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THE BEHAVIOR OF THE EMPLOYMENT MULTIPLIER OVER TIME: AN ANALYSIS FOR LOS ANGELES COUNTY

Norman Nicholson^{*}Introduction

Economic base multiplier analysis has achieved a certain amount of "status"; it has found its way into most textbooks in the field of urban and regional economic analysis. Nevertheless, it is still a controversial tool. Several articles have appeared questioning the appropriateness of the base multiplier technique. The prime consideration is, of course, whether the estimated relationship between local and export employment involves true functional dependence of local employment upon changes in export employment. Additionally, many studies of the economic base multiplier show it to be increasing over time.¹

This study develops a newly calculated employment multiplier for Los Angeles County in order to make comparisons between it and one calculated by Hildebrand and Mace [3] for the years 1940-47. Comparisons between the two multipliers along with an analysis of employment growth patterns during the intervening years yields reasonable explanations for the observed behavior of the multiplier.

The Hildebrand and Mace study was one of the first to use least squares regression on time series data to derive the employment multiplier. In their study local employment was regressed with export employment; this differs from the normal practice of regressing total employment with export employment. For purposes of comparability their method was followed in the present study.

For the newly calculated multiplier, employment data were utilized for the six year period of 1960-65. This was done for two reasons: (1) the period was "normal" in terms of employment demand in that the years involved were remarkably stable in terms of prices and general unemployment percentages (the years 1966-67 were not included because of the obvious impact of Viet Nam war spending on the Los Angeles area economy); (2) the twenty year period is convenient for purposes of comparison.

In order to implement an employment multiplier, it is necessary to classify regional employment into its local and export components. This can be done

^{*}Assistant Professor of Economics, Illinois Institute of Technology.

¹The best known work is by Pfouts, et al. [6]. A more recent study by Moody and Puffer [5] notes the trend for the employment multiplier to rise over time.

either by proxy estimation or by survey estimating techniques. The method utilized by Hildebrand and Mace was to determine location quotients for Los Angeles County vis-a-vis three bench mark areas: Southern California, eleven western states, and the United States. If the industry in question had a location quotient greater than unity with respect to any of the bench mark areas, then the industry in question was a candidate for assignment (see footnote 2) to the export category. Again for purposes of comparability this method was followed in the present study.²

The Theoretical Structure of Employment Multiplier Models

The formal conditions for deriving an employment multiplier model can be obtained either from Homer Hoyt's [8] "basic/service" employment dichotomy or from an aggregate regional Keynesian model cast in terms of employment rather than income.³ Demand for regional output comes from both the local and export sector of a region's economy. Therefore, growth can be initiated from either sector. It is true, however, that export demand is largely outside regional control; its effect on regional growth is predicated, among other things, on the degree of the subject economy's dependence upon export industries.

However, the hypothesis of economic base theory categorically states that employment growth (or decline) is dependent upon changes in the export sector of the economy. The flaws in this hypothesis are obvious. Nevertheless, it might be the case that employment multipliers provide a low cost minimum information model that is reasonably accurate in terms of short-run forecasting of employment changes. The foregoing proposition will also be examined. The employment multiplier model is defined as follows:

²The exact methodology is stated in Hildebrand and Mace [3 pp. 243-246]. The location quotients are transformed to logarithms and that distribution is examined for a breakpoint. The breakpoint value for their study was antilog 1.508. For the present study the breakpoint was antilog 1.34. Industries having a location coefficient greater than these values, for the respective studies, were assigned to the export category. For the present study quarterly employment data [1] is used. The original study used monthly data; however, the war years of 1942-45 were excluded. The Hildebrand and Mace study uses the major industrial breakdown of the 1940 census to classify industries. The present study uses the SIC major industrial breakdown. The industrial categories are quite compatible.

A survey estimate of the share of employment belonging to the local and export categories was computed by Hansen, Robson and Tiebout [2] for 1960 employment in Los Angeles County. A regression estimate of the resulting multiplier indicates a higher R^2 than for the location quotients technique. However, this multiplier is not directly comparable with that computed by Hildebrand and Mace, and therefore is not used in this study.

³For a discussion see Lane [4].

$$(1) \quad N = N_n + N_e$$

where

N = total employment

N_n = local employment

N_e = export employment

Since total employment growth is predicated upon an increase in the region's exports, a change in total employment is dependent upon a change in export employment which has both a direct and indirect impact; the indirect impact is that portion of the multiplier coefficient above unity, therefore:

$$(2) \quad \Delta N = c \Delta N_e$$

Where c is the employment base multiplier. For predictive purposes the multiplier should be stable over the forecasting period, therefore:

$$(3) \quad \frac{\Delta N}{\Delta N_e} = \frac{N}{N_e} = c$$

As an alternative, employment data can be taken over time and an estimator developed by regressing total employment with export employment which gives the following estimating equation:

$$(4) \quad N = A + c N_e + u$$

Where A is a constant term, and u is an error term. The Hildebrand and Mace practice of regressing local employment with export employment will cause the estimated multiplier to differ by a factor of one since their estimating equation would be:

$$(5) \quad N_n = d N_e + u$$

therefore estimated total employment would be:

$$(6) \quad N = d N_e + N_e$$

Results and Analysis

The study for the years 1940-47 yielded the following estimate:

$$(7) \quad \overset{\text{local}}{N_n} = 222,000 + 1.248 \overset{\text{export}}{N_e} \quad R^2 = .90$$

In comparison, the regression estimate for the years 1960-65 is as follows:

$$(8) \quad N_n = -800198.6 + 3.58 N_e \quad R^2 = 0.33$$

(1.09)

Of course, the question to be answered is, how can the decreased percentage of explained variance and the increased slope of the regression coefficient be accounted for?

The standard answer is that the marginal propensity to import goods and services into the region has declined. As the marginal propensity to import goods and services declines the value of the employment multiplier increases. The rationale being that as the region grows in terms of employment the home market will now support a greater number of industries, thus providing increased local employment; therefore, the need to import goods and services declines.

Given the base theory hypothesis, the employment multiplier must become more "leveraged," i.e., an increase of employment in export industries now leads to greater number of local jobs than before. This brings into question the causal dependence of local employment upon export employment. It may be the case that local jobs become less dependent upon export employment.

Evidence for such an effect is given in Table 1 which shows the compound annual growth rate for two-digit SIC industries in Los Angeles County for the years 1960 to 1965. Since the export coefficients for the service industries are quite low, the rates of increase for service industry employment would be significant over time. Even more striking evidence of this effect is given in Figure 1 which is a time plot of growth in manufacturing employment, service industry employment and population in Los Angeles County relative to the rest of the country for the years 1960-1965.

According to the location quotients assignment, Los Angeles County manufacturing industries are largely export oriented; these industries are declining in importance vis-a-vis the rest of the country. On the other hand service industries, which are locally oriented, are growing at a faster rate than for the United States as a whole.

To test for this effect a time trend variable was introduced into the estimating equation yielding the following result.

intro time

$$(9) \quad N_n = 769017.42 + 1.10 \overset{\text{local}}{N_e} + 0.11T \quad R^2 = 0.69$$

(0.89) (0.02) *export time*

Thus, the time trend which stands for other factors being the cause of local employment growth is significant while export employment is not.⁴

Up to now the regression estimates have followed the Hildebrand and Mace practice of estimating local employment by regressing it with export employment. Following the normal practice of regressing total employment with export employment and including a trend variable gives:

⁴The Durbin-Watson test statistic (1.80) indicates that the estimates are not affected by serial correlation bias.

TABLE 1: Compound Annual Employment Growth (or Decline) Rate
Los Angeles County 1960-1965

	Percentage Employment Growth Rate (Annualized)
Mining	-0.5
Contract Construction	1.0
Ordnance	7.6
Lumber and Wood Products	0.8
Furniture and Fixtures	1.1
Stone, Clay and Glass Products	1.6
Primary Metals	0.5
Fabricated Metals	1.1
Machinery, except Electrical	1.9
Electrical Machinery	-3.8
Transportation Equipment	-0.8
Instruments and Related Products	2.0
Miscellaneous Mfg.	4.9
Food and Kindred Products	-0.2
Textiles	6.1
Apparel and Related Products	2.0
Paper and Allied Products	2.5
Chemicals and Allied Products	2.9
Printing and Publishing	1.5
Petroleum Products	-1.9
Rubber and Plastics	-0.8
Leather and Leather Products	<u>1.4</u>
All Mfg. Industries Average	0.53
Transportation and Public Utilities	2.5
Wholesale and Retail Trade	3.0
Finance, Insurance and Real Estate	4.4
Services and Miscellaneous	4.6
Government	<u>4.0</u>
All Service Industries Average	3.69

tot N

April time

$$(10) \quad N = 769017.42 + 2.10 N_e + 0.11T \quad R^2 = 0.69$$

(0.89) (0.02)

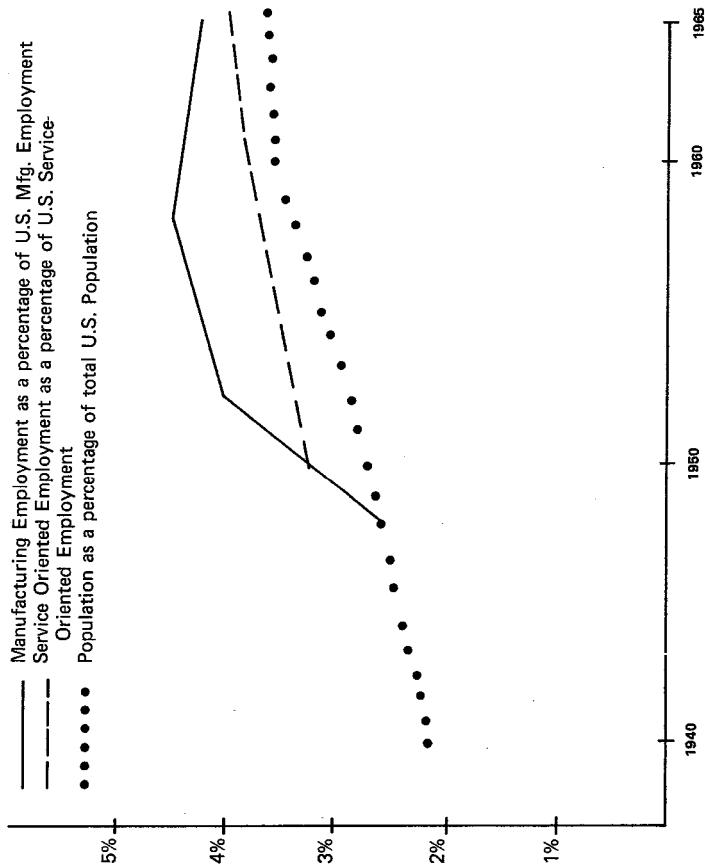
* Both export employment and the time trend were significantly different from zero at the 95 percent level. However, export employment was not significantly different from unity. Therefore, the hypothesis of local employment generation via export employment cannot be accepted. Evidently, local employment is being generated without appreciable dependence upon export employment.

Conclusions

The marginal propensity to import goods and services into Los Angeles County has declined over time as export base theory would predict. However, the higher employment multiplier reported in this study, as well as in other studies, is misleading; it seems to indicate an increase over time in the creation of local jobs through increases in export employment when, in truth, the dependence of local employment upon export employment has also declined. (This conclusion may not be valid when a relatively small community is under study. Then economic base theory may still be a viable research tool.)

Los Angeles County is probably a "bellweather" indicator of a postulated general trend in the United States. This hypothesis holds that as a country moves into the "post-industrial age" new employment opportunities are now occurring primarily in the services or tertiary industries. Since service industries usually have low export coefficients relative to manufacturing, (new employment growth within a large metropolitan area is now largely dependent upon national business cycles rather than exports from the region.

FIGURE 1: Trends in Los Angeles County Growth – Relative to the Rest of the United States
(As measured by employment)



Source: U.S. Department of Labor Statistics, L. A. County Regional Planning Commission

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