. Since last August, payroll employment has increased slightly, while in the corresponding ten months of each of the three previous correction periods it had declined at an average annual rate of 3.5 per cent.

A high level of utilization of the potential labor force is conducive to continued strong upward pressure on wages. In June total civilian employment was equal to 64 per cent of the population of working





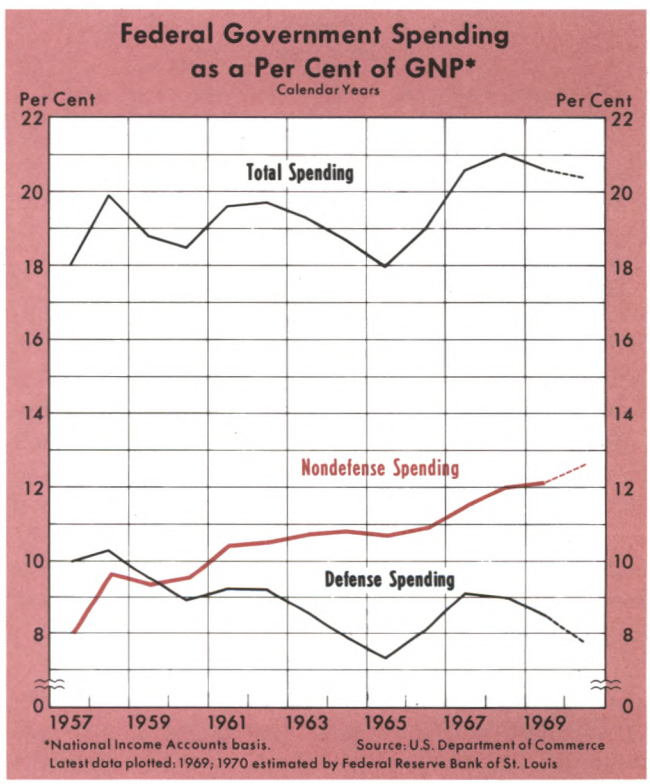
force age (16 through 64). In the sixteen years from 1950 through 1965 this ratio never exceeded 63.5 and declined to as low as 60. A somewhat lower utilization of the labor force is likely in the near future even if total production rises somewhat, since productivity gains and growth of population of labor force age will provide for some increase in output.

Construction is one area where cutbacks have been as great or greater than in the three previous recessions. It may be that construction is being adversely affected much more from the increasing inflation than from the efforts to reduce inflation. Construction has been hurt more than most industries by rising labor, material, and land prices. Since large amounts of long-term borrowed funds are used in purchasing homes and other buildings, construction has also been affected seriously by the higher interest rates, resulting from the rising price anticipations. Construction has suffered further from heavy financial disintermediation (resulting from Regulation Q ceilings and similar rules), and from state usury laws which have favored large businesses and others who can obtain funds in the free capital markets.

Recent Stabilization Actions

In implementing the gradual anti-inflationary program of the Government, fiscal actions have been moderately but steadily restrictive in 1969 and 1970. Since the first quarter of 1969, the high-employment budget surplus, as estimated by this bank, has been in the $7 to $11 billion range. This measure, unlike other measures of Federal Government fiscal developments, excludes most of the effect on the budget of changing levels of real economic activity, so as to observe more clearly the effect of Government actions on the economy. The surplus in this budget is expected to decline only slightly during the summer and fall.

The fiscal restraint since the end of 1968 has been achieved, in large measure, by a cutback in defense spending. National defense outlays have declined at a 0.4 per cent annual rate since the fourth quarter of 1968, after rising 13 per cent annually in the four previous years. In the first half of 1970, defense spending amounted to less than 8 per cent of total gross national product, compared with an average of 9.4 per cent from 1957 through 1963. Nondefense



expenditures have risen at an 8 per cent rate since the fourth quarter of 1968, following a 12 per cent rate in the previous four years. On the other hand, the Government, by removing the surtax in two steps, January 1 and July 1, 1970, took partially offsetting expansive actions.

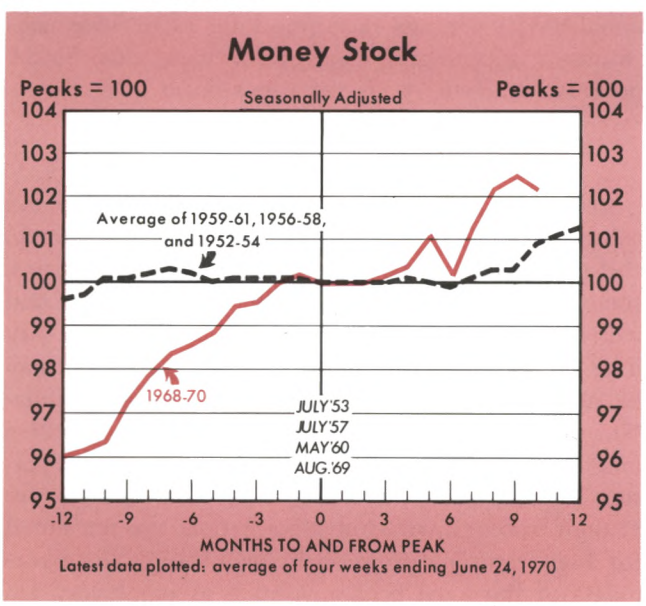
The current fiscal restraint, as measured by the high-employment surplus, is much milder than during the 1959-61 period of correction and, relative to the size of the economy, is even less than during the 1956-58 period. The 1953-54 adjustment, which was the longest period of correction reviewed here, occurred paradoxically at a time when the budget was expansive.

Indications are that Federal budget requirements will place large demands on money and capital markets in coming months. The Government's official budget, in contrast with the high-employment budget, is sliding into deficit because of a marked slowing in tax collections. When this factor is added to the planned activities of Government agency and loan guarantee operations, the Federal Government's demand for funds (both direct and indirect) in fiscal 1971 appears likely to be the largest since fiscal 1968.

Monetary authorities also have followed a comparatively moderate course in resisting inflation. Monetary action, as measured by growth of the money stock, was restrictive from early 1969 to February 1970. In the first half of 1969 money rose at a 4 per cent annual rate, down from a 7 per cent rate in the two previous years. From June 1969 to February 1970 the money stock was virtually unchanged.

This recent monetary restraint was more moderate than during the other periods of correction, probably contributing to the mildness of the current adjustment. On average the money stock in the earlier periods remained on a plateau from ten months before the peak until six months after the peak.

Since February, money has risen at a very rapid 7 per cent annual rate. This is much faster than during the relaxation periods following past periods of economic correction, and it began sooner; that is, the sixth month after the peak, compared with an average of nine months after the previous peaks. The growth in money since February approximates the expansive growth in early 1967.



Conclusions

Inflation has been accelerating since the end of 1964. Actions taken to resist the inflation have been more carefully applied than during previous periods of economic correction. As a result, total spending has continued to rise at a near long-run optimum growth rate. Prices have continued to rise rapidly, and production has declined slightly.

Continued price increases are disheartening, especially when there is growing slack in productive capacity. However, in view of the strong upward momentum built into the price structure by the expansive fiscal and monetary actions from 1964 through 1968, and in view of the moderate character of the policy steps taken to resist the inflation, it is unlikely that a substantial improvement will materialize for a considerable period. A more aggressive attack on inflation might have produced quicker results, but at the expense of harsher transitional costs in terms of real product, employment and profits.

The current inflation and the struggle against it have been accompanied by costs. Production has declined, construction has been depressed, growth in employment has slowed, and stock and bond prices have fallen. Questions have been raised as to whether the cost of even the gradual approach in reducing inflation is too great. Yet, many of these supposed costs of fighting inflation are, in fact, the result of the economy adjusting to higher expected levels of inflation. If spending continues to rise moderately, as it has for a year, some of these costs of adjusting to greater expected inflation should soon subside. On the other hand, costs involved in actually reducing the strong inflationary anticipations, which have probably been moderate, may intensify and continue for some time.

There is some evidence that the battle against inflation may be postponed again as in 1967. Spokesman for those hurt seek renewed economic stimulation, without distinguishing whether the pain has come from adjustments to higher rates of expected inflation or from adjustments to lower rates. Pressures are building to expand Government outlays, monetary expansion has been rapid since February, and unrealistic hopes are being placed on attempts to talk prices down. Each time a final showdown with inflation is postponed, the total costs of adjusting, first to a still higher rate of expected inflation and ultimately to a lower rate, become greater.

Metropolitan Area Growth: A Test of Export Base Concepts

by CLIFTON B. LUTTRELL and CHARLES M. GRAY

Economists have developed two different views of urban growth. One view holds that growth stems from increased demand for a city's output for export. This leads to expansion of employment in the exporting sector and to a multiple expansion of other employment. The other view is that migration to a city, which expands the supply of labor, leads to increased employment and economic growth.

Although the two views are not mutually exclusive, most studies of urban growth lean toward the former approach. This article concentrates on the record of nine Central Mississippi Valley metropolitan areas during the 1960's, and finds that emphasis on the export base view to the exclusion of other factors leaves much of the growth process unexplained.

ALL Standard Metropolitan Statistical Areas[1] in the Central Mississippi Valley made gains during the 1960's, as indicated by commonly used measures of economic activity. Employment in the nine metropolitan areas combined rose at the annual rate of 2.9 per cent from 1960 to 1968. Population rose at a 1.4 per cent rate from 1960 to 1968, and per capita personal income rose at a 3.1 per cent rate in the nine years ending in 1968. Employment and per capita personal income gains exceeded the national rates of 2.6 and 2.9 per cent, respectively, while population growth was at a somewhat lower rate than the national average of 1.6 per cent.

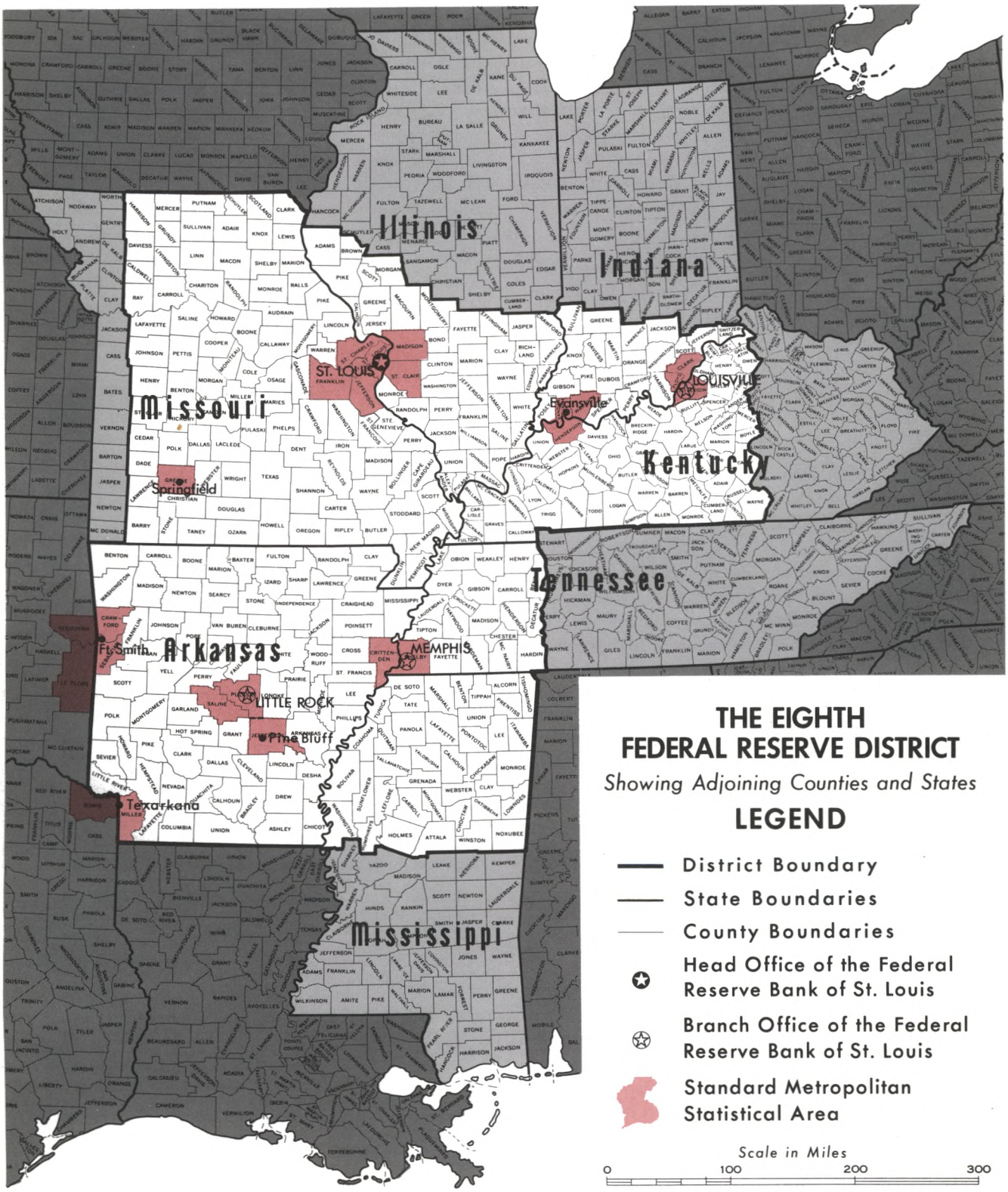
Although each of the regional SMSAs made gains in most measures of economic activity, the rates of growth among the areas differed widely. Employment increases ranged from a 2.3 per cent annual rate in St. Louis to 4.6 per cent in Texarkana. Population gains ranged from two-tenths of one per cent in Evansville to 2.2 per cent in Little Rock. Per capita income corrected for price changes rose at only a 2 per cent annual rate in Fort Smith, compared with 6.4 per cent in Texarkana. These wide variations of movement in growth indicators among regional SMSAs and between the regional and national SMSA average raise questions as to what constitutes a meaningful concept for measuring SMSA progress, and why such variations occur.

Meaning of Growth

Economic analysts generally recognize two broad categories of growth: volume or aggregate growth, and growth in economic well-being. Aggregate gains, such as population increases, higher gross output, and increases in total demand for goods and services, may have no relationship to individual welfare. There may be no direct relation, for example, between population growth and efficient operations of the competitive market or output of goods and services per person. India, Pakistan, and Egypt have had a high rate of population growth, but these nations are not noted for high rates of progress in well-being. Some elements of the local economy, such as employers, re-

[1]Standard Metropolitan Statistical Areas (SMSAs) consist primarily of one or more whole counties containing at least one central city of 50,000 population or more. SMSAs studied in this article are as defined by the Bureau of the Budget in April 1967 and are the same geographic areas for the period studied.

This study includes the Central Mississippi Valley (CMV), composed of the whole states of Arkansas, Kentucky, Mississippi, Missouri, and Tennessee, and also includes all other SMSAs in the Eighth Federal Reserve District (see map on facing page).



THE EIGHTH FEDERAL RESERVE DISTRICT

Showing Adjoining Counties and States

LEGEND

- District Boundary
- State Boundaries
- County Boundaries
- Head Office of the Federal Reserve Bank of St. Louis
- Branch Office of the Federal Reserve Bank of St. Louis
- Standard Metropolitan Statistical Area

Scale in Miles

0 100 200 300

tailers, owners of idle resources, and new immigrants may benefit from population gains. Other groups, however, who may have already paid for such capital items as schools, parks, public buildings, and churches, may be called upon to share their resources with the newcomers or to shoulder additional expenses as a result of rapid population growth. If new residents are unskilled, they may make disproportionately large demands upon the public sector, while their tax contributions are small.[2]

In contrast to volume growth, a rise in material well-being, as indicated by real per capita income gains, is applauded by most students of economic development. Growth in well-being may be indicated by rising real per capita income and rising per capita consumption of goods and services. These factors point to greater efficiency in the production and marketing of goods and services in an area.

A relatively high rate of employment growth may also indicate rising well-being. Assuming average labor force growth, if jobs are created faster in a particular area than in other areas, labor is bid away from current occupations elsewhere, or new employees are bid into the labor force. Other things being equal, the fact that employers in an area can profit by hiring such labor indicates a higher rate of gain in productivity here than elsewhere.

Although gains in real per capita income and relatively high rates of employment growth in an area indicate improvement in well-being, these measures provide no explanations of growth. Such analyses tell little about how progress starts and accelerates. For example, how does an area or region develop entrepreneurs and reorient itself from a static economy to one built around capital growth, labor specialization, flexible use of resources, and wider commercial exchange of goods and services?

Export Base Concepts

The export base approach to urban and regional growth analysis focuses attention primarily on the demand for goods and services from outside the local economy.[3] Local industries which have a large outside market are more responsive to changes in national demand than those with output limited to the local market, and are collectively termed the "export base." The group of industries which develops to service the export base and the local populace, and which consists largely of wholesaling and retailing establishments along with services and certain types of light industry, is termed the "nonbasic" sector. A rough line of dependence can be constru ed, leading from outside demand, to the base, and then to the domestic sector. If an assumption is made that the nonbasic sector maintains a constant relationship to the basic sector over time, then it can be shown that total employment growth is a multiple of basic employment growth.[4]

As a refinement of the export base theory, Stanislaw Czamanski devised a method of separating the total employment of an SMSA into three sectors.[5] His classifications have been used in this article. Industries located in an SMSA primarily because of locational advantages in a national market are called geographically-oriented industries. Industries in this sector include: coal mining, petroleum and gas extraction, primary metals industries, motor vehicles and equipment, machinery, meat products, and Federal Government operations. Employment in this sector is designated E_g in this article.

A second class of industries includes those which locate in an SMSA to provide inputs to the geographically-oriented industries, to utilize outputs of that sector, or to take advantage of economies resulting from the prior location of geographically-oriented in-

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[2]The ultimate desirability of immigration thus depends on whether those who stand to gain as a result can in some way compensate those who stand to lose. This criterion is treated extensively in the literature of "welfare economics," and further discussion of the problem can be found in George H. Borts and Jerome L. Stein, *Economic Growth in a Free Market* (New York: Columbia University Press, 1964), pp. 190-193.

[3]Another concept of urban growth is founded on the observation that a city grows through a series of separable stages. The products of various industrial sectors are assumed to have different income elasticities of demand so that a secular increase in income leads to a shift in sectoral prominence. Although demand plays a role, the chief emphasis is on the ability of the locality to supply factors of production. Further discussion of this approach can be found in Wilbur R. Thompson, *A Preface to Urban Economics* (Baltimore: The Johns Hopkins Press, 1969), especially pp. 15 ff., and Harvey S. Perloff et al., *Regions, Resources, and Economic Growth* (New York: Cambridge University Press, 1960), pp. 58-60.

[4]The idea of such a multiplicative effect within a region received impetus from the "investment multiplier" hypothesized by J. M. Keynes in *The General Theory of Employment, Interest, and Money* (New York: Harcourt, Brace & Co., 1936), especially p. 115. Perhaps the most complete statement of this theory can be found in Ralph W. Pfouts, ed., *The Techniques of Urban Economic Analysis* (West Trenton, N. J.: Chandler-Davis Publishing Co., 1960), which includes an extensive treatment of export base analysis. A recent statement of the importance of exports is in Jane Jacobs, "Strategies for Helping Cities," *American Economic Review*, September 1969, pp. 652-656.

[5]Stanislaw Czamanski, "A Model of Urban Growth," *Papers, Regional Science Association*, (1964), pp. 177-200; and "A Method of Forecasting Metropolitan Growth by Means of Distributed Lags Analysis," *Journal of Regional Science*, (1965), pp. 35-49.

dustries in the area. This complementary sector displays a strong dependence upon the geographically-oriented sector and is also responsive to national demand. Employment in this sector is designated E_c. Typical industries include knitting mills, other textile mills, petroleum and coal products, and rubber products.

Finally, the urban-oriented sector constitutes that group of industries which arises to service the urban area. Employment in this sector is designated E_u.[6] Included are such industries as construction, bakery products, printing and publishing, wholesale and retail trade, banking, finance, insurance, laundry and cleaning, hotels, recreation, education, welfare and religious organizations, and local government.

A central purpose of this sectoral division is to provide a means for using the export base theory to estimate future growth of an urban area. The following is an application of the theory with Czamanski's sectoral division adapted to each metropolitan area in the CMV states.

Table I

POPULATION IN CMV METROPOLITAN AREAS, 1950-68

SMSA	Thousands of Persons			Average Annual Rates of Change	
	1950	1960	1968	1950-60	1960-68
Evansville	213	223	227	0.5%	0.2%
Fort Smith	142	135	156	—0.5	1.8
Little Rock	221	272	323	2.1	2.2
Louisville	577	725	802	2.3	1.3
Memphis	530	675	770	2.4	1.7
Pine Bluff	76	81	87	0.6	0.9
St. Louis	1,755	2,105	2,326	1.8	1.3
Springfield	105	126	145	1.8	1.8
Texarkana	95	92	106	—0.3	1.7
Total CMV SMSAs	3,714	4,434	4,942	1.8	1.4
Total U.S. SMSAs	93,998	118,968	134,817[1]	2.4	1.6
U. S. Total	151,326	179,323	201,921	1.7	1.3

[1]Projected on basis of 1966 data and 1967-68 growth rate for 100 largest SMSAs.

Source: Department of Commerce, Bureau of the Census, *1950 Census of Population; Current Population Reports: Estimates of the Population of 100 Large Metropolitan Areas: 1967 and 1968, Series P-25,* No. 432, October 3, 1969; *Current Population Reports: Estimates of the Population of Counties and Metropolitan Areas, July 1, 1966, Series P-25,* No. 427, July 31, 1969; and telephone conversation with staff of Office of Business Economics, U.S. Department of Commerce.

St. Louis

The St. Louis area, with a 1968 population in excess of 2.3 million, is the largest metropolitan center in the CMV (Table I). Like other large, older metropolitan areas in the nation, St. Louis has had a relatively low employment growth rate (Table II). The rate of 2.3 per cent in the period 1960-68 was the smallest among the CMV metropolitan areas and was below the average for major labor market areas in the United States, which grew at a 2.6 per cent rate. Likewise, St. Louis had a relatively low growth rate in geographically-oriented employment (E_g), which accounts for more than one-fifth the area total (Table III). Only Fort Smith, with a rate of 0.4 per cent, was below St. Louis. Federal government, aircraft and parts, and ordnance were among the major growth sectors within the E_g classification. Employment declines occurred in meat packing, leather, and some other nondefense industries in this classification.

Complementary employment (E_c), which accounted for less than 4 per cent of the area total, actu-

Table II

EMPLOYMENT GROWTH IN CMV METROPOLITAN AREAS, 1960-68

(Average Annual Rates of Change)

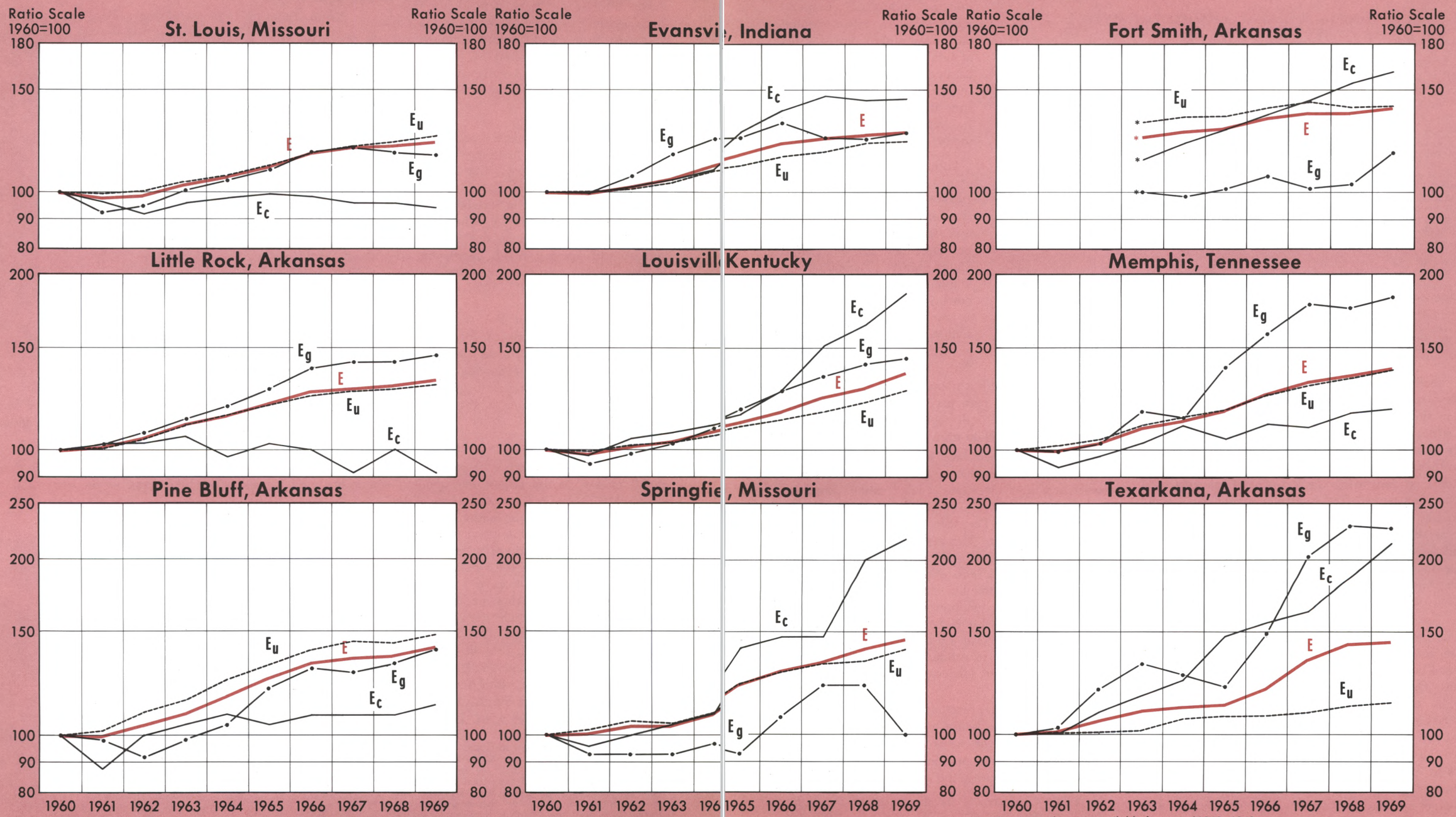
SMSA	Geographically-Oriented Employment (E_g)	Complementary Employment (E_c)	Urban-Oriented Employment (E_u)	Total Employment (E)
Evansville	2.7%	4.7%	2.5%	2.9%
Fort Smith	0.4	5.5	4.3	4.0
Little Rock	4.5	0	3.1	3.3
Louisville	4.4	6.4	2.4	3.2
Memphis	7.3	1.9	3.6	3.8
Pine Bluff	3.5	1.0	4.6	3.9
St. Louis	2.0	—0.5	2.6	2.3
Springfield	2.5	9.1	3.7	4.3
Texarkana	10.9	8.4	1.4	4.6
Average CMV SMSAs	3.3	3.3	2.8	2.9
Major Labor Market Areas*				2.6

*128 Areas

Source: Employment by industrial classification obtained from respective state employment agencies, and U. S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings,* various issues for 1960-69. Employment summarized by sectors according to Stanislaw Czamanski's classification in "A Model of Urban Growth," *Papers, Regional Science Association,* (1964), pp. 177-200.

[6]The sectors in Czamanski's analysis are not uniformly defined for every size SMSA. For example, a producer of furniture may locate in a large SMSA because of related industries there which provide economies of production. In this case the producer would be in the complementary sector. In a very small SMSA, however, a similar producer may supply a large geographical area without benefit of closely related industries. In this latter case it would be classified in the geographically-oriented industries. Allowances of this sort have been made wherever possible in this article.

Employment Trends - Central Mississippi Valley Metropolitan Areas



E–Total Employment

E_c –Complementary Employment

E_g –Geographically-Oriented Employment

E_u –Urban-Oriented Employment

*Consistent data not available for period 1960 - 1963.

Table III

EMPLOYMENT IN CMV METROPOLITAN AREAS BY SECTOR, 1960 and 1968

SMSA	Total Employment* (E) 1960	1968	Per Cent Employed in Each Sector: Geographically-Oriented Employment (E_g) 1960	1968	Complementary Employment (E_c) 1960	1968	Urban-Oriented Employment (E_u) 1960	1968
Evansville	75.7	95.3	15.3%	15.0%	16.9%	19.4%	67.8%	65.6%
Fort Smith	35.7	48.7	16.3	12.3	14.6	16.4	69.2	71.3
Little Rock	101.4	131.8	22.3	24.4	3.5	2.7	74.2	73.0
Louisville	242.1	311.2	17.3	19.0	9.9	12.6	72.8	68.4
Memphis	191.1	258.0	9.3	12.1	11.2	9.6	79.6	78.3
Pine Bluff	17.8	24.1	28.1	27.4	13.5	10.8	58.4	61.8
St. Louis	733.6	880.8	24.0	23.5	4.4	3.5	71.6	73.0
Springfield	37.0	52.1	7.6	6.5	11.9	16.9	80.5	76.6
Texarkana	33.7	48.3	24.6	39.3	3.3	4.3	72.1	56.3
Total CMV SMSAs	1,468.1	1,850.3	19.9	20.5	7.3	7.5	72.9	72.1

*Thousands.

Source: Employment by industrial classification obtained from respective state employment agencies, and U. S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, various issues for 1960-69. Employment summarized by sectors according to Stanislaw Czamanski's classification in "A Model of Urban Growth," *Papers, Regional Science Association*, (1964), pp. 177-200.

ally declined in the 1960-1968 period. Part of this decline in E_c can probably be accounted for by the major shifts in the type of geographically-oriented industries located in the area. Those which declined were more likely to attract complementary industries than those which gained in employment. For example, nondefense industries, such as meat packing and leather, can be expected to attract some closely allied industries. On the other hand, defense industries may not be subject to the same degree of competition as nondefense industries, and may not be forced to be quite so cost conscious. Hence they may not attract such complementary industries as suppliers of component parts to the area.

The large growth in Federal Government and defense employment may have had some retarding influence on the more market-oriented industries in St. Louis. One reason may be the fact that the more rapidly growing geographically-oriented defense industries in St. Louis generally pay above-average wage rates for the area. These locally high wages may reduce the competitive ability of other exporting industries in this labor market. Such nondefense exporting industries sell part of their output in regional, national, or international markets and must compete with products from other labor market areas where wages may be determined more competitively. Conversely, high wage rates in St. Louis geographically-oriented industries may have contributed to the somewhat higher growth rate of urban-oriented industries.[7] Employment in these urban-oriented industries, almost three-fourths of total employment, rose at a 2.6 per cent annual rate. Many service-type industries benefit from the high rate of spending by employees in the exporting sector.

Population in St. Louis grew at a 1.3 per cent rate during 1960-68, slightly below the rate for the CMV metropolitan area total and below the 1.6 per cent rate for all United States SMSAs (Table I). Population growth in St. Louis, however, was about the same as in other larger centers. Such centers have in recent years grown at slightly lower rates than medium-sized areas. For example, SMSAs with a population of two million or more grew 1.4 per cent per year during the period 1960-66, while those with populations of two hundred thousand to two million grew 2 per cent per year.[8]

According to export base theories, the lower-than-average rate of population growth in St. Louis is consistent with a lower rate of job creation. Causation is viewed, however, as running from job creation to population growth. This view excludes the possibility of reverse causation. The results of a study of 135 cities by Richard Muth indicated that migration and employment growth both affect and are affected by each other.[9] Thus the low rate of job creation may not have been a predominant cause of the slow population growth in St. Louis. Immigration may have resulted in the low rate of job creation, or other factors such as inefficiency of production could have caused both the low rate of job creation and of population growth.

Per capita personal income growth in St. Louis was consistent with the below-average rate of job and population growth for the area (Table IV). Such income rose over $600 per person during the period 1959-68, approximating the average dollar increase

[7]See Table V, equation 1 for the impact of E_g on total employment and other relationships relative to "export base" assumptions for each of the CMV metropolitan areas.

[8]U.S. Department of Commerce, Bureau of the Census, *Series P-25*, No. 427, July 31, 1969.

[9]See Richard F. Muth, "Migration: Chicken or Egg?" (Working paper, Washington University, 1969).

Table IV

PER CAPITA PERSONAL INCOME IN CMV METROPOLITAN AREAS, 1950-68

SMSA	Income in Constant Dollars*			Annual Rates of Change	
	1950	1959	1968	1950-59	1959-68
Evansville	1,814	1,922	2,765	0.6%	4.1%
Fort Smith	1,121	1,559	1,856	3.7	2.0
Little Rock	1,554	1,903	2,572	2.3	3.4
Louisville	1,965	2,230	2,965	1.4	3.2
Memphis	1,690	1,760	2,446	0.5	3.7
Pine Bluff	1,036	1,430	2,025	3.6	3.9
St. Louis	2,228	2,444	3,112	1.0	2.7
Springfield	1,688	1,924	2,394	1.5	2.5
Texarkana	1,206	1,445	2,515	2.0	6.4
Average CMV SMSAs	1,939	2,164	2,841	1.2	3.1
Average U.S. SMSAs	2,166	2,409	3,113	1.2	2.9

*Converted to 1958 dollars using GNP Price Deflator. Income figures are on a "where received" basis.

Source: U. S. Department of Commerce, Office of Business Economics, "Personal Income in Metropolitan and Nonmetropolitan Areas," *Survey of Current Business*, May 1970.

for all metropolitan areas in the CMV. With a rate of increase of 2.7 per cent per year, however, the gain here was at a lower rate than for most CMV metropolitan areas and somewhat below the weighted average national SMSA rate of gain. Despite this below-average rate of gain, personal income per capita in St. Louis of $3,112 in 1968 was well above the average for all other SMSAs in the CMV states, and about equal to the national average for all metropolitan areas.

Evansville

Evansville, a medium-sized SMSA in the CMV states, has made gains in recent years equal to the CMV average and slightly greater than the national SMSA average in employment, below average for both in population, and above average in personal income (Tables I, II, IV).

Geographically-oriented employment rose at the rate of 2.7 per cent. Such employment rose sharply from 1961 to 1964, at a somewhat slower rate from 1964 to 1966, and declined on balance from 1966 to 1968. With moderate time lags, E_c and E_u employment generally followed the E_g trend. Employment in these sectors accelerated after 1962 and tended to level out after 1967.

The decline in E_g after 1966 was the result of reductions in machinery manufacturing industries and mining. Employment in this sector of 15.3 thousand in 1966 accounted for almost one-sixth of total employment in the SMSA. Machinery manufacturing employment totaling 11.5 thousand, almost three-fourths of the E_g total in 1966, declined to 11.1 thousand in 1969. Employment in mining declined from 1.9 to 1.6 thousand. A slight increase in Federal Government employment was insufficient to offset these declines.

Complementary employment, amounting to 18.5 thousand in 1968 or almost one-fifth the total, consists largely of employment in furniture and fixtures, rubber and plastics, fabricated metals, and other miscellaneous manufacturing industries. Employment in the rubber and plastics industry is relatively new for the area, beginning in early 1966 with 2.5 thousand workers, and expanding to 3.1 thousand in 1968. Some expansion occurred during the 1960-68 period in furniture and fixtures, fabricated metals and miscellaneous types of E_c employment. The period 1964-67 was one of especially rapid employment growth in these industries.

Population in Evansville was virtually unchanged from 1960 to 1968 and grew only 0.5 per cent per year in the prior decade (Table I). In the 1950's the city lost two industries which were a major portion of all geographically-oriented employment. As a result, the unemployment rate at the turn of the 1960 decade was relatively high, averaging more than 7 per cent of the labor force. In comparison, unemployment rates ranged from 4.1 to 6.8 per cent of the labor force in the four larger metropolitan areas in the CMV. Furthermore, unemployment in Evansville remained somewhat above average for other regional SMSAs during most of the 1960 decade. This relatively high unemployment rate was probably a factor in the low rate of population growth in Evansville.

Per capita income growth in Evansville has been at a relatively high rate during recent years, averaging 4.1 per cent from 1959 to 1968 (Table IV). This was the highest rate of gain of all the CMV metropolitan areas except Texarkana. In the previous decade, however, per capita income in Evansville grew at the relatively low rate of 0.6 per cent. Much of this disparity can be traced to the major loss of industries in the 1950's and the resulting high unemployment rates at the end of the decade. With the proportion of the population employed down, per capita incomes were relatively low at the turn of the decade. Conversely, with a higher proportion of the population employed in 1968 (unemployment rate of 3.3 per cent), real per capita income was up sharply.

Despite the low rate of gain in the prior decade, the per capita personal income of $2,765 in 1968 was relatively high for regional SMSAs. It was exceeded in the CMV only by St. Louis and Louisville, but it was still about 10 per cent below the United States SMSA average.

Fort Smith, Arkansas — Oklahoma

Both employment and population in Fort Smith increased from 1960 to 1968 at higher rates than the regional or national SMSA averages (Tables I and II). Total employment rose 4 per cent per year compared with an average of 2.9 per cent for all regional SMSAs and 2.6 per cent for 128 major national labor market areas. Population rose at a 1.8 per cent rate, higher than most other regional SMSAs and well above the rate of 1.6 per cent for all U. S. SMSAs.

The highest rate of employment gains was in the complementary sector, which currently constitutes about 16 per cent of the total (Table III). Employment in this sector grew 5.5 per cent per year, most of which is attributed to expansion in furniture manufacturing. Employment in this industry totaled 5,200 in 1968 or more than 60 per cent of the sector total.

Geographically-oriented employment grew only 0.4 per cent per year. Employment in this sector was almost stable from 1963 to 1968, but by 1969 employment in metals industries had risen by about 800 workers, increasing total employment in the sector by about 10 per cent. Metals industries currently account for about 60 per cent of E_g in the area; Federal Government, 25 per cent; and mining and stone, clay, and glass industries, the remaining 15 per cent.

Urban-oriented employment in Fort Smith increased at the relatively high rate of 4.3 per cent from 1960 to 1968. This sector accounts for 71 per cent of all jobs in the area, about the average per cent for the region.

Employment growth trends in Fort Smith reflect the closing of a large military base in the area. The dismantling of this base and the replacement of military by civilian personnel apparently altered labor demand sufficiently to have a sizeable impact on employment in trade, transportation, and construction.

Population growth in Fort Smith exceeded most other CMV metropolitan areas during the years 1960-68, despite the dismantling of the military installation. The sharp increase after 1960 probably indicates migration from nearby counties to the Fort Smith SMSA. Population in the SMSA, which comprises four counties, declined during the 1950's as a result of rural migration to other parts of the nation.

A relatively low per capita income increase per year occurred in Fort Smith from 1959 to 1968 along with high rates of employment and population growth (Tables I, II, and IV). Average per capita personal income rose only 2 per cent per year, below average for SMSAs in the region and below the 2.9 per cent average rate for all SMSAs in the nation.

Little Rock

Employment in Little Rock grew 3.3 per cent per year during the period 1960-68. This was slightly above average for both the regional SMSAs and major national labor markets (Table II).

Geographically-oriented employment, which now accounts for one-fourth the total for the area, grew at the relatively high rate of 4.5 per cent. This growth represents primarily the expansion of one firm engaged in making fabricated steel and aluminum products. Complementary employment, which was already low at the beginning of the decade, declined further as a percentage of total employment during the period (Table III).

Urban-oriented employment, which accounted for 73 per cent of the total, grew at a 3.1 per cent rate. Employment in this sector is heavily weighted by wholesale and retail trade, construction, financial agencies, local government, and services.

Population in Little Rock grew 2.2 per cent per year from 1960 to 1968, the highest rate of all regional SMSAs and well above the national SMSA average (Table I). Population growth was also above average for the region in the prior decade. This higher-than-average rate of population growth in recent years may reflect the fact that a high rate of industrialization and migration from the farms occurred later in Arkansas than in most other states of the CMV. These trends were having an important impact on regional SMSA population growth after they ceased to have a major impact on SMSA growth in other regions.

Per capita personal income in Little Rock grew at above-average rates for regional and national SMSAs in both the recent and prior decades (Table IV). Such income in Little Rock grew at a 2.3 per cent annual rate in the 1950's and a 3.4 per cent rate from 1959 to 1968. In 1950 per capita personal income in Little Rock was only 80 per cent of the regional

SMSA average, but in 1968 had risen to 91 per cent. This rapid increase of income growth, coupled with relatively high population and employment growth rates, indicates a substantial rise in production efficiency and a sharp increase in demand for labor in the Little Rock SMSA.

Louisville

Total employment in the Louisville SMSA grew at a rate of 3.2 per cent from 1960 to 1968, exceeding the average for SMSAs in the region and for large national labor markets (Table II). Employment gains of 4.4 per cent per year in the geographically-oriented sector were also relatively high, exceeding all other SMSAs in the region except Little Rock, Memphis, and Texarkana. This sector, which constitutes almost one-fifth of total employment in the area, is heavily weighted by machinery manufacturing employees. Such employees, which account for about one-half the E_g total, rose from 20 to 27 thousand during the six-year period 1963-69.

Although employment in all three sectors rose, the increase of 6.4 per cent per year in complementary employment (13 per cent of the total) was especially rapid. Gains in this sector after 1965 were heavily weighted by increases in the manufacture of electric appliances. These increases are attributed largely to the decision of one firm to establish a major manufacturing center in Louisville. Small E_c increases occurred in lumber and wood products, chemicals, and other nondurables, which were about offset by declines in employment in fixtures, apparel, and related products.

Employment in urban-oriented occupations, which account for 68 per cent of the total, rose somewhat less than average for SMSAs in the region and substantially less than the other sectors in Louisville. Modest growth occurred, however, in all types of E_u occupations, including services, trade, finance, transportation, local government, fabricated metals, food and kindred products, and publishing.

Population in Louisville, the second largest SMSA in the region, grew at a below-average rate for regional and national SMSAs in the period 1960 to 1968, which was inconsistent with the high rate of employment growth. Louisville, however, had a relatively high rate of population growth for the region during the prior decade, averaging 2.3 per cent per year, the second highest rate among the regional SMSAs and almost equal to the national SMSA average of 2.4 per cent (Table I).

Per capita personal income in the Louisville area is the second highest of all SMSAs in the CMV states, averaging $2,965 (Table IV). Such income was slightly above the Evansville average, but was 5 per cent below the St. Louis and national SMSA average. Per capita income in Louisville rose 3.2 per cent per year from 1959 to 1968, slightly above the regional SMSA growth rate and exceeding the national SMSA average. Such income growth in the prior decade exceeded both the regional and national SMSA average.

Memphis

Employment in the Memphis SMSA grew at an annual rate of 3.8 per cent, greater than both regional and national SMSA average rates in the 1960's (Table II). Growth occurred in all three employment sectors, with especially sharp gains percentage-wise in geographically-oriented employment. Growth in this sector stemmed from a relatively small base and reflects primarily the establishment of a new electric appliance plant employing about six thousand people, almost doubling E_g in the area.

In contrast to rapid E_g gains, growth in the complementary sector was at the relatively low rate of 1.9 per cent. This sector is likewise relatively small, accounting for less than 10 per cent of total employment in the area.

Employment in Memphis is primarily urban-oriented with E_u constituting 78 per cent of the total (Table III). Growth of 3.6 per cent in this service area was well above average for the region. The city developed historically around wholesale and retail trade designed to serve both the local urban area and the smaller communities over a large trade area. Despite the recent sharp upturn of E_g, the service sector declined only slightly relative to total employment. Wholesale and retail trade still provide about one-fourth of the area's jobs, while other urban type services, such as local government, finance, transportation, construction, food processing, fabricated metals, and printing and publishing, provide the remaining 55 per cent.

Population growth in Memphis was well above the regional SMSA average and slightly higher than the national rate from 1960 to 1968. Population growth here of 1.7 per cent per year was exceeded only by Fort Smith, Little Rock, and Springfield, and was equal to Texarkana in the region (Table I). During the prior decade this growth in Memphis exceeded all other SMSAs in the region. The high rate of popu-

lation growth here was consistent with a relatively high rate of employment growth.

Per capita personal income in Memphis increased sharply in recent years along with jobs and population. Such income rose 3.7 per cent per year from 1959 to 1968 after a relatively low rate of gain in the prior decade. In the recent period per capita personal income growth in Memphis was exceeded only by Evansville, Pine Bluff, and Texarkana of the regional SMSAs, and was well above regional and national SMSA averages (Table IV).

Despite the recent income gains, per capita income in the area remains relatively low, averaging $2,446 in 1968, or 86 per cent of the regional SMSA average, and 79 per cent of the national SMSA average.

Pine Bluff, Arkansas

Pine Bluff, the smallest SMSA in the region, had a relatively high rate of employment growth from 1960 to 1968. The 3.9 per cent growth rate here was well above CMV and national SMSA averages and was exceeded in the CMV states only by Fort Smith, Springfield, and Texarkana (Table II).

Geographically-oriented employment, which accounts for more than one-fourth the area total, grew 3.5 per cent per year, less than total employment growth but slightly above the average E_g gain for the region. The large E_g sector in Pine Bluff and its high growth rate reflect primarily a government-operated ordnance plant which had sizeable employment gains during the period. Excluding the ordnance plant, E_g here accounts for less than 15 per cent of total employment, and growth was quite nominal, rising from 2.9 to 3.4 thousand, only 1.8 per cent per year.

The complementary sector, which accounts for about 11 per cent of total employment, grew only at the rate of 1 per cent and declined relative to total employment during the period. Urban-oriented employment, accounting for about three-fifths the area total, rose at a 4.6 per cent rate, the highest E_u growth rate of any SMSA in the region and well above the growth rate of other employment sectors in Pine Bluff.

Per capita personal income in Pine Bluff rose 3.9 per cent per year, an above-average rate for both CMV and national SMSAs (Table IV). This high rate of per capita income gain, coupled with high employment growth, indicates rising labor productivity in the Pine Bluff area. Population in Pine Bluff grew 0.9 per cent per year in the period 1960-68, a rate well below both the regional and national SMSA averages.

Springfield, Missouri

Total employment in Springfield increased at a rapid rate relative to SMSAs in both the CMV and the nation from 1960 to 1968. The 4.3 per cent rate of employment growth was exceeded only by Texarkana among the CMV metropolitan areas and was more than 50 per cent greater than the average CMV and national SMSA rates (Table II).

Geographically-oriented employment changed little on balance during the decade. It declined slightly from 1960 to 1965, increased sharply for the next two years, was unchanged from 1967 to 1968, and declined sharply from 1968 to 1969. The closing of a large machinery manufacturing plant in the area was a major factor in the sharp 1968-69 decline. Relative to the total, geographically-oriented employment declined from 7.6 to 6.5 per cent during the 1960-68 period (Table III).

In contrast to little E_g growth, complementary employment rose throughout most of the decade with especially rapid gains after 1964. Such employment more than doubled, rising from 4.4 to 9.6 thousand, and relative to total employment, increasing from 11.9 to 16.9 per cent. These gains are attributed to sharp increases in a wide variety of manufacturers of both durable and nondurable goods. New plants or expansions resulted in larger employment in the manufacture of industrial ventilators, radios, plastics, boxes, cement, and shoes.

Urban-oriented employment, which accounts for more than three-fourths the total, grew 3.7 per cent per year, an above-average rate of growth for all regional SMSAs.

The Springfield population has in recent years grown at a high rate consistent with the employment gains. Population increased 1.8 per cent per year from 1960 to 1968, somewhat faster than either the CMV or national SMSA average. This rate was equaled by Fort Smith but was exceeded in the CMV states only by Little Rock (Table I).

In contrast to the rapid employment and population gains, per capita personal income in the Springfield area grew at a relatively low rate during the years 1959 to 1968. Average real income rose only 2.5 per cent per year, compared with a 3.1 per cent rate for the regional SMSA total. The rapid increase

in employment, coupled with only nominal gains in per capita income in the area, reflects a relatively elastic labor supply in the Springfield area.

Texarkana, Arkansas — Texas

Total employment in Texarkana grew at the relatively high rate of 4.6 per cent per year from 1960 to 1968, the highest rate of any SMSA in the CMV states and well above the 2.6 per cent average rate for major national labor markets. Most of the area's employment gains are attributed to a sharp increase in the geographically-oriented sector.

Geographically-oriented employment, which consists largely of workers in ordnance manufacturing, rose sharply with the expansion of Viet Nam military operations in 1965. Such employment now constitutes almost two-fifths of total employment in the area, up from less than one-fourth the total in 1960. E_g here is the largest per cent of total employment of all SMSAs in the region.

Employment in complementary industries likewise increased at a high rate, but this sector still constitutes less than 5 per cent of the area total. Urban-oriented employment was apparently little affected by sharp increases in the E_g and E_c sectors. Such employment grew only 1.4 per cent per year, well below the average rate for E_u in all metropolitan areas in the CMV states. The number of employees in transportation and utilities and the self-employed remained about unchanged during the period, while small increases occurred in construction, finance, services, and state and local government.

Population in Texarkana grew at a 1.7 per cent rate from 1960 to 1968, somewhat faster than the SMSA average in the region and slightly faster than the national SMSA average. Population in the area declined somewhat during the prior decade, reflecting migration from the rural portions of the two counties which currently comprise the SMSA.

Per capita personal income in Texarkana has grown at the highest rate of all SMSAs in the region and more than double the regional and national SMSA averages. Most of this sharp increase is attributed to the major increase in ordnance employment and the relatively high wage rates prevailing in this industry.

Statistical Analysis of Area Growth Patterns

As indicated in the tables and charts, wide variations occurred in employment growth patterns among the metropolitan areas in the CMV. The sharp gains of geographically-oriented employment (E_g) in Memphis in 1965, for example, were not followed by rising growth rates of complementary (E_c) and urban-oriented (E_u) employment. E_g grew faster in Little Rock than other employment categories throughout most of the period. In contrast, E_u growth led other sectors in St. Louis, and E_c grew fastest in Springfield. These diverse patterns cast doubt on the validity of applying any single explanation of employment growth uniformly among urban areas. This section investigates these growth trends more rigorously using statistical analysis.

If growth of E_g and E_c generate additional employment expansion within a labor market area, as postulated by export base theorists, then from the following equations one would expect the indicated results, where each coefficient is significantly different from zero:

$$(1)\quad \Delta E = a + b\,\Delta E_g \qquad b > 1$$

$$(2)\quad \Delta E = a + b\,\Delta(E_c + E_g) \qquad b > 1$$

$$(3)\quad \Delta E_u = a + b\,\Delta(E_c + E_g) \qquad b > 0$$

$$(4)\quad \Delta E_c = a + b\,\Delta E_g \qquad b > 0$$

On the other hand, if E_g or E_c growth "crowd out," or replace, expansion in another sector, contrary to the postulates of the export base approach, the following are the expected results:

$$(1')\quad \Delta E = a + b\,\Delta E_g \qquad b \leq 1$$

$$(2')\quad \Delta E = a + b\,\Delta(E_c + E_g) \qquad b \leq 1$$

$$(3')\quad \Delta E_u = a + b\,\Delta(E_c + E_g) \qquad b \leq 0$$

$$(4')\quad \Delta E_c = a + b\,\Delta E_g \qquad b \leq 0$$

Table V should be interpreted in light of these expectations. The equations in this article have incorporated the approximate form of (1) - (4) above, utilizing lagged values of the independent variables in each case.

The time series regressions of employment growth by sectors in individual cities further confirm the relatively small impact of geographically-oriented employment growth on employment in other sectors. First differences of quarterly data indicate that geographically-oriented employment had some initial impact on total employment in most CMV metropolitan areas (Table V). In equation (1) the coefficient for the current quarter was significant at the 5 per cent

Table V

REGRESSION ANALYSIS

	St. Louis	Evansville	Fort Smith	Little Rock	Louisville	Memphis	Pine Bluff	Springfield	Texarkana
				(1) $\Delta E = a + \Sigma b \Delta E_g$					
t	1.752 *	1.040 *	0.941 *	1.429 *	0.962 *	1.268 *	0.893 *	0.277	0.714 *
	(6.638)	(4.507)	(5.777)	(4.538)	(4.035)	(4.789)	(3.919)	(0.443)	(9.679)
t−1	0.705 *	0.498 *	0.372 *	0.965 *	0.434	0.556 *	0.384 *	0.236	0.358 *
	(3.733)	(2.455)	(2.685)	(3.922)	(1.652)	(2.934)	(2.104)	(0.492)	(10.349)
t−2	−0.694 *	−0.292	−0.383 *	0.019	−0.311	−0.434	−0.316	0.077	−0.177 *
	(−2.710)	(−1.291)	(−2.351)	(0.062)	(−1.018)	(−1.648)	(−1.380)	(0.114)	(−2.309)
SUM	1.763 *	1.246 *	0.930 *	2.413 *	1.085	1.389 *	0.961 *	0.590	0.895 *
	(3.733)	(2.455)	(2.685)	(3.922)	(1.652)	(2.934)	(2.104)	(0.492)	(10.349)
R^2	.55	.35	.59	.38	.40	.38	.28	.00	.81
				(2) $\Delta E = a + \Sigma b \Delta (E_g + E_c)$					
t	1.723 *	0.883 *	1.005 *	1.289 *	0.813 *	1.370 *	0.724 *	0.930 *	0.709 *
	(6.943)	(7.955)	(6.464)	(5.401)	(7.933)	(7.234)	(3.288)	(3.690)	(9.545)
t−1	0.686 *	0.399 *	0.398 *	0.827 *	0.564 *	0.804 *	0.383 *	0.478 *	0.344 *
	(3.904)	(4.124)	(2.883)	(4.308)	(6.358)	(5.257)	(2.056)	(2.701)	(9.639)
t−2	−0.694 *	−0.284 *	−0.408 *	−0.048	0.032	−0.165	−0.150	−0.212	−0.194 *
	(−2.889)	(−2.579)	(−2.601)	(−0.202)	(0.281)	(−0.892)	(−0.673)	(−0.852)	(−2.500)
SUM	1.715 *	0.999 *	0.995 *	2.069 *	1.409 *	2.009 *	0.957 *	1.196 *	0.859 *
	(3.904)	(4.124)	(2.883)	(4.308)	(6.358)	(5.257)	(2.056)	(2.701)	(9.639)
R^2	.57	.64	.65	.45	.66	.59	.20	.26	.80
				(3) $\Delta E_u = a + \Sigma b \Delta (E_g + E_c)$					
t	0.925 *	0.095	0.278 *	0.536 *	−0.059	0.636 *	−0.047	0.162	−0.082
	(4.930)	(1.348)	(2.404)	(2.350)	(−0.876)	(3.783)	(−0.243)	(0.688)	(−1.578)
t−1	0.295 *	0.021	0.098	0.490 *	0.029	0.491 *	0.035	0.107	−0.039
	(2.222)	(0.334)	(0.950)	(2.668)	(0.395)	(3.618)	(0.214)	(0.645)	(−1.555)
t−2	−0.483 *	−0.064	−0.132	0.198	0.102	0.100	0.100	−0.002	0.024
	(−2.656)	(−0.918)	(−1.129)	(0.869)	(1.140)	(0.613)	(0.508)	(−0.008)	(0.440)
SUM	0.738 *	0.052	0.244	1.225 *	0.072	1.226 *	0.079	0.267	−0.097
	(2.222)	(0.334)	(0.950)	(2.668)	(0.395)	(3.618)	(0.214)	(0.645)	(−1.555)
R^2	.39	.01	.16	.15	.00	.30	.00	.00	.05
				(4) $\Delta E_c = a + \Sigma b \Delta E_g$					
t	0.019	0.109	−0.057	0.166 *	0.120	−0.119	0.045	0.001	0.001
	(0.727)	(0.579)	(−1.349)	(2.891)	(0.607)	(−1.150)	(0.708)	(0.004)	(0.056)
t−1	0.010	0.117	−0.041	0.063	0.003	−0.084	0.004	−0.003	0.010
	(0.548)	(0.707)	(−1.144)	(1.399)	(0.015)	(−1.133)	(0.074)	(−0.015)	(1.026)
t−2	−0.004	0.067	−0.005	−0.072	−0.115	−0.007	−0.039	−0.006	0.014
	(−0.143)	(0.361)	(−0.111)	(−1.253)	(−0.453)	(−0.067)	(−0.615)	(−0.020)	(0.641)
SUM	0.026	0.292	−0.102	0.157	0.008	−0.210	0.009	−0.008	0.025
	(0.548)	(0.707)	(1.144)	(1.399)	(0.015)	(−1.133)	(0.074)	(0.015)	(1.026)
R^2	.00	.00	.00	.16	.00	.00	.00	.00	.00

Note: The equations shown here use the Almon technique with three lags, endpoints constrained to zero, and a third degree polynomial. For further discussion of the methodology, see Shirley Almon, "The Distributed Lag Between Capital Appropriations and Expenditures," *Econometrica*, (January 1965), pp 178-196. Regression coefficients are the top figures, and their "t" values are enclosed by parentheses below each coefficient. The regression coefficients marked by an (*) are statistically significant at the 5 per cent level.

level for eight of the nine SMSAs, and the sums of the coefficients for three quarters were significant in seven of the nine SMSAs.

The impact multiplier was positive for each city and averaged slightly greater than unity in the current period. The lagged multipliers, however, changed signs after the second quarter for most cities and tended to reduce the total multiplier. The sums of the multipliers for those SMSAs with significant coefficients ranged from a high of 2.4 in Little Rock to 0.9 in Texarkana and Fort Smith, and averaged 1.4. Three of the seven SMSAs with significant coefficients indicated some crowding out; that is, an increase in E_g led to less employment in other sectors.

The combined relationship of E_g and E_c to total employment, as indicated in equation (2), is significant for every SMSA in the region. The results vary greatly, however, with total multipliers exceeding 2 in both Little Rock and Memphis. Substantial crowding out is indicated in Texarkana, and coefficients were slightly less than unity in three other SMSAs.

Equation (3) results are inconclusive with regard to the induced expansion of urban-oriented employment. The summed coefficients are positive for the most part, but they show significance only for St. Louis, Little Rock, and Memphis. Crowding out is indicated in Texarkana although the coefficient is not significant.

Equation (4) investigates the hypothesis that geographically-oriented industries attract complementary activities. No significant correlations were found between E_g and E_c. Almost as many coefficients were negative as were positive in the lagged quarterly data, and sums of the coefficients were negative in three of the SMSAs. In addition to the lag structure included in Table V, lags up to three years were tested on this equation as well as the other equations, with essentially unchanged results.

Spearman rank correlation analysis likewise reveals little relationship between the growth rates of the various employment sectors (Table VI). Although causation cannot be determined from this method, failure of correlation results to support a theory indicates that the theory is incomplete at best. Such basic tenets of the export base theory as the impact of E_g on E_c, E_g on total employment, and E_g on population are not supported by the Spearman rank correlation coefficients, indicating little relationship between these factors.

This analysis does indicate, however, some important growth relationships. Geographiclly-oriented employment was significantly associated with per capita personal income growth. Furthermore, correlations of three other relations – E_g and E_u, total employment and population, and population and per capita personal income – approach significance, the first and last with negative coefficients and employment and population with a positive one.

Table VI

RANK CORRELATION COEFFICIENTS, GROWTH FACTORS IN NINE CMV METROPOLITAN AREAS*

Factors	Spearman Coefficients
Geographically-oriented and complementary employment	.083
Geographically-oriented and urban-oriented employment	—.450
Geographically-oriented and total employment	.217
Complementary and urban-oriented employment	—.200
Geographically-oriented employment and population	.071
Total employment and population	.487
Geographically-oriented employment and per capita personal income	.717
Total employment and per capita personal income	.033
Population and per capita personal income	—.463

*A Spearman rank correlation coefficient of .600 is significant at the .05 level with nine SMSAs. For a description of this method of analysis, see Sidney Siegel, *Nonparametric Statistics* (McGraw Hill: New York, 1956), pp. 202-205 and 284.

Evaluation of Statistical Relationships

There are a number of possible reasons why export base analysis has not proven more useful for explaining growth in the CMV areas. First, the theory tends to focus primarily on demand for output of exporting industries. Demand for a city's output, however, is derived from two sources, the local economy and the rest of the world. A city's growth in employment, according to the export base thesis, relies primarily on growth of national and international demand for export goods. Growth of the export sector may be offset, however, by a decline in resource availability for the urban and complementary sectors. These sectors are influenced by resource demands of the export industries. For example, wholesaling and warehousing facilities which are included in the urban-oriented sector may be moved to lower cost locations as a result of E_g demands for labor in an SMSA. Such effects imply that industry classification by sector may not only be unstable over the longer pull, but may also be unstable over relatively short spans as the relative efficiency of production changes in an SMSA.

Second, the export base view tends to ignore supply factors, including the fact that economies and diseconomies of production and input availability have an observable impact on employment and output. If the supply of labor is relatively inelastic with respect to wage rates, a gain in E_g may tend to crowd out employment elsewhere. On the other hand, if the supply of labor is relatively elastic with respect to wages, a gain in E_g may induce employment gains in other sectors as has occurred in Little Rock and Memphis. Ultimately, the community which can produce more efficiently will likely grow faster.

Third, there is the question of the use of employment statistics as a measure of the economic base. To the extent that the labor-output ratio changes at different rates in different industries over time, the linear specification of the equations tested may be inappropriate. Furthermore, it is difficult to determine with precision the proportion of employment engaged in producing goods and services for export. The method used here may lead to some bias in the results.

Fourth, demand for output by sector may grow at unequal rates. The nonbasic service sector, for instance, is experiencing great secular expansion nationally.[10] As income increases over time, the population tends to demand more services relative to goods.

Finally, growth in both per capita income and geographically-oriented employment in a given SMSA (excluding military related jobs) may be more related to basic factors, such as capital accumulation and the acquisition of managerial and labor skills, than to increases in national demand for a few products which happen to be currently produced in a given SMSA.

Crowding Out Effects

The crowding out effects of gains in E_g on employment in other sectors are not only indicated in statistical analysis of the data, but also on an *a priori* basis. Export type industries generally pay higher wages than local service type industries. In January 1969, production workers in durable goods manufacturing and ordnance and accessories had average weekly earnings of $136.70 and $139.59 respectively in the United States. In comparison, average earnings of all nonagricultural production workers were $110.63 per week.[11]

A rise in money wages which results from an increase in export demand has effects which both increase and reduce demand for labor in the domestic sector.[12] The increase in money wages leads to an increase in income per family, higher demand for domestic output, and an increase in derived demand for domestic employment. The rise in money wages relative to the price of domestic output, however, provides incentive for the substitution of other factors for labor in domestic production. Furthermore, a rise in price of domestic output tends to reduce the quantity of such output demanded and thereby the quantity of labor demanded.

The apparent relationship between E_g growth and per capita income gains found in the Spearman correlation analysis may reflect both the lack of a completely elastic labor supply and some rigidities in the labor market. In the absence of infinite elasticity in the labor supply, any increase in demand for labor as a result of new employment in export industries tends to raise money wages throughout the labor market. Higher per capita income will result. Even with a relatively elastic labor supply, if the new geographically-oriented employees are paid higher than average wage rates in the community as a result of collective bargaining agreements or other nonmarket factors, average per capita money income in the area will rise.

Some relationship between employment and population growth can be anticipated except in unusual situations. The labor force tends to rise with an increase in population in the absence of unusual distribution of the various age groups.

Growth Related to Education and Skills

The differences in nominal incomes among SMSAs can be traced to a multiplicity of factors. Sizeable differences in living costs occur between various sections of the nation and among the various cities, according to the United States Department of Agriculture.[13] Food costs in metropolitan areas are generally higher than in the small cities, while total costs in the Northeast are generally greater than in the rest of the nation. Although the study did not provide direct comparisons between two CMV metropolitan areas, the fact that living costs in St. Louis were 1 per cent above the national average, while Nashville, Tennessee and Baton Rouge, Louisiana were 5 and 6 per cent respectively below the national average, indicates that differences in living costs account for part of the difference in nominal per capita incomes among the CMV metropolitan areas. Part of the nominal income difference, however, surely reflects a difference in well-being.

Variations in real per capita income levels among SMSAs are probably more related to unequal labor and managerial skills than to autonomous growth in a specific industrial sector. Theodore W. Schultz estimated on a tentative basis that the stock of educational capital in the labor force rose about one and one-half times the stock of tangible capital between 1929 and 1957, implying that the growth of invest-

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[10] According to a recent study, "the Service sector's share of total employment has grown from approximately 40 per cent in 1929 to over 55 per cent in 1967. Between 1947 and 1965 alone, there was an increase of 13 million jobs in the Service sector compared with an increase of only 4 million in Industry [primarily manufacturing] and a decrease of 3 million in Agriculture." Victor R. Fuchs, *The Service Economy*, (New York: National Bureau of Economic Research, 1969), p. 2.

[11] U.S. Department of Labor, *Monthly Labor Review*, (March 1969), pp. 104 and 105.

[12] Richard F. Muth, "Differential Growth Among Large U.S. Cities," (Working Paper CWR 15, Institute for Urban and Regional Studies, Washington University, February 1968), pp. 13, 14.

[13] U.S. Department of Agriculture, *The Farm Index* (January 1969), pp. 19, 20.

ment in man is a major source of economic growth.[14] In a series of regression analyses, Jacob Mincer found that the rate of return to various types of on-the-job training and to a college education were about equal.[15]

Edward Denison has specified the importance of labor force education:

> A better educated work force – from top management down – will be better able to learn about and to utilize the most efficient production practices known. . . . Additional education, especially general education, presumably increases versatility, mobility and awareness of employment opportunities.[16]

SMSA Employment and Population Affected by Farm Sector

Part of the difference in employment growth among SMSAs in the CMV may be associated with unequal rates of migration from farm to nonfarm occupations. Rapid growth in farm output per person relative to demand for farm products since the end of World War II has resulted in a major reduction in farm workers and a mass migration from rural to urban type occupations throughout the nation. Although such migration is still sizeable, it has been on the wane in recent years as indicated by the slower rate of urbanization (Table VII).

This moderation in the rate of urbanization is observable in the Central Mississippi Valley. The sharp uptrend in urbanization here occurred somewhat later than in the nation as a whole because of the slower rate of agricultural and industrial development.[17] Missouri, with 51 per cent of the population living in urban areas, was the most urbanized state in the region in 1930. At the other end of the scale, Mississippi and Arkansas had only 17 and 21 per cent of their respective populations living in urban areas.

By 1970 the urban population of Missouri accounted for 63 per cent of the state total, a slightly greater per cent than in the nation. Furthermore, urbanization in Mississippi and Arkansas had moved sharply upward, rising to 39 and 44 per cent respectively.

Although the CMV metropolitan population grew at less than the national rate on a weighted average basis in the 1960-68 period, most areas in the region grew faster than the national average (Table I). Those areas with the lowest growth rates are located in the northern portion of the region, and those with the highest growth rates in the southern portion of the region, reflecting the tardy farm to nonfarm adjustments in the South.

Employment Reflects Both Labor Supply and Demand

Rapid employment and per capita income growth in most CMV metropolitan areas probably reflects, in addition to rising demand for some local export products, both a more rapid growth in labor supply and an improvement in the quality of the labor force compared with the national average. Employment growth in the region exceeded the average growth rate for large labor market areas in the nation during the 1960-68 period. Eight of the nine SMSAs in the region exceeded the national SMSA average growth rate of 2.6 per cent (Table II). Employment growth in the region was fed by a supply of migrants from rural to urban areas. Since per capita income growth was above the national average despite the increase in number of workers, labor productivity was apparently rising at a relatively high rate.

Table VII

PER CENT URBAN POPULATION, 1870-1970*

CMV STATES	1870	1900	1930	1940	1950	1960	1970**
Arkansas	2.6%	8.5%	20.6%	22.2%	32.3%	41.9%	43.8%
Kentucky	14.8	21.8	30.6	29.8	33.5	38.7	39.3
Mississippi	4.0	7.7	16.9	19.8	27.6	37.5	39.4
Missouri	25.0	36.3	51.2	51.8	57.9	61.2	63.4
Tennessee	7.5	16.2	34.5	35.2	38.4	44.0	46.8
OTHER EIGHTH DISTRICT STATES							
Illinois	23.5	54.3	73.9	73.6	74.5	76.1	77.9
Indiana	14.7	34.3	55.5	55.1	56.4	57.2	58.9
United States	25.7	39.7	56.2	56.5	59.0	59.3	61.7

*Urban population as used here includes all persons living in incorporated areas of 2,500 or more inhabitants.

**Projected by Federal Reserve Bank of St. Louis.

Sources: Hope T. Eldridge and Dorothy Swaine Thomas, *Demographic Analyses and Interrelation*, Vol. III of *Population Redistribution and Economic Growth: United States, 1870-1950* (Philadelphia: American Philosophical Society, 1964), and Department of Commerce, Bureau of the Census, *1960 Census of Population.*

[14] Theodore W. Schultz, "Reflections on Investment in Man," *Journal of Political Economy*, (Supplement: October 1962), pp. 1-8.

[15] Jacob Mincer, "On the Job Training: Costs, Returns, and Some Implications," *Journal of Political Economy*, (Supplement: October 1962), pp. 50-79.

[16] Edward F. Denison, *Why Growth Rates Differ* (Washington: The Brookings Institution, 1967), pp. 79-80.

[17] The declining rate of urbanization was documented earlier by Clifton B. Luttrell and Claire Armentrout, "Growth – Metropolitan vs. Nonmetropolitan Areas in the Central Mississippi Valley," this *Review* (January 1969).

Improved educational programs and labor skills were probably important factors in this high rate of growth in productivity and well-being. Some relative improvement may have occurred in the quality of schools for most people in the area. Military training for the area's youth during and since World War II has likely contributed to regional labor skills. In addition, there has been a wide dissemination of labor skills in the smaller cities and rural areas through more extensive on-the-job contacts with highly skilled people in recent years.

Summary

Employment growth in Central Mississippi Valley metropolitan areas exceeded the national SMSA average for major labor markets during the 1960-68 period. Population grew at a slightly lower rate and per capita personal income at a slightly higher rate than the national SMSA average.

Wide variations occurred in growth rates among the various SMSAs in the region. Employment growth rates ranged from 2.3 to 4.6 per cent, population from 0.2 to 2.2 per cent, and per capita personal income from 2 to 6.4 per cent.

Regression analysis indicates that growth in the export base sector does not always create multiple employment expansion throughout the local economy. With the exception of perhaps three SMSAs in the CMV, additional workers in local export occupations had only a slight impact on employment in the urban-oriented sector of the local economy. In some instances such service type employment is actually crowded out. Rank correlation analysis of all the SMSAs indicates no significant relationship between export base employment and total employment growth or between export base employment and population growth.

Nevertheless, export base employment growth was apparently an important factor in raising the level of per capita money income in some SMSAs. Rank correlations indicate a significant relationship here, and with nominal per capita gains, some real income gains were probably realized.

This study provides evidence that such supply factors as quantity and quality of labor and managerial skills and availability of capital may have been as important as demand for export base products in determining growth in the CMV metropolitan areas. The SMSAs located near large reservoirs of lower income farm labor had the more rapid growth rates in employment, population, and per capita personal income. A high rate of growth in farm technology contributed to urbanization in these areas, and more uniform educational programs nationally have undoubtedly narrowed the labor and managerial skill gap between CMV and national SMSAs. As this gap continues to narrow, the differential in productivity will also diminish. The long-run impact of these trends is a gradual reduction of the regional disparities in personal income and well-being.

This article is available as Reprint No. 58.