THE SPATIAL LOCATION OF METROPOLITAN EMPLOYMENT

by

JOHN JAMES FIFIELD

Submitted in Partial Fulfillment
of the Requirements for the
Degree of Bachelor of Science
at the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
February, 1974

Signature of Author. . . . . .
Department of Urban Studies and Planning; February 1974

Certified by . . . . . / Thesis Supervisor

Accepted by . . . . .
Chairman, Departmental Committee on Theses

ABSTRACT:

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The recession of 1970-71 showed conclusively the employment decentralization and consequent lost job opportunities were still a critical issue to the central cities in the United States. This thesis reviews both the theoretical and methodological issues of establishment locational behavior and the recent empirical research and policy prescriptions for the changing spatial patterns of employment.

The thesis finds the pertinent literature and research seriously biased by the cyclical effects of business conditions. A time series data base of employment by location and industry is constructed for six cities in the United States. A period by period mix-shift analysis shows the dominant correlation of the national business cycle with the over-all employment activity of the six central cities. No evidence of accelerating suburbanization is found. The author does find a correlation with the time duration of the positive economic conditions which show the city to be a 'holder of surplus inventory stock of capital resources.

Investigating policy alternatives to spread the cost and risk of this inventory societally is a main recommendation.

Thesis Supervisors: John Harris / Bennett Harrison

Titles: Associate Professors, Economics and Urban Studies and Planning.

ACKNOWLEDGEMENTS

Although there are more than several people who have wittingly or otherwise helped my efforts and enjoyment of urban studies and urban economics, I hope they will continue to accept my silent thanks for a helping hand or a new insight. There are however three people I would like to publically thank for their efforts. First, I would like to thank the co-advisors of this thesis. John Harris has in one way or another presided over better than half of my urban economic scholarship. I hope this thesis will represent his efforts well. Secondly, I would like to thank Bennett Harrison for some original direction on this effort, for his scholarly support, and enthusiastic orientation towards urban economics. Finally I wish to thank my wife Jill, whose ministrations to both the author and the text have gone on beyond heroic. It is a signal of her patience and skill that this has gone beyond the idle back-of-the-envelope stage, and it is to her that this thesis is dedicated.

--J.J.F.
February 1974

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CHAPTER 1: INTRODUCTION

1.1 PURPOSE

The purpose of this thesis has been to research, understand, and explain some of the aspects of the spatial location and changes in location of metropolitan employment and establishments. Part of this effort has also been to qualify the more recent empirical research by assessing their cyclical dependence, and to explore and quantify the interrelationships between national economic conditions and the spatial movement of employment. Further illumination of locational and fiscal policies and their interrelationship with national urban, social, and economic policy is included.

These objectives have been modestly achieved. Although the original intent to specify a complete model of establishment location behavior has not been fully realized, both theoretical and methodological insights into such a model are explored. These are detailed in Chapter 2. In addition, three major sub-goals of the research have been achieved. A machine-readable time-series data base of employment and establishment decentralization by industry for 6 United States metropolitan regions has been complied. It is part of an ongoing survey, now published in machine readable form, to which additions may be made. Secondly, a search of the literature has covered all the recent theoretical, methodological, and empirical work on employment decentralization and estab-

lishment location analysis and behavior. These are reported in Chapter 3. Thirdly, some empirical measurement of the interrelationship between national economic conditions, industry locational characteristics, and employment decentralization has been made. These are related in Chapters 4 and 5. Finally, some future research and policy implications are explored in Chapter 5.

1.2 IMPORTANCE OF EMPLOYMENT DECENTRALIZATION AND BUSINESS LOCATION ANALYSIS.

Employment decentralization, and the activity its analysis per force assumes, business locational behavior, are central to almost all the practical and mythological problems and decisions about central cities and their suburbs. A great deal of individual efforts, household equilibriums, planning activities, infrastructure developments, service delivery activity, fiscal policy, and academic research focus on job location and movement as a key input. Whether one is a traditional economist concerned with atomistic maximizers, land use specialization and economic efficiency, or whether one is a poverty economics analyst searching for a wholistic view of perverse patterns in the economic and social fabric of society, the question of job location and movement are central to one's investigation. If one is concerned with planning a subway, speculating in land, finding a job, buying a house, designing revenue sharing, implimenting a

tax, designing and delivering a public/private service, or investigating mathematical economics, establishment location and movement and the decentralization of jobs and firms becomes a major part of one's concern and analysis. The location of employment is one of the strongest determinants of household equilibrium. To a large extent work, its quality, wages, availability, satisfaction and its location for those who seek and travel to it determine not only individual and household economic position, but also many urban social pathologies. The journey-to-work is a major input to transportation planning. Great public and private expenditures are made concerning the location, transportation to and from, and service delivery to producers and workers. And because great sums of money are taxed and expended for the above activities, and because the atomistic competitive firm is the key signal in a market economy, employment decentralization and establishment location are the 'cause celebre' in the fiscal crisis of most large American cities. To each of these separate disciplines, employment decentralization and establishment location behavior are a key input.

Although however important employment decentralization and establishment locational behavior is to each of the above separate investigations, its influence is strongest as a totality. Employment decentralization is one of the dominant features of the American city in this century. Taken as a whole, these separate disciplines form the constituent parts

of an implicit American 'urban policy,' and a clear understanding of employment and firm decentralization will be an important key to understanding urban growth processes. Whether it is on the level of legislative hearing for revenue sharing or private consultation on plant expansion, decisions are made daily on the basis of this implicit urban policy. As employment decentralization and establishment location are more clearly understood not only will this urban policy set be more genuinely revealed, but also the requisite level and design of policy intervention will grow more clear. To these ends, the present efforts are directed.

1.3 SUMMARY OF FINDINGS.

The findings of this research find no evidence of accelerating decentralization of employment. Employment is decentralized at a reasonably steady rate in the six studies analyzed over the eighteen year period, and appeared as a normal function of economic growth and land use specialization.

The employment opportunities of the central city are clearly dominated by national economic conditions, however they are slightly compensated for by a counter cyclical move of an industrial endowment factor. A regional attractiveness measure is found to be consistently positive for a sub-group of Southern and Western cities and negative for older eastern cities.

The most important finding of the research is that a suburban shift characteristic is correlated with the length of positive economic conditions (a "boom"). In all the cities examined, the suburban shift factor moved into a pro-city position at the peak of the Vietnam War build-up. This was taken as a direct indication of a plant utilization queue in which the relatively old central city plant equipment is the last to be utilized and the first to be retired. Coincident with the pro-city move of the suburban shift index is a negative move of the regional attractiveness measure. A further support that central city plant is less desireable.

CHAPTER 2: THEORETICAL AND METHODOLOGICAL ASPECTS OF EMPLOYMENT DECENTRALIZATION AND ESTABLISHMENT LOCATION ANALYSIS

2.1 INTRODUCTION.

Theoretical model building of employment decentralization and establishment location is an inherently difficult task. Although a general paradigm and some of the more recent large models have been reveiwed elsewhere[1] an outline of such a model, and a discussion of some of its major difficulties and their methodological and policy implications will put the empirical work of this thesis and others in a reasonable perspective.

The central question of an employment location model seeks to answer the second question of the trilogy, "Where are employers located?;" "Why are they located there?;" "What are the social and economic implications of such location behavior and patterns?" By focusing on the second question of the "why" an intra metropolitan location model assumes that the data part of analysis, the "where" of the general question, is known, and also assumes that the implications and interaction of any set of patterns with other social phenomena are also known. Although these two assumptions are heroic, to say the least, their discussion will be deferred to the second half of the chapter. Restated then, in a simple example, the "why" question of an intrametropoli-

1. See Lowry (24).

tan location model follows as: "Why does a grocery store locate in one zone but not another with identical (or nearly so) characteristics, and why do both a steel mill and a grocery store locate in the same zone?"[2]

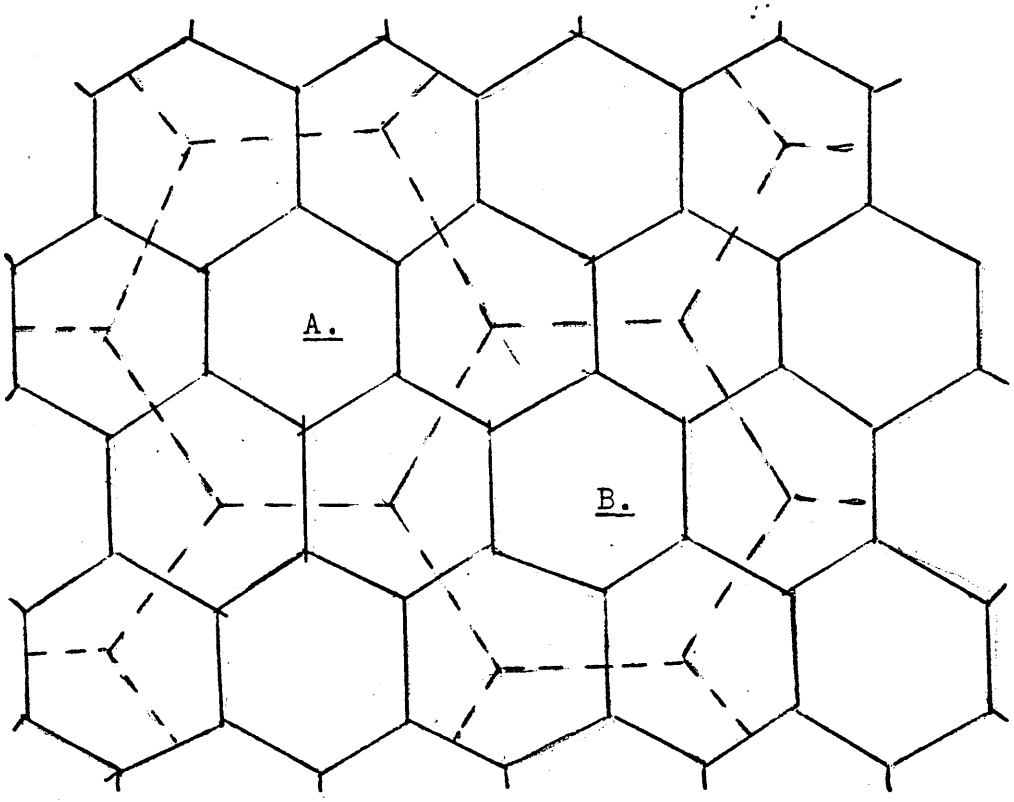
In this recast form, the steel-mill-grocery-store example focusses in on the horns of several dilemmas faced by the theorist. The first half of the example focusses on the primal tension between the dominance of supply/or demand as the determinant of economic behavior. There may be no grocery store in zone two because there are enough grocery stores for the area located in other zones, or perhaps there is no grocery store in zone two because a speculator is holding the land from the market for a higher use later. Demand and supply activities

2. By way of a glossary, an "establishment" is a single location entity which employs people, although it may not be a business establishment, for instance a government office. A "company" is a multi-establishment economic entity, while a "firm" will refer to a single establishment entity unless otherwise specified and may be used interchangeably with "establishment." A "site" is an individual plot which holds a single establishment, while a "zone" is a collection of sites with characteristics so nearly identical that their grouping will in no way lose essential differences and defeat the analysis. In this sense a large office building could have many sites for the different establishments of firms and companies which occupy it; however, it with the surrounding office buildings might form a single zone, the CBD for instance, although it and its neighbors might form several zones, the upper floors with a prestigious view, the street level floors for high volumne retail and restaurant activities, the basement for garage and parking activities, etc.

have traditionally been approached through different paths in the literature, one via central place theory/location theory and the other via land rent/land use specialization theory. These historical approaches will be briefly examined in the second part of the chapter.

The second half of the steel-mill-grocery-store example highlights the major methodological crisis for the model builder, the grouping of entities with multiple important characteristics. In this regard, the tension faced is between a formulation with enough generality to be useful but not misspecified. This tension exists not only for establishment types to be grouped, but also for sites to be grouped into zones.

Finally, one other part of intrametropolitan location analysis will be mentioned here to await their further development later, gaming (in the von Neuman sense). In particular games in the locational sense have two major divisions, the role of price or the game between landlord and tenant (buyer and seller), and the games of competitive response between like (or nearly so) establishments. The role of price is to essentially make "all things equal"; to balance the other attributes of a site and zone with other combinations of price and attributes of other sites in the market. Analogously location itself may be a competitive response, a key variable in the game of the product/services markets. Gaming is the most complex and intractable aspect of intrametropoli-



CRISTAILER'S CENTRAL PLACE THECRY

Diagram 2.2.1

tan location; it will be explored briefly in the final part of the chapter.

2.2 THEORETICAL APPROACHES TO ESTABLISHMENT LOCATIONAL BEHAVIOR.

The traditional theoretical approaches to locational behavior have been either via the fixed demand orientation of central place theory and location theory, or via the land supply characteristics orientation of land use theory.

The main observation of central place theory is that cross-culturally cities of any nation-state area display a rank size relationship. Cristaller and Losch explained this phenomenon with the classical featureless plane and a set of urban settlement types (village, town, regional city, national city) each of which has a unique area of influence and service bundle to deliver to that area. (See diagram 2.2.1) Although the geographers went on to calculate exponents and the number of villages per local town, etc., the implicit assumptions of the rationale are important to a locational behavior study. The essential statement of the construct is that an area has an intrinsic demand inherent in it, and that each settlement type has a unique service bundle, which in turn has an inherent constant optimal spacing, presumably as a function of trade-offs between their fixed costs and transportation costs. There are 'vertical' agglomerative economy possibilities,

both a regional center and a village could co-locate at the same point, and there are implied horizontal agglomerative economies in that all establishments of the same radius would locate at the single settlement point. However, despite the fact that these agglomerative possibilities are only implied, there are no intra-metropolitan locational choices (each establishment type located at the same place, the 'point' settlement of appropriate type), and central place theory is a single equilibrium paradign which does not accept the diffusion of new technologies and service types which may alter the 'inherent' parameters. Nevertheless it focuses on two constant aspects of locational behavior planning; First demand just <u>is</u>, it exists for some quite not understood reasons, and secondly, that distance, not density, (until congestion levels are reached) is an intrinsic part of the supply economies of any establishment type. (Diagram 2.2.1)

The central concept of location theory is the economies of substitution. Originally formulated by Alfred Weber and brought to its modern form by Walter Isard[4], an exogenous demand for an establishment is postulated free from any areal implications, and the profit maximizing entrepeneur is free to adjust and substitute the various factors of supply to arrive at a minimum cost solution. Obviously a key input in this schema is the location of the establishment. The costs and benefits of locational options, such as raw material aasembly cost,

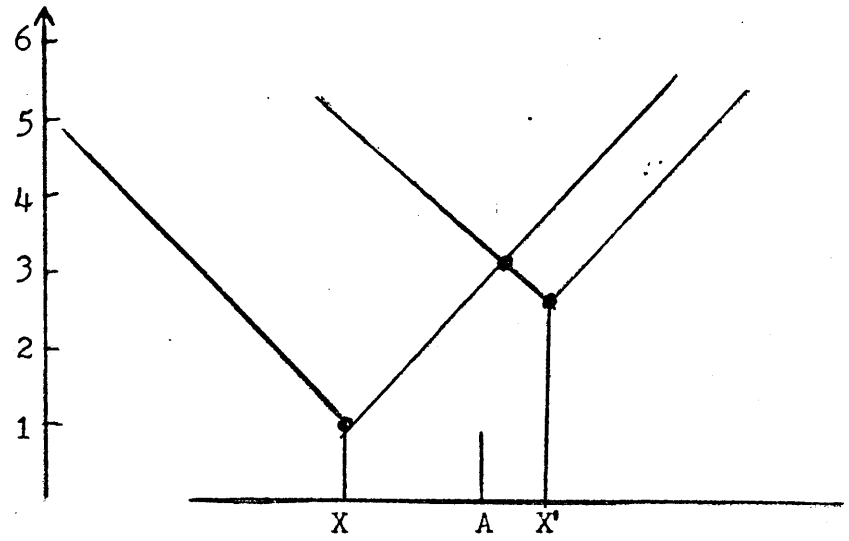
4. See Isard (14).

labor assembly cost, business service assembly costs, land cost (rent), finished goods transportation costs, communication costs, capital costs, entrepeneurship costs, etc. may be internalized into the profit maximizing analysis. The entrepeneur chooses the minimum cost location, and if there are no competitive games, and free markets, the general solution will be Pareto optimal. (When these conditions are not met, Pareto optimality may not be the case.[5]) When the loading and movement economies of transportation are wound into these analyses and many of the supply inputs are held constant, the general observation is that most establishments will locate at the transshipment point (classically a port) of the dominant input. Area is appended finally as a market influence area which spreads concentrically from the establishment location until a like establishment competitor's area of influence is met at the same price (See diagram 2.2.2)

Location theory has great power. Its logic applies both inter-regionally and intra-regionally. However, in the move from central place theory to location theory, what the theorist gains in power he loses in concreteness. As demand is made exogenous, the central place theory's geographical interaction of supply and demand is lost, & if the competitive game of land cost enters the analysis, in which the role of land price is to make 'all things equal,' then so long as

5. See Koopman and Beckmann for a general discussion of this problem. (21).

MARKET INFLUENCE AREAS OF LOCATION THEORY



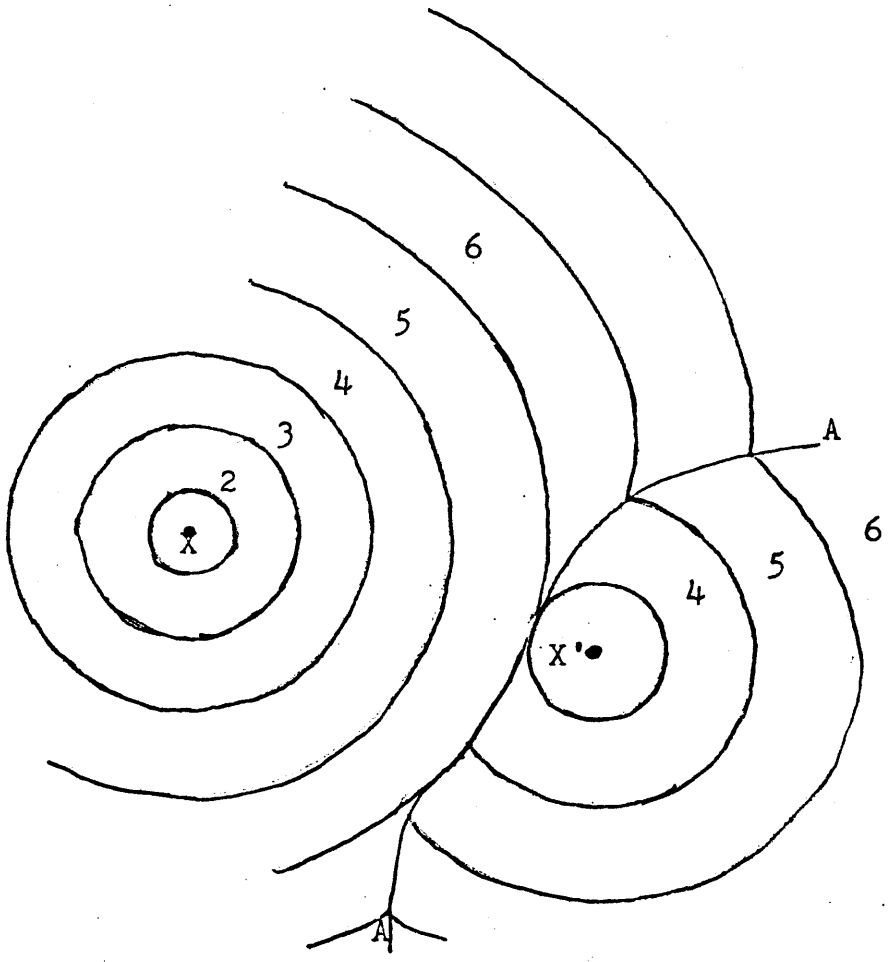


Diagram 2.2.2

landlords are acting rationally in a perfect market, the entrepreneur will be indifferent to each possible feasible location because land price will have reduced any differential benefit from one site to another. Location theory makes the rationale of the entrepreneur clear, but the spatial consequences of his acts, employment patterns, are indeterminant.

Land use theory, as first developed by von Thünen and later refined by Alonzo[6], approaches the problem of employment and establishment patterning from the other side of the coin. In models with a point city on the featureless plane, far too abstract for any empirical work but rich nonetheless in intellectual utility, the major question is what does a single all-owning landlord have to offer the tenant (entrepreneur/consumer) irregardless of the source of his demand, and to which tenants will he sell which sites to maximize his profits? The landlord has two joint commodities to offer, acreage and accessibility to the center, and the essence of the model is that the game of price will not be played between various landlords and tenants (the one landlord owns all), and the landlord will therefore set price on the characteristics of the tenant/entrepreneur only. If establishments are not playing competitive games, the landlord will set prices so that each establishment locates where the marginal contribution of land (acreage) and accessibility is greatest, and each establishment will thereby offer the greatest rent per

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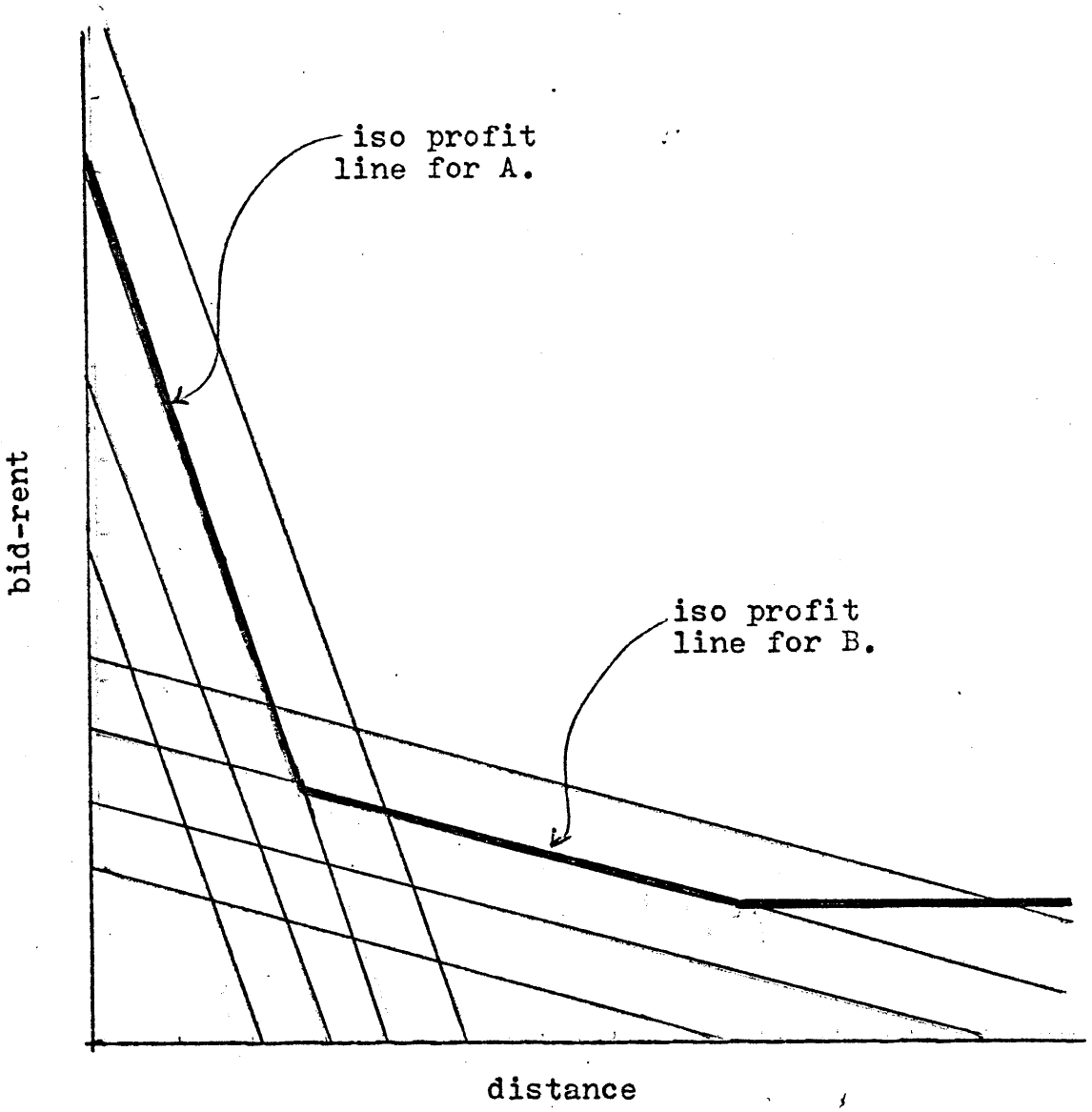
6. See Alonzo (2) and von Thünen (35).



THE BID-RENT FUNCTIONS OF LAND USE THEORY

Diagram 2.2.3

unit and maximize the landlord's profit. If there is perfect substitution between access and acreage then the bid rent curves per unit of area will be downward sloping from the point center of the city and iso-rent lines will form concentric circles. (See diagram 2.2.3) However, the implied assumption of the theory, and certainly the empirical fact, is that there is not perfect substitutability between factors for all classes of establishments. Although the landlords total profits (if maximized) are a function of the total demand in the area, his pricing system, his algorithm for maximizing the profits he may earn, is dependent on the characteristics of his tenants and their discontinuous production functions. Implicitly the landlord groups his tenants according to their cross-elasticity of demand for the items he can furnish. In the model this results in the obvious: high access users locate close to the center, high acreage users locate on the periphery. Equally clear, however, is that the model may be generalized to sites with many attributes beyond access and acreage (rail/no rail, port/no port, risk capital/ no risk capital, like industries/ no like industries, etc.) and that with these extensions no real city has a single point center. The central concept is that the spatial pattern is <u>not</u> nulified by the game of price, but is a function of site characteristics, discontinuous production functions, and total demand. The question is not 'accessibility,' but presence of factors A, B, and C, and a certain level of accessi-

bility to factors X, Y, and Z.

2.3 EMPIRICAL RESPONSES AND METHODOLOGICAL CONSTRAINTS OF LOCATIONAL BEHAVIOR MODELS.

The twin objectives of an establishment locational behavior model are: 1) to give prescriptive rules of action for participants (landlords and entrepreneurs), and 2) derive a spatial pattern of development capable of evaluating policy manipulation. When restated in a micro-economic paradigm[7], the difficulties of an operational locational model can be realized in both terms of data availability and methodological problems in grouping.

The prescriptive rule for entrepreneurs can be stated as a decision criteria as to whether one should, or should not, move an establishment k, from feasible site i to feasible site j. When the net present value of the incremental profit of site j over site i is greater than the cost of moving, then the entrepreneur should move from i to j. In any moving period, the entrepreneur will choose that site j which most increases his profits.

$$\text{Max } E^{i}_{j}k = f(\Delta\pi^{i}_{j},\ k;\ I_{o}{}^{k}_{j},\ k) \geq 0$$

$$= NPV(\Delta\pi^{i}_{j},\ k) - I_{o}{}^{k}_{j},\ k \geq 0 \qquad (\pi_{j} \geq 0)$$

The criteria for a birth of a new establishment would be the same except I_o would represent incorporation and start up

7. The author duplicated Lowry's paradigm independently in another notation, but adopts and modifies his notation here for clarity. See Lowry (24).

costs, etc. A disappearance of a firm (a 'death') would be when all possible locations of the firm were unprofitable ($E^i_{j,k} < 0$, for all j). (In these circumstances, the entrepreneur should liquidate.)

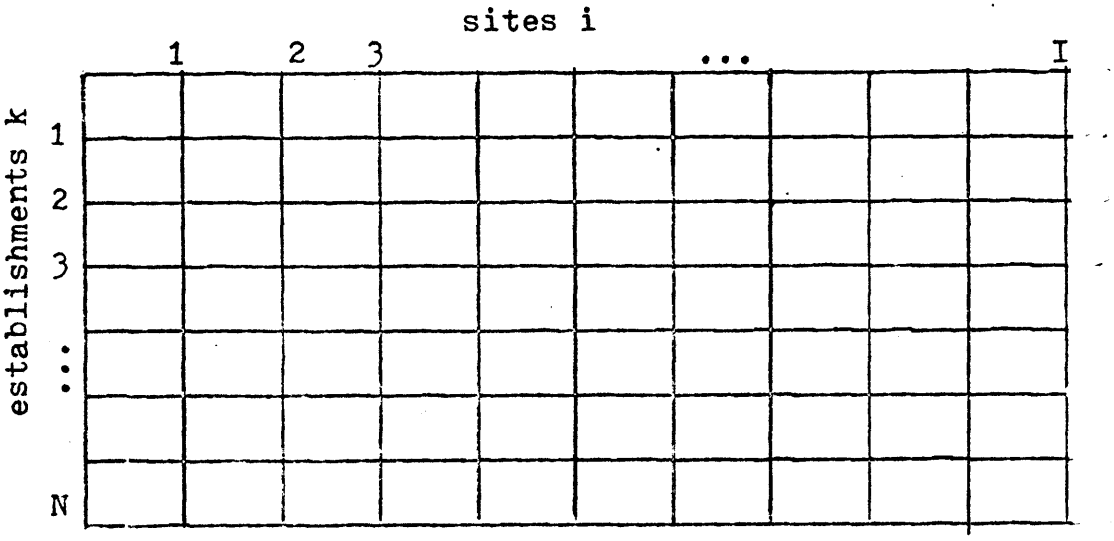
The landlord's prescriptive rule is much the same as that of the entrepreneur. The decision facing the landlord is whether to change or not change the attributes of his property (to convert). When his criteria is greater than zero, he should convert his property to a more profitable use.

$$\text{Max } L^i_j = g(\Delta P^i_j,\ C^i_j) \gtrless 0$$

$$= \text{NPV } \Delta P^i_j - C^i_j \gtrless 0$$

(Note that in this landlord case, site i and j are colocated. Site i with one set of attributes 'dies,' and site j with another set of attributes is 'born.' Clearly some attributes remain constant over the conversion. Also buying or selling property is of no significance in this paradigm. While it may record a profit or a loss to the former owner, this in no way changes the possible set of property states or the cost of conversion to them. The new owner faces the identical question.)

The second objective of a model is to get a spatial pattern of land uses. Diagrammatically we may consider all the possible sites of an urban region as the columns of a matrix, and all the land users including establishments, households, park acres, fallow land, etc., as rows of the



Price of site i for user k:

$$P^i_k = h(X^k_1, X^k_2, \ldots, X^k_M; Y^i_1, Y^i_2, \ldots, Y^i_A; Z^i_k, k=1,2, \ldots, N)$$

Entrepreneur's Relocation Prescription:

$$\text{Max } E^i_j, k = f(\Delta \pi^i_j, k; I_o{}^i_j, k) \geq 0 \qquad (\pi_j \geq 0)$$

Landlord's Conversion Prescription:

$$\text{Max } L^i_j = g(\Delta P^i_j, C^i_j) \geq 0$$

PARADIGM OF A LOCATIONAL BEHAVIOR MODEL

Diagram 2.3.1

matrix. (See diagram 2.3.1) The objective is to allocate a landuser to each site and a site to each landuser at a price, P^i_k. Clearly the price of the site P^i_k is the central determinant of both incremental profitability of moving an establishment ($\Delta\pi^i_j$, k) and, likewise, of the landlord profits. The value of the land V^i_k, is a function of the characteristics of the firms who seek it ($X^k_1, X^k_2, \ldots, X^k_M$), the attributes of the site itself, ($Y^i_1, Y^i_2, \ldots, Y^i_A$) and the special relationship of this site to other activities important to the firm is (Z^i_k, k = 1,2,...,N). If markets are perfect, price will equal value.

$$P^i_k = V^i_k = h(X^k_1, X^k_2, \ldots, X^k_M; Y^i_1, Y^i_2, \ldots, Y^i_A; Z^i_k, \; k = 1,2,\ldots,N)$$

This model has no lack of generality and has captured most of the problems of an urban employment/establishment location model. First there are prescriptive rules for both the entrepreneur/land user and the land owner. Secondly the logic of a spatial pattern is determined by price, firm characteristics, (discontinuous production functions), site attributes, and special extra-site attributes of the site for the locating establishment. The specification allows for competitive games and agglomerative economies and diseconomies (Z^i_k), games of price (P^i_k vs. P^j_k), changes in supply (L^i_j), costs of movement, information and conversion ($I_o{}^i_j$, k; $C_o{}^i_j$, k), birth

movement, and death of establishments, $(E\,\frac{i}{j}\,k)$, etc. Policy may be tracked by executing a policy set on any combination of the above variables.

The challenge at this point is not misspecification but rather compression of the total information into useful parts. Although it is tautologically true that everything is connected to everything, the interesting and useful question is what special thing is connected with what special thing. We wish not to measure everythings but only to measure special things. The essence of such a utilitous compression would be to group the sites into zones of sites with similar attributes and to group the establishments in establishment types with similar characteristics and agglomerative desires. The optimal model would reduce the number of rows and columns until there was a cell for each important interaction and the model was fully specified but without any extra cells of unnecessary duplication and clutter.

To a priori estimate such a model is at least a very difficult task. To empirically justify and arrive at such a model may be almost impossible. The essence of the solution is to group the establishment and sites into zones and types which recognize and hold the multi-important characteristics and attributes. A priori, the size of the matrix is a problem of mathematics of combinations. If one can postulate m important characteristics in n important combinations ($n \leq m$), then there are m x n rows to the model (ship transportation

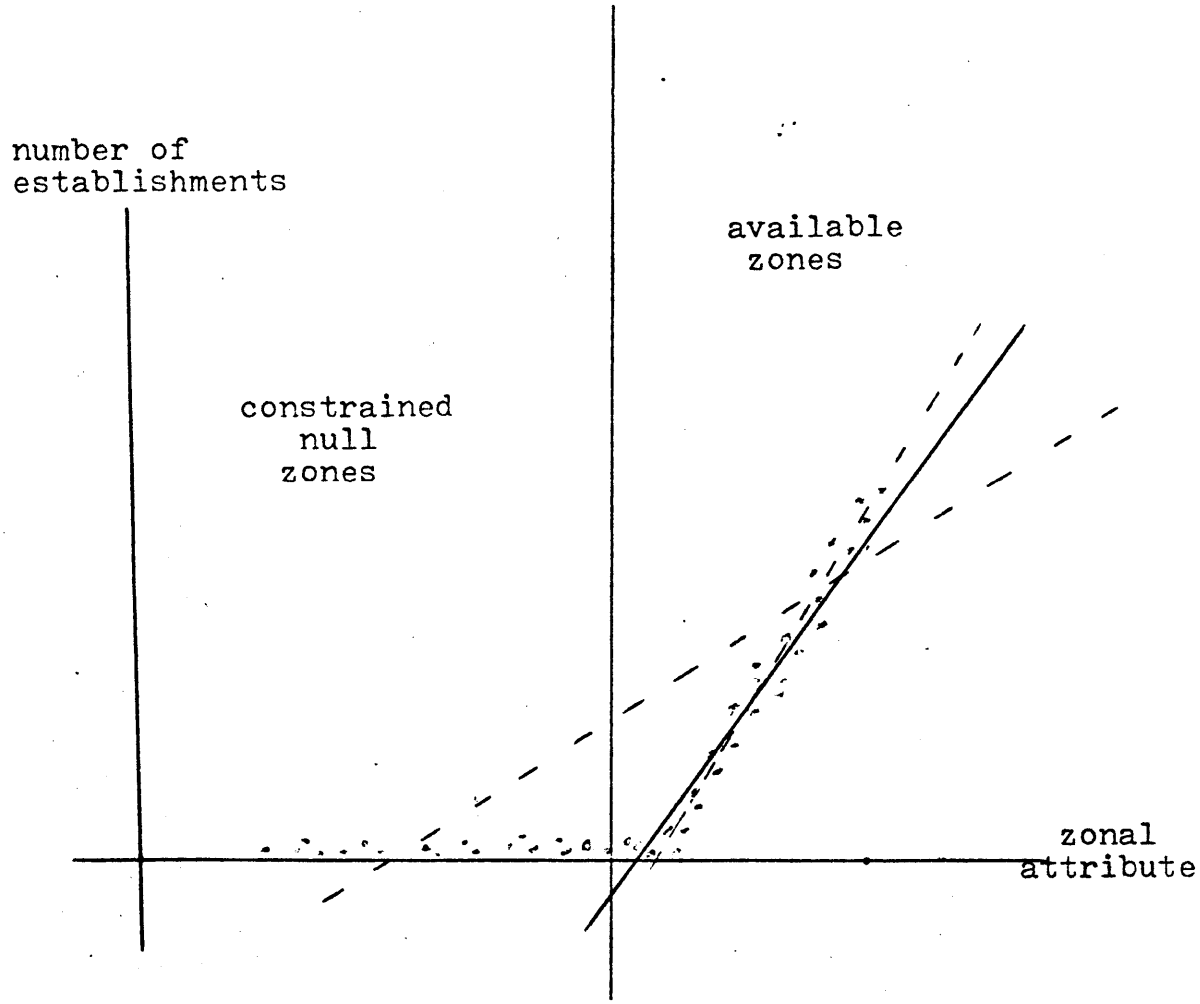
services, rail transportation services, rail and ship transportation services, etc.). If there are A attributes of sites and B combinations of attributes, ($B \leq A$), then there are A xB zones (port, railhead, part and railhead, etc.) The matrix has M x N x A x B cells. An example of the difficulties is the comparison between a containerized ship cargo terminal, a yacht club, and a golf club. Both the cargo terminal and the golf club need a large minimum site size for container storage and a golf links respectively. Both the golf club and the yacht club need the proximity of a high income population, and both the terminal and the yacht club need water facilities. Three different entities with three different combinations of needs. But to further complicate matters, two of the primary characteristics should be divided into four. The quality of the terminal acreage must be industrially zoned, while the golf links will be rolling countryside. Likewise the water access quality will be deep draft in one case and recreational seashore in the other. Only the need for a high income population is common between two production functions. The possible 'splits' of major attribute types can possibly be very large, however that does not imply that each 'split' is important. That is a question for empirical validation.

Any empirical approach to reduce the rows and columns, to group characteristics and attributes, has major problems. As discussed by Rose[8], the analysis of establishment location

8. See Rose (4).

behavior requires one to ask not only why an establishment locates on a certain site, but also why an establishment does not locate on a second site. The analyst must separate the constrained null zones (zones which lacked a primary input of the production function) from the available null zones (zones which might have received activity but did not.) He must then go on to group these various behavior characteristics so that the groupings are functions of the intrinsic production functions, land availability and total demand, not of his discrimination process. He must then rank the desireability of each available zone, and finally the empiricist must determine if the behavior is stable over time and if his groups are consistant over time.

The first problem, the 'zeroes problem', deals with the discontinuities of the various production functions and special characteristics of the land areas. In the prescriptive rule for the entrepreneur, there is the qualification that $\Pi^{j} > 0$. Clearly there may be a minimum level of specific services types such as rail, sewerage, accounting services that the firm requires to occupy a site. (The parallel to integer programming is very useful here.) If the requisite services are not available, then the site is dropped from further consideration. Only those sites which pass this first screening are then ranked for desireability. If the analyst wishes to develop a regression scoring system for the sites, he will bias his scores if he includes all sites, some of



GRAPHICAL REPRESENTATION OF THE 'ZEROES' PROBLEM

Diagram 2.3.2

which were essentially not even ranked by the behavioral unit, and he will bias his scores if he includes only those sites which had locational activity. He must distinguish between the constrained null sites and the available null sites. Diagram 2.3.2 puts this graphically.

For the ranking algorithm there is an important point to the 'zeroes problem.' Essentially the locational decision is a two stage process. First the total range of possible sites are scanned, and those without the 'integer' attributes are eliminated from the second stage of site desireability (including price) ranking. Clearly some integer prerequisite like port facilities may be negatively correlated with an important ranking attribute like rent. To the extent possible the locator will move as far away from the 'integer' attribute as possible while still remaining 'in bounds' to minimize the cost of the other attributes. However, this may result in the regression analysis showing a very weak correlation with integer attributes. This only compounds the grouping problem.

If the grouping of sites and establishments is to be one of the outcomes of the analysis and not a function of the assumptions, somehow the empiricist must minimize the difference within groups while maximizing the difference accross groups, and keeping the number of groups to a manageable minimum. The problem is what difference to what? If one chooses a set of zonal attributes and defines them as important, so as to group establishments, these zonal attri-

butes can be important only so far as they are meaningful to a referent group of establishments. The posterior grouping will contain the biases of the referent group. Clearly the referent group may not reflect distinctions of non-reference group establishments, and likewise importance of the attributes are important only so much as they are internally averaged over the referent group. The underdetermined system runs full circle in that one might start with referent groups of establishments to find a grouping of attributes to build zones, etc. The same circular tautology is delivered. Essentially the grouping is the central and yet impossible output of the analysis. The question as to whether a yacht club is more like a golf club or a containership port cannot be answered by the analysis.

(The triviality of this example should not confuse its import. The example might be rephrased as follows: is an oil refinery which receives its crude from ships more like a steel mill or a set general cargo quays? Note that each industry has pollution diseconomies but the employment of the steel mill and the quay fluctuate more than the refinery's, one with national economic trends, the other more predominantly with international economic trends. With transport systems like pipelines, is a refinery more or less port bound than the steel mill which may use ships or railroads, etc. Can the locations of these large establishments be interchanged? Any more than the yacht club, the golf club, and the container shipping points may be?)

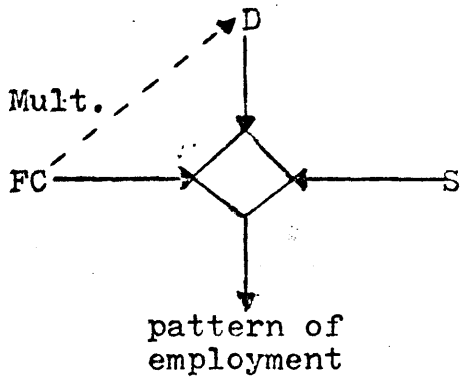
Given that the grouping of establishments into establishment types and sites into zones cannot be the pure result of the analysis, then some other alternative criteria must be chosen to select groups. All model builders, particularly those who simulate, are beholden to the problems of consistency over time and stability of aggregation, i.e. that establishments act consistently over time and that the constituent members of groups and zones are fairly stable. In this way the aggregation serves as a fair measure of unit behavior. But in this context, where any grouping set is a bias of the original selection criteria, stability over time and within divisions becomes centrally important as criteria which validate the original selection sets. If the groups and zones are not stable over time, and if the aggregates do reflect fairly the behavior of the individual units, then we may begin to allow that our grouping process is bringing us fairly close to the mark.

In light of the methodological difficulties of grouping establishments and sites, traditional models of metropolitan employment offer interesting observations on the interaction of data availability and model construction. Note also the dominance of demand projections in each of the models and the lack of supply interactions.

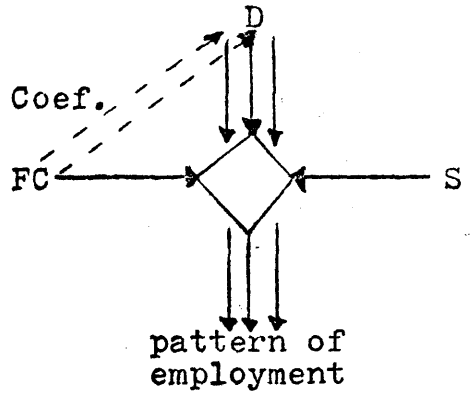
Economic base studies were the first general models of metropolitan employment, and still serve a work horse role (albeit slightly spruced up)[9]. The grouping is 'exporters/

9. See Tiebout (33).

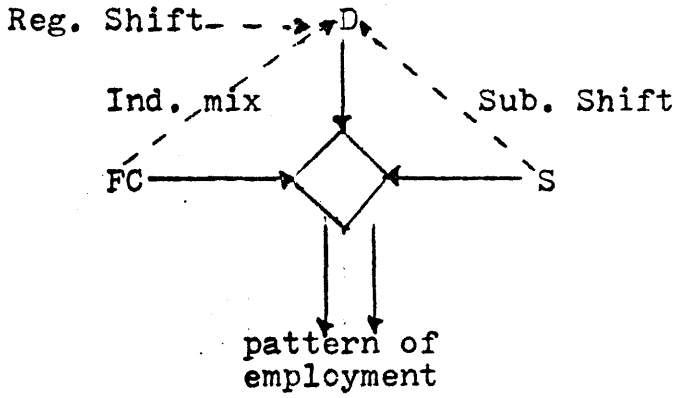
Economic Base Study



Input Output (Econometric)



Mix Shift Analysis



D = demand source
FC = firm (establishment) characteristics
S = supply of sites

CAUSAL LINKS OF COMMON EMPIRICAL EMPLOYMENT MODELS

Diagram 2.3.5

local/implicit them.' Firm characteristics parameterize demand; empirical measurement develops a regional multiplier. (See diagram 2.3.5)

Input-output studies are an extension of economic base study methodology. The grouping is 'exporters/importers/all us locals tied together/implicit them.' Firm characteristics parameterize demand in greater detail, empirical measurement develops a more sophisticated multiplier; output is more detailed. See diagram 2.3.5. (Econometric models use the same grouping but add the sophistication of leads and lags. The grouping remains the same, 'us inside/them outside/how we inside interact to them.')[11]

Mix-Shift analysis is the first analysis to consider land supply aspects as well as firm characteristics[12]. The groupings are 'slow growth industry/fast growth industry' and 'how are we doing all together/how are the suburbs doing/how is the central city doing/implicit them.' The output is less detailed than input-output, industry-wise, but more detailed spatially, contrasting center city and suburban results.

Other more complicated models which utilize the land supply data of the transportation planning financed by the interstate highways of the 1960's are reviewed elsewhere[13]. Some are noteworthy in their attempt to use the data although the groupings are often export/residential/local with only

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11. See Glickman (11)
12. See Lewis (23)
13. See Lowry, op. cit.

scant attention being directed to the changes of business location due to site and zone changes.

2.4 THE RELATIONSHIP OF ESTABLISHMENT LIFE CYCLE TO LOCATIONAL ACTIVITY AND SPATIAL DISTRIBUTION OF EMPLOYMENT.

If we have anything abstract to bring to locational behavior theory, it is our belief that locationally active individual eastablishments will not and should not remain stable within a single group. The essence of a move is that discontinuous jump has been made, that a change will be more profitable than remaining at the same location despite a moving surcharge of I_o. There are several rationales for an interzone move; either the production function of the firm has changed due to growth (or decline) and there is a more profitable location elsewhere; there has been a change in the attributes of the zone such that there are more favorable locations elsewhere, or there is a particularly fortuitous opportunity to seize a below market site. If one rules out the third possibility as unlikely due to good urban land markets and at least unsystematic, one has two systematic reasons for a move. Either the establishment characteristics have changed, or the site attributes have changed. (In the case of a simple expansion where the establishment characteristics remain the same and although the site is changed, the site attributes are also the same,the establishment has not

shifted out of its cell in the matrix, and therefore has only moved in an intra-zonal fashion.) The essence of a move, then, is that establishments which have locational activity are not stable within their original groups, and likewise with sites and sites in proximity of active sites (the agglomerative Z^{i}_{k} term).

Although unwilling to hypothesize that active establishments remain in stable groups, we do feel that establishment characteristics will clump into stable groups. If one follows Greiner[14] and sees the development of firms and companies as challenge and response stages, evolution and revolution within the firm, then it is perfectly consistant for a broad group of firms in the first growth stage to clump into several first-stage groups by technological and business attributes. As they grow and move, one will expect the firms to move to one of several second-stage groups. We may even expect the growing and therefore locationally active firms to progress through a set of groups which correlates with their stages of development and their business and technological characteristics.

Greiner's paradigm[15] of the life cycle of a firm will make clearer the relation between the life cycle and the locational activity of establishments. Greiner hypothesizes five stages for a firm's growth: each stage begins with a problem, manages (or fails) to solve that problem and then

14. See Greiner (11A).
15. This is directly from Greiner (11A).

grows (or does not grow) in a continuous sense until that stage's solution causes the problem for the next possible stage of growth. (See diagram 2.4.1) The first stage is the entrepreneurial stage. The challenge is survival; the solution is creativity (generally either technological or marketing); the major feedback system is the market. Stage two is the formalization stage. The challenge is organizational (as opposed to entrepreneurial) leadership; growth comes through the installation of simple centralized controls; the major feedback is the internal information system. In the third stage the crisis is the autonomy of active well-informed middle management; the solution is through delegation and decentralization; the major feedback system is local performance measures as profit centers. In the fourth stage, the crisis is control of the decentralized parts; the solution is through greater internal coordination; the major feedback system is an ultra specific centralized coordination-reporting system. The crisis of the fifth stage is the 'red tape' crisis where all activity becomes reporting; the solution is collaboration, internal consulting, and mutual goal setting; the major feedback system is intense personal interaction, team efforts and results. Greiner projects that the next crisis may be the 'psychological saturation' of managers and employees who are "emotionally and physically exhausted by the intensity of teamwork and the heavy pressure for innovative solutions." (In view of Chinitz's comments[16] on

16. See Chinitz (8).

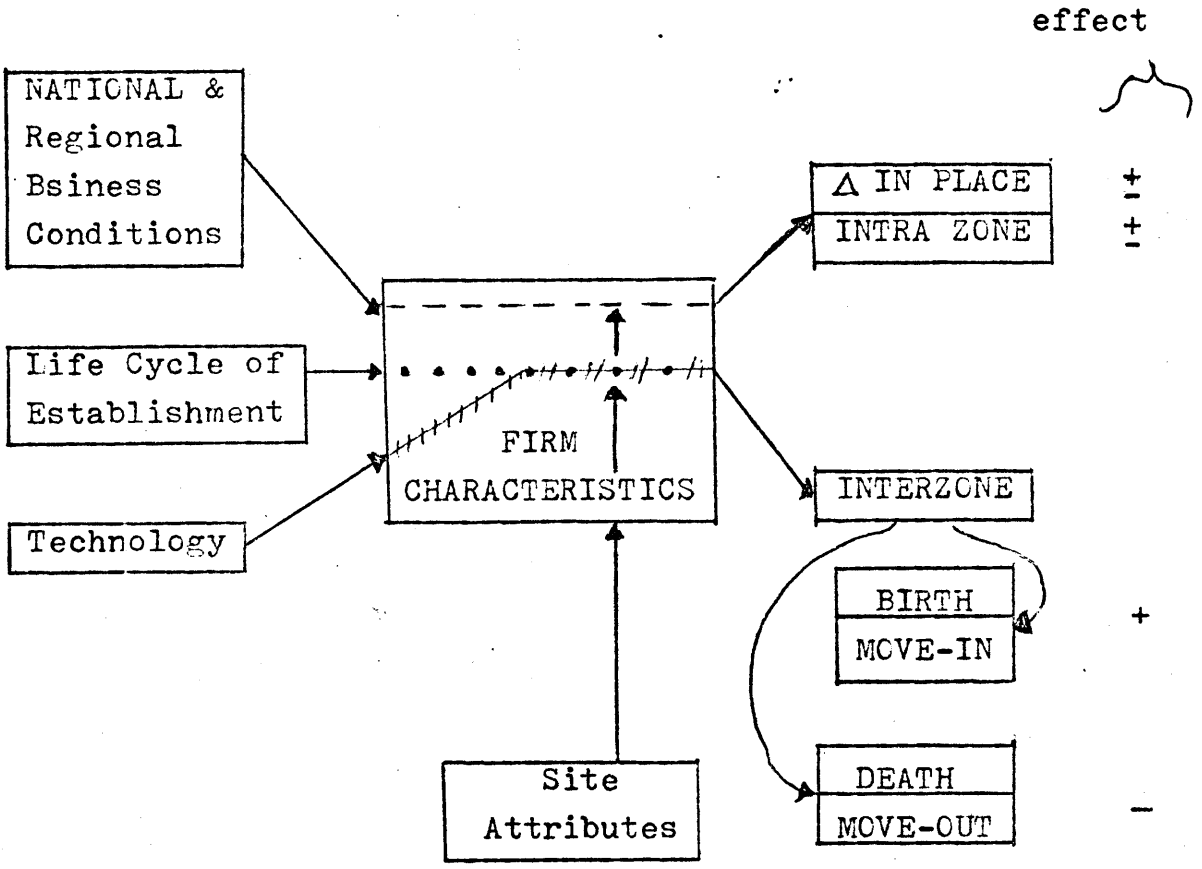
entrepreneurial capital and attitude it is interesting to see that the largest corporations have attempted to come full circle and internalize the entire entrepreneurial process, capital, attitude, service delivery and portfolio diversification, but without spreading any agglomerative economies (services) out into the community.)

While not exposed here for a detailed discussion of its merits as organizational history, the paradigm is useful in showing a certain central focus for any one stage of an establishment's parent irregardless of the specific technology. More importantly, we hypothesize that the various stages of Greiner's paradigm represent major relatively stable periods for establishment production functions, and the 'crises' points represent step discontinuities in these production functions as they shift from one mode of operation to another. This is felt to be particularly so for Greiner's first three stages.

The nexus of our beliefs gives the following causal explanation of locational behavior and spatial patterns of employment. Locational activity is a function of either the establishment shifting its production function as it matures or declines, or it is a function of changing site attributes. If the movement is due to a changing of site attributes and the establishment moves to another site with the site attributes it formerly enjoyed, this is non-pathological motion. The establishment stays in the same zone as before and is simply restoring the former equilibrium. (Note this requires

a somewhat odd definition of zone which is only a bundle of sites with like characteristics, like-zone sites need not be geographically contiguous.) If site attributes change, and the establishment moves to another zone type (which it may do so by simply remaining geographically fixed, or by moving), this may be interpreted as a special case of the former instance where former site changed characteristics as well as the establishment shifting its production function. A change in the production function is a characteristic of either a passage over a 'crisis' in the life cycle of the firm or due to changing technology. Empirical evidence to support such a construct would include the fact that establishments which stayed within or moved in an intra-zonal fashion maintained the same essential operating characteristics, while establishments which moved in an inter-zonal fashion underwent substantial internal changes.

The spatial patterns of metropolitan employment are a function of two factors: changes of in-place employment and the relocation of employment by establishments (births, move-ins, move-outs, deaths). (A firm moving into a region is a regional 'birth;' moving out is a regional 'death.') If a firm has a stable production function and is locationally inactive, the business cycle, national and regional economic conditions would reflect directly the variability of its inplace employment changes. If a firm was locationally active and had a shifting production function, the effect of the



CAUSAL INFLUENCE OF BUSINESS CONDITIONS AND ESTABLISHMENT LIFE CYCLE ON THE SPATIAL PATTERN OF EMPLOYMENT

Diagram 2.4.1

business cycle,nationaland regional economic condition would be indeterminant. (For instance, a depressed economic condition might offer both a depressed product/service market and reduced cash flow, but also lower site and plant acquisition and moving expenses, etc.) See Diagram 2.4.1 for an implied causal rationale for the spatial pattern of metropolitan employment.

The empirical part of our research will be a mix-shift analysis with control for the spatial distribution of employment caused by the business conditions in an effort to draw more clearly the effects of life cycle, technology, and locational activity on the metropolitan patterns of employment.

2.5 OTHER CONSIDERATIONS FOR LOCATIONAL BEHAVIOR MODELS.

The first main question of the spatial location model, the 'where', is just recently being answered with some accuracy. With the advent of the zip code mail system in the United States both state departments of employment security and private business census takers (Dun and Bradstreet) know what zip code an employment establishment is in, the number of employees it has, and the standard industrial classification code (four digit level) of the establishment's activity. These data sources may hopefully soon be married to much of the extensive land use files collected and maintained by transportation departments, which may be able to be organized by zip codes (or close proxies).

The third question of the trilogy, the which policy to what end, is muddy at best. Speaking weakly, and in general, the spatial location of employment is not considered an important input or output of infrastructure development. The transportation and infrastructure development policy has been captivated with a users orientation. At times this orientation is modified by neighborhood, class, race, environmental, and political arguments, however the concept of managing metropolis as a systematic whole has not arrived. As far as metropolitan development activities are concerned, again generally many metropolitan regions are pursuing a 'site strategy' where essentially the city or one of its captive public corporations plays the role of developer. The strategy is to get a site, provide it with the requisite necessities and get someone to occupy it. The city acts just as a real estate agent might, but with a political conscience. Again, no literature indicates a systematic approach to city development.

The von Neuman games of locational behavior have no solution. The dual location problem is without a general solution, and shows every promise of remaining so. A second empirical game is the tenant-land owner game. If the establishment owner also owns the property under his establishment, the diseconomies of conversion are doubled by the cost of moving to convert. This generally slows down conversion of land which is growing more valueable as time goes by. These circumstances are also aggravated by the tax situation. Finally

it is not clear when a tenant-land owner stops acting as an entrepreneur and starts acting as a landlord.

The ultimate answer may well be the world's largest integer program, but that is beyond the efforts of this research.

CHAPTER 3: RECENT EMPIRICAL RESEARCH

3.1 Introduction.

Recent empirical research has focused on three major areas in the last ten years. The first area of research and issue has been about the decentralization of establishments and employment and the spatial pattern and consequences of the various preceived patterns. A second major area of research centers around the development of micro data bases of establishment behavior, and these descriptive studies have focused on delineating actual patterns and searching for confirmation or denial of 'old saws' and new theory. The third major area of empirical work has been a test and hopeful validation of new methodologies and grouping systems to qualify and begin full intra-metropolitan locational models.

There are two threads which consistently run through this group of studies. A challenge and response tension is the first thread. In each case the following researcher is at somewhat of a policy or methodological variance with his predecessor and seeks to justify his point of view with new data and/or insights. As the conglomerate of different data bases is developed, the second thread through this literature set is data base bias and inability to qualify cyclical and long-term effects. This inability to qualify cyclical and long-term effects explains some of the contradiction between the studies,

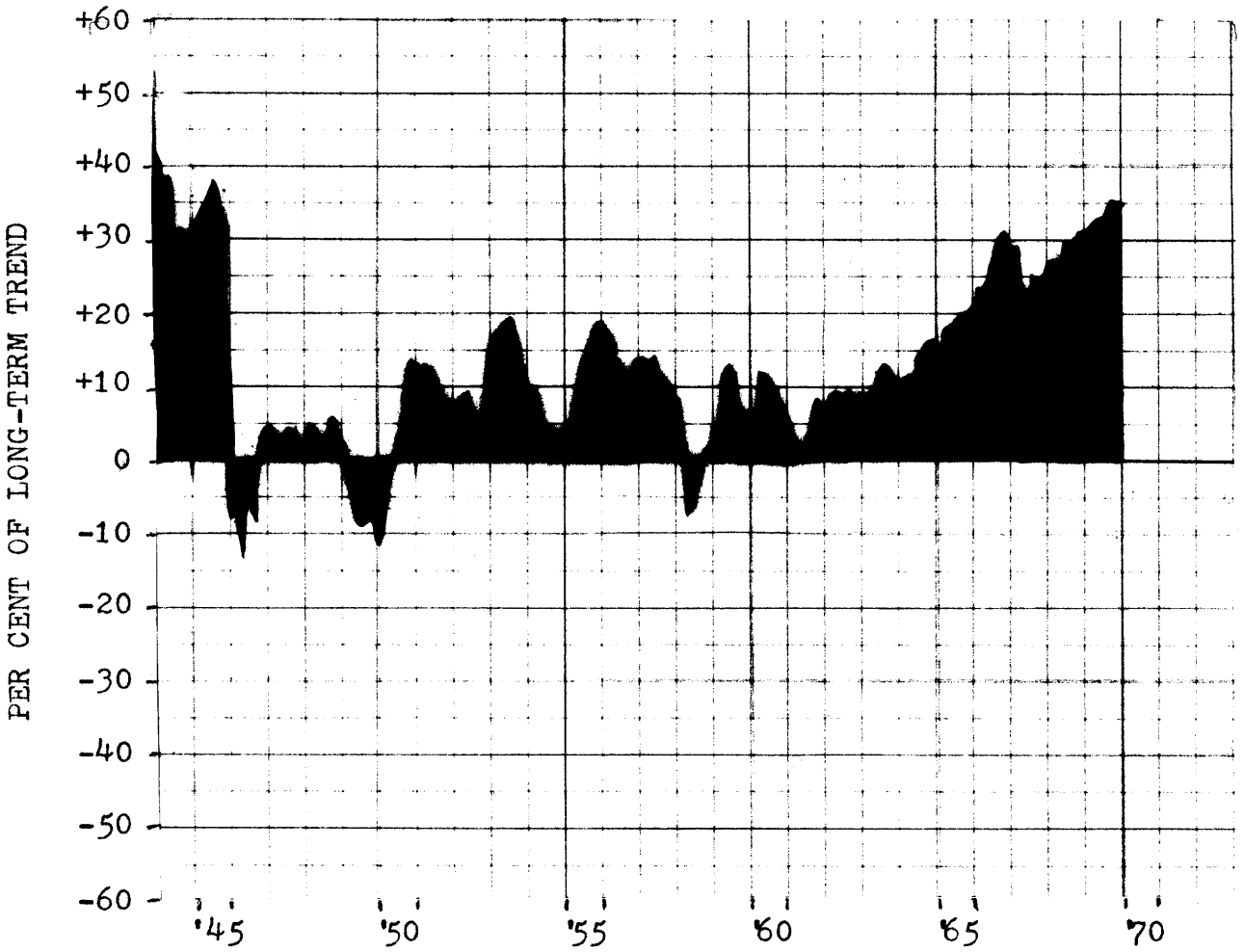
and it is a major weakness of the set as a unified body of empirical knowledge.

3.2 EMPLOYMENT DECENTRALIZATION LITERATURE AND THE PRESCRIPTIVE POLICY RESPONSES.

The first work in the area, and the one which became accepted as the 'conventional wisdom,' is John Kain's "The Distribution of Jobs and Industry".[1] Using data from thirty United States cities, Kain found an accelerating decentralization of employment in not only manufacturing but also employment retail and wholesale trades. He hypothesized a future "donut" city, a place in which a large majority of employment activity occured in the suburban ring. In both this article and many following ones[2], his major policy prescription was that minorities, located almost exclusively in the center city ghettos, must accept a ghetto dispersal startegy and pursue the decentralizing jobs to the suburb or find themselves out of work.

A look at Kain's data sources reveals bias. Kain's data was outer city and suburban employment in manufacturing, wholesaling, retailing, and services as measured by the 1948, 1954, 1958, and 1963 Census of Manufactures. This gave him three intervals of measurement: 1948-54, 1954-58, and 1958-63. The data set included no measures on financial, insurance, real estate, (FIRE industries); some services (hospitals and educa-

1. See Kain (18).
2. See Kain (16), (17), (19), (20).



NATIONAL BUSINESS CYCLE

Diagram 3.2.1

tion); or government; all key to a center city employment base. Kain did take a frequency count of major industrial home offices which were decentralizing, but no employment size inferences were in the data. Interestingly, 1948 was a fair economic year, 1954 a poor one, 1958 a recession year, and 1963 the beginning of the 60's boom. (See diagram 3.2.1) Clearly the business cycle alone would moderate employment changes in the first two periods and emphasize them in the third. The question might be raised that business conditions would effect both center city and suburban ring employment equally, but this would be so only if the industrial mix of both the areas were the same. As Kain himself convincingly showed, cyclically dependent manufacturing was already greatly decentralized in 1948 due to direct government investment in industry in World War II.

Kain's analysis technique was to compare both the percentage change and absolute numbers change of both the center city and the suburban ring. In both comparisons in almost every city and in the 30 city average he found the suburbs with a much superior growth rate, and in the 1958-63 period an absolute decline in employment for central cities. The relatively flat (biased) response of the first two periods plus the actual decline in the third period led Kain to conclude that decentralization was no longer a constant long-term phenomenon but rather there was an <u>accelerating trend</u> to decentralization. He buttressed his conclusion with the example of the decentralization of wholesaling during the late 1950's and early 1960's.

Although Kain qualified his results and said there clearly might be a cyclical dependence, the subsequent volumne and attitude of his policy prescriptions showed a fatal disrespect for his own healthy skepticism.

On his inference of the 'donut city' Kain made two major policy prescriptions. The first prescription was that if his inference was correct, a great deal of employment projection models, land-use projections, and future transportation plans would be way off the mark. His second policy prescription of ghetto dispersal with minorities chasing non-poverty jobs to the suburbs was an inference drawn both from his accelerating decentralization belief and other predelictions. Kain specifically rejected ghetto business development as a possible solution to minority poverty not only on the moral grounds of segregation but also for two practical reasons. First, Kain felt that minorities would be unable to compete for the remaining center city jobs because these remaining jobs would be essentially at high skill levels way above those levels that minorities could deliver (the mis-match hypothesis). Secondly, Kain felt that any ghetto improvement would be self-defeating for if the ghetto opportunities were improved, then a net inmigration of rural poor would dilute any net benefit the development could have delivered to the former ghetto residents.

With this study, Kain established his work as part of the conventional wisdom , the accelerating flight of business from the city became another major entry on the urban crisis

checklist, and ghetto dispersal became a controversy for ethnicists, integrationists, and black power advocates to argue. The major biases of Kain's data base have already been mentioned, cyclical dependence and lack of coverage in FIRE, government, and select services important in the center service employment base.

There were several avenues of response to Kain's conventional wisdom. First the donut city inference could be attacked either with better and more complete data, or by questioning whether decentralization was accelerating or not. Secondly, two of Kain's major assertions could be checked directly; was there really a mis-match between central city skills and central city labor demand, even as presently constituted, and was there actually an opportunities-migratory response to changes in the work conditions of ghetto residents? A key group of works focusing on the various questions came out of some of the economics-of-poverty research work done in the middle and late 1960's. Works by Lewis, Fremon, Noll, others, and a synthesis-review by Harrison clearly faced off and took on Kain's conventional wisdom.[3]

Primary amongst these studies was a study directed by Lewis[4]. Using an alternate data source, County Business Patterns, Lewis and his associates did a mix-shift analysis on 15 large United States cities from 1953-59 and 1959-65. By

3. See Lewis (23), Fremon (10), Noll (27), & Harrison (12).
4. See Lewis, op. cit.

segmenting central city employment changes into four factors--a national growth factor, an industrial endowment factor, a regional shift factor, and a suburban shift factor--Lewis was able to determine that the national growth factor was the single most important factor explaining overall gross levels of center city employment, but that there was a sizeable factor which however remained constant over both the period of low national growth (1953-59) and high national growth (1959-65). Lewis took a great deal of wind from Kain's sails with these results as the County Business Pattern data was both more complete and more strongly augmented with government and railroad employment data. His major inference was that the decentralization of employment was not accelerating, but was occuring at the natural 1%-1.5% rate it had been proceeding at since the early 1900's. Decentralization was not a pathological problem of the 60s but merely an adjunct of natural economic growth processes.

Lewis' major policy prescriptions were that a good rate of national growth was necessary to keep the cities from stagnating, and secondly that different industries had different suburban shift coefficients. If a city was to create a job holding stretegy, one could most profitably offer inducements to stay to those industries which had a "lumpy" decentralization pattern, over the cities of the sample, and not offer inducements to either those who always decentralize or those

who never do. Additionally, as reported by Harrison[5] the newest growth industries of the central city were government and health and hospitals, both which exclusively located in the central core of the region and were outpacing all other industry growth.

The challenge of the mis-match hypothesis was answered directly by Fremon[6]. Using County Business Pattern employment data from 1965-67, and a skill conversion table (the percentage of jobs paying under $5000), Fremon was able to calculate the number of central city low skilled jobs available to central city (and suburban) workers. By comparing the employment possibility count with population and labor force characteristics, Fremon was able to show that there were numerically plenty of jobs for central city residents at the skills they now possessed, but that these same central city residents were unable to gain the jobs available. These low-skilled reasonable paying jobs were being held and realized by suburbanites. With an analysis that controlled for every characteristic (age, sex, race, location, etc.) Fremon was able to show that the only meaningful dimension was race; minorities were not getting available jobs--not because they were central city residents, but simply because of blatant discrimination. Harrison went on to report that the situation was the same in the suburbs. Suburban minorities were just as poor, unemployed,

5. Harrison, op. cit.
6. See Fremon, op. cit.

and disadvantaged as center city ghetto minorities.

Fremon's study is interesting because it so clearly showed discrimination to be the only basis for systematic differences between ghetto minorities and others in the job market, however the job supply figures of the study were surely biased upwards with two top years of the 'fabulous 60s' as data points. Nonetheless Fremon's results are significant; even when the economy is so hot it may boil over there is still room for crippling discrimination.

The third major point to be addressed in Kain's conventional wisdom is where South-North, rural-city migration is motivated by the pursuit of economic advantage. Harrison details a study which shows that the net economic advantage for a rural Southern black is greater in the South than in the North. Harrison's source goes on to say that South-North, rural-city migration follows distinct migration chains whose primary attributes are information connection, relatives, friends, family, etc. Migrants do not movealong these chains until they reach the city with the highest expected benefit, but rather until they reach a city with the lowest risk, i.e., one with a relative in it. Ghetto development would improve the lot of the resident as well as the migrant because the resident would have greater economic opportunities and the migrant would be diluting a larger base of economic opportunities.

The essence of the responses to Kain are that if national economic growth is at a high level and if discrimination can

be eliminated then economic activities will continue to sort themselves out in an orderly fashion and ghetto development is a viable bootstrap alternative to central city development and equal economic opportunity. These results however were possibly observable only in the middle of the greatest economic boom in the United States history, and it is not clear that such conditions are a maintainable strategy, especially in view of the problem with inflation.

3.3 MICRO DATA RESEARCH IN ESTABLISHMENT LOCATIONAL BEHAVIOR AND EMPLOYMENT DECENTRALIZATION.

The two following studies both build their results from a newly available micro-data file, the Dun and Bradstreet DMI file. This data file has unique number address SIC codes, sales and employment plus other information on every purchasing establishment in the United States which might require a Dun and Bradstreet credit report. Originally it covered only manufacturing and headquarters establishments, however its coverage was extended and now serves as a virtually ongoing census of non-governmental establishments in the United States. The key to the file is a unique DUNS number which is assigned to each establishment and stays with that establishment despite moves and name changes. It will change only if the establishment is purchased by a new owner and he requests a number change. In this way, the number may be used to track the birth, movement, and death of firms, while four digit SIC codes,

employment and sales figures may serve as grouping criteria and variables in an analysis. In general the primary zone is a postal zip code tract although street addresses are also part of the file.

Two recent studies utilizing these files have been recently published. The first "Location of Manufacturing Activity in the New York Metropolitan Area," by Robert Leone, concentrates on the characteristics of locationally active manufacturing and headquarters establishments in the New York area, and issues of land use specification. Using the DMI file for 1967 and 1969, Leone assembled New York establishments into six overlapping groups: Communication oriented establishments, headquarters, fashion, media; nuisance industries, port industries; raw material consuming industries; growing industries; and declining industries. He assembled the New York area into four regions by density: the CBD, the core, the inner ring, and an outer ring.

Leone's observations may be split into two groups: observations about individual and group member locational activity, and observations about the new spatial employment pattern. Of the individual observations, the most remarkable part was the sheer volumne of locational activity. Over the two year period more than 10% of the establishments in the New York City Region participated in some type of locational activity (birth, death, or move), which indicates a highly fluid urban business land market. Additionally over 50% of the moves were intra-

zonal, and if the CBD is expanded slightly to include some nearby core regions, 73% of the moves were intra-zonal. The most common locational scenario was an intra-zonal move with an increase in employment (which supports the concept of an evolutionary growth move). An increase in employment was the best single indicator of a move. Headquarters and communication establishments rarely moved but if they did so, their moves were larger than average. Smaller firms were more likely to move, and multi-establishment companies were more likely to move one of their establishments, an indication of ongoing land use specialization within firms. Single establishments and headquarters had more dynamic growth and declining firms showed a tendency not to move. In one way the incubation hypothesis was proven in that a disproportionate number of births occurred in the CBD, however these births were also larger than in other areas. Birth size seemed to be correlated with the density of the birth location, indicating perhaps a generalized minimum size constraint for certain areas. In general movement activity is negatively correlated with size except that firms in the 11-20 employment size class moved more often than those in the 1-10 size class.

Despite all this movement activity, moving establishments were not important to the spatial changes of employment, employment densities, and relative shares. All of the movement effectively cancelled out, and almost all of the spatial changes of employment was due to changes at in-place firms, and in this

regard the very large establishments truly dominated the changes. The top 10% of firms in size made up 90% of the net spatial changes of employment with their growth and decline of in-place employment. In terms of zones, the CBD was the vital center of the region, held the apparel and headquarters firms, had some of the major births, and also attracted single establishment firms. Location was a dominant input for centralized functions. Likewise the inner ring suffered as much as the OBD succeeded. It held declining establishments which were characterized by a lack of motion. Essentially the inner core was stuck with the losers.

The essence of the Leone work is that the urban land market is much more fluid than formerly expected and that there is a process of on-going land use specialization which is acting in a non-pathological manner, although there are problems with rejuvenating the inner ring areas. However, the major problem is that Leone's data points straddle the best economic period of the century. If an establishment died in 1967-69 it truly must have been a sick establishment. The author knows for a fact[7], that New York City began to lose employment badly during the recession of 1970-71, and even by the beginning of the boom in 1973 had just levelled the downward trend. The extent to which Leone's observations are a product of the extraordinary business conditions are at this time unknown.

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7. Oral presentation, July 1973 Metropolitan Economics Section, First National City Bank, New York, New York.

The second published DMI study is "Spatial Concentration of Manufacturing Employment in Metropolitan Areas: Some Empirical Evidence," by Raymond Struyk.[8] Struyk analyzes the presence of agglomerative economies for manufacturing from 1965 to 1967 in four cities: Boston, Cleveland, Minneapolis-St. Paul, and Phoenix. Struyk sets a null hypothesis that employment is evenly distributed in all the zones of an area. If there is more than twice the average expected amount, then the industry is concentrated. Every manufacturing industry in the four cities was at least concentrated in two zones. This was as true for old time industries like shoemaking and food processing as it was for newer industries like electrical machinery, and the newest industries like electronics.

The historical influence of the concentration is also quite evident. Struyk's only conclusion is that there must be external economies for the firms to get such uniform results over four cities. Reinforcing this conclusion is that secondary industries locate in a predictable way in Cleveland, primary metals are at two poles in the city and fabricated metals lie on a line which travels between the poles.

Despite some data sensitivity, the microdata studies generally confirm expectations about agglomerative economies and enhance expectations about the fluidity of urban land markets. They bring to light some rational behavior on the part of single plant firms which highlights some of the

8. See Struyk (30.).

indivisibilities of a production function. They also highlight the importance of space to evolutionary growth and the importance of the business cycle on the spatial distribution of employment.

3.4 RECENT METHODOLOGICAL ADVANCES IN REGIONAL EMPLOYMENT AND ESTABLISHMENT LOCATION MODELING.

Two research efforts have recently been published which are new twists in the employment and establishment locational models.

Norman Glickman[9] has made the first regional econometric model for the Philadelphia SMSA. He used a standard form with 29 equations to describe the regional economy.

$$Y_{it} = f(Y_{it}, Z_{kt}, U_t)$$

Y_{it} = endogenous,

Z_{kt} = exogenous,

U_t = error terms.

However he had two flips to surmount data restrictions. First he factor-analyzed the exogenous variables to reduce their number and thereby maintain as many degrees of freedom as possible. Secondly he structured his model into two blocks, a private sector block and a public sector block. Because there was less government data he removed interactive feedback between the two sectors and estimated the coefficients of each separately, using two-stage least-squares. Twenty-three of his variables

9. See Glickman (11.).

track with less than 5% error, and nine track with less than 3.5% error. The model is designed to receive input from the Wharton forecasting model.

The noteable aspects about the model are that it is the first successful regional econometric model and secondly, that the author ingeniously structured both the data inputs and the model to surmount data and statistical difficulties. The second empirical work with a new methodological twist is the recent work of Bergmann, Greenston, and Healy, who are working for the Urban Institute. In "The Agglomeration Process and Urban Growth," the authors identify localization economies and urbanization economies, and see to cluster with factor analysis large groups of industries identified by SIC codes. Per capita employment is one of their key inputs and they receive coordinated groups of industries. That they achieve groups is interesting, however their utility is as of yet unmeasured. It is also felt that city location is not a specific enough attribute on which to join or separate establishment types. The example of the yacht club and cargo pier comes again to mind--there can be a yacht club on an Iowa lake, but not a ship cargo pier in Des Moines.

All in all, data availability and grouping methodology are still great stumbling blocks on the road to a fully specified model.

CHAPTER 4:

EMPLOYMENT DECENTRALIZATION AND THE BUSINESS CYCLE: A RESEARCH DESIGN

4.1 PURPOSE AND DESIGN.

The purpose here is much less grandiose than a fully-specified locational behavior model. We seek a more modest goal of qualifying the cyclical biases of the recent empirical research and exploring the relationships between the cycle and its areal effects.

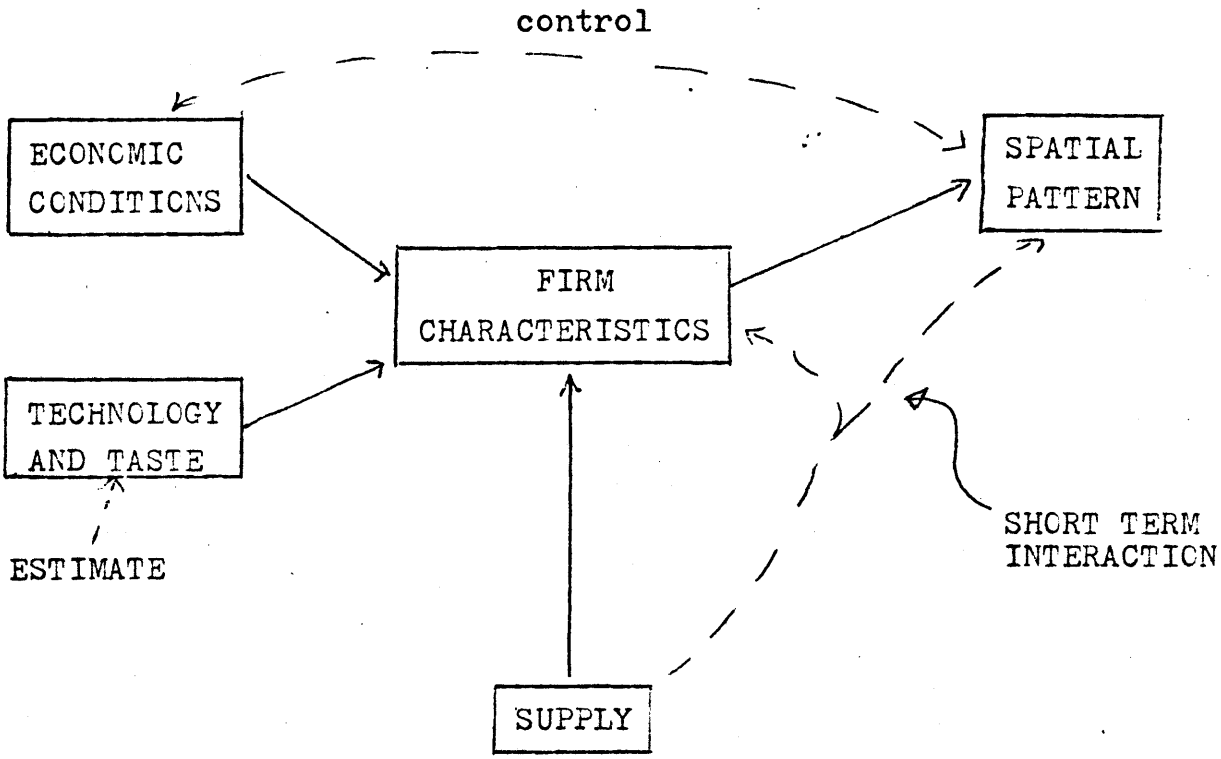
Essentially our research model is a 'black box' design. As explored in Chapter Two, there are three major inputs into the spatial pattern of employment: firm characteristics, demand, and supply. Major past modeling efforts have focused on the relationship of firm characteristics and demand although Chinitz and others have argued persuavsively that the supply side of the picture may be more determinant. (Rephrased, their argument would be that the supply characteristics of an area are more enduring than firm characteristics, and given a supply and demand, profit maximizers would move to fill any profitable void). Our design is to quantify variations in demand with spatial movements of employment, assume that these "pass through" the establishments, and hypothesize residual motion effects will be caused by the 'black box' interactions between supply characteristics and establishment characteristics. Although clearly supply, demand, and firm characteristics all

mutually interact, to a very real extent the levels of demand, fixed structure, and production functions are inflexible over the short term. (It is the role of price, not production functions, to clear markets in the short term.) If we can parameterize long term taste and technological trends, then observations of effects over the short term can reveal the underlying structure of land supply and firm characteristics. The theoretical and constrained design of our research are pictured with causal paths in Diagram 4.1.1.

Specifically, we seek to test whether employment decentralization is accelerating, to what extent it is a universal phenomena, and whether there are any cycle/industrial interrelations in the decentralization process.

4.2 THE MIX-SHIFT ANALYSIS.

The engine of our research is a period by period mix-shift analysis of center city and SMSA employment variability. Derived in detail in Appendix One, the principle function of a mix-shift analysis is to segment demand into four convenient catagories according to their geographic and industrial legacy. The component measurements are a national growth factor (NGF) which compares a city's employment with that of the nation as a whole; an industrial endowment factor (IEF) which adjusts a city's employment on a weighted basis of its share of growing and declining industry; a regional shift factor (RSF) which compares the growth of the region with that of the nation and serves as a proxy for the general attractiveness of the area's



CAUSAL DIAGRAM OF THE RESEARCH DESIGN

Diagram 4.1.1

regional economy; and a suburban shift factor (SSF) which compares the city's growth rates with those of its regional suburbs and serves as an 'attractiveness' measure of the city's economy vis-a-vis the regional economy as a whole and the suburbs with which it competes.

The four factors sum to give the total effect of all four influences. A mix-shift analysis may carry forth in terms of jobs, percentage of employment (a weighted average of the mix-shift coefficients), or on a pure coefficient basis. For this research project we have graphed the percentage change of employment of the four factors and their total to seek correlation or non-correlation of any of the factors with each other and other exogenous inputs. In detail we will analyze the change of the suburban shift factor over time to seek any signs of an accelerating trend, and also will analyze its variability with the national growth factor, a direct proxy for cyclical conditions.

4.3 THE DATA BASE: COUNTY BUSINESS PATTERNS.

The data base for the mix-shift analysis of this research is the County Business Patterns series published by the U.S. Department of Commerce. Using information from the Social Security Administration, County Business Patterns publishes the first quarter employment payroll number, and size class of establishments in each county of the United States. The series is now published annually at a four-digit level of detail and also is now available in machine readable form.

The problem, from a city/suburban point of analysis is to find major United States cities in which the central city is a full county, or so nearly so as to be immaterial, or is carried as a separate entity in CBP. Six cities in out of 12 to 15 were chosen to maximize these criteria: Baltimore, Denver, New Orleans, Philadelphia, St. Louis, and Washington D.C. Randomly chosen, they nonetheless also divided themselves into two groups: first a group of relatively young rapidly growing "20th century" Southern and Western cities--Denver, New Orleans, and Washinton; and a group of older, larger, and more industrialized, 19th century cities--Baltimore, Philadelphia, and St. Loùis. An additional point of interest was that the older cities were also 'second fiddle' cities, being regionally dominant in and of themselves, but ranking behine in size and importance from the primary cities of the area (Washington, New York, and Chicago).

The specific aspects of CBP are covered in Appendix One. The only three sources of bias are that increased social security coverage appears as exogenous increases in demand, that railroad and other "incidental" employers are not covered, and government employment is not covered (because of lack of data for earlier years).

CHAPTER 5:
CONCLUSIONS

5.1 FINDINGS.

Nine analyses were made. Each city was analyzed individually, the 'young' and 'old' cities were measured as groups, and all six cities were measured as a single large, United States cities group. The heart of the analysis is in these graphs in Appendix Two. Additionally the national, regional and suburban growth coefficients were plotted by industry to see if any industries displayed any common or uncommon locational habits across cities. Obviously those industries who were not acting in a consistant fashion from one city to another might find industrial development overtures particularly enticing. The analysis of these coefficients was indeterminant, however the graphs are provided in Appendix 3.

One of the clearest signals contained in the graphs in Appendix Two is the dominance of the business cycle on the fortunes of the city. What is impressive about the interrelationship of the national growth factor and the overall sum of factors is not that they are related but rather how clearly the national conditions dominate the contributions of the other factors by a wide margin. Somewhat more curious is the countra-cyclical influence of the industrial endowment factor. Aggregately speaking, the industrial endowment factor provides a cushion against recession, and may be one reason for the

effectiveness of the urban size ratchet.

The regional shift factor is erratic from city to city and shows strong traditional characteristics in the individual analyses. However, as an averaged force in the group analysis of 'new' cities and old cities, the regional movement away from the old and towards the new are clearly steady and stable relationships not dependent on the influence of national economic policies. This can be taken as a signal that there may be intrinsic locational advantages. It is also interesting to note that all of the 'new' cities are also essentially low wage cities with strong minority percentages.

The suburban shift factor, despite the attention bias of our research is also the most interesting of the four indicators. As demonstrated by the group graphs (7 and 8), the suburban shift puts a strong 'drag' on central city economic opportunities and is twice as strong as the other locally controllable effect, the regional shift factor. Although its relative strength varies from city to city, its behavior is consistant and steady. The graphs show no tendency for suburbanization to be accelerating.

Another interesting feature in the suburban shift is that in every case, the SSF moved into the plus column during the boom of the sixties and the Vietnam War build-up. The suburban shift factor apparently is swayed not by the strength of the business cycle but by the business cycle's length. The theory that older, less efficient, and underutilized capital

resources, the aging central city business plant, are the last to be hired and the first to be retired when a boom comes to the economy. The figures in this thesis support that view emphatically. Not only does the SSF drop quickly into the negative as the boom levels off or cools, but the positive trend peaks in the young cities in 1965 while it does not peak positively until 1967 in the older cities. It takes two years longer to soak up the excess capacity in the more developed suburbs of the older cities. Presumably not only is the 19th century city's plant at a greater competitive disadvantage with its suburbs, but it also is interregionally disadvantaged, as witnessed by the negative correlation of the regionaly shift factor with the suburban shift factor as the economy approaches (and in this case, goes beyond) its capacity. Clearly this increased demand applies through the economy working down a queue of capital resources from more efficient to less efficient.

To qualify the empirical research annotated in Chapter 3, nothing in these figures indicate that any of these six cities face an accelerating decentralization threat. In all comparisons decentralization appears to be a constant non-pathological economic process of taste, technology utilization and land use specialization. However, the great activity of establishment re-location and minority economic opportunity may, unfortunately, not be sustainable in a non-wartime economy.

5.2 POLICY IMPLICATIONS AND AREAS FOR FUTURE RESEARCH.

There are two major policy implications in the findings of this research project. The first is that it may well be a futile exercise to carry on economic development in a "bring 'em back" mode. Retention of viable economic activities makes both good economic and political sense, but recruitment of firms that have already left may not only be frustrating but also disfunctional. Some types of industrial site development carried on by some eastern cities may well fall into this category. It is unclear but an areally oriented infrastructure development may well be more successful. (This may well happen with the growing trends towards mass transit, etc.)

The other major policy input that the research provides is that fiscal problems of suburbanization (decentralization across political boundaries) cannot be solved at the local level. The economy of the city is intimately wound into that of the national economy growth.

Two areas of research are also suggested by the findings of this study. First some type of case approach to the costs and effects of areal versus site development efforts should be initiated.

Secondly, the costs and politics of industrial plant recycling may open new opportunities for cities to understand and manage the productivity of their economic resources.

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APPENDIX ONE:

TECHNICAL AND COMPUTATIONAL NOTES OF A MIX-SHIFT ANALYSIS OF SIX UNITED STATES CITIES 1953-1971.

A mix-shift analysis may be defined as follows:

Let: $i = 1,2,\ldots,N$ separate industry catagories, and

$j = 1,2,\ldots,M$ regions of analyses,

$E(R)_{ij}$ = employment in industry i in region j at time (t-1),

$E'(R)_{ij}$ = employment in industry i in region j at time t,

$E(R)\cdot j$ and $E'(R)\cdot j$ are the total regional employment at the respective time periods in region j;

$E(C)\cdot j$ and $E'(C)\cdot j$ are the total center city employment in the jth region for the respective time periods; and

$E(N)_{i}.$ and $E'(N)_{i}.$ the national employment in industry i;

$E(N)..$ and $E'(N)..$ equals total national employment.

With this notation, the following terms may be defined:

$$NGF._{j} = \left(\frac{E'(N)..}{E(N)..} - 1.0\right) E(C)\cdot j$$

= a national growth factor for region j.

$$IEF._{j} = \sum_{i}\left(\frac{E'(N)_{i}.}{E(N)_{i}.} - \frac{E'(N)..}{E(N)..}\right) E(C)_{ij}$$

= an industrial endowment factor; an average of the industrial growth rates in the region weighted by their employment.

$$RSF._j = \sum_i \left(\frac{E'(R)_{ij}}{E(R)_{ij}} - \frac{E'(N)_{i\cdot}}{E(N)_{i\cdot}}\right) E(C)_{ij}$$

= a regional shift factor; a weighted average of the growth of regional firms vis a vis the national average, weighted by industry and employment; and

$$SSF._j = \sum_i \left(\frac{E'(C)_{ij}}{E(C)_{ij}} - \frac{E'(R)_{ij}}{E(R)_{ij}}\right) E(C)_{ij}$$

= a suburban shift factor; a weighted average of the city 's industrial growth rates vis a vis the regions.

The factors are additive, and sum to the net change in employment:

$$NGF._j + IEF._j + RSF._j + SSF._j = E'(C)._j - E(C)._j$$

(Note how the first term of any preceeding equation cancels with the second term of its following equation.)

From these equations one may calculate either the actual employment change, the percentage change, or the coefficient directly.

Exactly analogous definitions are possible for double subscripted variables, yielding coefficients by industry and region. One simply substitutes subscripted employment for industrially aggregated employment in the formulas and drops the summations over industries. The NGF remains the same.

There are four technical aspects to the data base, the absent data, the estimated missing data, geographical aggregation and the key-punching check. The primary source is

County Business Patterns, published by the U.S. Department of Commerce, although years 1953 znd 1959 were extracted from Lewis' tables (who compiled his data from CBP) in an aggregated form.[1] County Business Patterns' source of information is the Social Security Administration. It does not include uninsured workers, workers in mining and fishing, proprietors, partnerships, the self-employed, domestics, railroad men and in earlier years, government workers. Its major bias is in the increased coverage of social security which would appear as an exogenous 'increase' in employment. This is especially important in some of the rapidly growing service industries which were not covered in the early years of the period (SIC codes 80 to 90).

In some cases the CBP has withheld data for reasons of confidentiality when less than three firms were in a single category, or when an employer comprised more than 90% of the total employment in a catagory. CBP does however still provide the size-class distribution of the firms, and in these cases if possible the data was estimated by using the mid-point of the size-classifciations as a weight to aggregate employment from this size class information. For the size class of "greater than 500", 750 was arbitrarily chosen as a weight.

With a data file as large as this one prepared by hand, errors are inevitable. The data was plotted and visually inspected for reasonableness. Secondly, central city employment was subtracted from SMSA employment, and the ring was

searched for 'negative employment.' Happily the only errors that remain are unavoidable errors in estimation and publishing errors in the original sources.

Since the study was centered around the decentralization of firms, equal geographical sizes were built up for each region. These areas were equivalent to the 1971 SMSA definitions.

Finally, the employment catagories had to be compressed to maintain consistency over a massive 1957 SIC manual change. The four digit SIC code is a combination of two 2-digit codes. The first two numbers represent the beginning code, the last two the ending SIC code. "2727" is just SIC group 27, while "2425" is both group 24 and SIC group 25.

The computational aspects of the data analysis are as straight forward as the formulas with only one exception. In some cases a preceeding year's coefficient was zero or unidentified because of missing data. In these cases when possible the next earlier observation was taken and a longer run average was computed. Undefined coefficients have not been plotted. Also in this situation the denominator of the percentage calculations was reduced by the appropriate quantity.

APPENDIX TWO:

MIX-SHIFT ANALYSIS OF SIX UNITED STATES CITIES, 1963-1971.

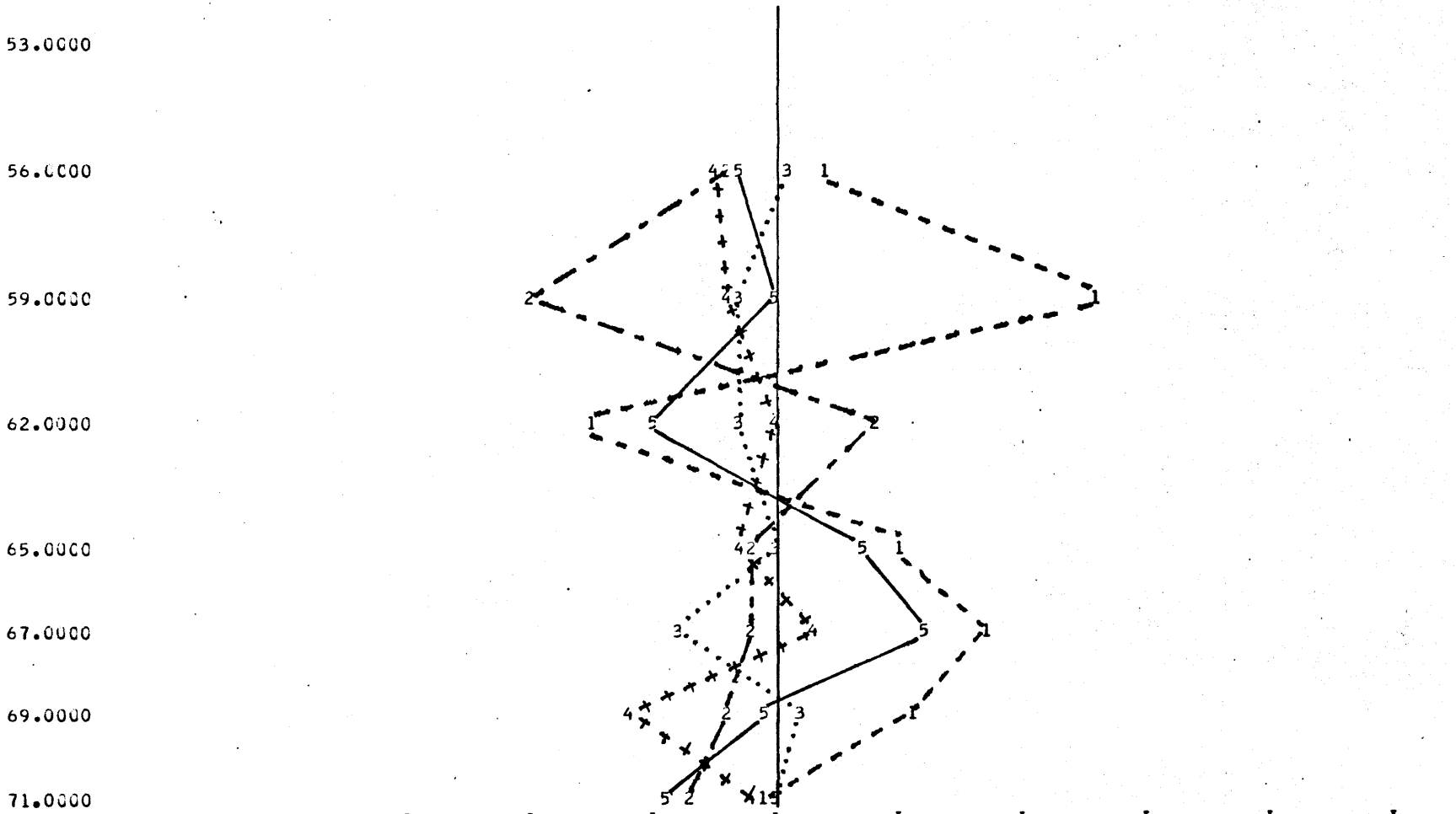
Appendix Two contains tables and printer graphs of the mix-shift analysis for six United States cities, two groups of the six, and the average of the six. The data is represented as the arithemetic average annual change of the total central city's employment since the last observation period attributable to the factor. The national growth factor (1) represents that growth that could have been expected if the city's employment had grown at the over-all national average. The industrial endowment factor (2) adjusts the city's growth rate according to the city's weighted share of industries which are growing nationally above and below the over-all national growth rate. The regional shift factor (3) adjusts the city's regional weighted growth with respect to national growth. The suburban shift factor (4) adjusts the city's growth with respect to the weighted growth of the region of which it is a part. The factors are additives and sum to the total actual growth rate of the city (5).

The table and the graph form facing pages. The data on the left is displayed in the graph on the right. In the case of the graphs, a superior number may cover an inferior number. The tables will locate the appropriate superior number position.

MIX SHIFT ANALYSIS FOR BALTIMORE ,1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0108	0.0037	-0.0129	-0.0073
59.	0.0785	-0.0580	-0.0089	-0.0106	0.0011
62.	-0.0448	0.0248	-0.0079	0.0006	-0.0273
65.	0.0324	-0.0047	0.0018	-0.0082	0.0213
67.	0.0520	-0.0032	-0.0225	0.0109	0.0373
69.	0.0345	-0.0099	0.0076	-0.0335	-0.0013
71.	-0.0028	-0.0194	0.0002	-0.0049	-0.0269

CHART 1



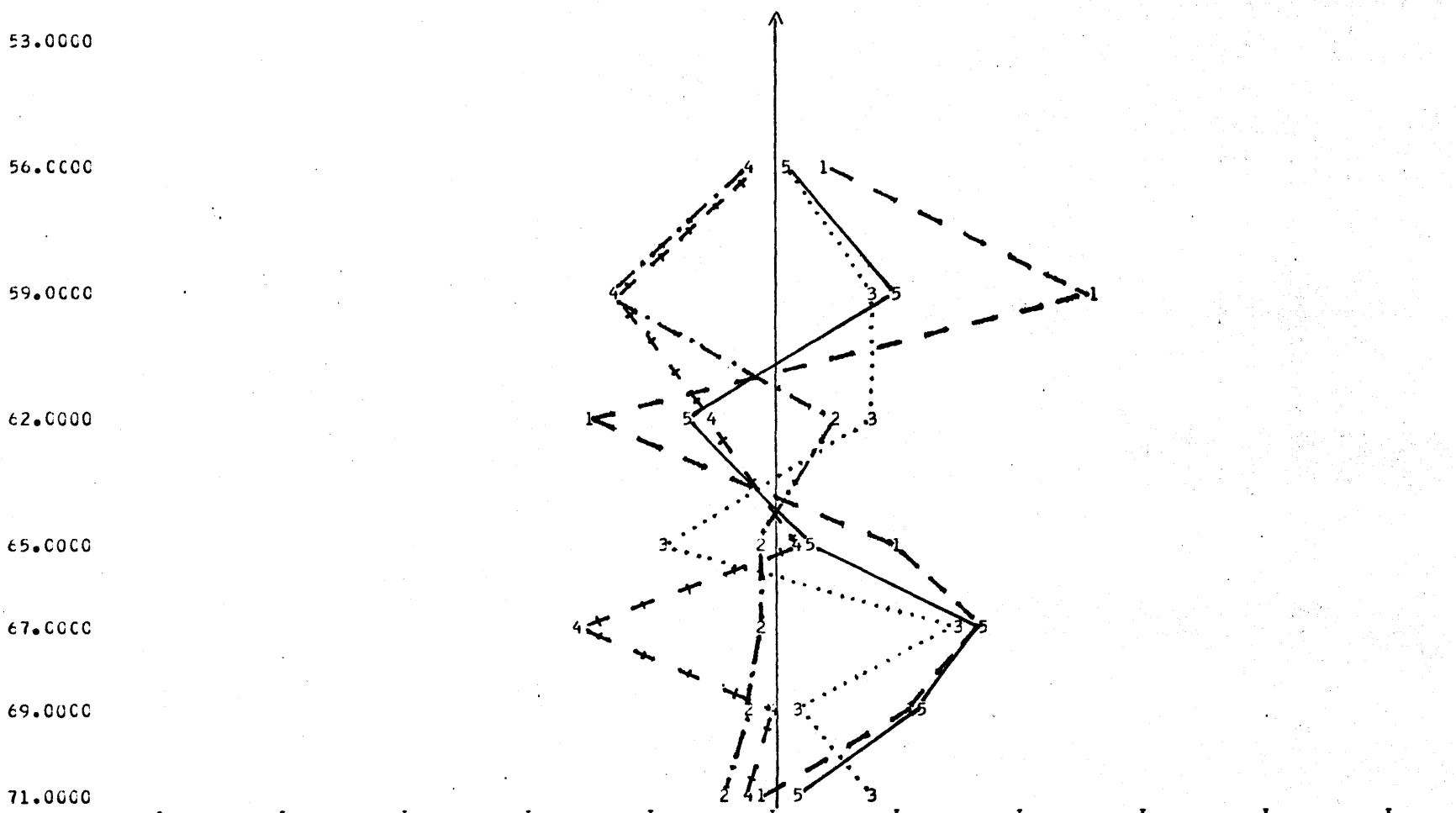
MIX SHIFT ANALYSIS FOR BALTIMORE ,1953-1971

1=ANNUAL RATE CC EMPLOY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE CC EMPLOY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE CC EMPLOY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE CC EMPLOY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE CC EMPLOY CHANGE

MIX SHIFT ANALYSIS FOR DENVER ,1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0059	0.0039	-0.0052	0.0054
59.	0.0785	-0.0373	0.0268	-0.0361	0.0319
62.	-0.0448	0.0153	0.0247	-0.0149	-0.0197
65.	0.0324	-0.0024	-0.0263	0.0068	0.0106
67.	0.0520	-0.0026	0.0476	-0.0453	0.0517
69.	0.0345	-0.0053	0.0088	0.0005	0.0385
71.	-0.0028	-0.0108	0.0259	-0.0059	0.0064

CHART 2



MIX SHIFT ANALYSIS FOR DENVER ,1953-1971

1=ANNUAL RATE CC EMPLOY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE CC EMPLOY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE CC EMPLOY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE CC EMPLOY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE CC EMPLOY CHANGE

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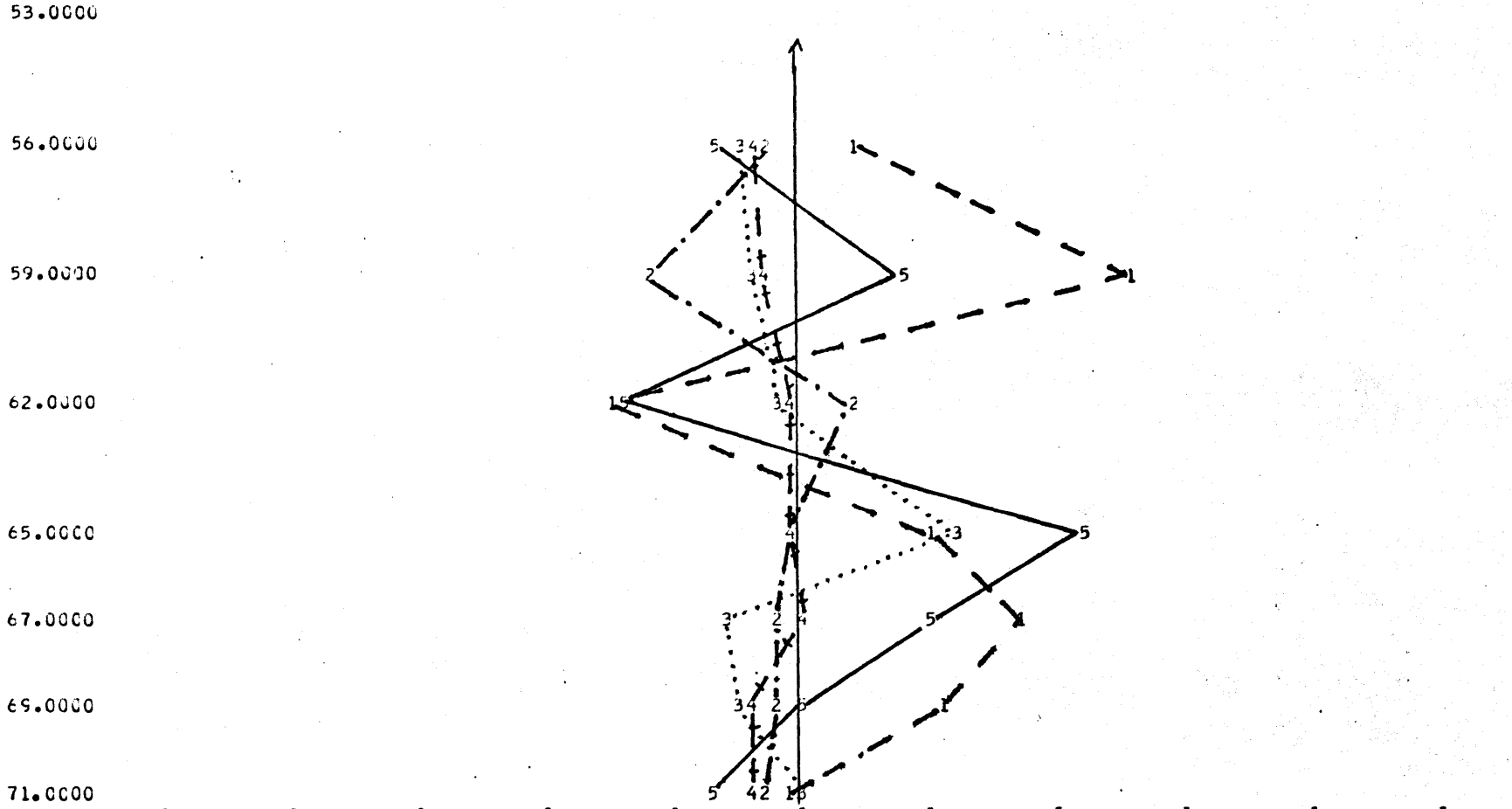
MIX SHIFT ANALYSIS FOR NEW ORLEANS ,1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0075	-0.0130	-0.0106	-0.0185
59.	0.0785	-0.0358	-0.0104	-0.0064	0.0259
62.	-0.0448	0.0137	-0.0056	-0.0027	-0.0394
65.	0.0324	-0.0022	0.0372	-0.0012	0.0662
67.	0.0520	-0.0033	-0.0173	0.0009	0.0323
69.	0.0345	-0.0051	-0.0147	-0.0119	0.0028
71.	-0.0028	-0.0084	0.0012	-0.0100	-0.0200

CHART 3



MIX SHIFT ANALYSIS FOR NEW ORLEANS ,1953-1971

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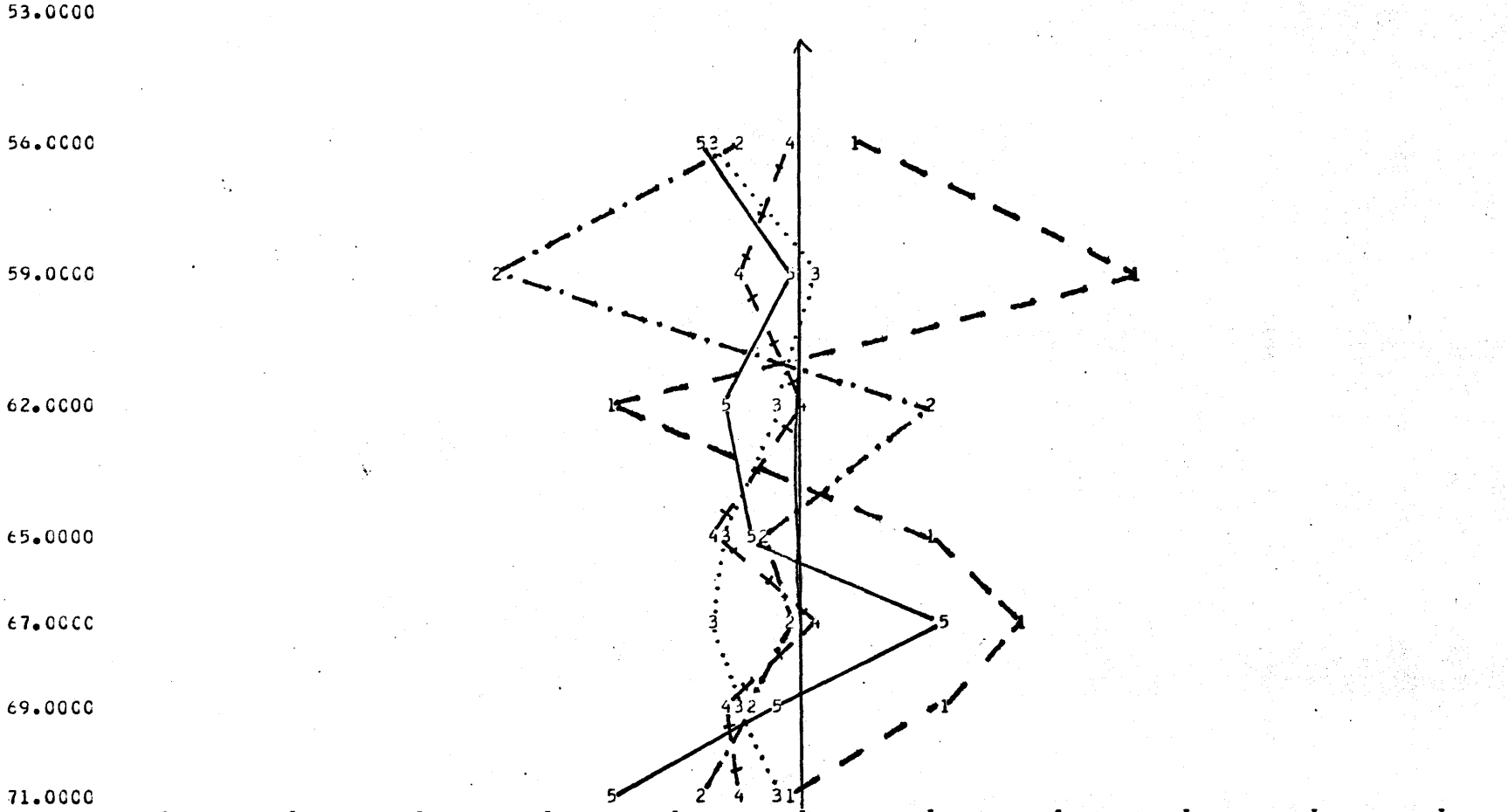
2=ANNUAL RATE CC EMPLOY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE CC EMPLOY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE CC EMPLOY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE CC EMPLOY CHANGE

MIX SHIFT ANALYSIS FOR PHILADELPHIA ,1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0149	-0.0199	-0.0013	-0.0234
59.	0.0785	-0.0709	0.0040	-0.0143	-0.0027
62.	-0.0448	0.0325	-0.0044	0.0004	-0.0163
65.	0.0324	-0.0066	-0.0164	-0.0195	-0.0101
67.	0.0520	-0.0023	-0.0189	0.0044	0.0353
69.	0.0345	-0.0118	-0.0128	-0.0159	-0.0059
71.	-0.0028	-0.0218	-0.0033	-0.0146	-0.0424

CHART 4



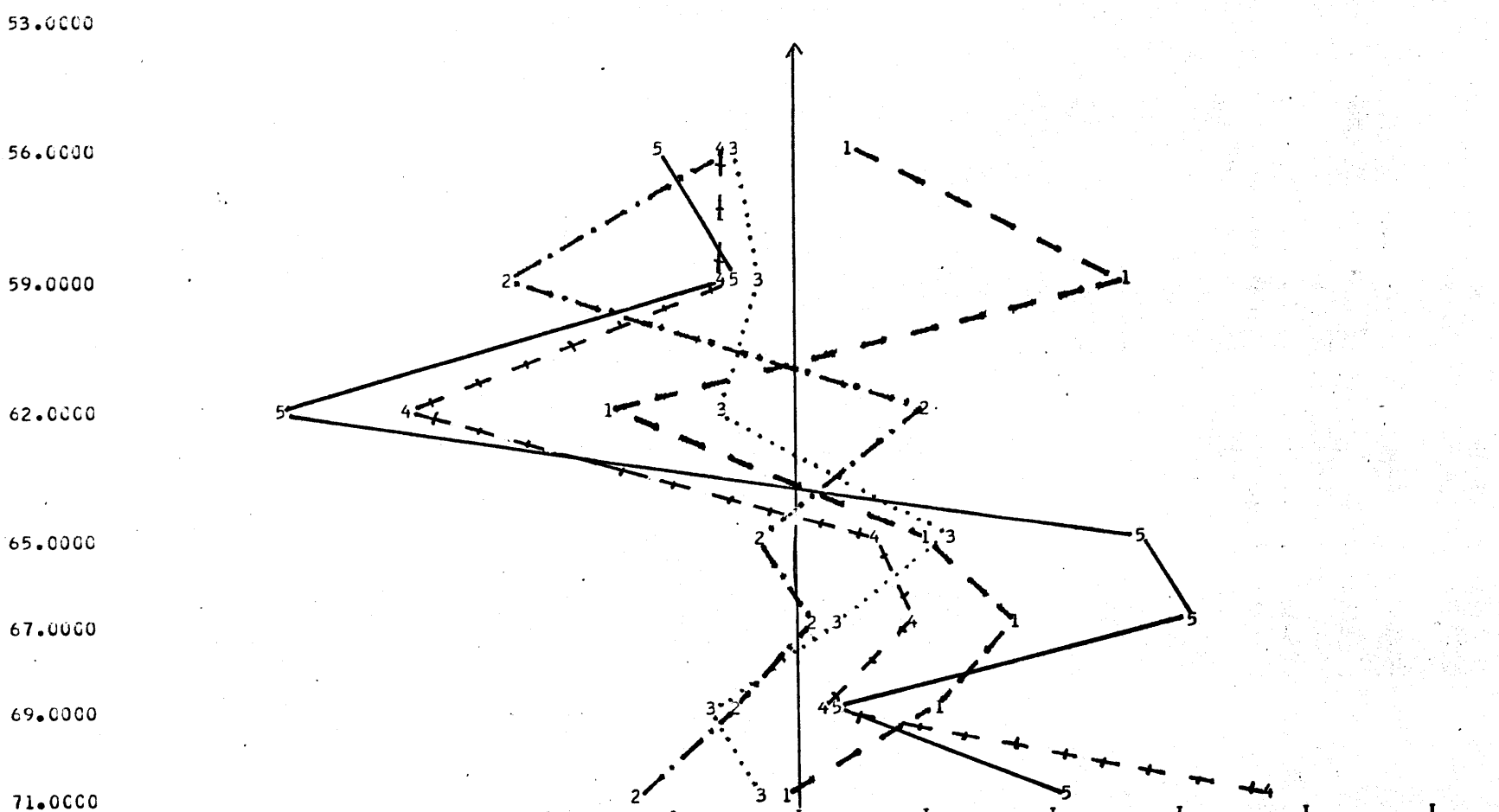
MIX SHIFT ANALYSIS FOR PHILADELPHIA ,1953-1971

1=ANNUAL RATE OF EMPLOY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE OF EMPLOY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE OF EMPLOY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE OF EMPLOY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE OF EMPLOY CHANGE

85 MIX SHIFT ANALYSIS FOR ST. LOUIS ,1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0138	-0.0142	-0.0152	-0.0306
59.	0.0785	-0.0667	-0.0090	-0.0150	-0.0122
62.	-0.0448	0.0307	-0.0166	-0.0913	-0.1220
65.	0.0324	-0.0071	0.0374	0.0196	0.0823
67.	0.0520	0.0050	0.0097	0.0283	0.0950
69.	0.0345	-0.0129	-0.0185	0.0072	0.0104
70.	-0.0028	-0.0388	-0.0061	0.1127	0.0650

CHART 5



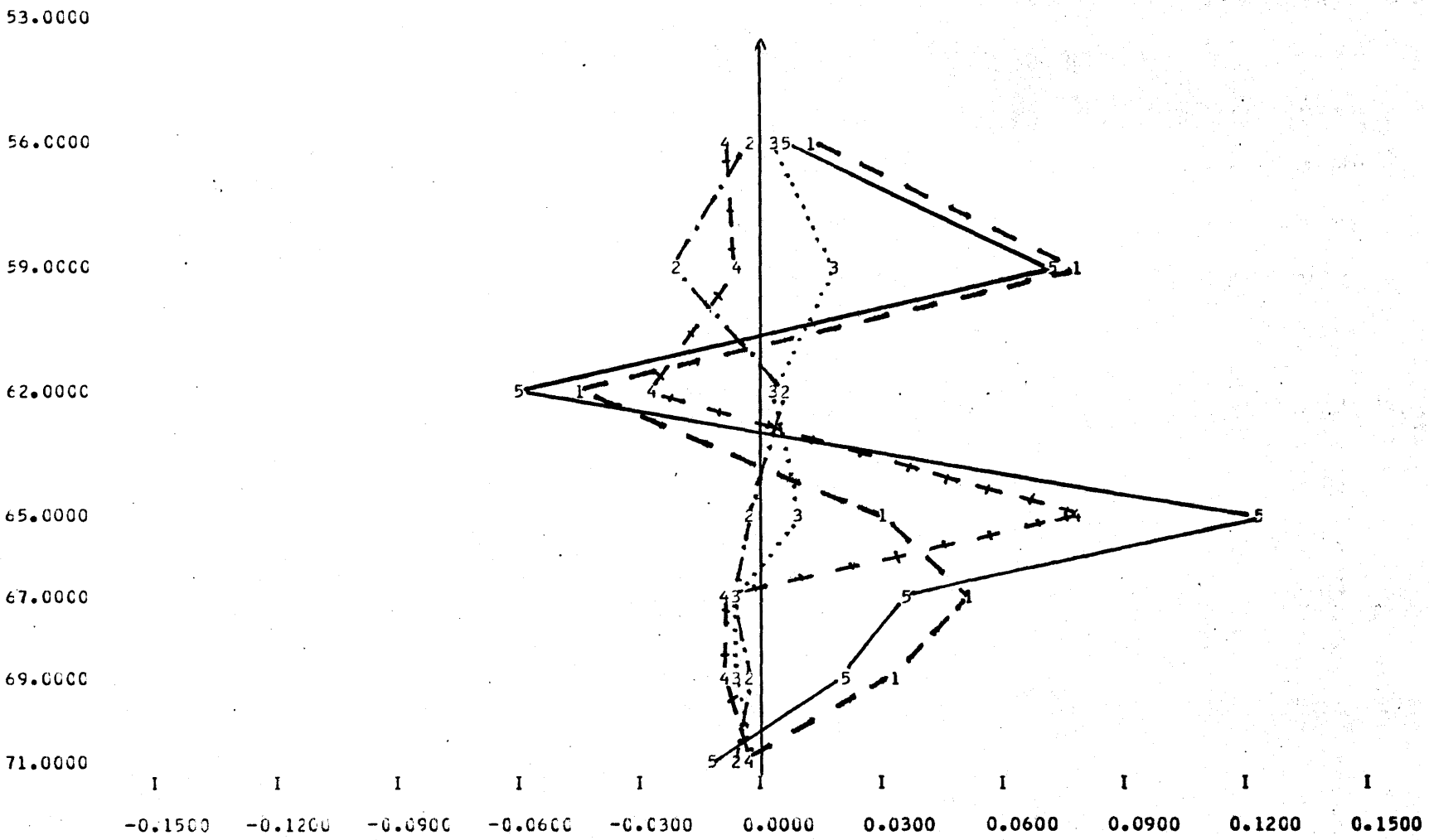
MIX SHIFT ANALYSIS FOR ST. LOUIS ,1953-1971

1=ANNUAL RATE OF EMPLOY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE OF EMPLOY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE OF EMPLOY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE OF EMPLOY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE OF EMPLOY CHANGE

87 MIX SHIFT ANALYSIS FOR WASHINGTON,DC ,1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENCOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0010	0.0042	-0.0078	0.0081
59.	0.0785	-0.0188	0.0187	-0.0044	0.0739
62.	-0.0448	0.0072	0.0040	-0.0252	-0.0589
65.	0.0324	-0.0014	0.0119	0.0805	0.1233
67.	0.0520	-0.0035	-0.0039	-0.0075	0.0370
69.	0.0345	-0.0022	-0.0030	-0.0070	0.0224
71.	-0.0028	-0.0038	-0.0020	-0.0024	-0.0109

CHART 6



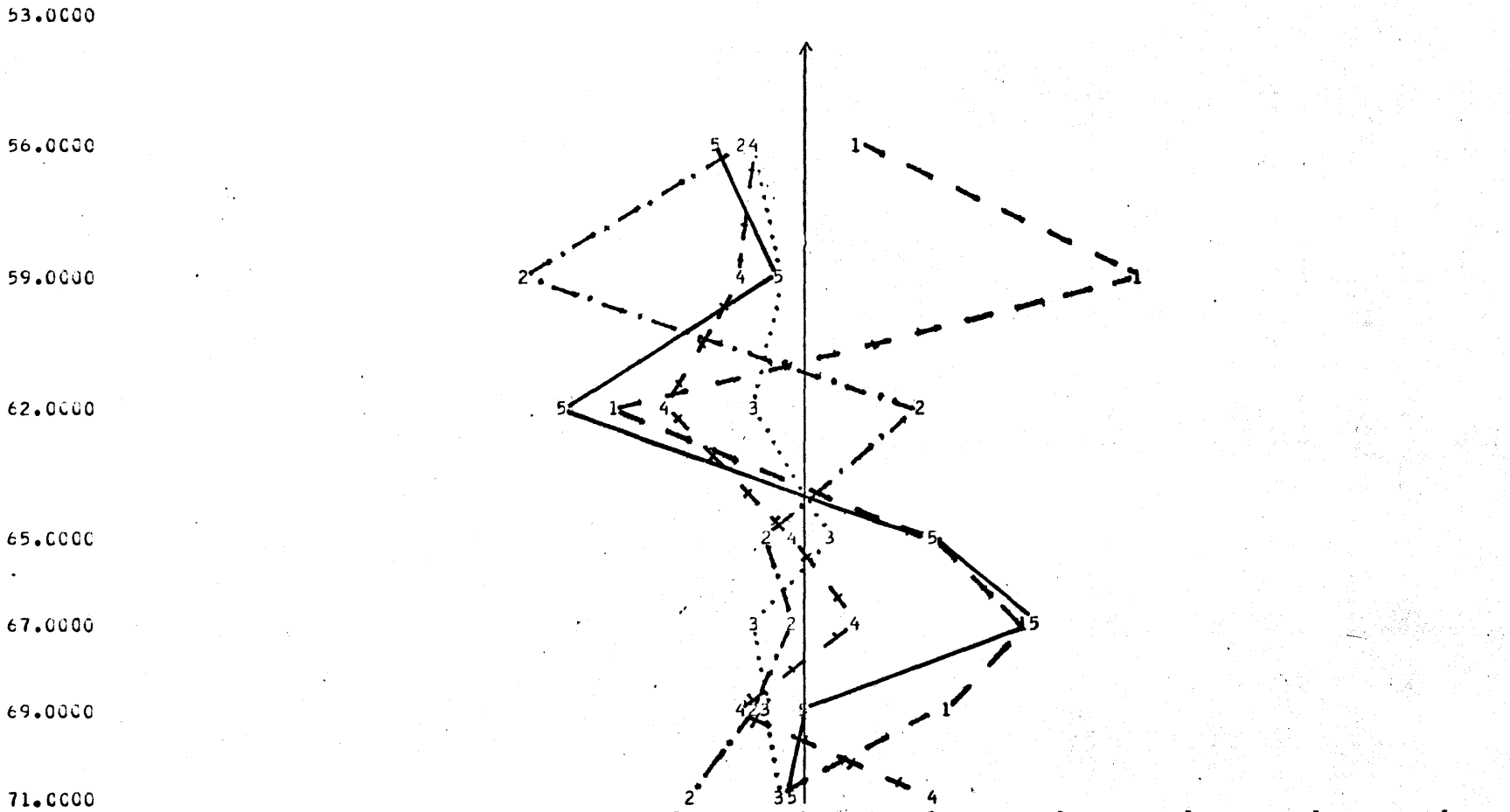
MIX SHIFT ANALYSIS FOR WASHINGTON,DC ,1953-1971

1=ANNUAL RATE CC EMPLCY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE CC EMPLCY CHANGE, IND. ENDCW. FACTOR
3=ANNUAL RATE CC EMPLCY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE CC EMPLCY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE CC EMPLCY CHANGE

MIX SHIFT ANALYSIS FOR AVE. OF BALT/PHIL/ST.LOU, 1953-1971

YEAR	NAT. GROWTH FACTOR	INC. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0131	-0.0101	-0.0098	-0.0204
59.	0.0785	-0.0652	-0.0046	-0.0133	-0.0046
62.	-0.0448	0.0293	-0.0096	-0.0301	-0.0552
65.	0.0324	-0.0061	0.0076	-0.0027	0.0312
67.	0.0520	-0.0001	-0.0105	0.0146	0.0559
69.	0.0345	-0.0115	-0.0079	-0.0141	0.0011
71.	-0.0028	-0.0267	-0.0031	0.0311	-0.0015

CHART 7



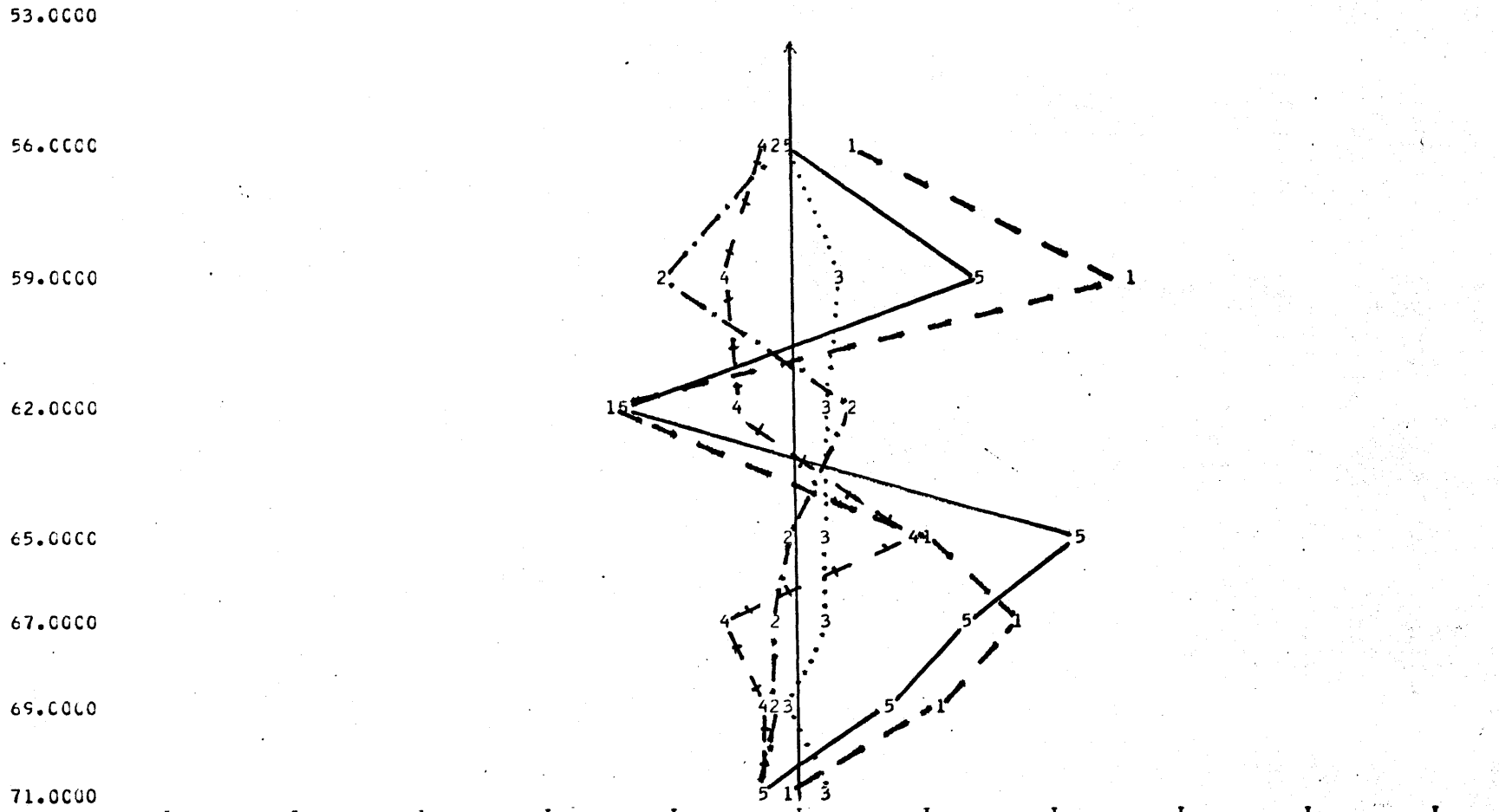
MIX SHIFT ANALYSIS FOR AVE. OF BALT/PHIL/ST.LOU, 1953-1971

1=ANNUAL RATE OF EMPLOY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE OF EMPLOY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE OF EMPLOY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE OF EMPLOY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE OF EMPLOY CHANGE

MIX SHIFT ANALYSIS FOR AVE. OF CEN/N.C./WASH, 1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0126	-0.0048	-0.0016	-0.0079	-0.0017
59.	0.0785	-0.0306	0.0117	-0.0156	0.0439
62.	-0.0448	0.0120	0.0077	-0.0143	-0.0394
65.	0.0324	-0.0020	0.0076	0.0287	0.0667
67.	0.0520	-0.0031	0.0088	-0.0173	0.0403
69.	0.0345	-0.0042	-0.0030	-0.0061	0.0212
71.	-0.0028	-0.0077	0.0084	-0.0061	-0.0082

CHART 8



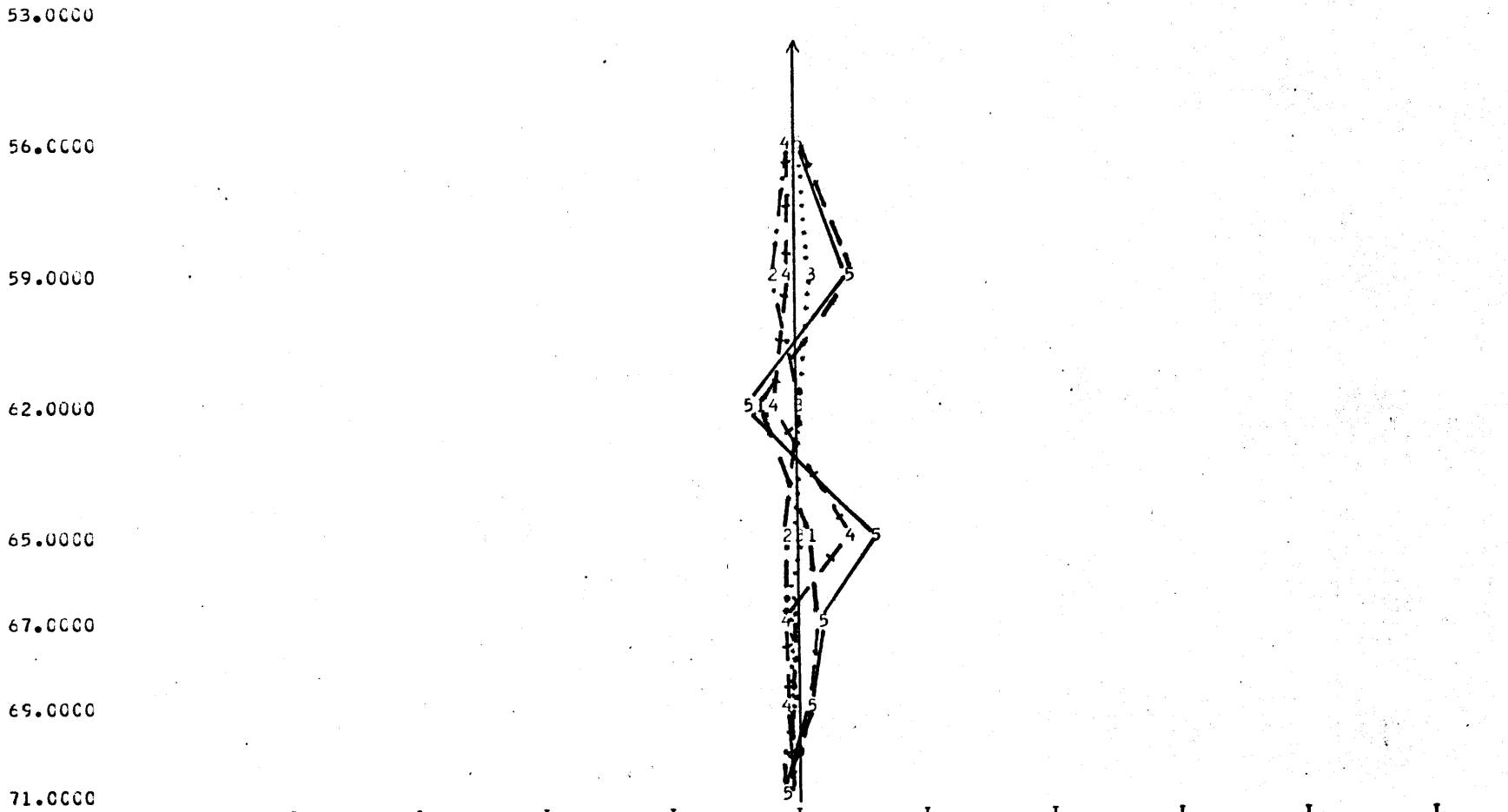
MIX SHIFT ANALYSIS FOR AVE. OF DEN/N.C./WASH, 1953-1971

1=ANNUAL RATE CC EMPLOY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE CC EMPLOY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE CC EMPLOY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE CC EMPLOY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE CC EMPLOY CHANGE

MIX SHIFT ANALYSIS FOR AVE. OF 6 CITIES, 1953-1971

YEAR	NAT. GROWTH FACTOR	IND. ENDOW. FACTOR	REG. SHIFT FACTOR	SUB. SHIFT FACTOR	TOTAL
53.	0.0	0.0	0.0	0.0	0.0
56.	0.0021	-0.0002	0.0007	-0.0013	0.0013
59.	0.0131	-0.0031	0.0031	-0.0007	0.0123
62.	-0.0075	0.0012	0.0007	-0.0042	-0.0098
65.	0.0054	-0.0002	0.0020	0.0134	0.0205
67.	0.0087	-0.0006	-0.0007	-0.0013	0.0062
69.	0.0058	-0.0004	-0.0005	-0.0012	0.0037
71.	-0.0005	-0.0006	-0.0003	-0.0004	-0.0018

CHART 9



MIX SHIFT ANALYSIS FOR AVE. OF 6 CITIES, 1953-1971

1=ANNUAL RATE CC EMPLCY CHANGE, NAT. GROWTH FACTOR
2=ANNUAL RATE CC EMPLCY CHANGE, IND. ENDOW. FACTOR
3=ANNUAL RATE CC EMPLCY CHANGE, REG. SHIFT FACTOR
4=ANNUAL RATE CC EMPLCY CHANGE, SUB. SHIFT FACTOR
5=TOTAL ANNUAL RATE CC EMPLCY CHANGE

APPENDIX THREE:
REGIONAL AND SUBURBAN SHIFT COEFFICIENTS BY INDUSTRY FOR SIX UNITED STATES CITIES 1953-1971.

Appendix Three contains tables and printer graphs of the unweighted industrial regional and suburban shift coefficients of the mix-shift analysis for six United States cities. The coefficients represent the regional and suburban "attractiveness" of each industry type since the last observation. Attractiveness is a dimensionless ratio; the coefficients as reported are not balanced by the size of the employment base. The national growth rate of the industry and the over-all national employment growth rate are also plotted.

The tables and the graphs form facing pages. The data on the left is displayed on the two pages on the right. In the case of the graphs, a superior number may cover an inferior one, the tables will locate the appropriate superior number position. Values beyond the scale of the graphs are represented by dollar signs ($) in the left or right hand margins. The tables carry the correct value. The visual impact of the graphs may have to be adjusted for changes in scale.

See Appendix One for a technical derivation and computational description of the coefficients.

Data Source: County Business Patterns, U.S. Department of Commerce, Washington, D.C.

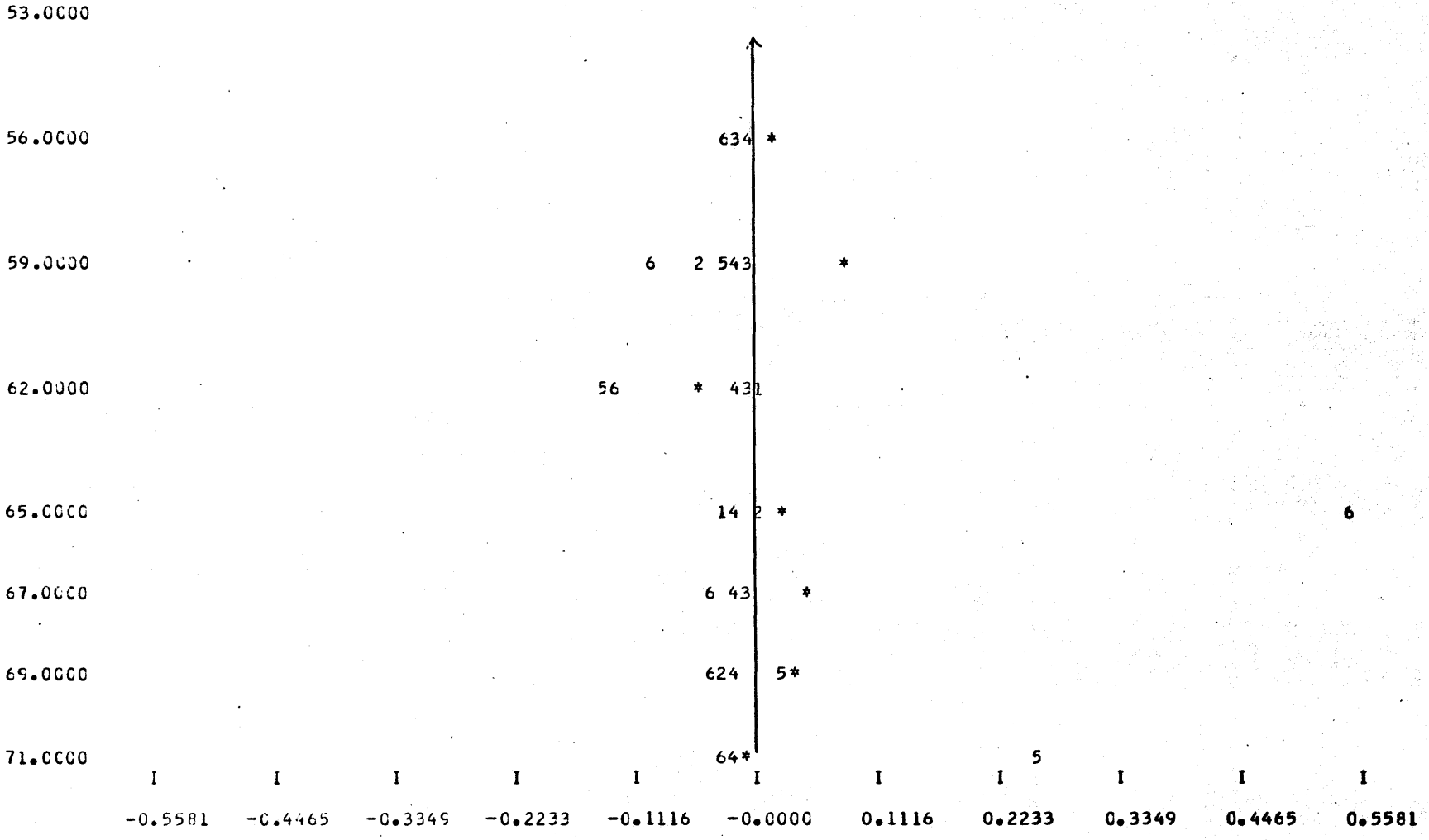
See Appendix One for a technical derivation and computational description of the analyses.

Data Source: County Business Patterns, U.S. Department of Commerce, Washington, D.C.

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 1593; TOTAL EMPL

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0019	0.0161	0.0011	-0.0264	-0.0332	0.0248	0.0126	0.0126
59.	-0.0180	0.0593	-0.0090	-0.0131	-0.0258	0.2828	0.0785	0.0785
62.	-0.0062	0.0390	0.0038	0.0109	-0.0471	-0.0680	-0.0448	-0.0448
65.	0.0032	-0.0321	0.0361	-0.0186	0.0765	0.0331	0.0324	0.0324
67.	-0.0025	0.0180	-0.0064	-0.0067	0.0002	0.0105	0.0520	0.0520
69.	-0.0191	0.0411	-0.0329	-0.0103	-0.0081	0.0113	0.0345	0.0345
71.	0.0020	0.0391	0.0144	-0.0149	-0.0269	0.0194	-0.0028	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0253	-0.0125	-0.0137	-0.0088	-0.0248	-0.0320	0.0126	0.0126
59.	-0.0111	-0.0455	-0.0093	-0.0141	-0.0280	-0.0960	0.0785	0.0785
62.	0.0026	-0.0178	-0.0063	-0.0151	-0.1367	-0.1328	-0.0448	-0.0448
65.	-0.0301	0.0005	-0.0151	-0.0175	0.0277	0.5581	0.0324	0.0324
67.	-0.0180	-0.0164	-0.0087	-0.0116	0.0486	-0.0341	0.0520	0.0520
69.	-0.0132	-0.0274	-0.0133	-0.0211	0.0267	-0.0429	0.0345	0.0345
71.	-0.0093	-0.0093	-0.0133	-0.0121	0.2635	-0.0275	-0.0028	-0.0028

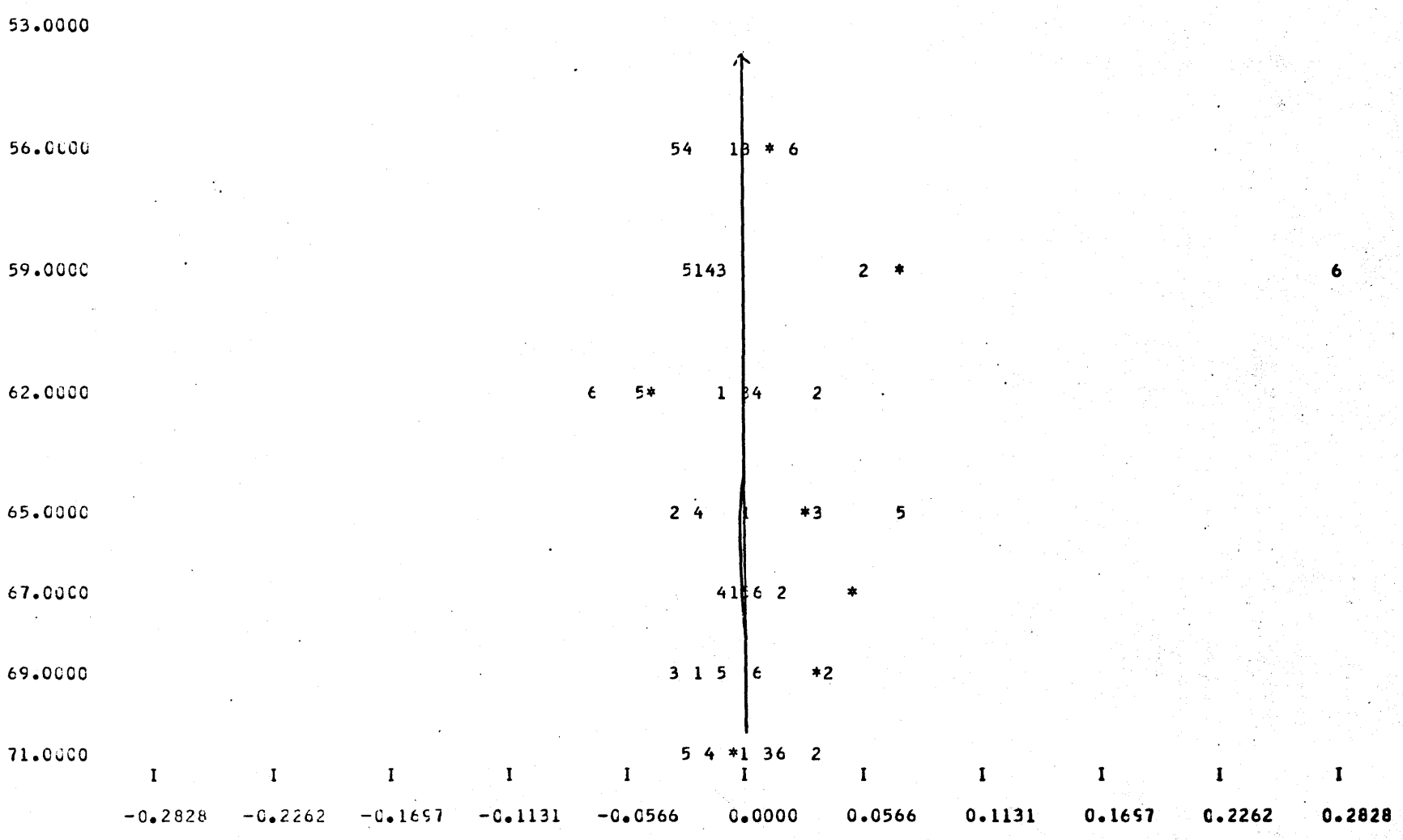
CHART 1 - S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 1593; TOTAL EMPL

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 1 R



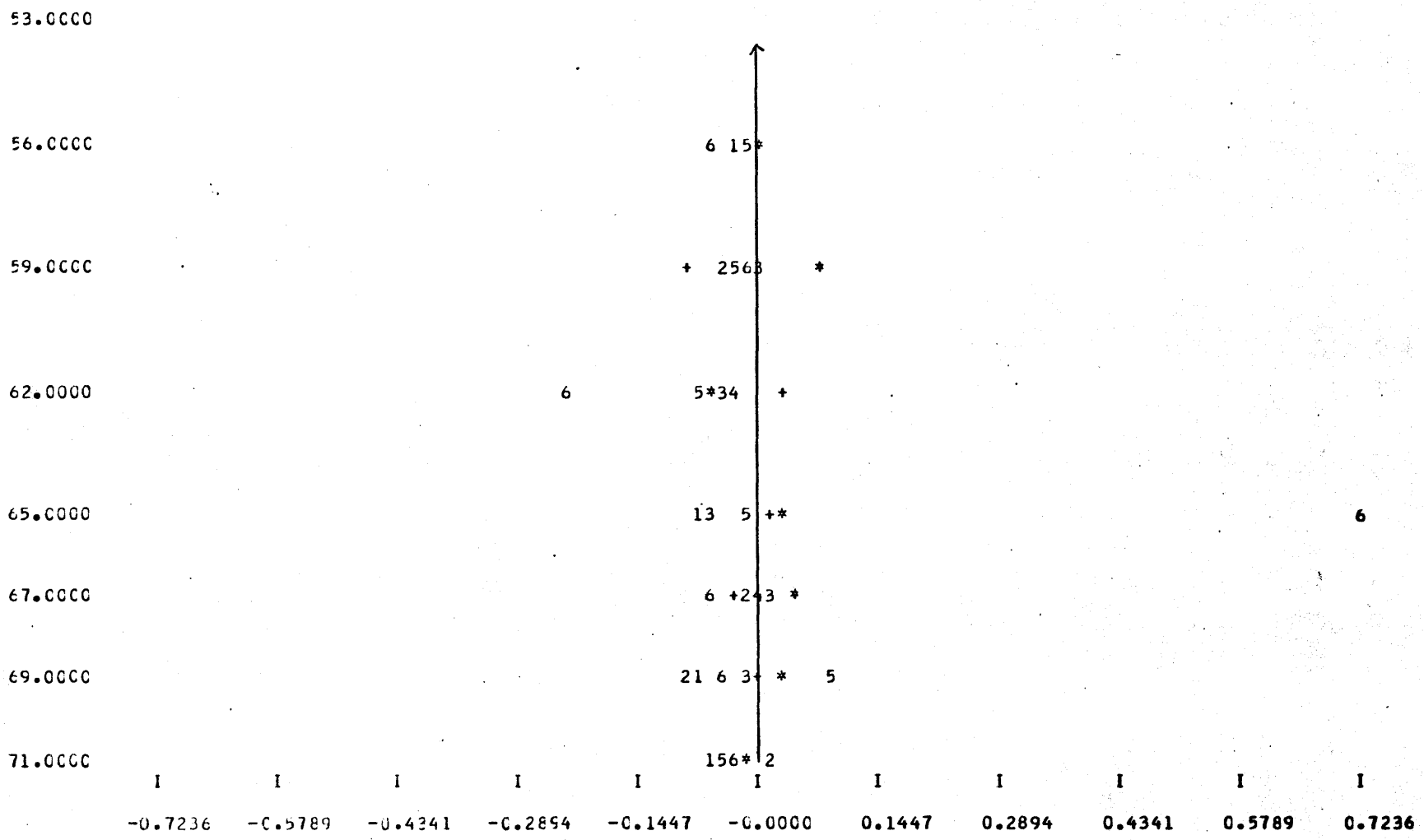
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 1593; TOTAL EMPL

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 1517; CONST

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0046	-0.0220	0.0021	-0.0592	-0.0060	0.0080	0.0092	0.0126
59.	-0.0681	0.0001	-0.0252	-0.0200	-0.0201	0.0727	-0.0833	0.0785
62.	0.0061	0.0808	0.0002	-0.0242	-0.0307	0.0235	0.0352	-0.0448
65.	0.0280	-0.0856	0.1354	0.0129	0.0838	0.0698	0.0223	0.0324
67.	-0.0185	0.0068	0.0224	0.0190	0.0203	-0.0447	-0.0274	0.0520
69.	-0.0410	0.0641	-0.1244	-0.0279	-0.0694	-0.0477	0.0037	0.0345
71.	0.1105	0.0991	-0.0091	0.0275	-0.0214	-0.0609	-0.0059	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0252	0.0126	-0.0529	-0.0058	-0.0143	-0.0527	0.0092	0.0126
59.	-0.0070	-0.0327	0.0113	-0.0045	-0.0166	-0.0009	-0.0833	0.0785
62.	-0.0145	-0.0657	-0.0304	-0.0269	-0.0715	-0.2302	0.0352	-0.0448
65.	-0.0603	0.0240	-0.0487	0.0187	-0.0007	0.7236	0.0223	0.0324
67.	0.0092	-0.0145	0.0194	0.0002	-0.0169	-0.0469	-0.0274	0.0520
69.	-0.0586	-0.0732	-0.0068	-0.0414	0.0922	-0.0409	0.0037	0.0345
71.	-0.0553	0.0208	-0.0393	-0.0172	-0.0430	-0.0197	-0.0059	-0.0028

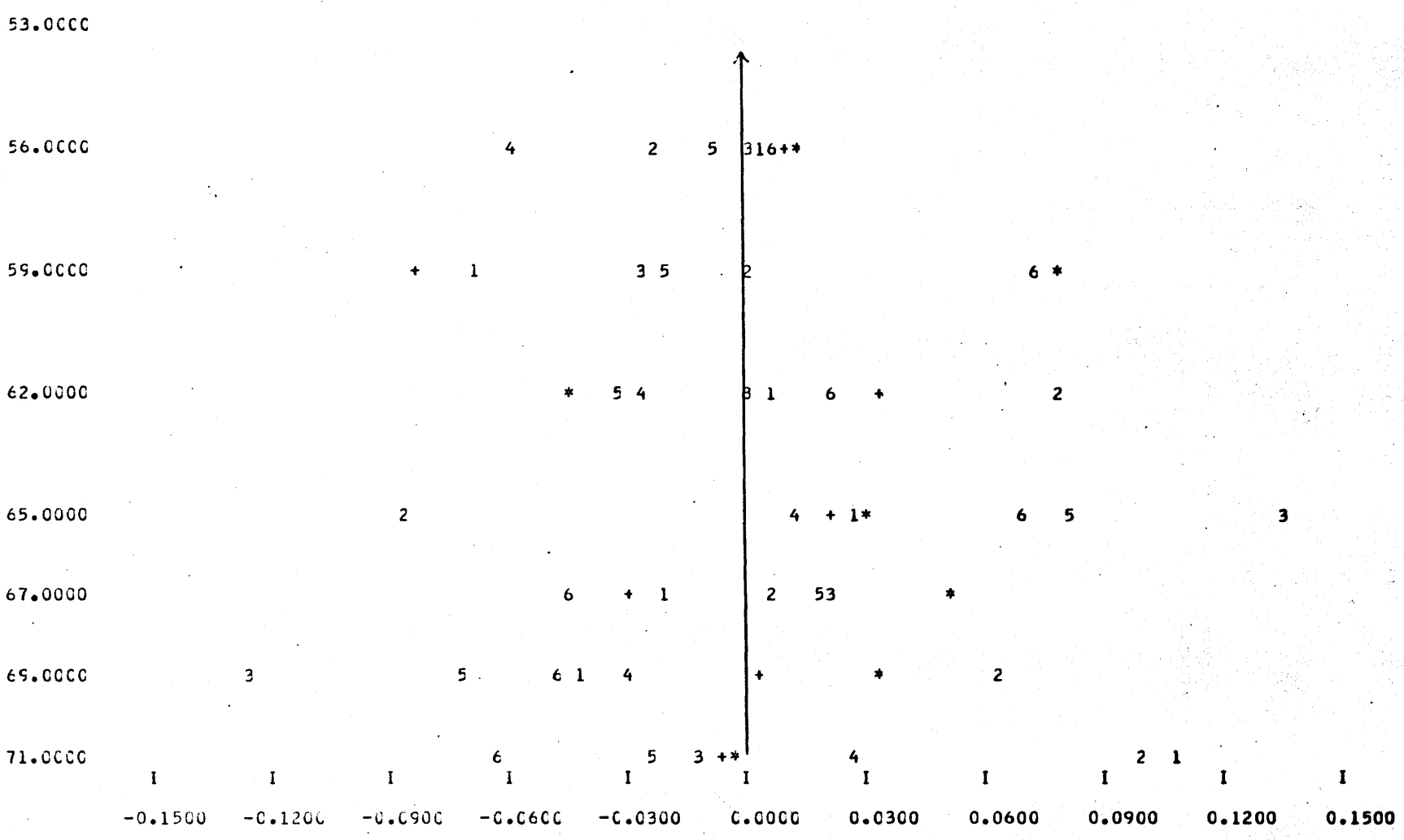
CHART 2 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 1517; CONST

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 2 R



REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 1517; CONST

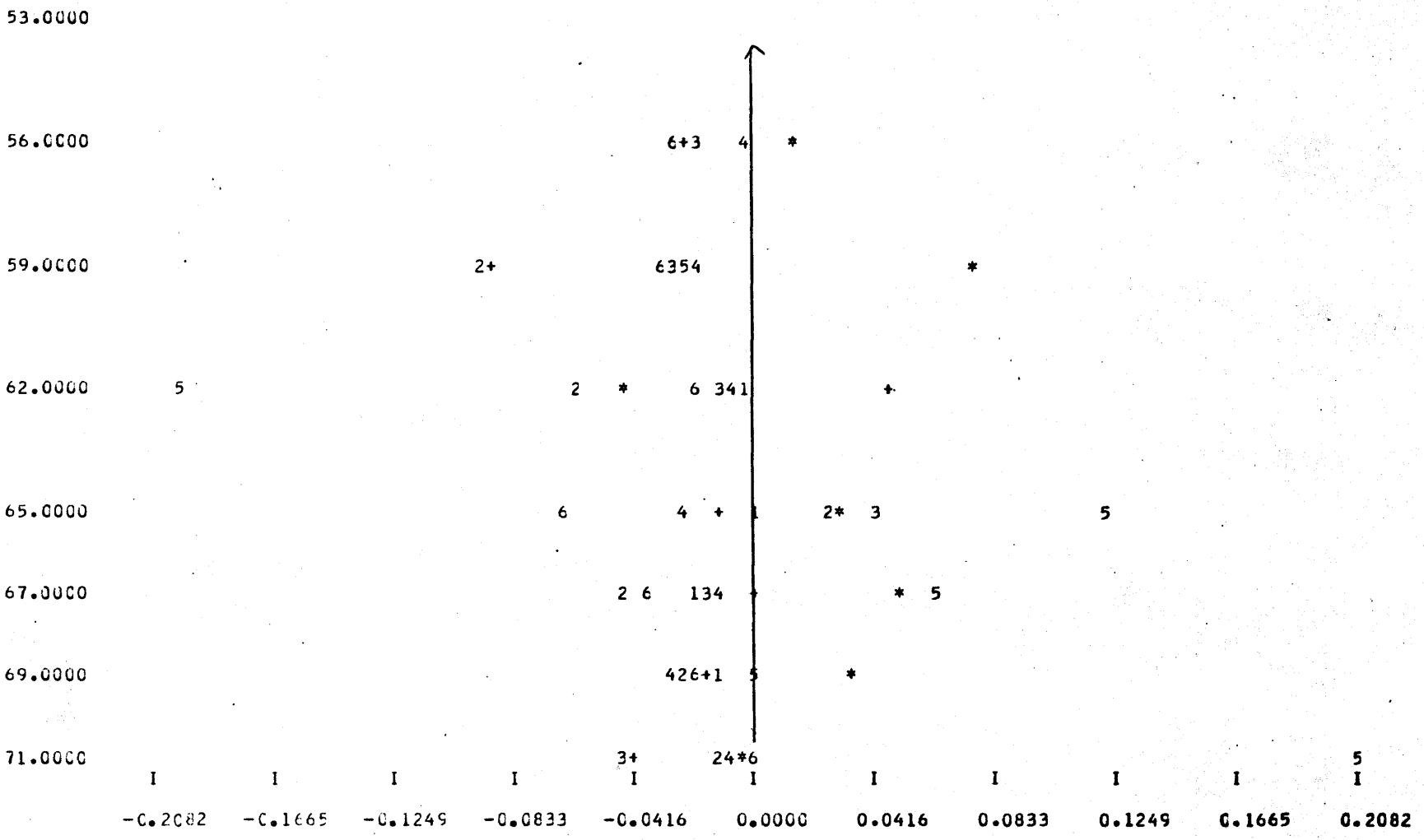
1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

/03

REGIONAL AND SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 1939; TOT MFG

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0126	0.0278	-0.0270	-0.0255	-0.0193	0.0465	-0.0216	0.0126
59.	-0.0080	0.0790	-0.0163	0.0031	-0.0128	0.0864	-0.0909	0.0785
62.	-0.0093	0.0928	-0.0138	0.0038	-0.0130	0.0423	0.0491	-0.0448
65.	-0.0178	-0.0827	0.0751	-0.0299	0.0017	0.0329	-0.0084	0.0324
67.	-0.0053	0.0561	-0.0477	-0.0145	-0.0042	0.0059	0.0004	0.0520
69.	-0.0326	0.0605	-0.0264	-0.0169	-0.0154	-0.0050	-0.0151	0.0345
71.	-0.0080	0.0503	0.0108	-0.0196	-0.0180	0.0104	-0.0413	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0272	-0.0169	-0.0179	-0.0026	-0.0209	-0.0268	-0.0216	0.0126
59.	-0.0168	-0.0942	-0.0257	-0.0187	-0.0234	-0.0300	-0.0909	0.0785
62.	-0.0034	-0.0602	-0.0119	-0.0081	-0.1988	-0.0192	0.0491	-0.0448
65.	0.0018	0.0289	0.0428	-0.0233	0.1245	-0.0647	-0.0084	0.0324
67.	-0.0171	-0.0434	-0.0163	-0.0120	0.0641	-0.0356	0.0004	0.0520
69.	-0.0083	-0.0240	-0.0264	-0.0282	0.0000	-0.0167	-0.0151	0.0345
71.	-0.0091	-0.0124	-0.0431	-0.0074	0.2082	0.0034	-0.0413	-0.0028

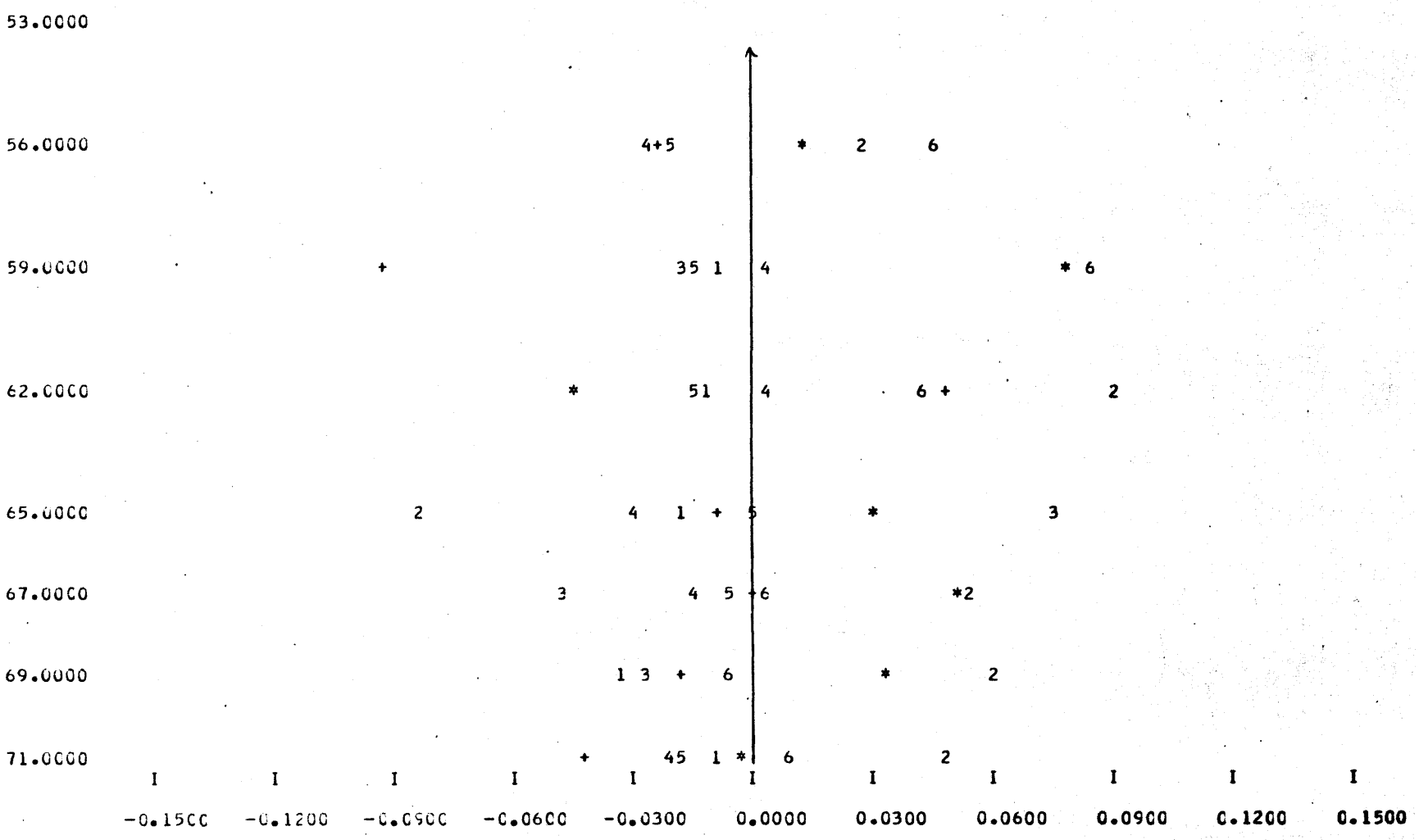
CHART 3 5



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 1939; TOT MFG

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 3 R

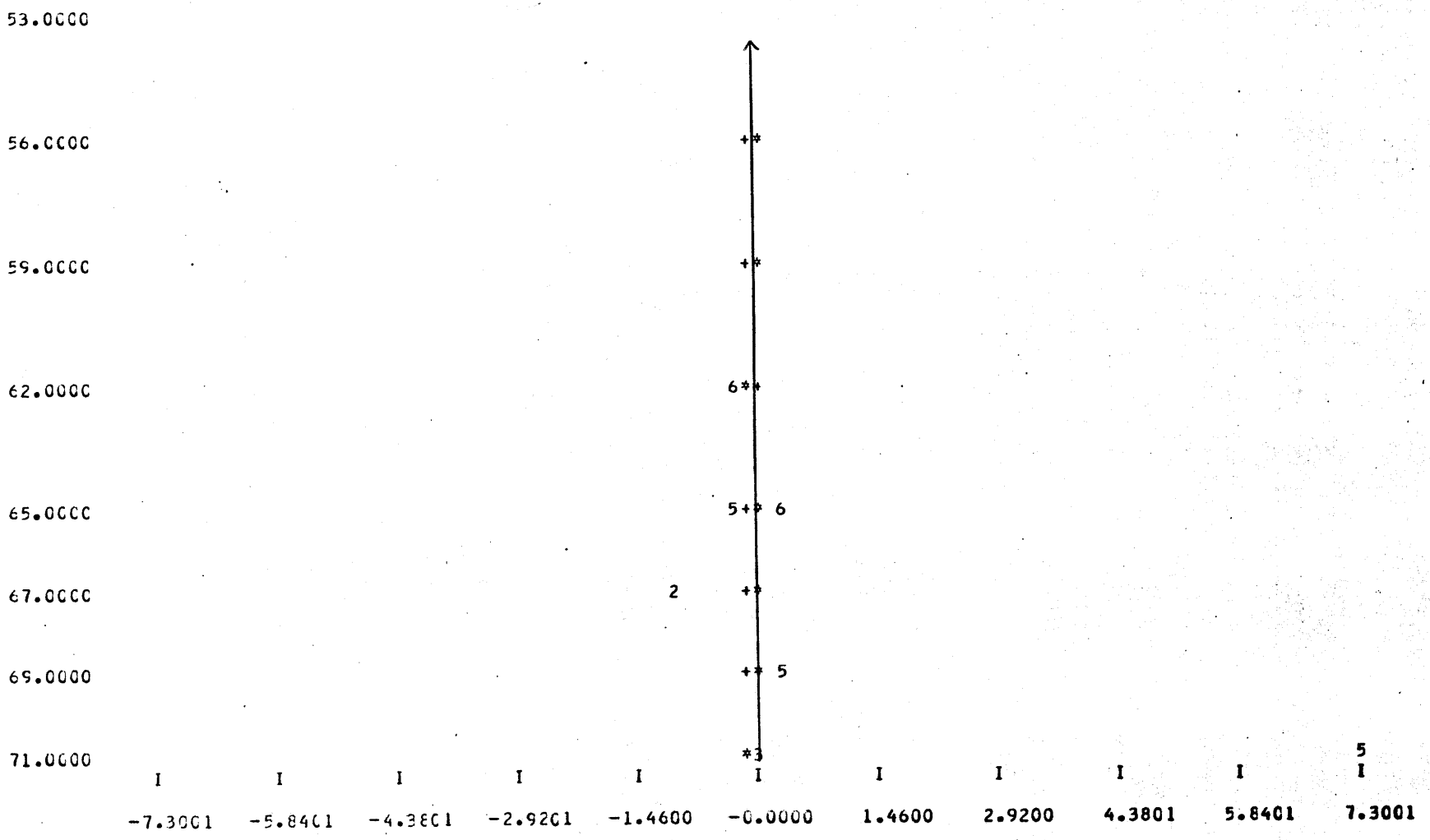


REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 1939; TOT MFG

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

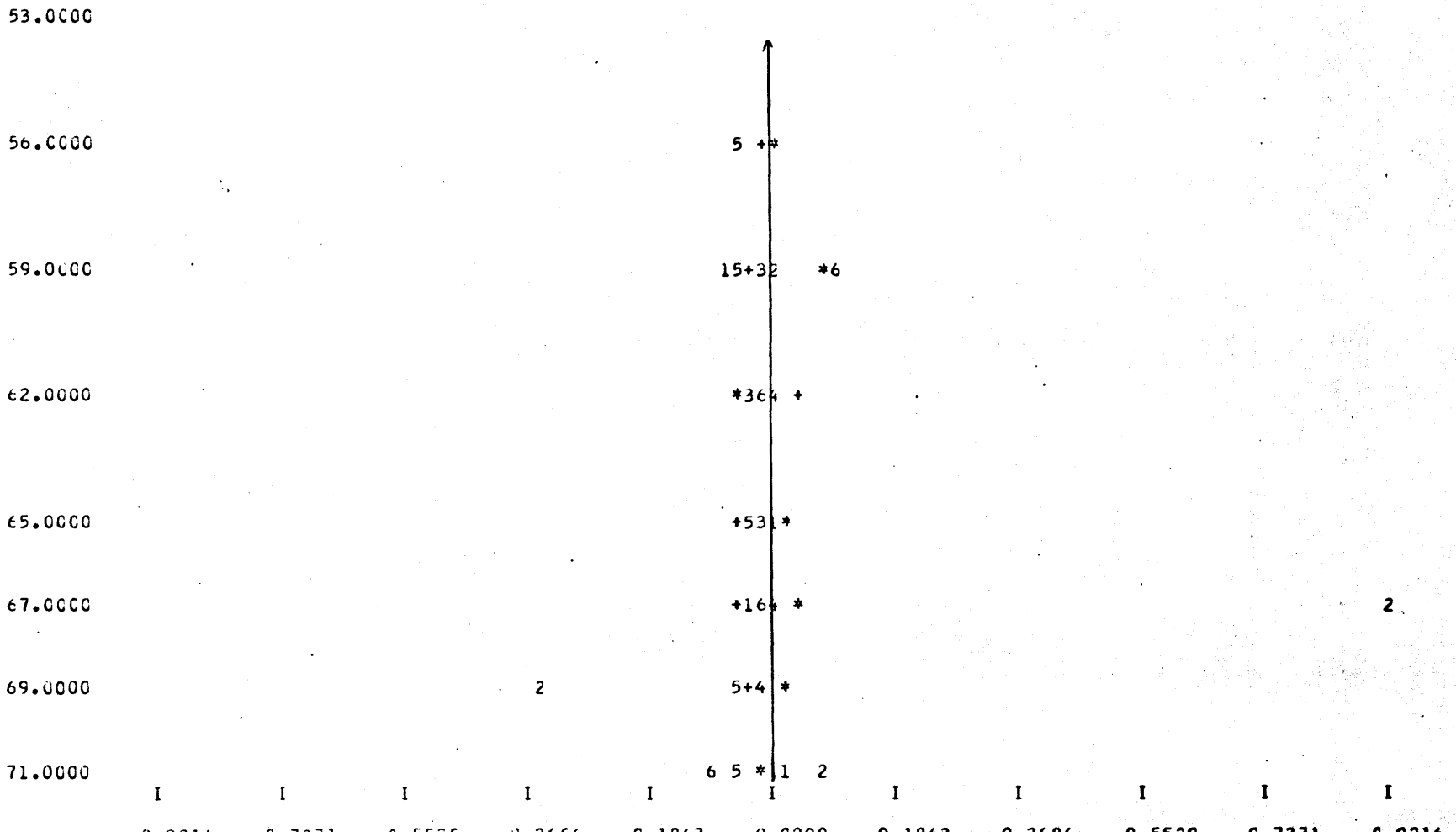
REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 2020; FOOD

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0090	0.0045	-0.0159	0.0025	-0.0422	0.0003	-0.0057	0.0126
59.	-0.0621	0.0180	-0.0150	-0.0239	-0.0457	0.1006	-0.0368	0.0785
62.	0.0	0.0079	-0.0249	0.0128	-0.0116	-0.0164	0.0388	-0.0448
65.	0.0045	-0.0414	-0.0000	-0.0242	-0.0260	0.0185	-0.0394	0.0324
67.	-0.0219	0.9214	-0.0030	0.0069	-0.0079	-0.0169	-0.0387	0.0520
69.	-0.0108	-0.3343	-0.0134	-0.0040	-0.0526	0.0205	-0.0337	0.0345
71.	0.0214	0.0762	-0.0141	-0.0171	-0.0499	-0.0781	-0.0127	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0038	-0.0181	0.0082	0.0018	-0.0081	-0.0077	-0.0057	0.0126
59.	-0.0084	-0.0357	0.0188	-0.0147	0.0176	-0.0406	-0.0368	0.0785
62.	0.0	-0.0154	0.0000	-0.0099	-0.0372	-0.1952	0.0388	-0.0448
65.	-0.0069	0.0165	-0.0251	-0.0131	-0.2902	0.4227	-0.0394	0.0324
67.	0.0035	-0.9550	0.0077	0.0002	0.0389	-0.0105	-0.0387	0.0520
69.	-0.0289	0.3012	-0.0107	-0.0156	0.3226	-0.0644	-0.0337	0.0345
71.	-0.0079	-0.0355	0.0016	-0.0134	7.3001	-0.1091	-0.0127	-0.0028



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 2020; FOOD

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY



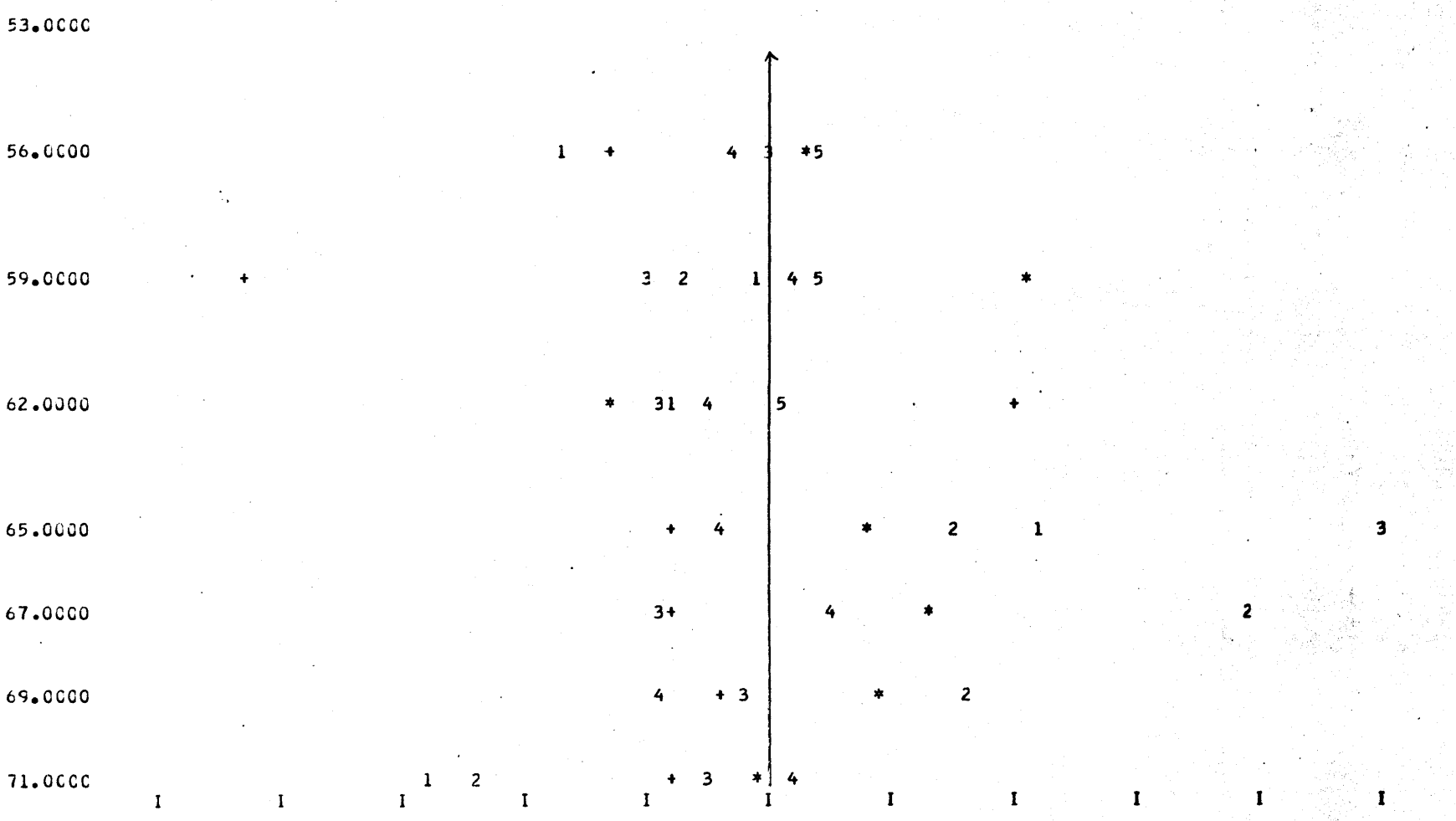
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 2020; FOOD

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

/09 REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 2222; TEXTILE

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0700	0.1261	-0.0689	-0.0272	-0.0382	0.0	-0.0472	0.0126
59.	-0.0075	-0.1751	-0.1552	0.0200	-0.0746	0.0	-0.1598	0.0785
62.	-0.0994	0.4035	-0.0988	-0.0788	-0.0027	0.0	0.0747	-0.0448
65.	-0.1278	0.4026	-0.0902	-0.0234	-0.0999	0.0	-0.0292	0.0324
67.	0.0529	0.0710	-0.0082	-0.0827	0.0479	0.0	-0.0282	0.0520
69.	0.0	-0.1125	0.1057	0.0229	0.0677	0.0	-0.0127	0.0345
71.	0.0626	0.1324	-0.0124	-0.0663	-0.0525	0.0	-0.0290	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0633	0.0	0.0023	-0.0082	0.0179	0.0	-0.0472	0.0126
59.	-0.0026	-0.0256	-0.0342	0.0097	0.0167	0.0	-0.1598	0.0785
62.	-0.0272	0.0	-0.0303	-0.0152	0.0053	0.0	0.0747	-0.0448
65.	0.0853	0.0583	0.1867	-0.0134	0.0	0.0	-0.0292	0.0324
67.	-0.0328	0.1483	-0.0310	0.0204	0.0	0.0	-0.0282	0.0520
69.	0.0	0.0598	-0.0052	-0.0313	0.0	0.0	-0.0127	0.0345
71.	-0.1035	-0.0875	-0.0157	0.0091	-0.0001	0.0	-0.0290	-0.0028

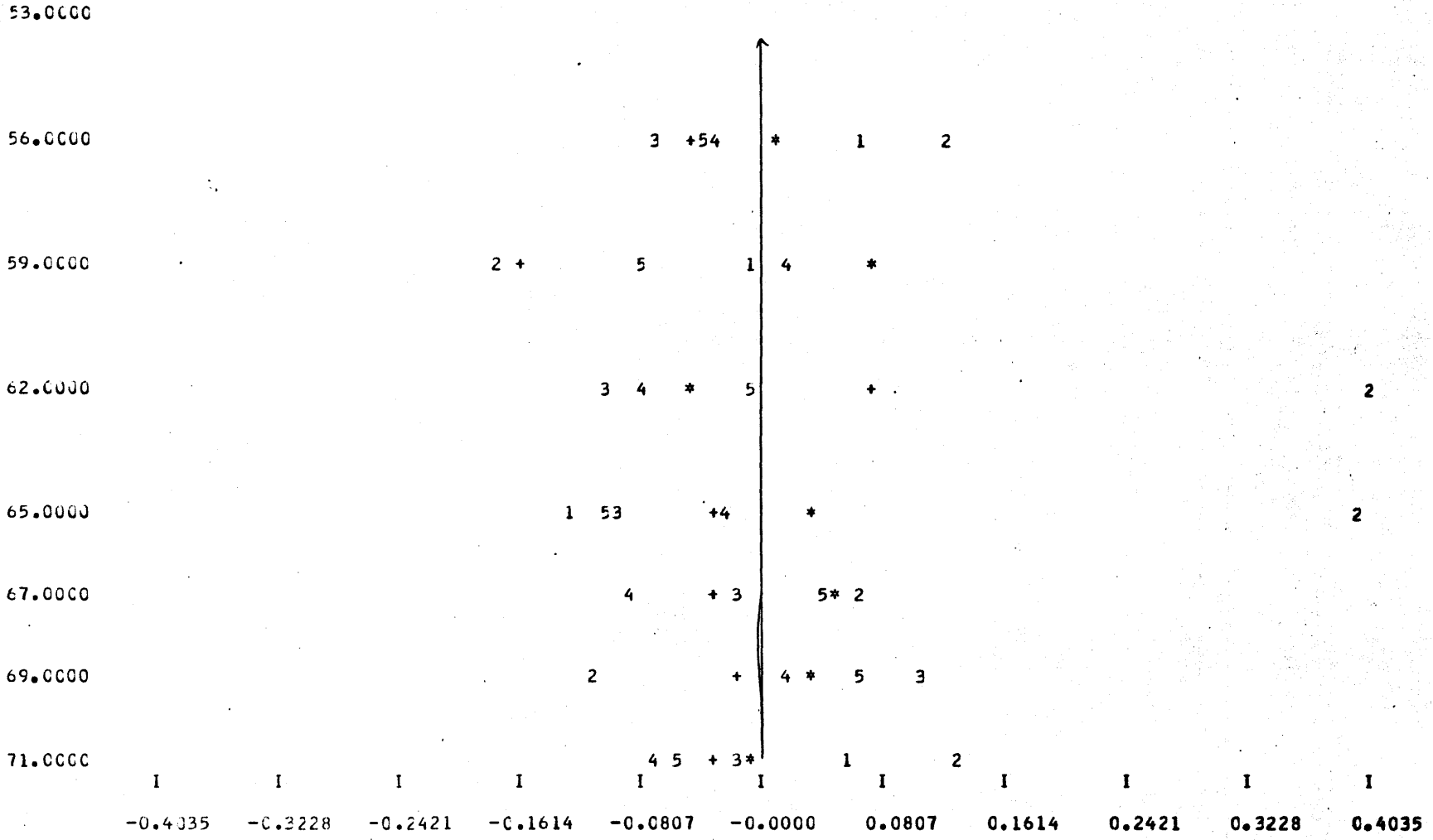
CHART 5 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 2222; TEXTILE

1=SUBUREAN SHIFT COEF FOR BALTIMORE
2=SUBUREAN SHIFT COEF FOR DENVER
3=SUBUREAN SHIFT COEF FOR NEW ORLEANS
4=SUBUREAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBUREAN SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 5 R



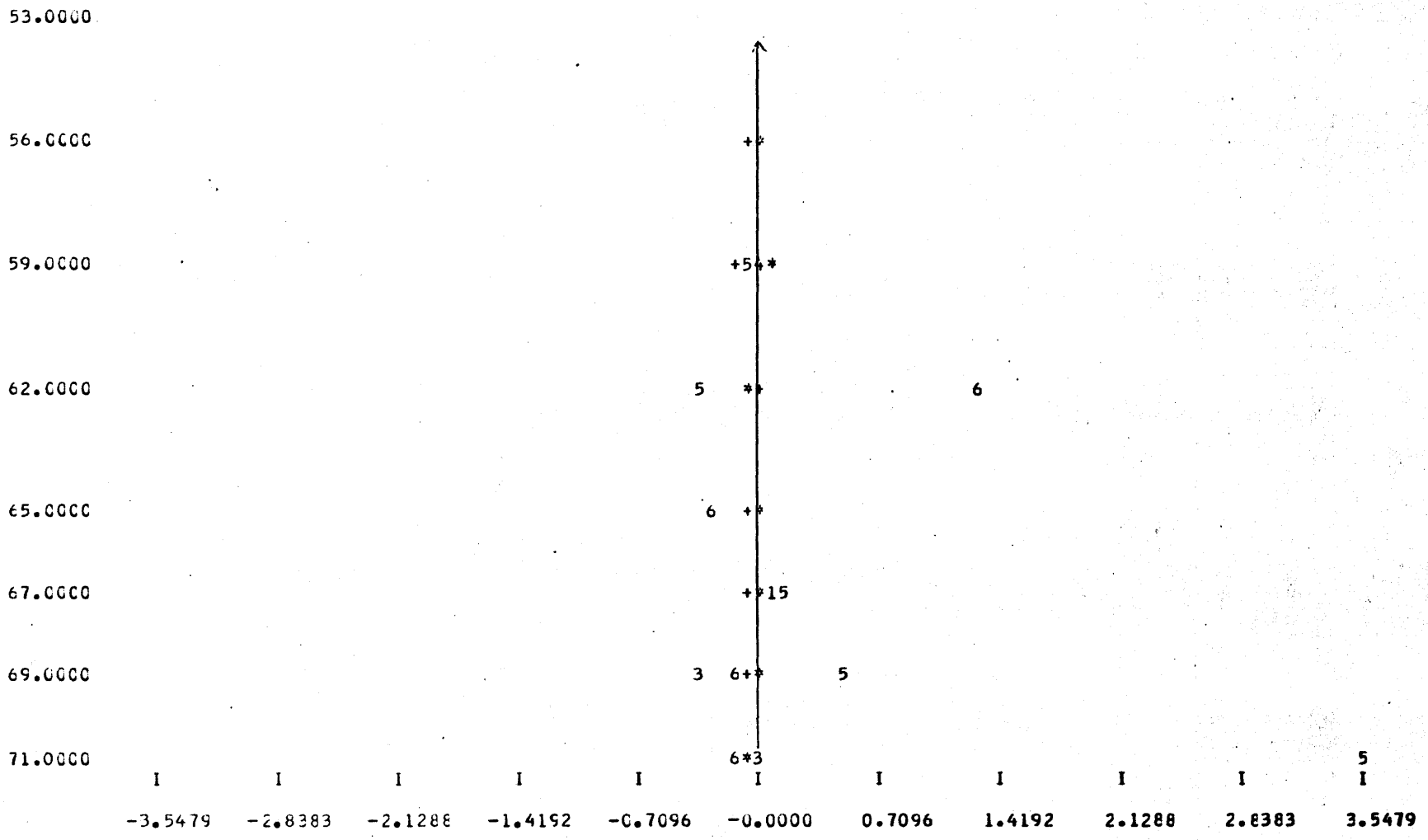
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 2222; TEXTILE

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 2323; APPAREL

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0	-0.0350	-0.0413	-0.0182	-0.0437	0.0599	-0.0146	0.0126
59.	-0.0214	0.0245	0.0015	0.0098	-0.0064	0.3009	-0.0973	0.0785
62.	0.0156	-0.0421	-0.0102	-0.0241	-0.0149	-0.0754	0.0625	-0.0448
65.	0.0061	-0.0315	-0.0322	-0.0063	-0.0458	-0.0953	-0.0108	0.0324
67.	-0.1086	-0.0165	-0.2054	-0.0160	-0.0244	-0.0861	-0.0305	0.0520
69.	0.0	0.2237	0.2667	-0.0159	-0.0482	-0.0318	-0.0284	0.0345
71.	-0.0188	-0.0318	0.0139	-0.0675	-0.0201	0.2614	-0.0267	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0	0.0049	0.0	-0.0009	-0.0096	0.0356	-0.0146	0.0126
59.	-0.0119	-0.0151	-0.0014	0.0022	-0.0190	-0.0789	-0.0973	0.0785
62.	-0.0003	0.0131	0.0003	0.0030	-0.3266	1.3248	0.0625	-0.0448
65.	-0.0139	-0.0221	-0.0038	0.0008	0.0693	-0.2227	-0.0108	0.0324
67.	0.0840	0.0095	0.2058	0.0011	0.1615	-0.0560	-0.0305	0.0520
69.	0.0	-0.0523	-0.3056	-0.0027	0.5184	-0.1106	-0.0284	0.0345
71.	-0.0463	-0.0033	0.0004	-0.0145	3.5479	-0.1319	-0.0267	-0.0028

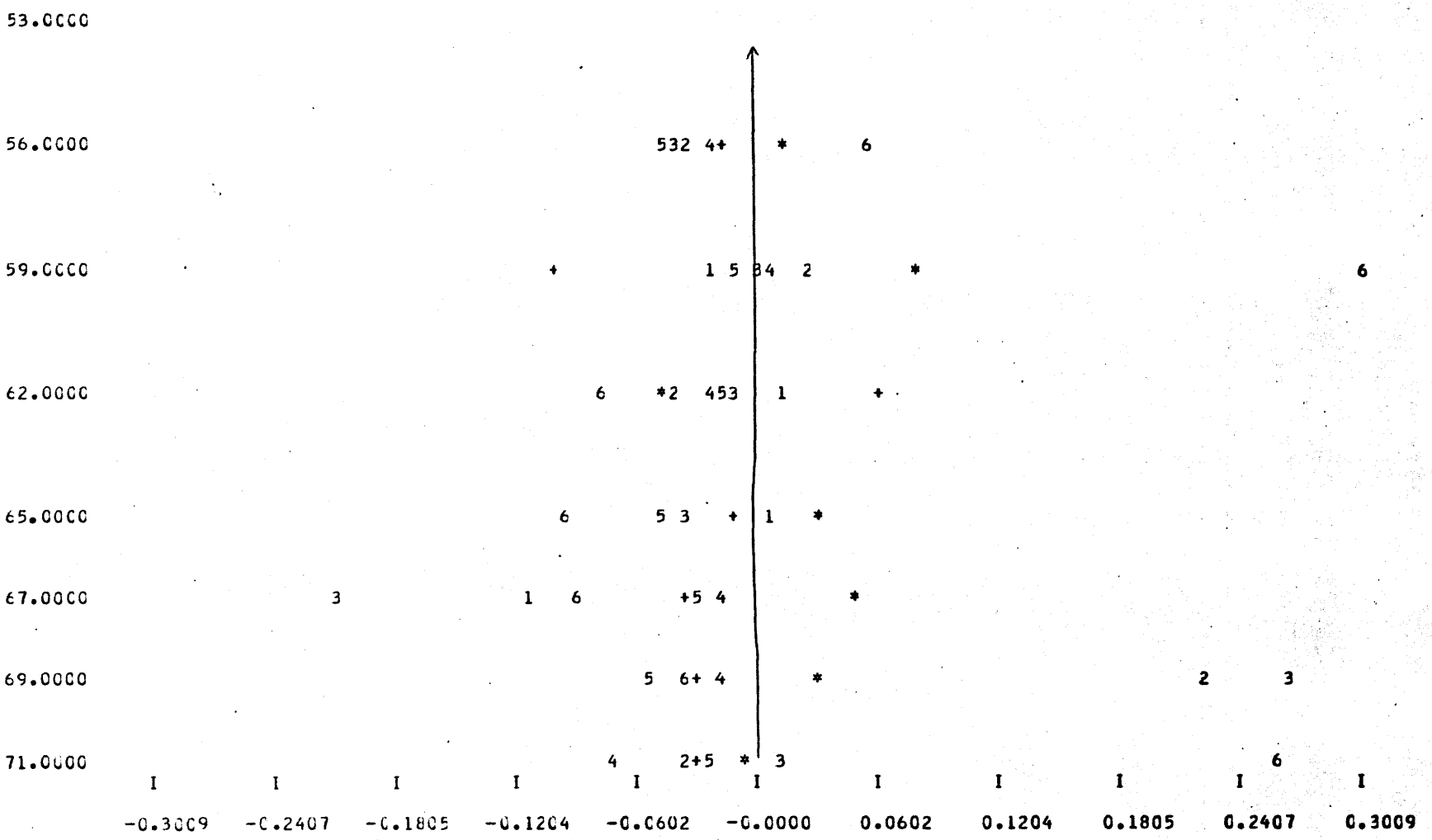
CHART 6 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 2323; APPAREL

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 6 R

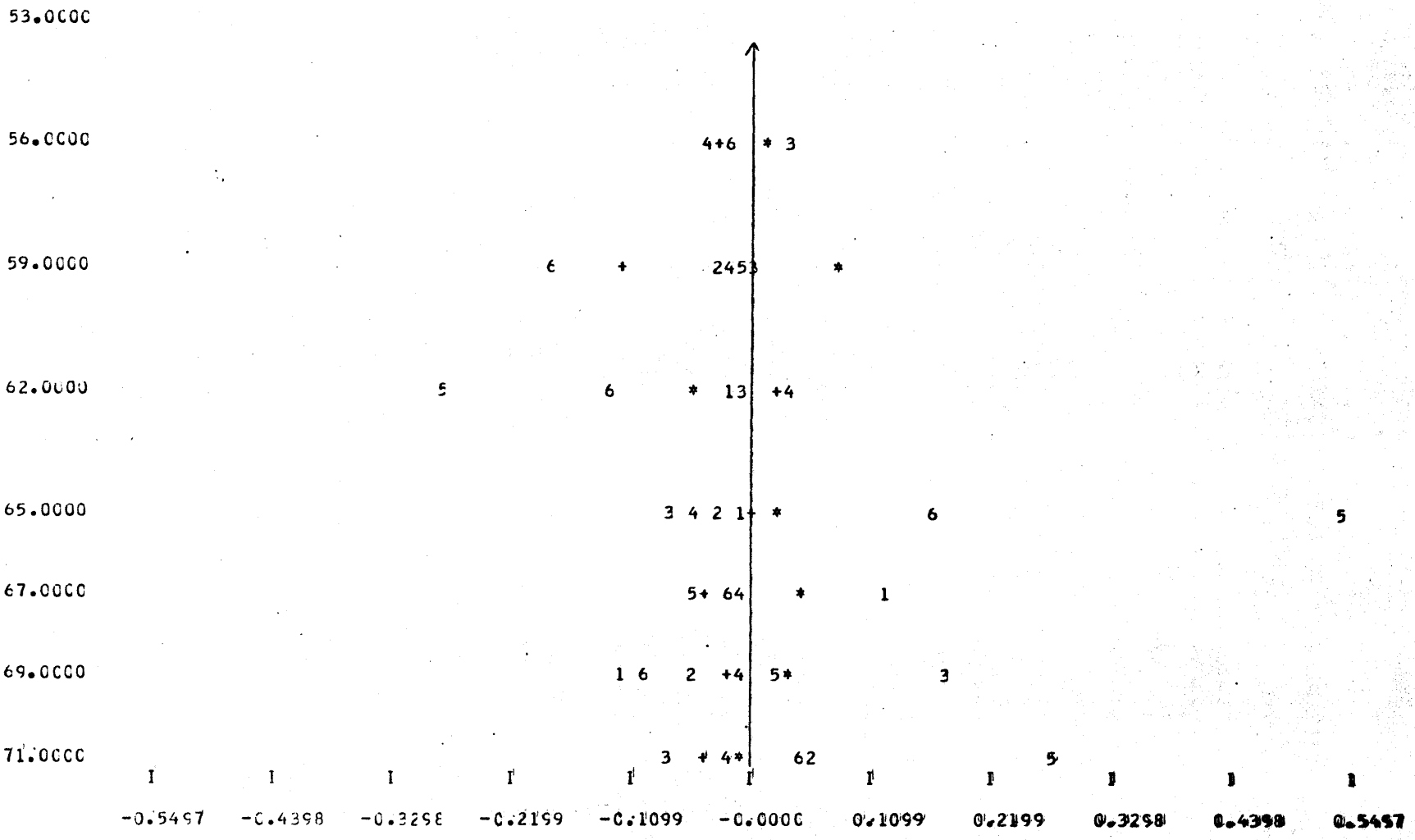


REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 2323; APPAREL

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 2425; LUMBER

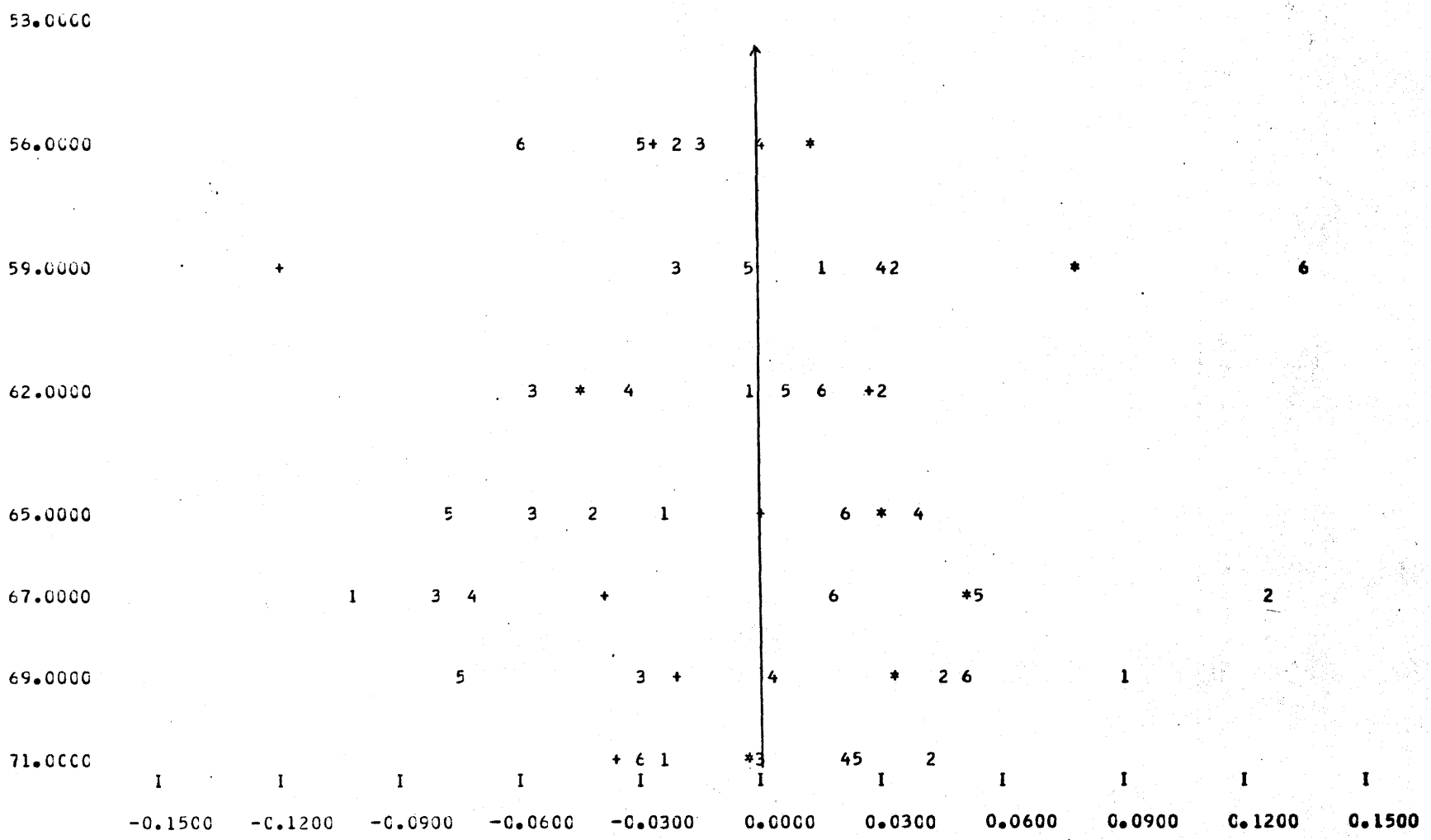
YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0	-0.0186	-0.0123	0.0013	-0.0290	-0.0588	-0.0252	0.0126
59.	0.0172	0.0355	-0.0207	0.0323	-0.0015	0.1360	-0.1191	0.0785
62.	-0.0028	0.0321	-0.0557	-0.0325	0.0080	0.0157	0.0283	-0.0448
65.	-0.0234	-0.0402	-0.0549	0.0417	-0.0754	0.0220	0.0009	0.0324
67.	-0.1005	0.1273	-0.0786	-0.0697	0.0568	0.0183	-0.0366	0.0520
69.	0.0907	0.0450	-0.0292	0.0059	-0.0731	0.0510	-0.0185	0.0345
71.	-0.0220	0.0425	0.0025	0.0227	0.0264	-0.0281	-0.0343	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0	-0.0354	0.0360	-0.0398	-0.0236	-0.0182	-0.0252	0.0126
59.	-0.0046	-0.0307	0.0062	-0.0199	-0.0023	-0.1819	-0.1191	0.0785
62.	-0.0219	0.0337	-0.0087	0.0350	-0.2774	-0.1240	0.0283	-0.0448
65.	-0.0082	-0.0320	-0.0750	-0.0487	0.5497	0.1749	0.0009	0.0324
67.	0.1261	-0.0140	-0.0389	-0.0049	-0.0450	-0.0136	-0.0366	0.0520
69.	-0.1116	-0.0502	0.1814	-0.0077	0.0295	-0.0987	-0.0185	0.0345
71.	-0.0026	0.0659	-0.0692	-0.0214	0.2757	0.0549	-0.0343	-0.0028



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 2425; LUMBER

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 7 R



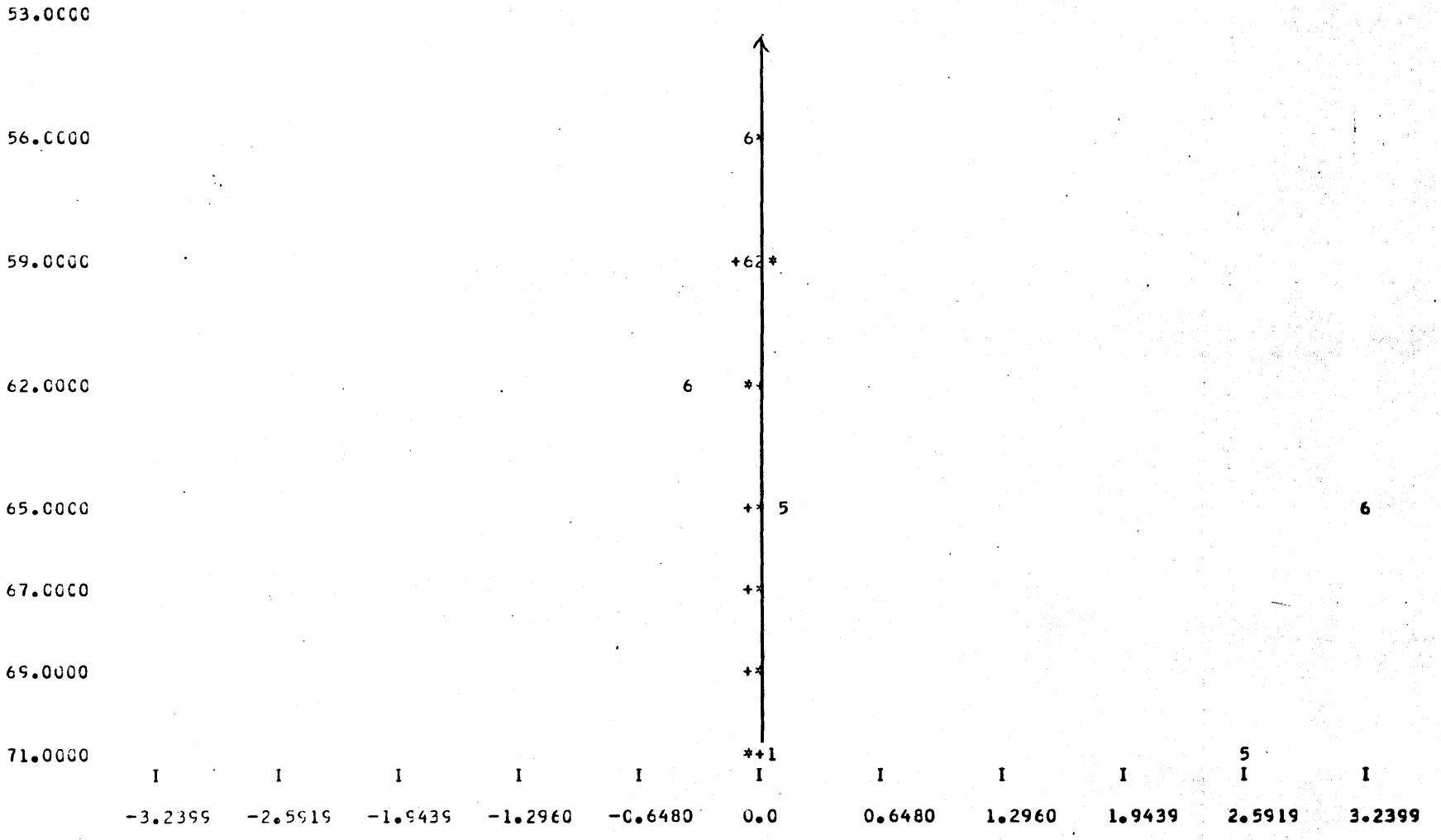
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 2425; LUMBER

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 2727; PRINTING

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0027	0.0033	-0.0039	-0.0237	-0.0225	-0.0039	0.0067	0.0126
59.	0.0116	0.0013	-0.0572	0.0141	0.0071	0.0511	-0.0667	0.0785
62.	-0.0010	0.0351	-0.0234	-0.0225	0.0081	0.0136	0.0630	-0.0448
65.	-0.0162	-0.0036	0.0314	-0.0137	-0.0649	0.0232	-0.0136	0.0324
67.	0.0049	0.0227	-0.0157	0.0225	0.0838	-0.0019	-0.0134	0.0520
69.	-0.0138	0.0555	-0.0034	-0.0351	-0.0068	0.0161	-0.0169	0.0345
71.	-0.0990	-0.0148	0.0236	-0.0330	0.0044	0.0460	0.0001	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0026	-0.0310	0.0071	-0.0233	-0.0036	-0.0065	0.0067	0.0126
59.	-0.0050	0.0086	-0.0117	-0.0064	-0.0047	-0.0052	-0.0667	0.0785
62.	-0.0227	0.0008	0.0070	-0.0016	-0.3292	-0.3307	0.0630	-0.0448
65.	-0.0148	-0.0063	-0.0061	-0.0307	0.1770	3.2399	-0.0136	0.0324
67.	0.0014	-0.0031	-0.0078	0.0010	0.0642	-0.0131	-0.0134	0.0520
69.	-0.0220	-0.0320	-0.0281	-0.0210	-0.0286	-0.0427	-0.0169	0.0345
71.	0.0782	0.0010	0.0011	-0.0022	2.6027	0.0043	0.0001	-0.0028

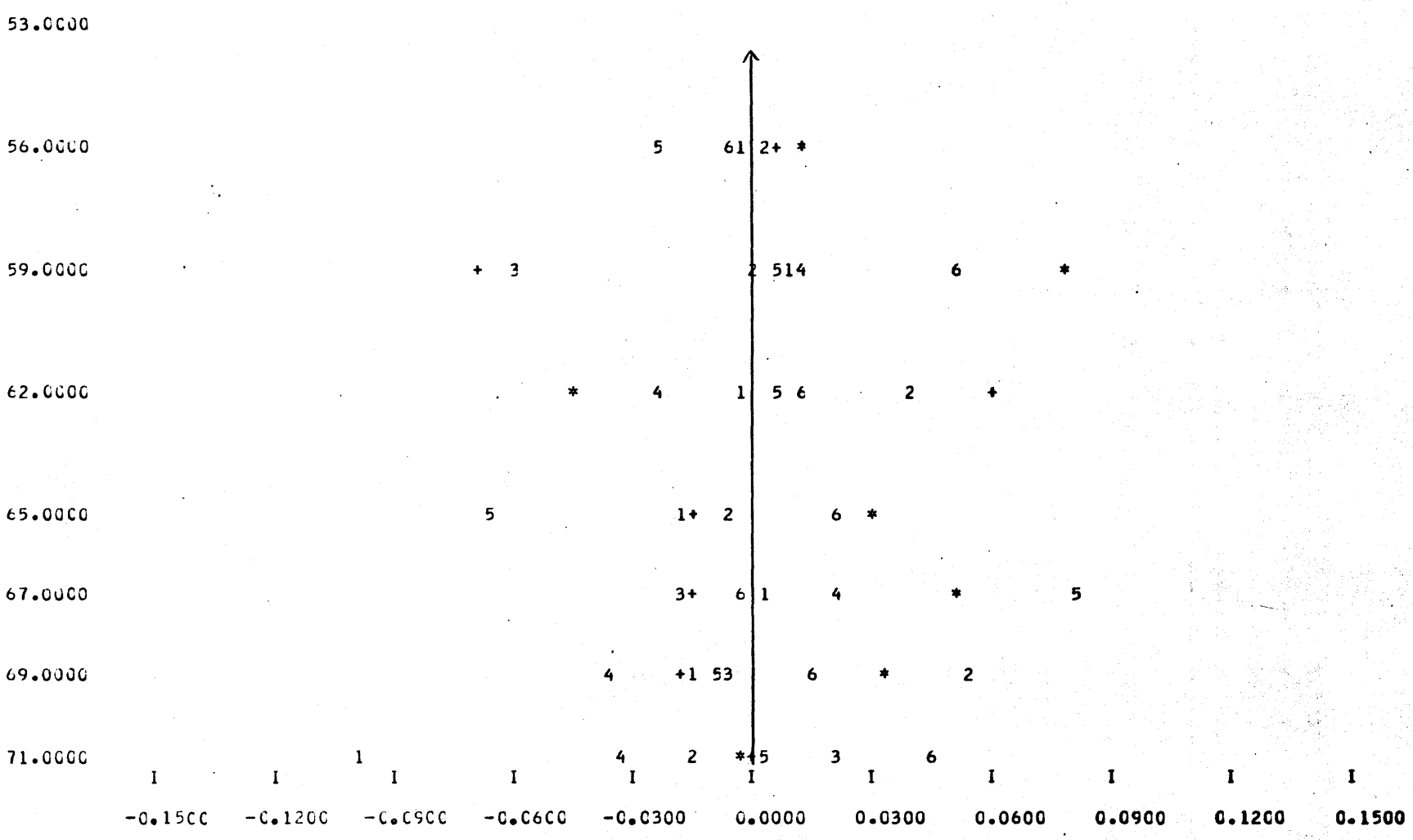
CHART 8 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 2727; PRINTING

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 8 R



REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 2727; PRINTING

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

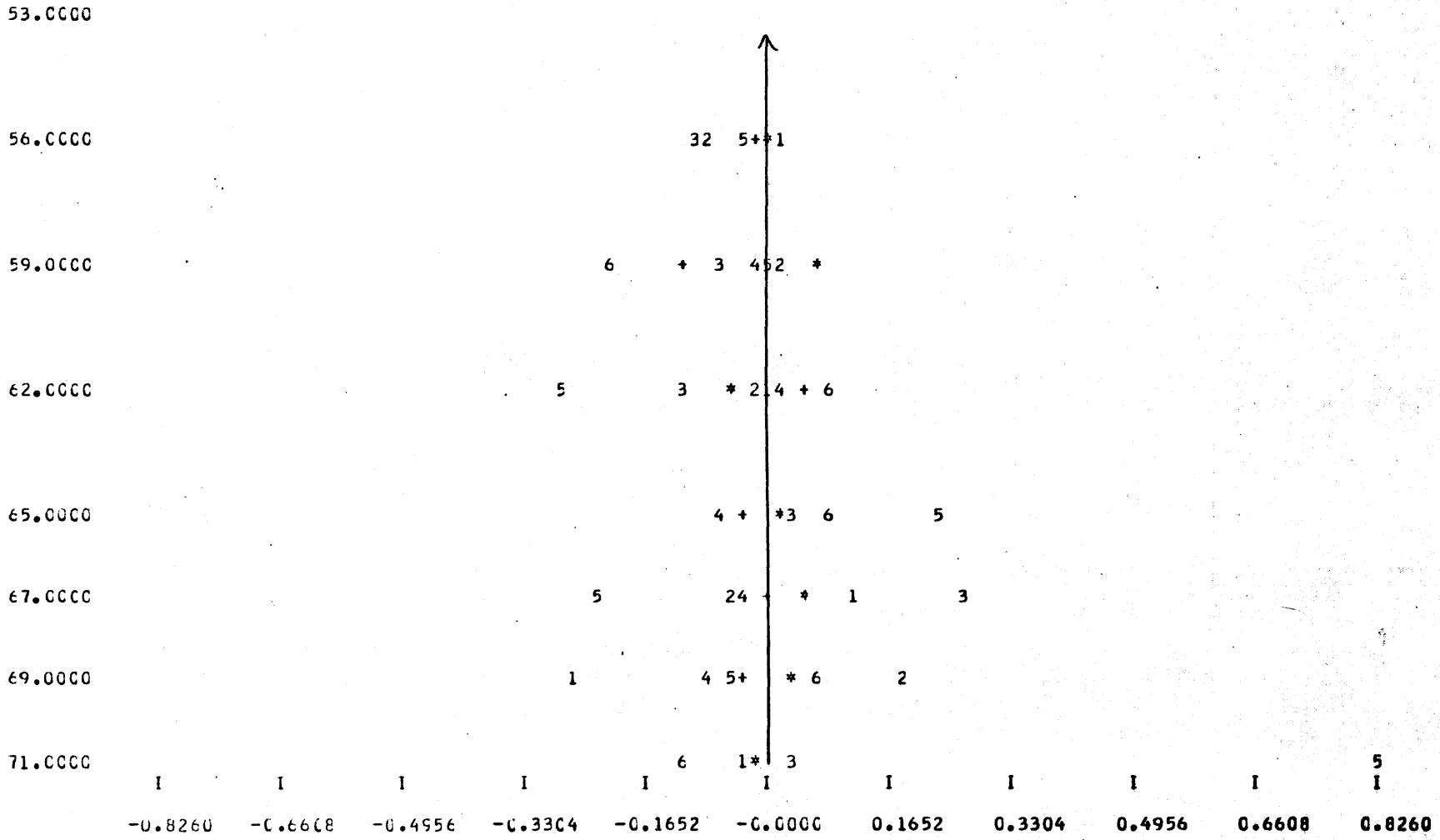
(2)

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 2828; CHEMICALS

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0337	-0.1287	0.0414	-0.0011	-0.0066	0.0197	-0.0039	0.0126
59.	-0.0044	-0.0088	-0.0017	0.0331	0.0423	0.1325	-0.1053	0.0785
62.	-0.0188	-0.0216	-0.0594	0.0252	-0.0087	-0.0064	0.0628	-0.0448
65.	0.0494	-0.0668	-0.0434	-0.0252	-0.1594	0.0226	-0.0310	0.0324
67.	-0.1683	0.0685	-0.2950	-0.0314	0.2681	-0.1009	0.0071	0.0520
69.	0.1667	0.2149	0.1092	-0.0059	-0.0292	-0.0122	-0.0271	0.0345
71.	0.0069	-0.0203	-0.0793	-0.0062	0.0079	0.0632	-0.0125	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0217	-0.0709	-0.0978	-0.0108	-0.0286	-0.0119	-0.0039	0.0126
59.	-0.0061	0.0192	-0.0664	-0.0143	0.0102	-0.2058	-0.1053	0.0785
62.	0.0013	-0.0159	-0.1154	0.0223	-0.2696	0.0886	0.0628	-0.0448
65.	-0.0296	-0.0312	0.0395	-0.0624	0.2353	0.0844	-0.0310	0.0324
67.	0.1316	-0.0418	0.2729	-0.0186	-0.2253	0.0614	0.0071	0.0520
69.	-0.2636	0.1901	-0.0469	-0.0818	-0.0430	0.0767	-0.0271	0.0345
71.	-0.0224	0.0355	0.0485	-0.0029	0.8260	-0.1138	-0.0125	-0.0028

CHART 9 S

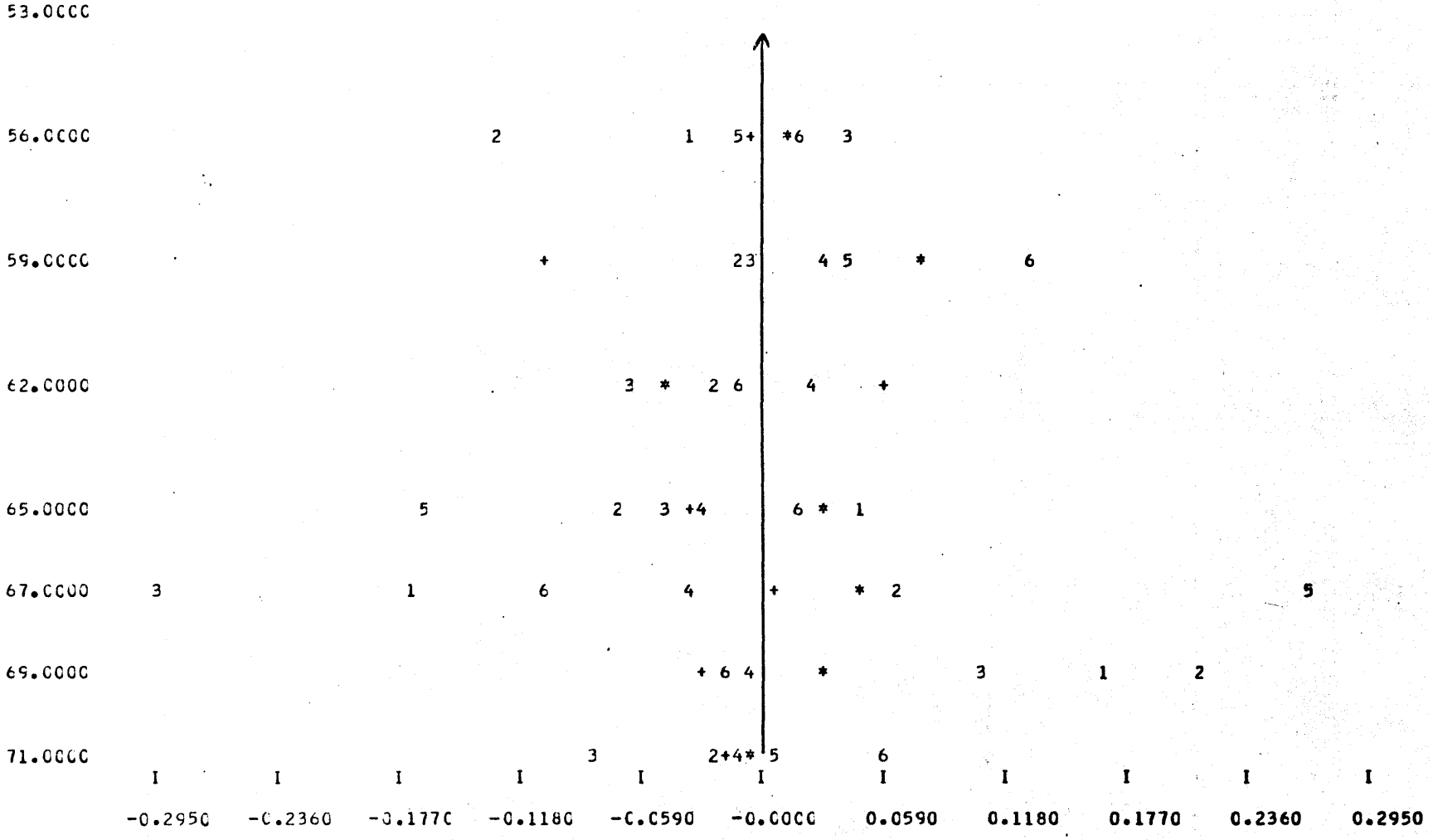
122



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 2828; CHEMICALS

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 9 R



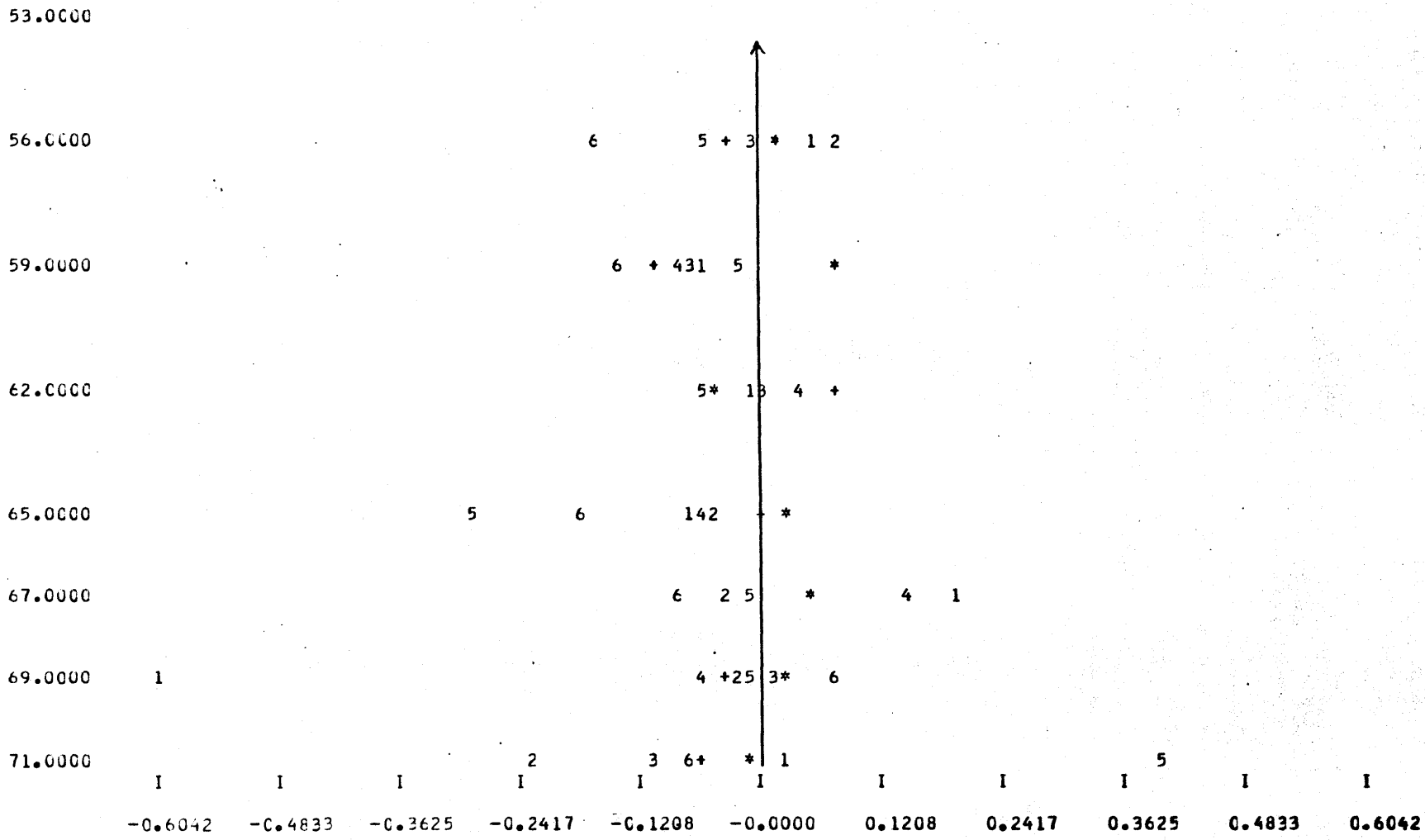
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 2828; CHEMICALS

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 3536: MACHINERY

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0562	-0.0223	-0.1975	-0.0138	-0.0021	-0.0690	-0.0252	0.0126
59.	0.1007	-0.0399	-0.0608	0.0140	-0.0547	0.6379	-0.0994	0.0785
62.	-0.0328	0.1527	-0.0578	-0.0472	-0.1976	0.2748	0.0791	-0.0448
65.	0.0422	-0.0275	0.2283	-0.0083	0.3115	-0.0156	0.0055	0.0324
67.	-0.2947	0.0465	-0.0667	-0.1868	-0.0296	-0.0023	0.0539	0.0520
69.	0.6221	0.0699	-0.0652	0.0068	0.0030	0.0524	-0.0287	0.0345
71.	-0.0291	0.3557	0.0819	0.0442	0.0255	-0.0638	-0.0600	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0583	0.0733	-0.0108	0.0161	-0.0554	-0.1656	-0.0252	0.0126
59.	-0.0595	-0.0159	-0.0701	-0.0788	-0.0153	-0.1362	-0.0994	0.0785
62.	-0.0119	0.0103	0.0036	0.0453	-0.0495	0.0	0.0791	-0.0448
65.	-0.0665	-0.0444	0.0055	-0.0504	-0.2789	-0.1783	0.0055	0.0324
67.	0.2051	-0.0336	-0.0751	0.1523	-0.0078	-0.0770	0.0539	0.0520
69.	-0.6042	-0.0175	0.0233	-0.0523	-0.0052	0.0768	-0.0287	0.0345
71.	0.0356	-0.2215	-0.1001	-0.0523	0.4051	-0.0643	-0.0600	-0.0028

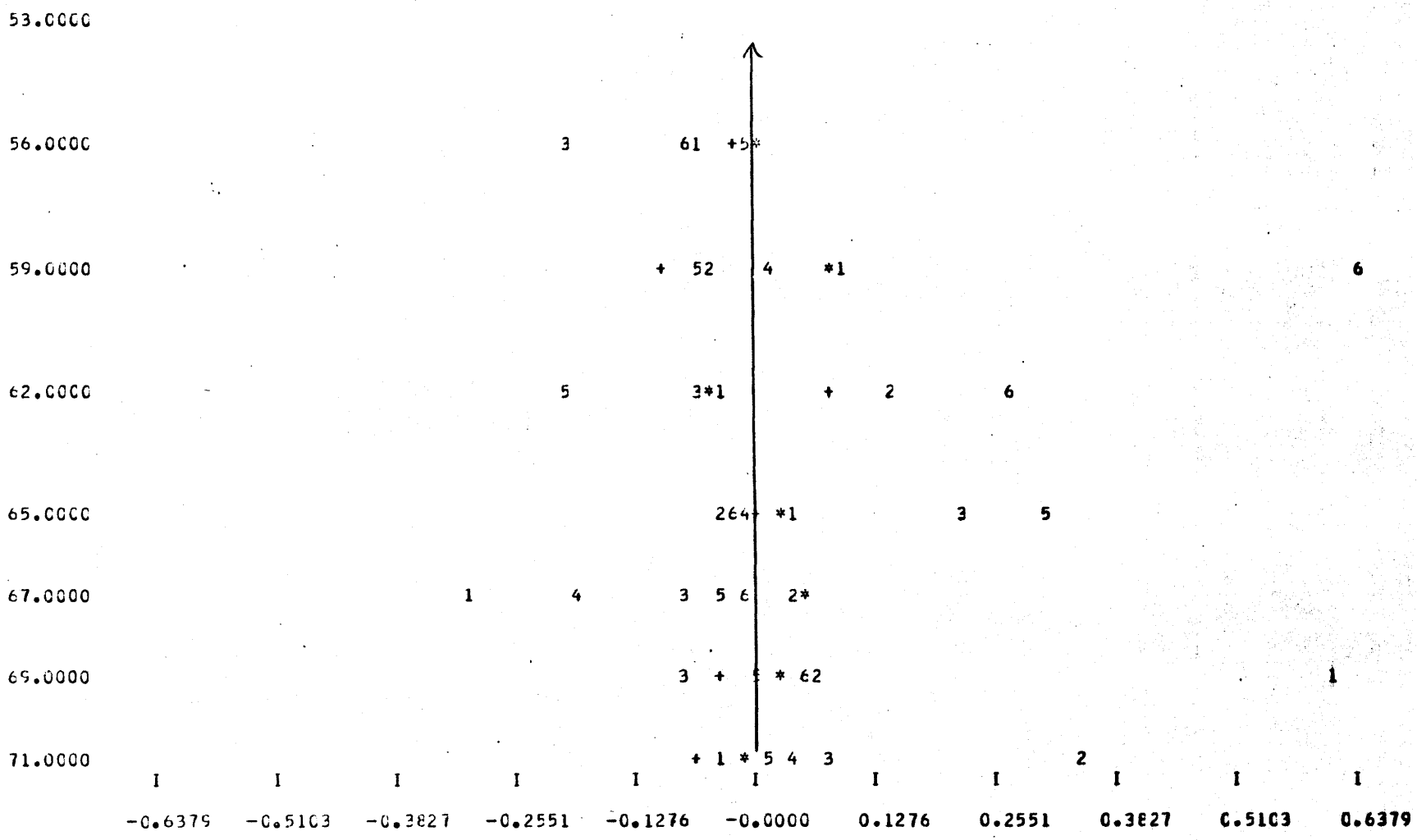
CHART 10 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 3536; MACHINERY

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 10 R



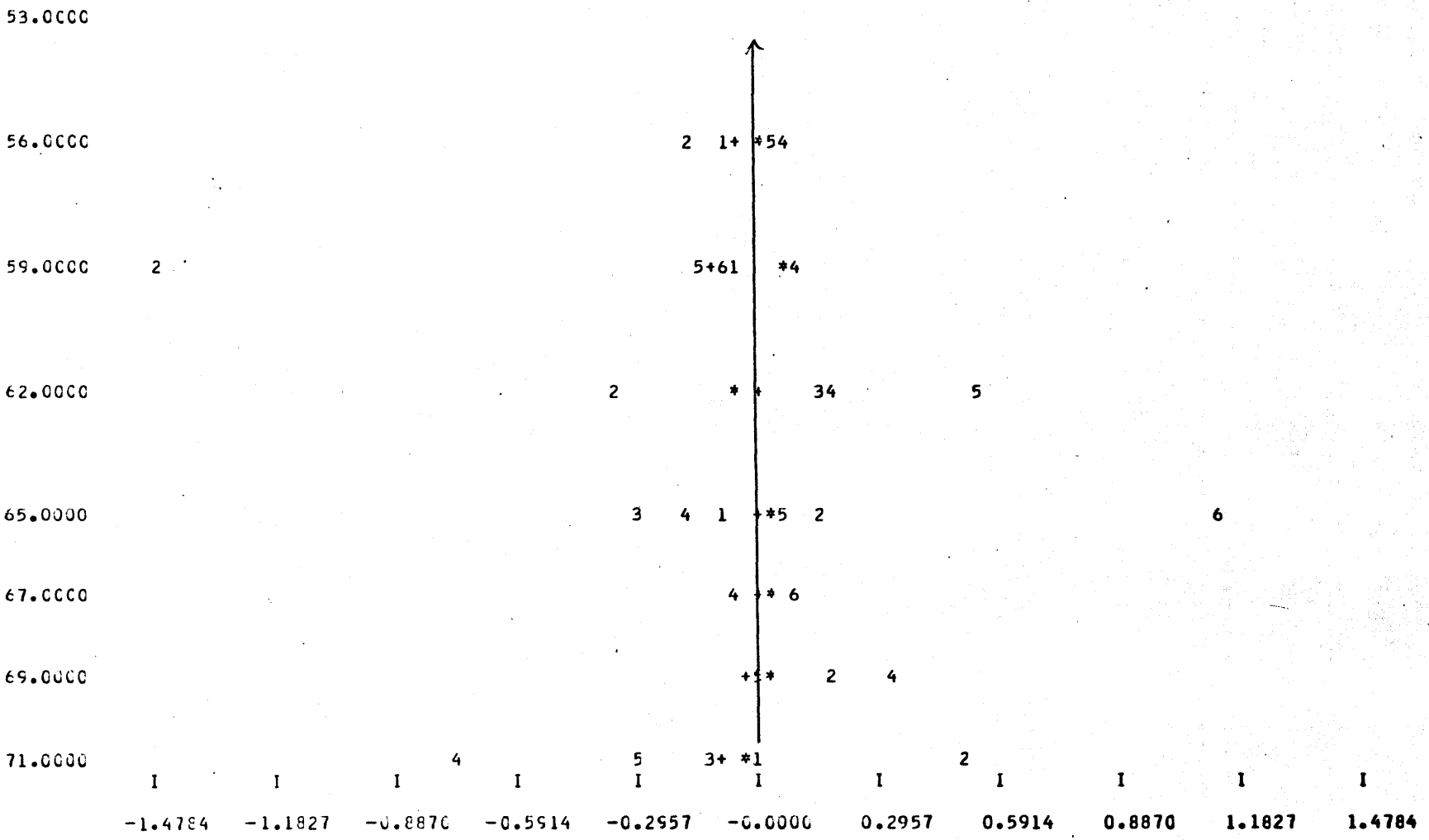
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 3536; MACHINERY

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

/27 REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 3737; TRANS EQUIP

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0329	0.4120	-0.0243	-0.1227	-0.0073	0.1020	-0.0410	0.0126
59.	0.0141	1.3027	-0.0751	0.0616	0.1180	-0.1068	-0.1047	0.0785
62.	-0.1950	0.6409	-0.1254	0.0913	0.0108	0.0	0.0236	-0.0448
65.	0.1895	-0.2352	1.6471	-0.0654	0.1010	0.0707	0.0037	0.0324
67.	-0.0036	-0.0439	-0.0897	0.0132	0.0242	-0.0750	0.0196	0.0520
69.	-0.0764	-0.2908	-0.1268	-0.3800	-0.0248	-0.5055	-0.0173	0.0345
71.	0.0061	0.0423	0.1391	0.6835	0.0054	17.0797	-0.0869	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0663	-0.1657	-0.0441	0.0749	0.0468	0.0	-0.0410	0.0126
59.	-0.0393	-1.4784	-0.0822	0.0936	-0.1223	-0.0697	-0.1047	0.0785
62.	0.1612	-0.3435	0.1587	0.1780	0.5559	0.0	0.0236	-0.0448
65.	-0.0718	0.1561	-0.2713	-0.1554	0.0692	1.1383	0.0037	0.0324
67.	0.0343	0.0549	-0.0483	-0.0578	0.0262	0.1065	0.0196	0.0520
69.	0.0359	0.1974	0.0	0.3505	0.0010	0.0	-0.0173	0.0345
71.	0.0110	0.5048	-0.1172	-0.7109	-0.2751	0.0	-0.0869	-0.0028

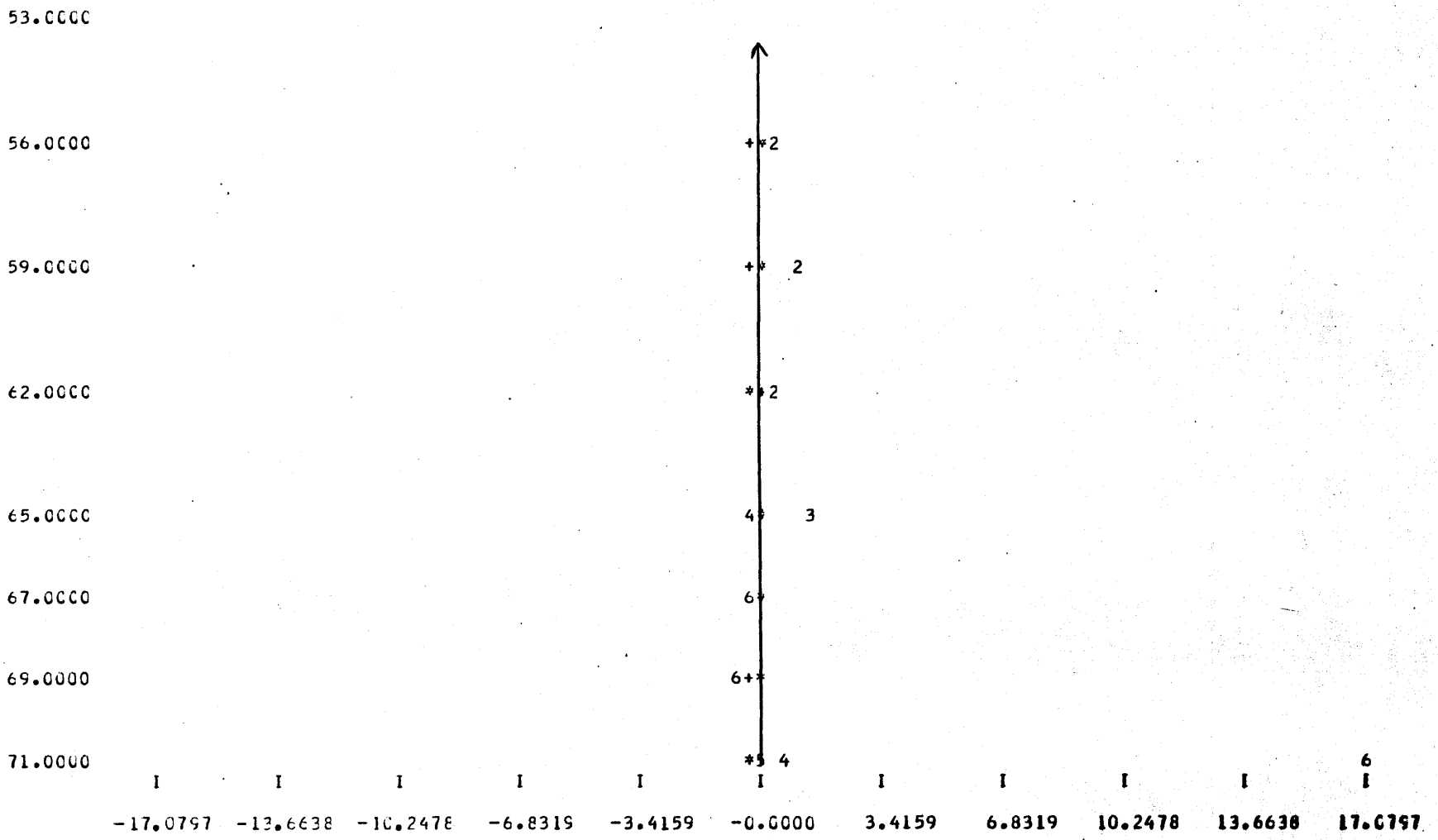
CHART 11 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 3737; TRANS EQUIP

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 11 R



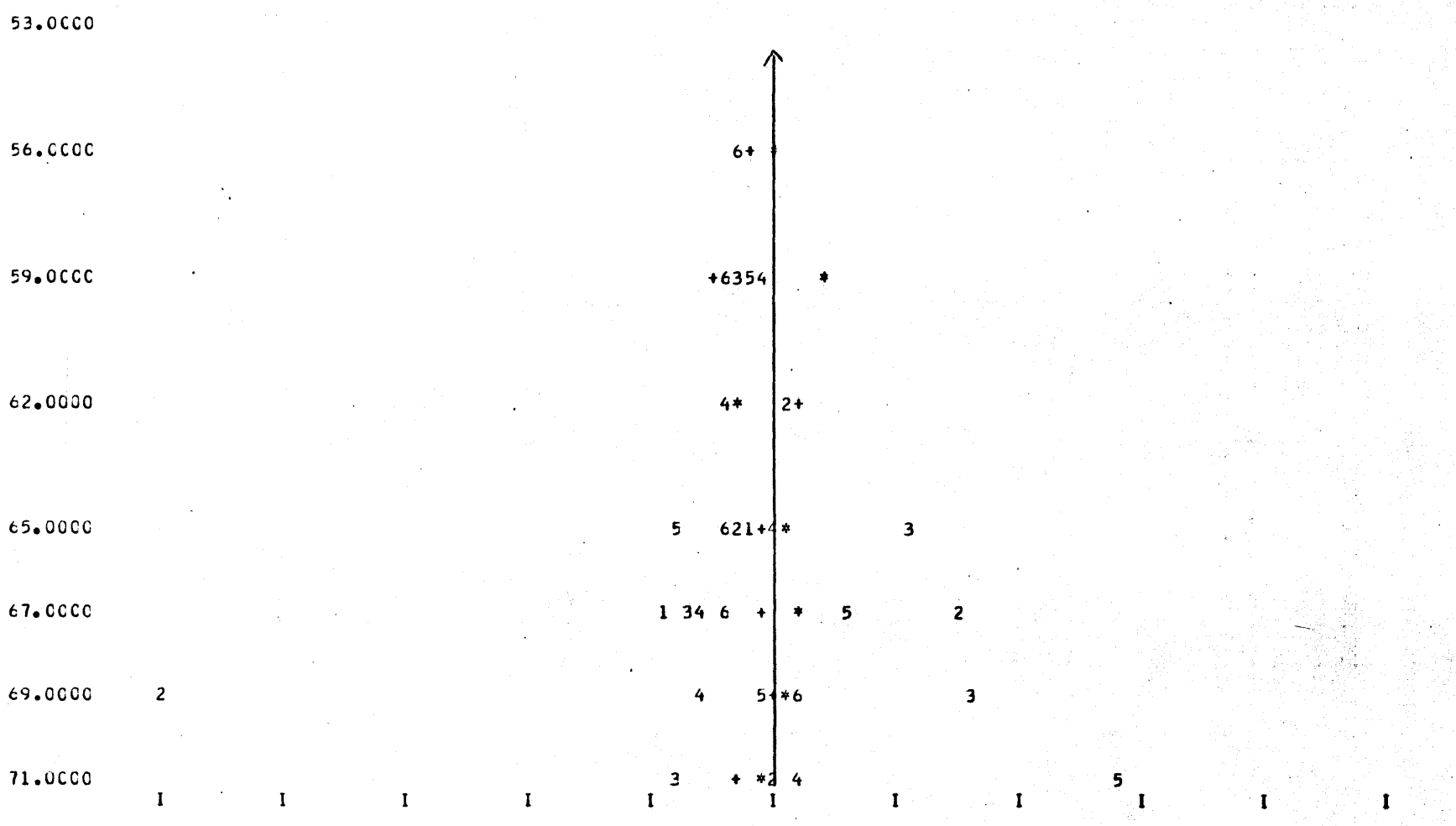
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 3737; TRANS EQUIP

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

130 REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 3919; OTHER MFG

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	C.C	C.C	C.C	C.C	0.0	0.0	0.0	0.0
56.	0.0	0.0600	-C.C160	-C.C211	-C.0248	C.1751	-C.C189	0.0126
59.	-0.0030	C.0478	-0.CC69	-0.0202	-0.0534	C.0007	-C.0783	0.0785
62.	C.C	C.0046	C.C649	0.C284	C.0381	C.C	0.0391	-0.0448
65.	0.0029	-0.0175	-C.C519	-C.C452	-0.0209	C.C858	-0.0040	0.0324
67.	0.1439	-C.2274	C.C779	C.C716	-0.0532	0.0752	-0.0048	0.0520
69.	C.0	0.9295	-C.C1C3	C.C287	-C.0037	-C.CC92	0.0023	0.0345
71.	-C.0709	-C.0110	-C.C466	-0.C689	-0.0337	-C.0490	-0.0398	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	C.0	0.0	C.C	0.0	0.0	C.C	0.0	0.0
56.	0.0	-0.0227	-C.C233	-C.C344	-C.0247	-C.0473	-0.0189	0.0126
59.	-0.0359	-C.0882	-C.C441	-C.C144	-0.0204	-C.C673	-0.0783	0.0785
62.	0.0	0.0302	-C.C676	-C.C540	C.0	0.0	0.0391	-0.0448
65.	-0.0237	-C.0468	0.2043	C.CC64	-C.1248	-C.0535	-0.0040	0.0324
67.	-0.1519	C.2693	-C.1203	-C.C941	C.1237	-0.0566	-0.0048	0.0520
69.	0.0	-C.8868	C.2850	-C.C88E	-0.0041	0.0525	0.0023	0.0345
71.	0.0356	C.CC37	-C.1349	C.0404	0.5141	-0.0079	-0.0398	-0.0028

CHART 12 S



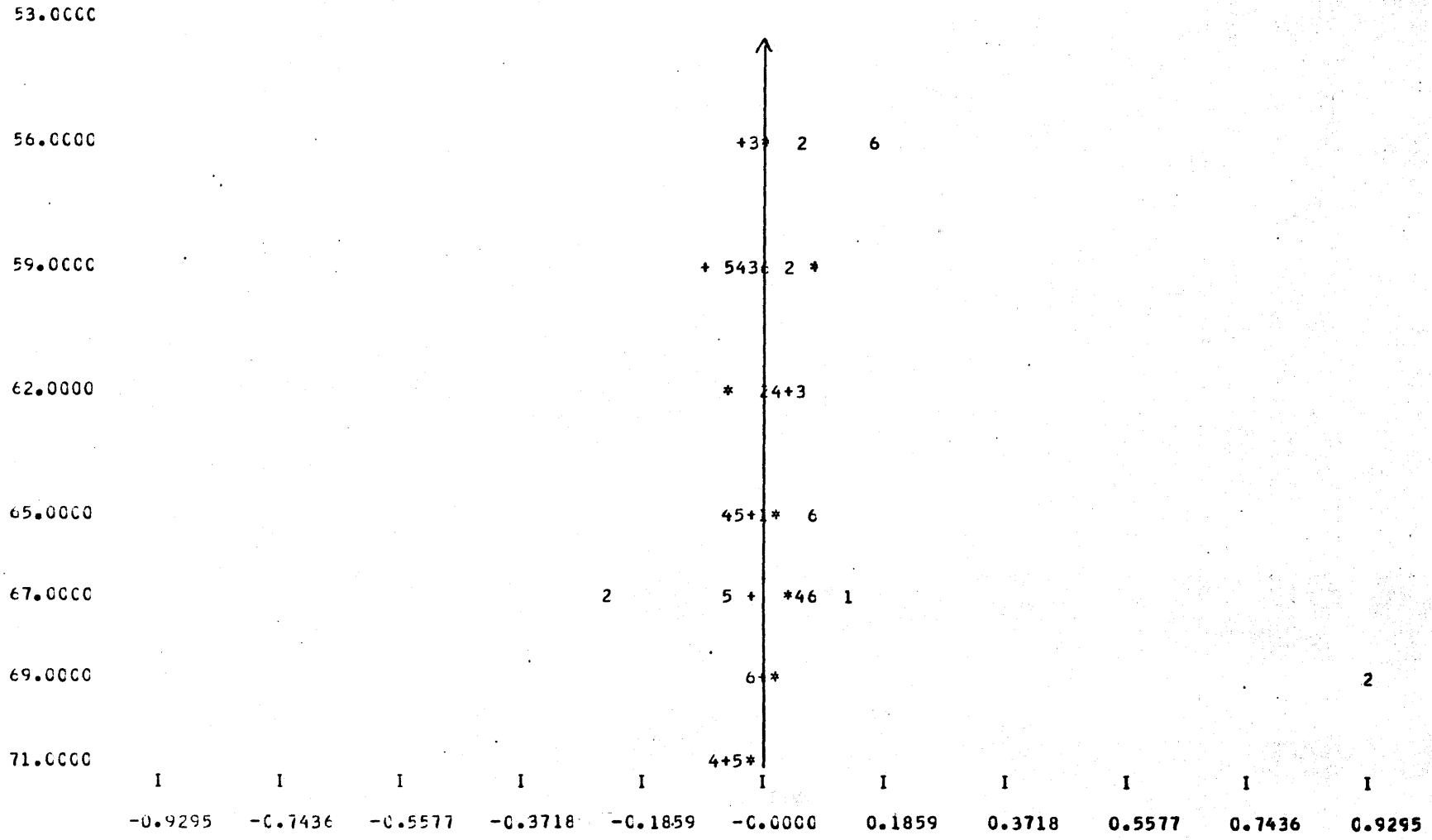
SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 3919; OTHER MFG

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

A337

CHART 12 R

132



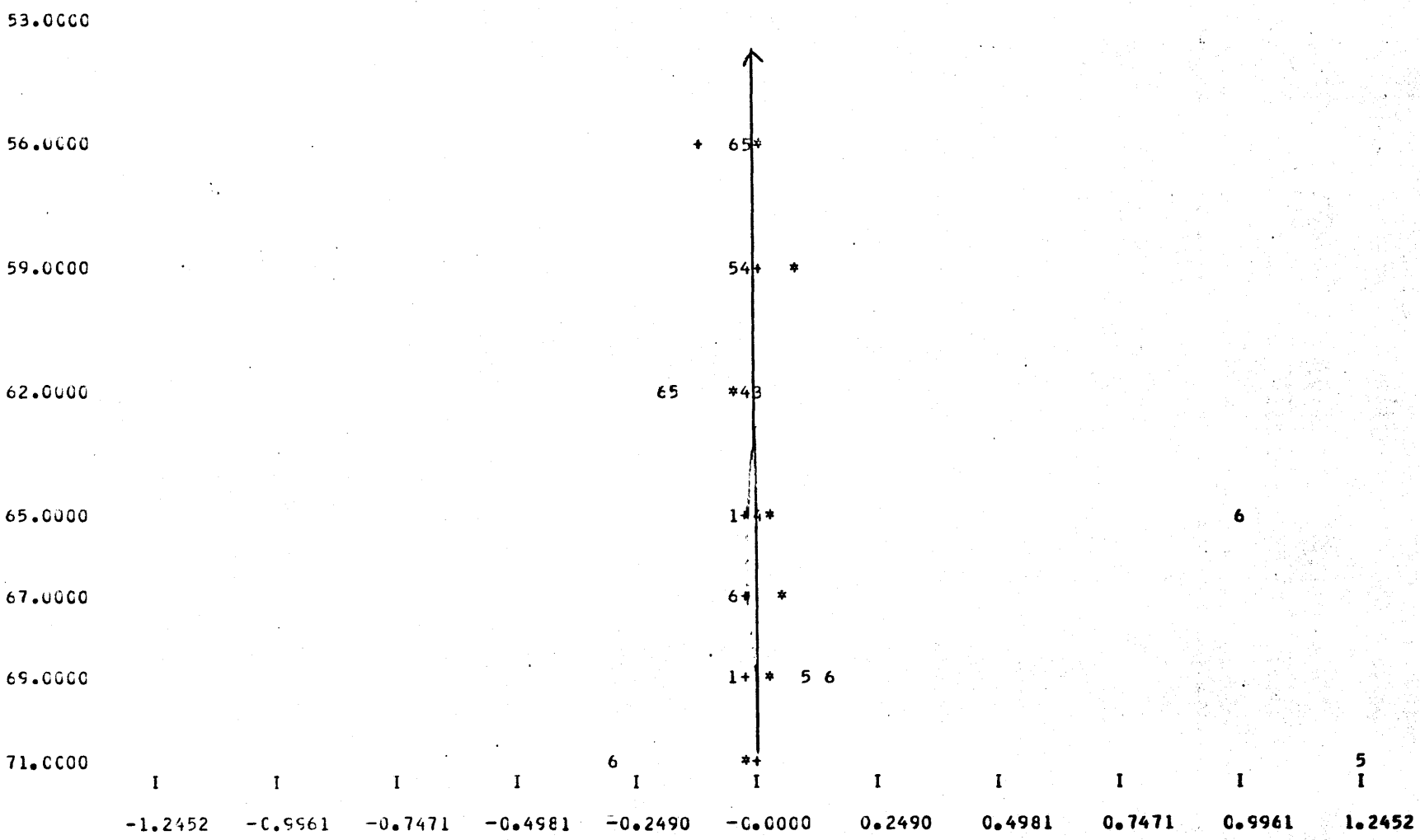
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 3919; OTHER MFG

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 4049; UTILITIES

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0197	0.0226	0.0407	0.0337	-0.0203	0.0306	-0.1177	0.0126
59.	-0.0215	-0.0125	-0.0609	-0.0666	0.0421	0.0398	0.0237	0.0785
62.	0.0075	0.0296	0.0672	-0.0055	-0.0430	0.0030	-0.0256	-0.0448
65.	-0.0346	-0.0117	-0.0076	0.0181	-0.0026	0.0311	-0.0094	0.0324
67.	-0.0212	0.0278	0.0260	-0.0115	0.0051	0.0520	-0.0043	0.0520
69.	0.0159	-0.0030	-0.0585	-0.0206	0.0280	-0.1801	-0.0093	0.0345
71.	-0.0273	0.0140	-0.0089	-0.0374	-0.0451	0.2658	0.0163	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0072	0.0005	-0.0047	-0.0228	-0.0139	-0.0306	-0.1177	0.0126
59.	-0.0040	0.0046	-0.0109	-0.0023	-0.0254	0.0013	0.0237	0.0785
62.	-0.0080	-0.0046	0.0069	-0.0098	-0.1733	-0.1972	-0.0256	-0.0448
65.	-0.0294	-0.0020	-0.0087	0.0043	0.0279	1.0165	-0.0094	0.0324
67.	-0.0103	-0.0017	-0.0008	-0.0159	-0.0343	-0.0464	-0.0043	0.0520
69.	-0.0421	-0.0166	-0.0116	-0.0045	0.1147	0.1639	-0.0093	0.0345
71.	0.0005	-0.0023	-0.0128	-0.0154	1.2452	-0.2879	0.0163	-0.0028

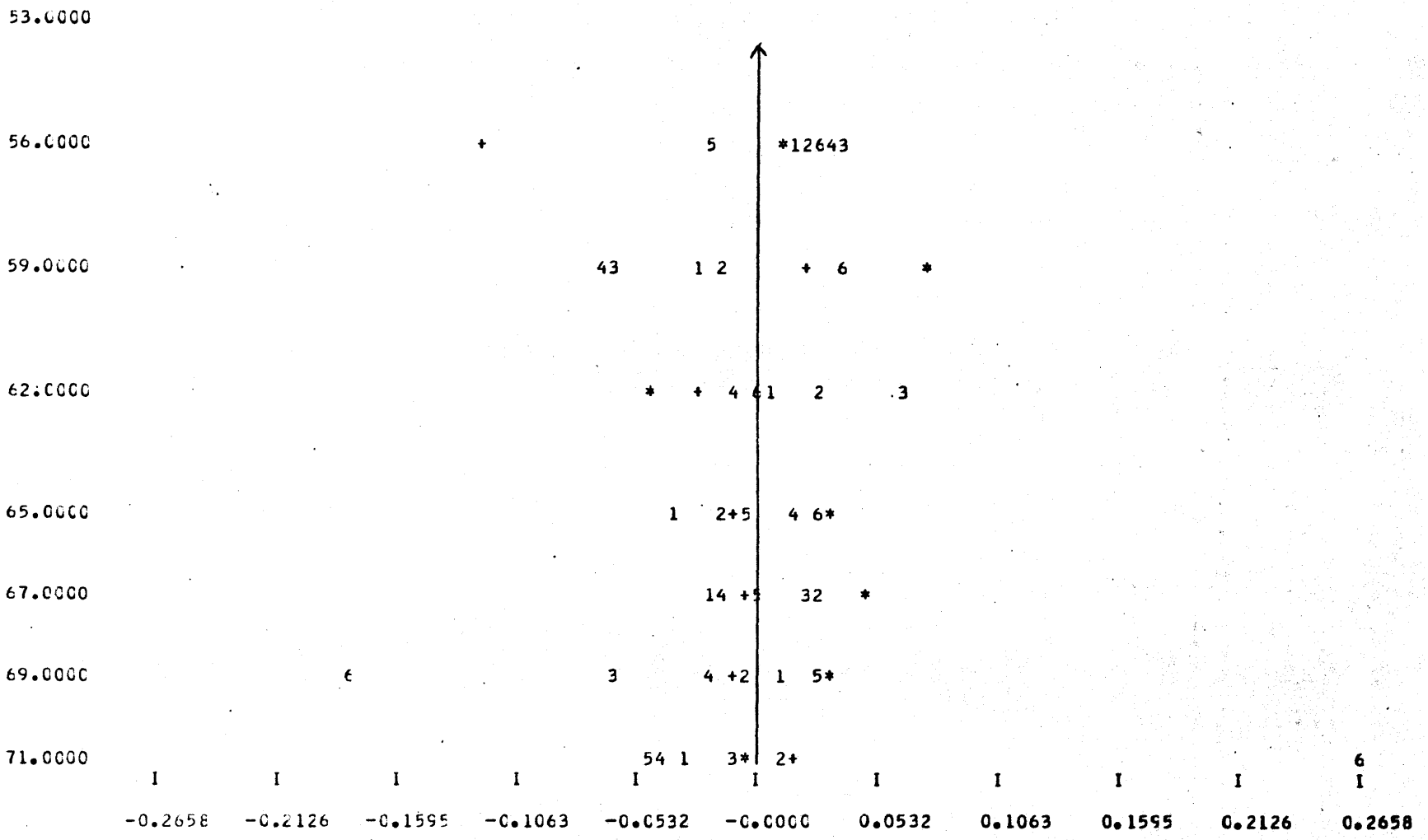
CHART 13 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 4049: UTILITIES

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 13 R



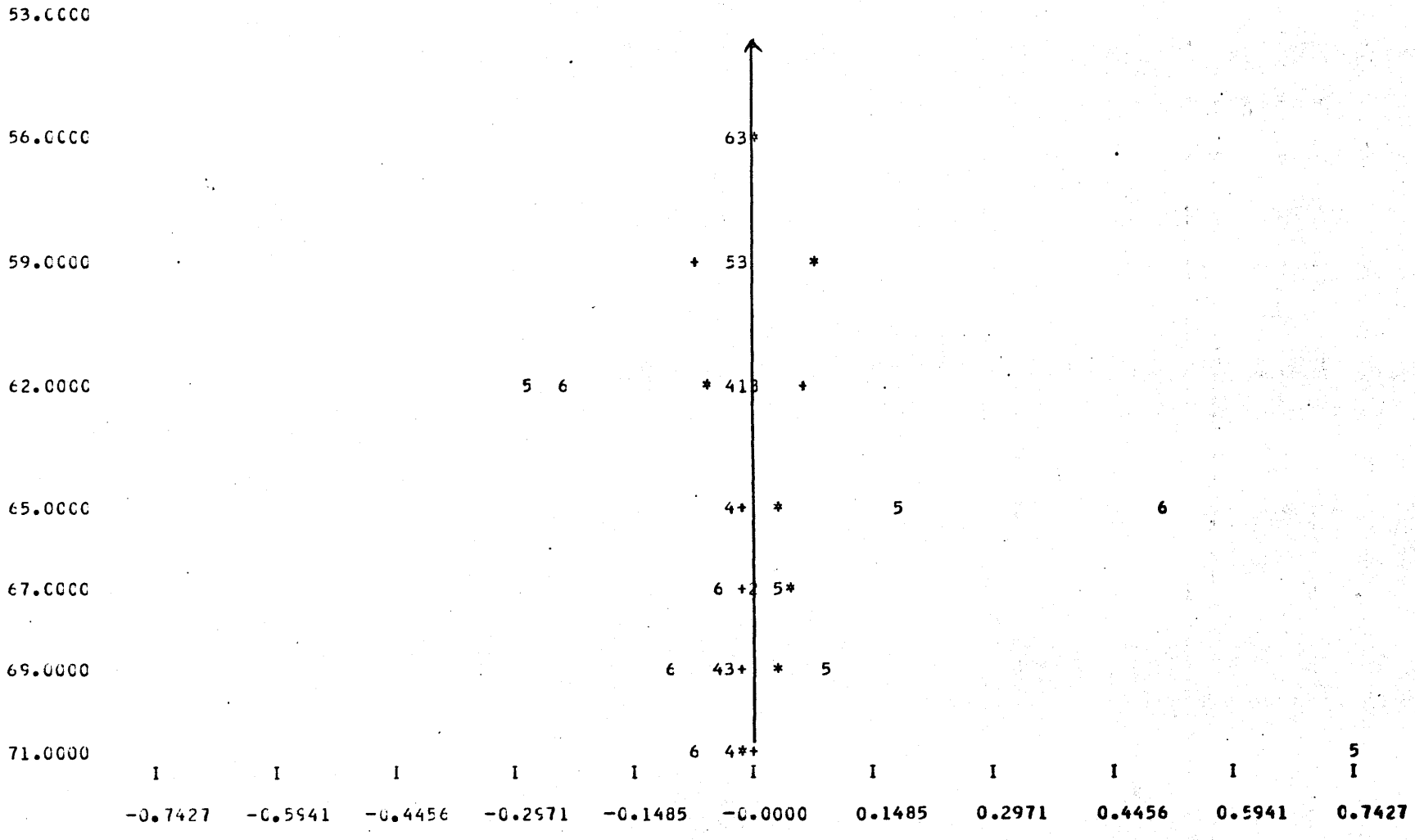
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 4049; UTILITIES

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 5050; WHOLESALE

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	C.C	C.0	C.0	0.C	0.0	C.C	0.0	0.0
56.	0.0023	C.CC6C	0.C363	-C.C139	-C.0302	-C.0100	0.0121	0.0126
59.	-0.0066	0.0385	-C.C152	0.C139	-C.0179	C.0555	-0.0735	0.0785
62.	-0.C069	-0.C093	-C.C496	-0.CC99	-0.0261	0.0231	C.0607	-0.0448
65.	0.0160	C.CC42	C.C145	-C.C161	-0.0035	C.C179	-0.0123	0.0324
67.	-0.0030	-C.0020	-C.0067	-0.C109	-0.0261	C.C015	-0.0135	0.0520
69.	-0.0308	0.0339	-C.C162	C.C072	C.0105	0.0621	-0.0047	0.0345
71.	0.0123	0.C373	C.C237	-0.C190	-0.0226	-0.0162	0.0110	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	C.C	C.C	C.0	C.C	0.0	0.0
56.	-0.0149	-C.CC82	-C.C115	-C.C197	-0.0172	-0.0155	0.0121	0.0126
59.	-0.0018	-C.CC54	-C.C1CC	-C.C195	-C.0285	-C.C596	-0.0735	0.0785
62.	-0.0131	C.CC19	C.C112	-C.C252	-C.2653	-C.2307	C.0607	-0.0448
65.	-0.0258	-C.0134	-C.C229	-C.C174	0.1796	C.5111	-0.0123	0.0324
67.	0.0011	C.CC42	-C.CC32	-C.C052	0.0364	-0.0387	-0.0135	0.0520
69.	-0.0282	-C.0109	-C.C184	-C.C395	0.0920	-0.1010	-0.0047	0.0345
71.	-0.0143	-C.CC63	-C.CC65	-C.C151	C.7427	-0.C635	0.0110	-0.0028

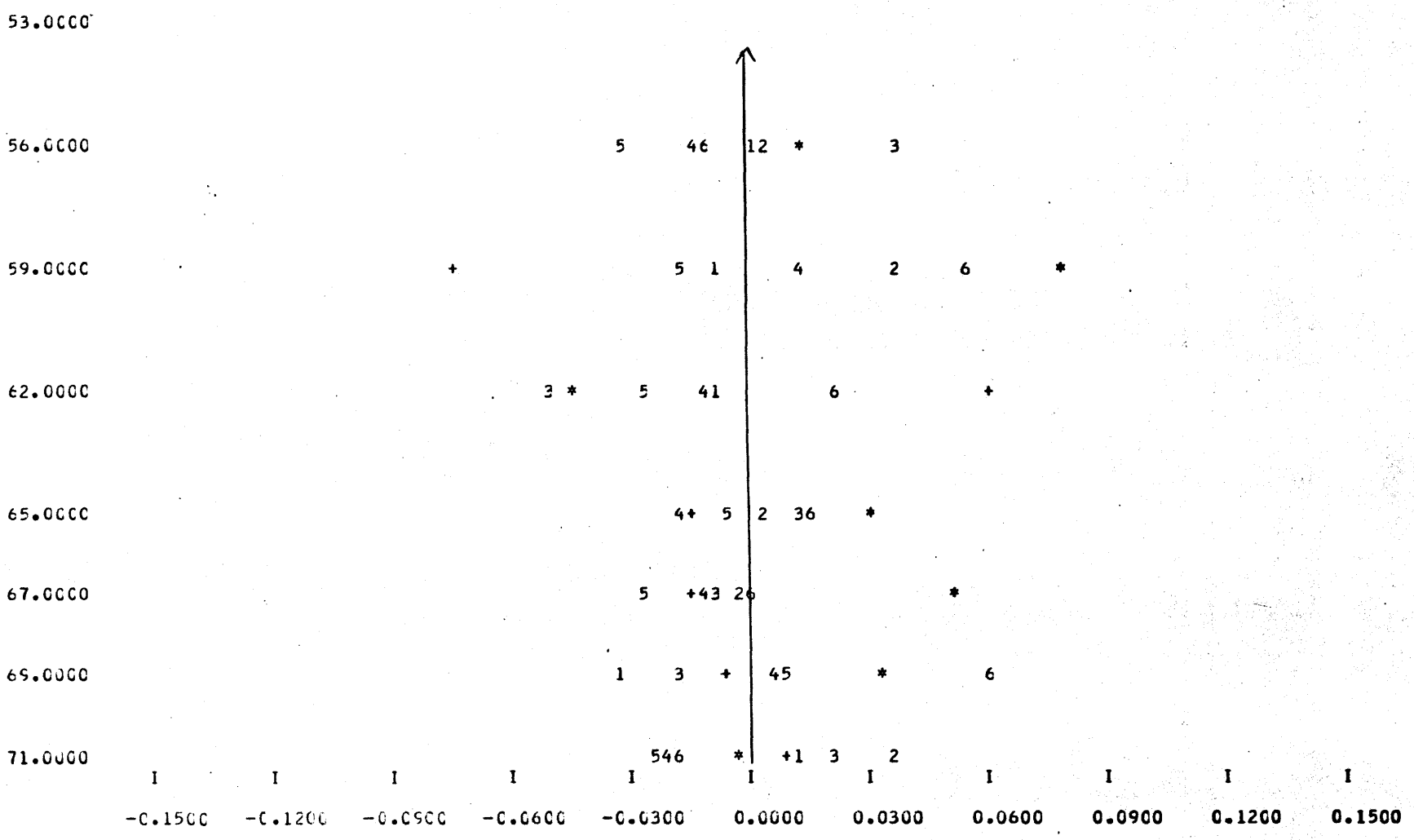
CHART 14 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 5050; WHOLESALE

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 14 R



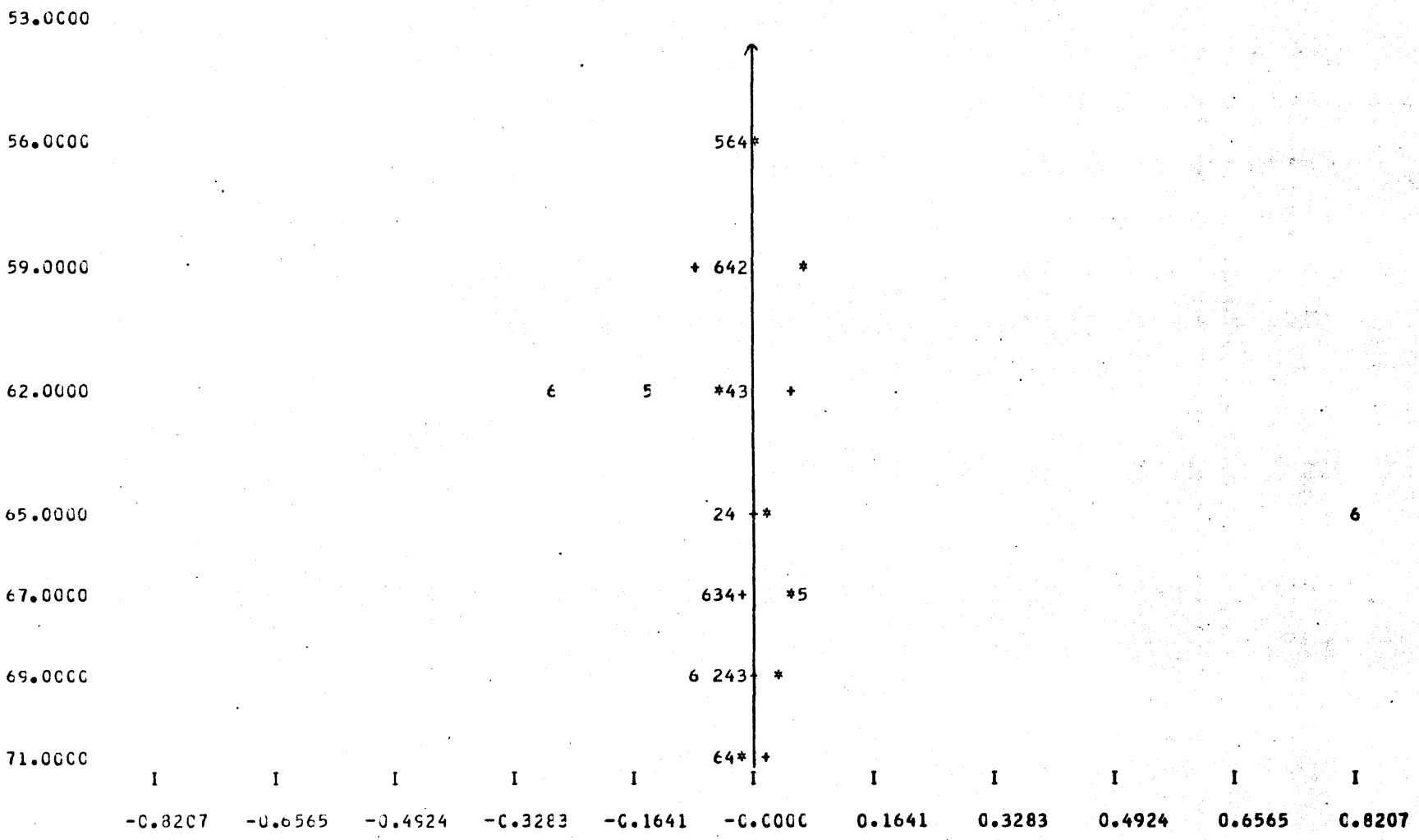
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 5050; WHOLESALE

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 5259; RETAIL

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	C.0	C.0	C.C	0.C	0.0	0.0	0.0	0.0
56.	0.0076	0.0140	-C.0004	-C.C134	-C.0422	-C.0058	C.0007	0.0126
59.	0.0061	C.0023	C.0158	C.0020	0.0053	0.0236	-0.0796	0.0785
62.	0.0051	C.0572	-C.0198	-C.0012	-0.0131	C.0140	0.0578	-0.0448
65.	-0.0129	-C.0130	C.0145	-0.0131	-0.0013	C.0223	0.0057	0.0324
67.	-0.0007	0.0164	C.0026	C.0004	C.0104	0.0212	-0.0033	0.0520
69.	-0.0070	C.0371	-C.0391	-C.0159	-0.0039	C.0163	C.0097	0.0345
71.	-0.0132	C.0061	C.0154	-C.0134	-0.0265	-0.0088	0.0212	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	C.0	C.0	C.C	C.C	0.0	0.0	0.0	0.0
56.	-0.0358	-C.0213	-C.C136	-C.C131	-0.0447	-0.0293	C.0007	0.0126
59.	-C.0129	-C.C159	-C.C208	-0.C304	-0.0398	-0.0438	-0.0796	0.0785
62.	-0.0328	-C.0140	-C.C143	-C.C304	-C.1449	-0.2640	0.0578	-0.0448
65.	-0.0355	-C.C390	-C.C278	-C.C287	0.0323	C.8207	0.0057	0.0324
67.	-0.0216	-C.0107	-C.C343	-C.C226	0.0704	-0.0618	-0.0033	0.0520
69.	-0.C254	-C.0471	-C.0085	-0.C241	C.0368	-C.C781	0.0097	0.0345
71.	-0.0173	-C.C150	-C.C084	-C.C208	-0.0427	-0.0430	0.0212	-0.0028

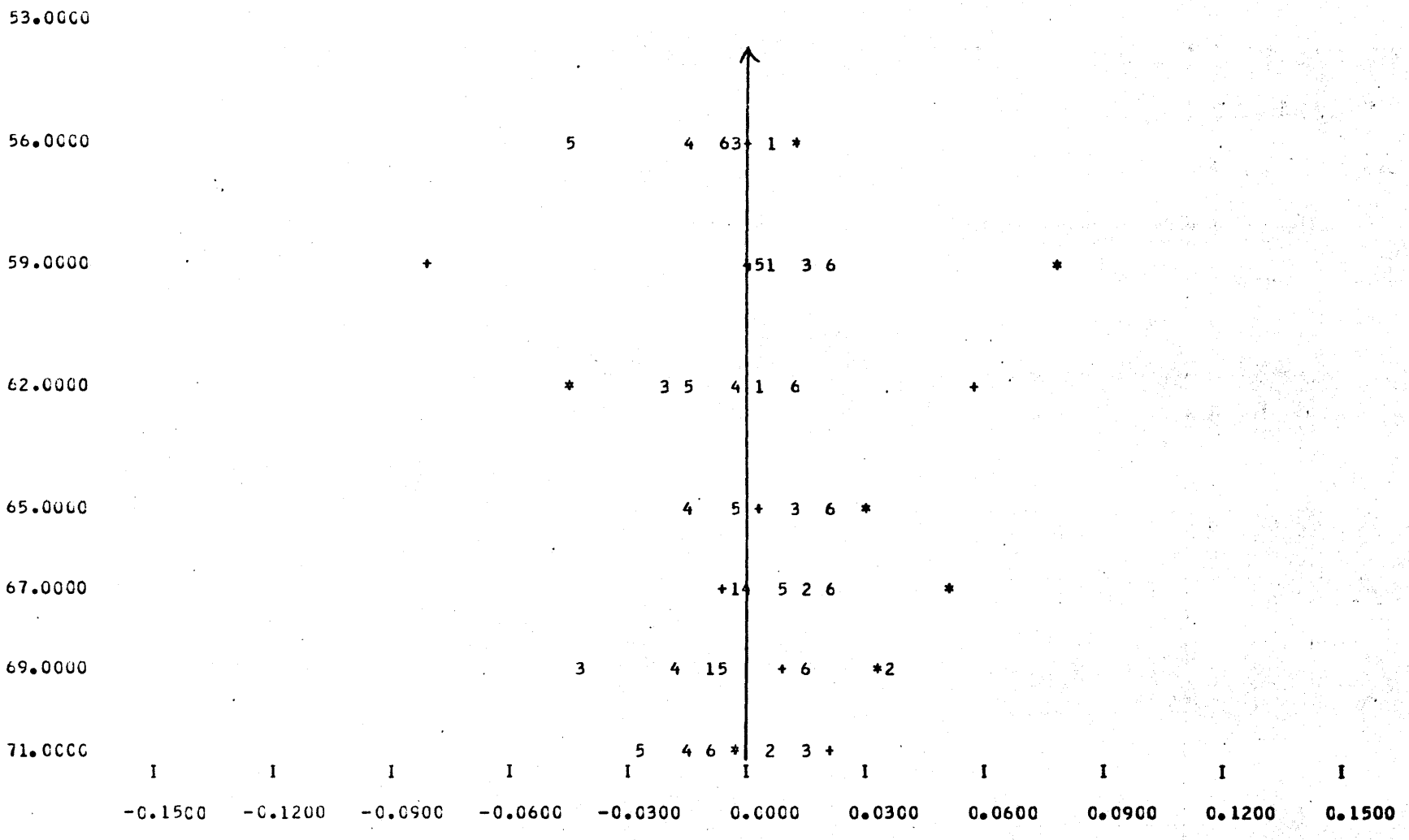
CHART 15 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 5259; RETAIL

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 15 R



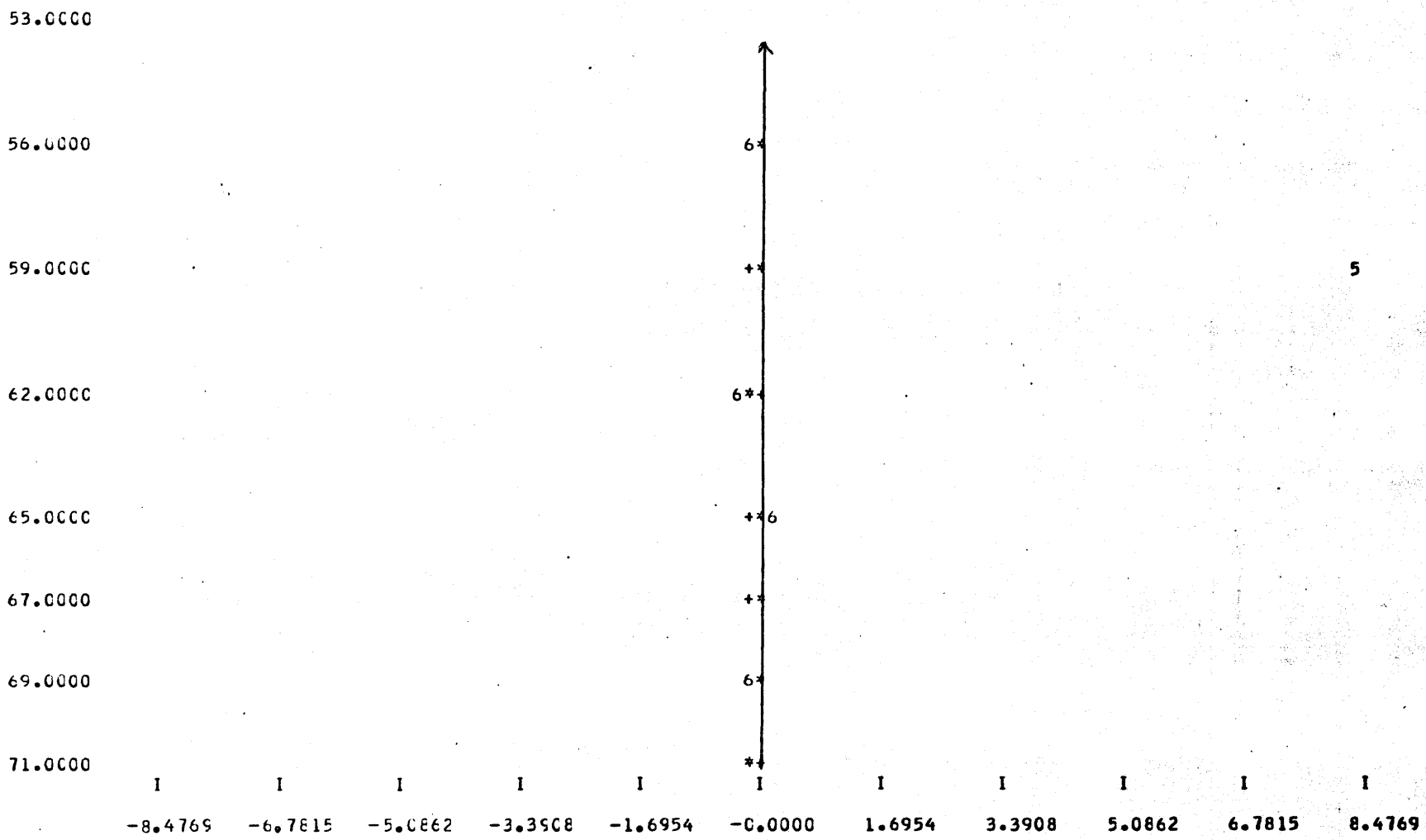
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 5259; RETAIL

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 5454; FOOD

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0052	0.0570	0.0053	0.0012	-0.2008	-0.0136	0.0112	0.0126
59.	-0.0044	-0.0700	-0.0012	-0.0162	0.4051	-0.0102	-0.1245	0.0785
62.	0.0019	0.1488	-0.0049	-0.0353	-0.0422	0.0529	0.0564	-0.0448
65.	-0.0265	-0.0115	0.0656	-0.0241	-0.0062	0.0399	-0.0007	0.0324
67.	-0.0117	-0.0427	-0.0087	0.0046	-0.0123	0.0476	-0.0119	0.0520
69.	0.0058	-0.0085	0.0398	-0.0149	0.0181	-0.0322	0.0005	0.0345
71.	-0.0227	0.0343	0.0147	-0.0264	-0.0427	-0.0192	0.0244	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0499	-0.0325	-0.0459	-0.0138	-0.1492	-0.0454	0.0112	0.0126
59.	-0.0002	-0.0406	-0.0446	-0.0128	0.4769	-0.0516	-0.1245	0.0785
62.	-0.0656	0.0042	-0.0012	-0.0701	0.0087	-0.2236	0.0564	-0.0448
65.	-0.0296	-0.0367	-0.0599	-0.0297	0.0020	0.2217	-0.0007	0.0324
67.	-0.0042	0.0244	-0.0144	-0.0274	0.0295	-0.0732	-0.0119	0.0520
69.	-0.0708	-0.0509	0.0230	-0.0355	0.0224	-0.0334	0.0005	0.0345
71.	0.0200	-0.0267	-0.0012	-0.0317	-0.1514	-0.0400	0.0244	-0.0028

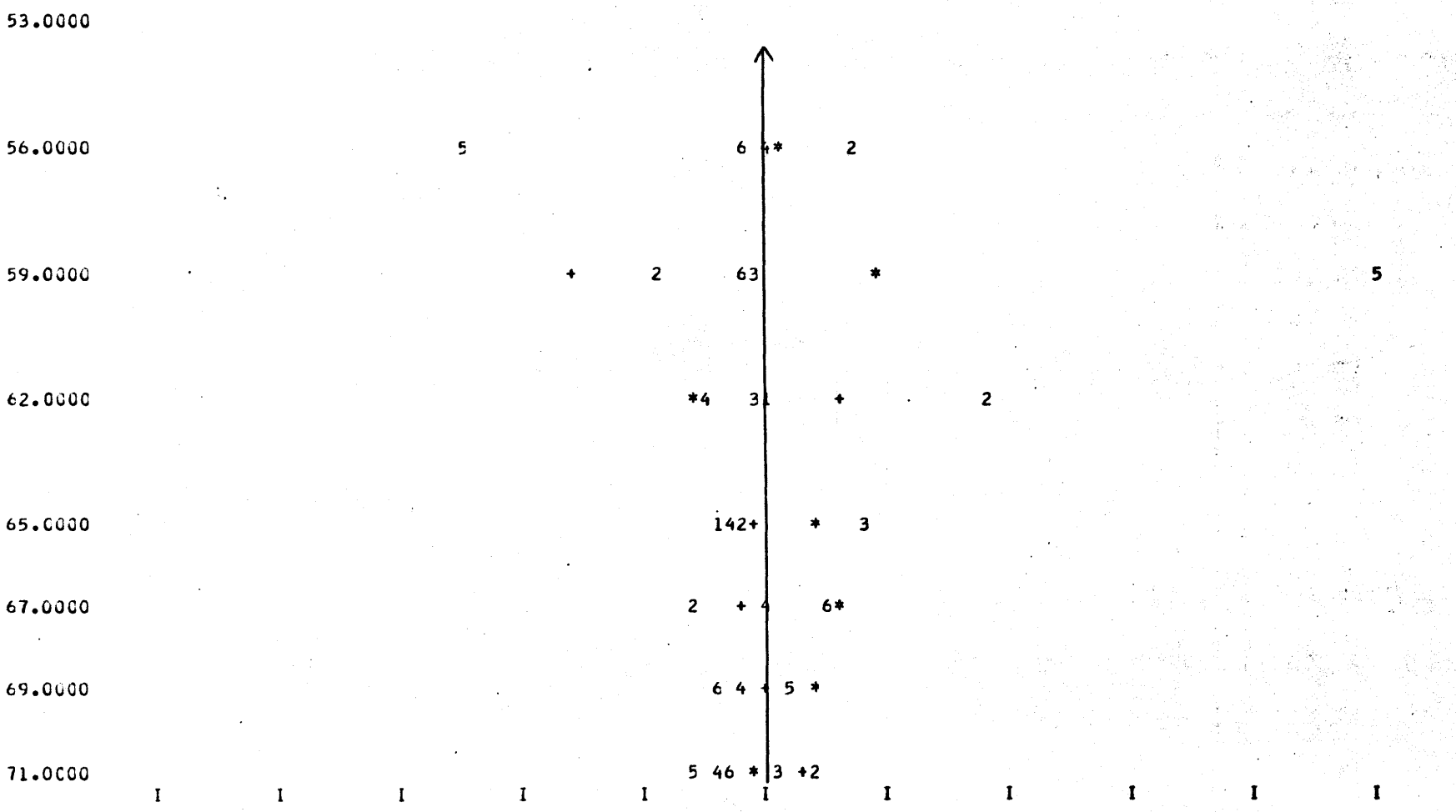
CHART 16 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 5454; FOOD

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 16 R

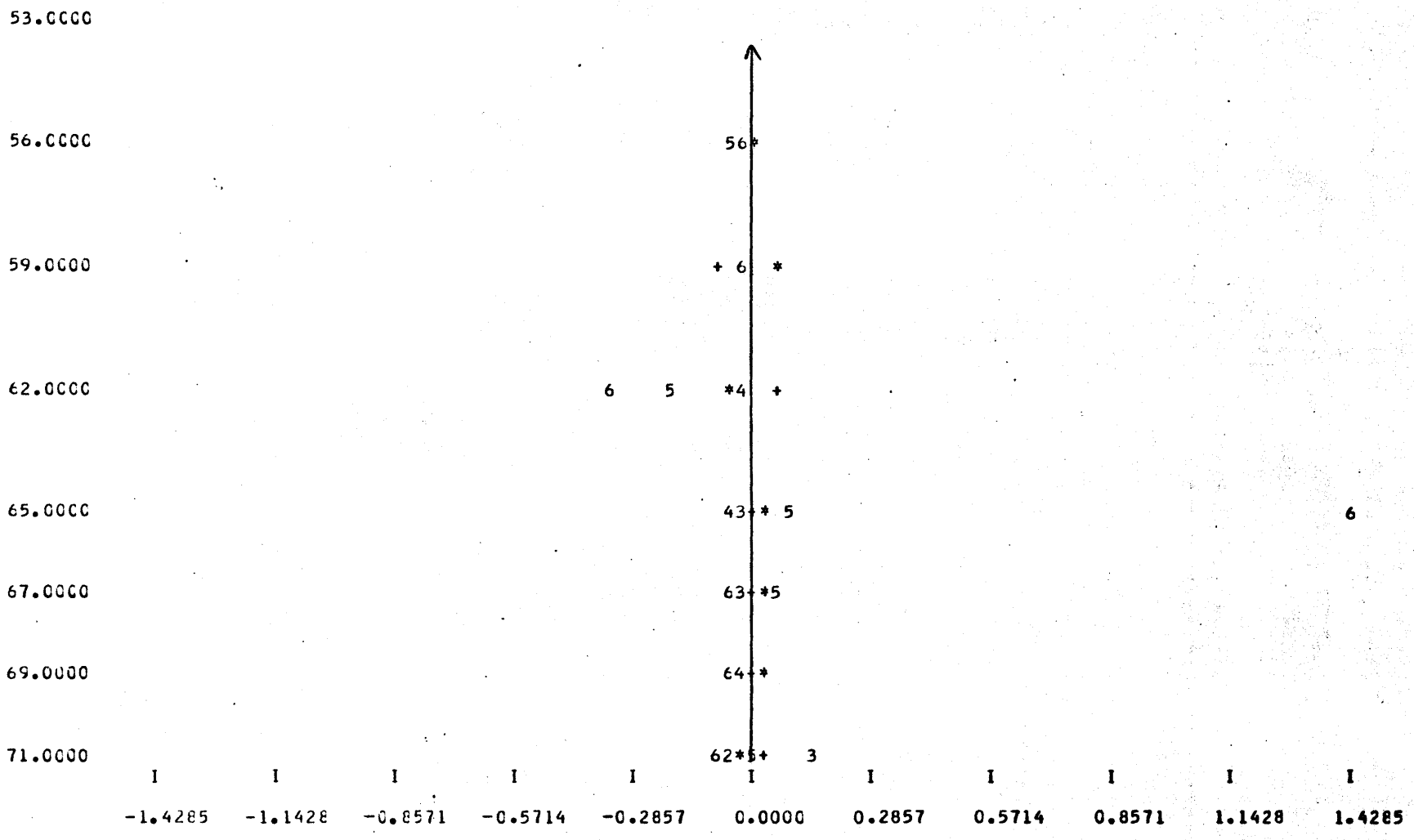


REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 5454; FOOD

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 5858; RESTAUR

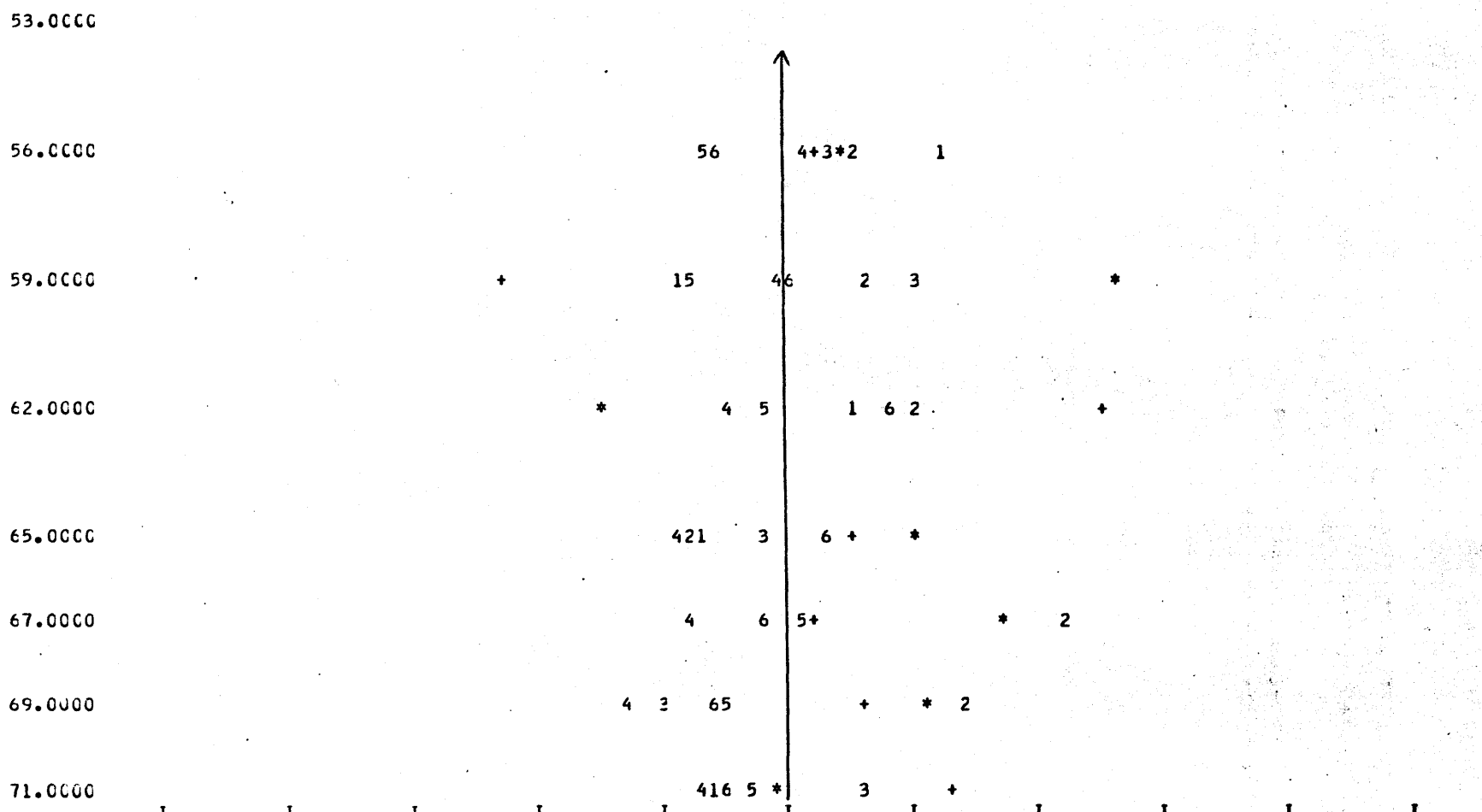
YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0376	0.0175	0.0100	0.0031	-0.0192	-0.0159	0.0061	0.0126
59.	-0.0246	0.0193	0.0318	-0.0016	-0.0212	0.0009	-0.0682	0.0785
62.	0.0154	0.0325	-0.0446	-0.0130	-0.0058	0.0240	0.0773	-0.0448
65.	-0.0185	-0.0213	-0.0030	-0.0262	0.0159	0.0104	0.0177	0.0324
67.	-0.0040	0.0667	-0.0031	-0.0225	0.0042	-0.0046	0.0089	0.0520
69.	-0.0175	0.0429	-0.0272	-0.0360	-0.0146	-0.0167	0.0196	0.0345
71.	-0.0175	0.0197	0.0199	-0.0208	-0.0071	-0.0125	0.0407	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0441	-0.0221	-0.0156	-0.0195	-0.0483	-0.0242	0.0061	0.0126
59.	-0.0055	-0.0098	-0.0083	-0.0137	-0.0018	-0.0217	-0.0682	0.0785
62.	-0.0361	-0.0183	-0.0131	-0.0229	-0.1990	-0.3173	0.0773	-0.0448
65.	-0.0446	-0.0427	-0.0155	-0.0361	0.0963	1.4285	0.0177	0.0324
67.	-0.0412	-0.0384	-0.0214	-0.0342	0.0641	-0.0366	0.0089	0.0520
69.	-0.0367	0.0015	-0.0095	-0.0206	0.0007	-0.0417	0.0196	0.0345
71.	-0.0049	-0.0369	0.1501	-0.0218	0.0217	-0.0584	0.0407	-0.0028



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 5858; RESTAUR

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 17 R



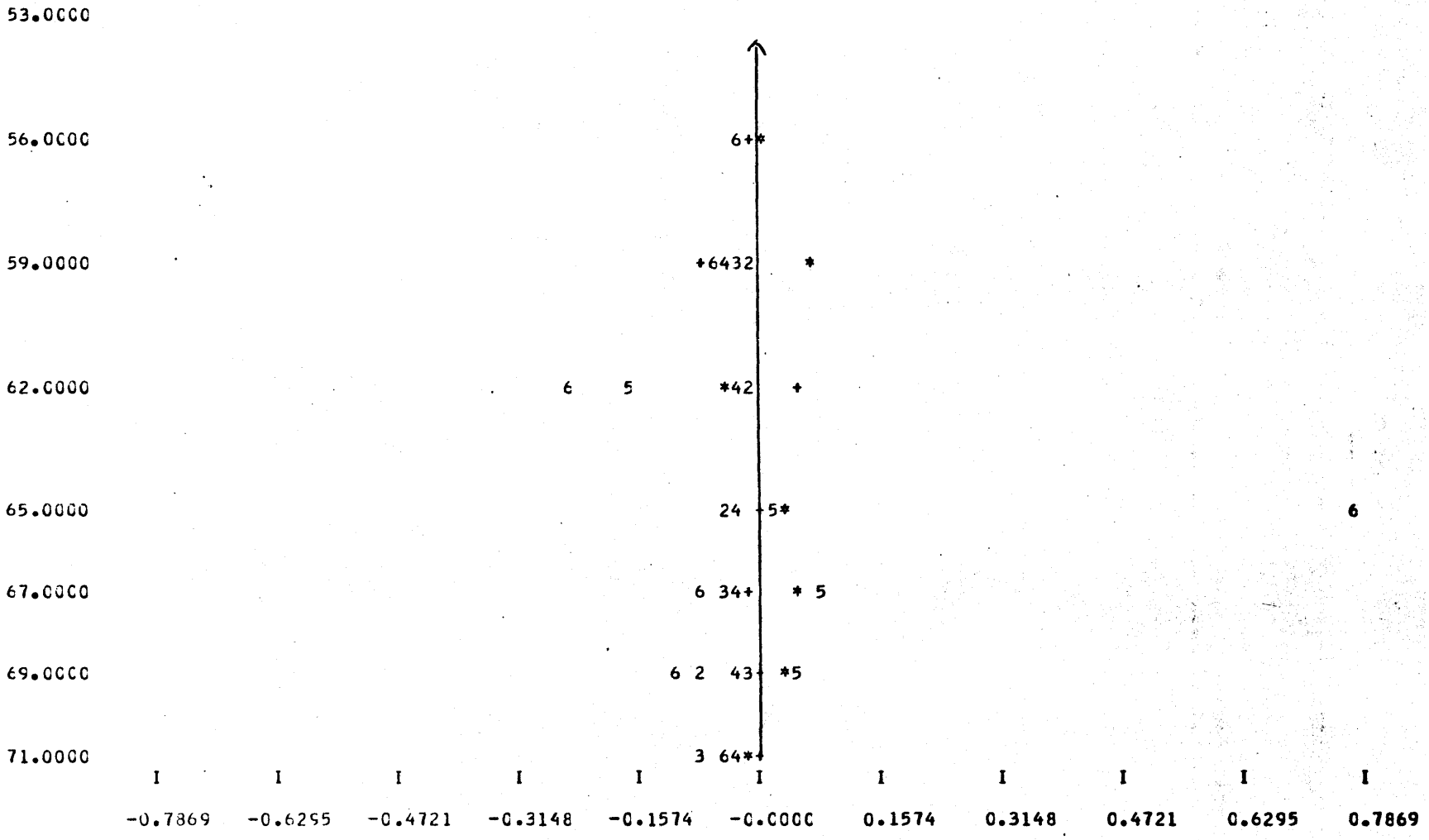
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 5858; RESTAUR

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 5952; OTHER RTL

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0008	0.0023	-0.0048	-0.0250	-0.0089	-0.0004	-0.0037	0.0126
59.	0.0195	0.0183	0.0129	0.0129	-0.0412	0.0371	-0.0701	0.0785
62.	0.0025	0.0481	-0.0154	0.0113	-0.0071	0.0032	0.0525	-0.0448
65.	-0.0082	-0.0109	0.0090	-0.0062	-0.0051	0.0222	0.0034	0.0324
67.	0.0026	0.0118	0.0071	0.0075	0.0178	0.0244	-0.0053	0.0520
69.	-0.0065	0.0430	-0.0619	-0.0091	-0.0054	0.0382	0.0086	0.0345
71.	-0.0098	-0.0053	0.0129	-0.0081	-0.0290	-0.0053	0.0139	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0292	-0.0176	-0.0052	-0.0103	-0.0249	-0.0278	-0.0037	0.0126
59.	-0.0202	-0.0135	-0.0207	-0.0442	-0.0524	-0.0546	-0.0701	0.0785
62.	-0.0241	-0.0116	-0.0163	-0.0216	-0.1606	-0.2491	0.0525	-0.0448
65.	-0.0343	-0.0383	-0.0248	-0.0260	0.0276	0.7869	0.0034	0.0324
67.	-0.0191	-0.0098	-0.0437	-0.0171	0.0871	-0.0691	-0.0053	0.0520
69.	-0.0133	-0.0046	-0.0113	-0.0236	0.0516	-0.1036	0.0086	0.0345
71.	-0.0267	-0.0038	-0.0753	-0.0190	-0.0322	-0.0388	0.0139	-0.0028

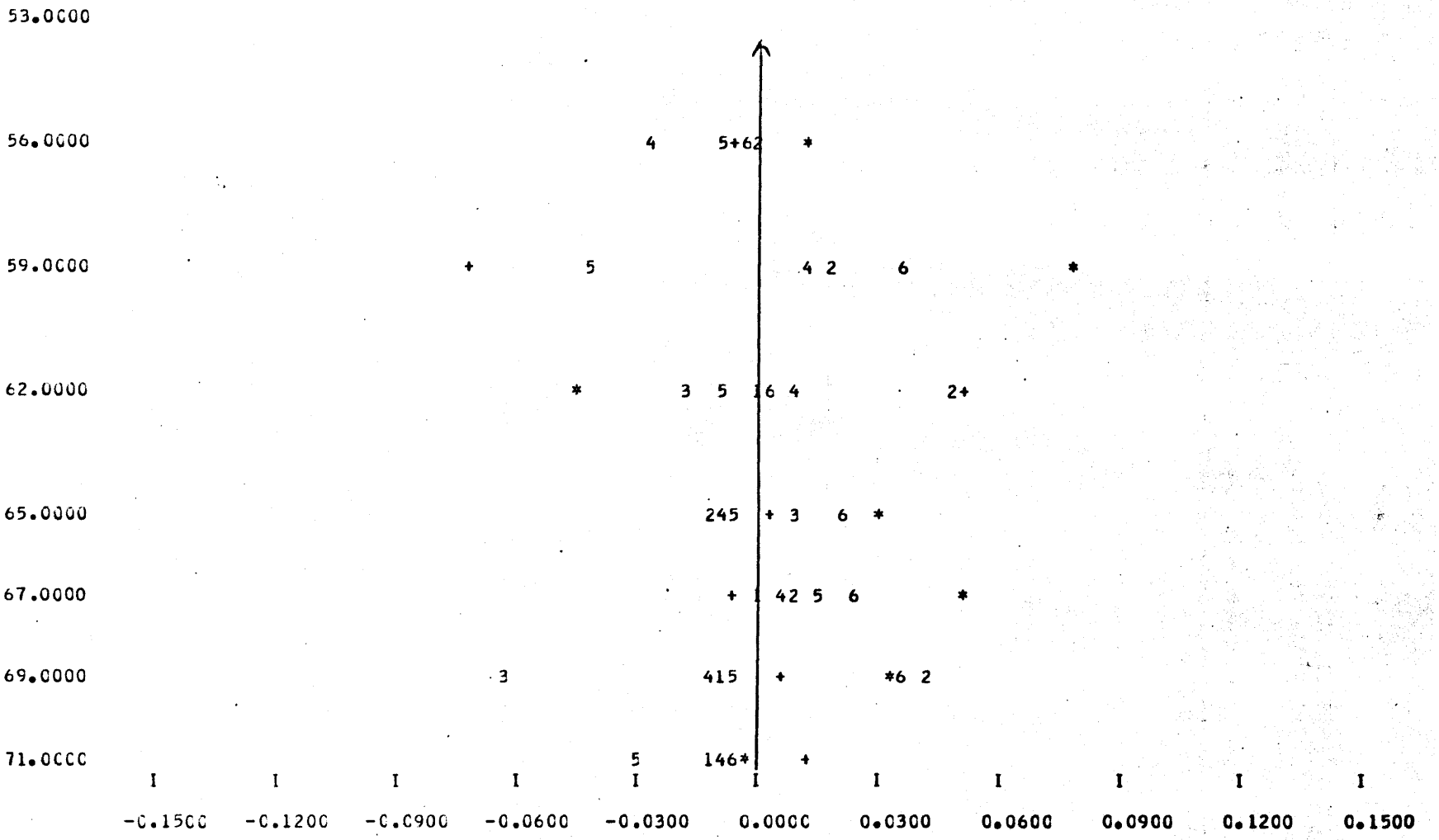
CHART 18 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 5952; OTHER RTL

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 18 R



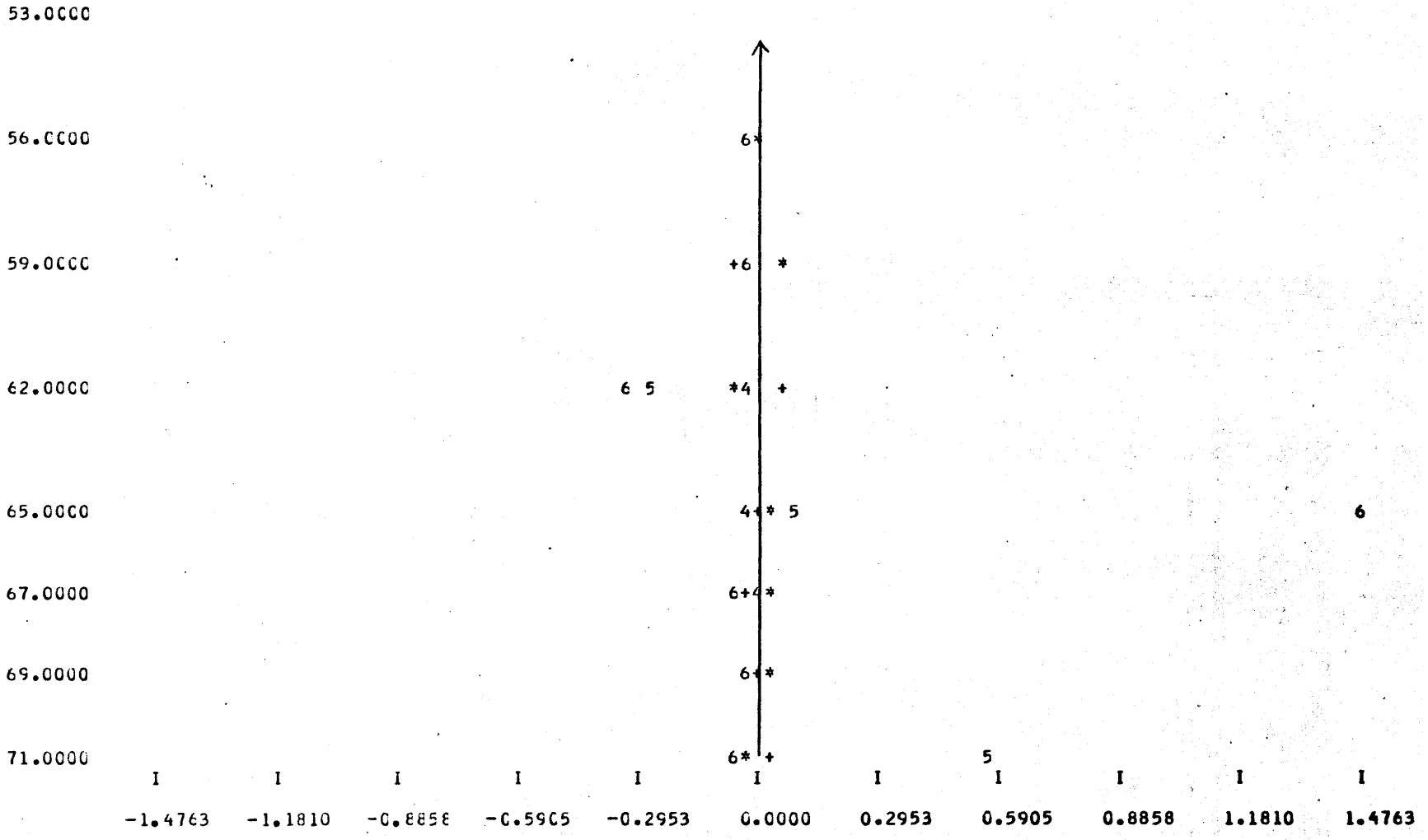
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 5952: OTHER RTL

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

/57 REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 6067; FIN RE

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0031	0.0378	0.0067	-0.0107	0.0031	-0.0173	0.0259	0.0126
59.	-0.0280	0.0417	0.0098	-0.0304	-0.0224	-0.0007	-0.0485	0.0785
62.	-0.0145	0.0111	-0.0150	0.0004	-0.0019	0.0091	0.0738	-0.0448
65.	-0.0021	-0.0032	0.0100	-0.0107	-0.0010	0.0718	0.0032	0.0324
67.	-0.0115	-0.0136	0.0061	-0.0035	-0.0069	0.0096	-0.0210	0.0520
69.	0.0006	0.0489	-0.0209	0.0202	-0.0159	-0.0220	0.0135	0.0345
71.	-0.0003	0.0117	-0.0120	-0.0127	-0.0364	0.0201	0.0320	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0138	-0.0089	-0.0052	-0.0069	-0.0182	-0.0280	0.0259	0.0126
59.	-0.0047	-0.0086	-0.0061	-0.0119	-0.0319	-0.0042	-0.0485	0.0785
62.	-0.0160	-0.0039	-0.0007	-0.0084	-0.2620	-0.2990	0.0738	-0.0448
65.	-0.0068	-0.0064	-0.0181	-0.0155	0.1177	1.4763	0.0032	0.0324
67.	-0.0218	-0.0054	-0.0100	0.0075	0.0393	-0.0318	-0.0210	0.0520
69.	-0.0101	-0.0063	0.0037	0.0016	0.0011	-0.0272	0.0135	0.0345
71.	-0.0013	-0.0212	-0.0028	-0.0308	0.5814	-0.0446	0.0320	-0.0028

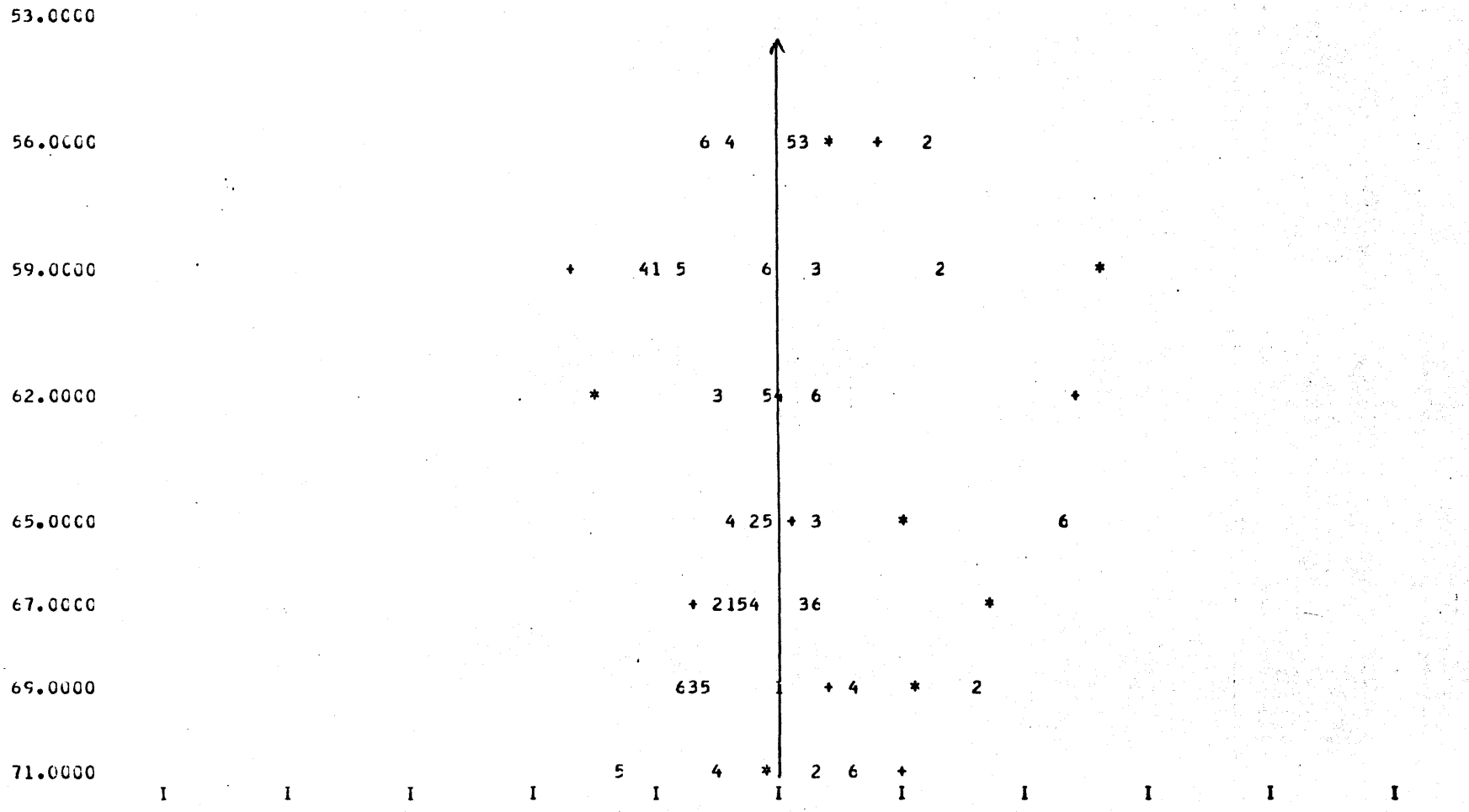
CHART 19 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 6067; FIN RE

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 19 R



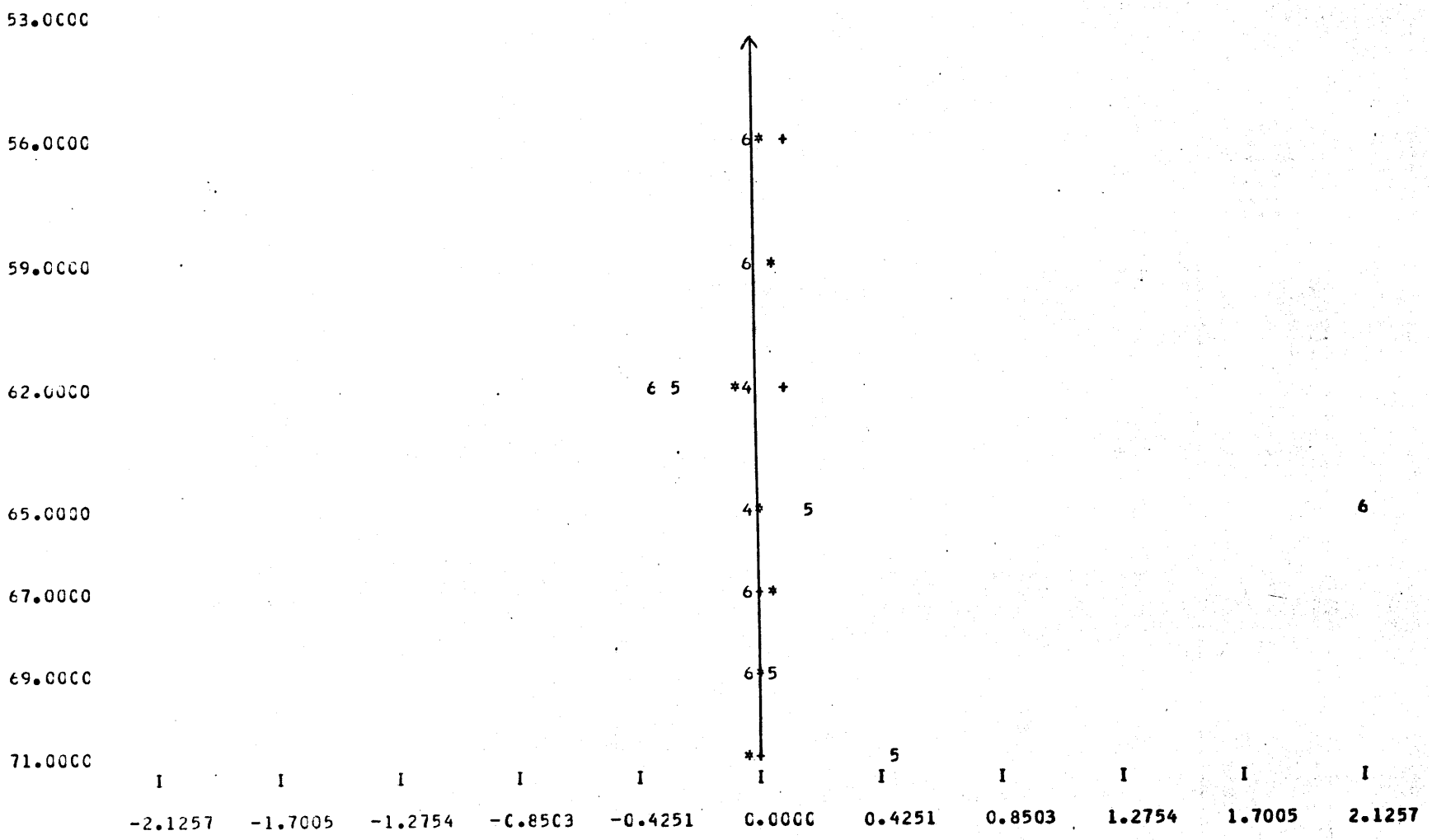
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 6067; FIN RE

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 7089; SERVICES

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	C.C	C.C	0.0	0.0	0.0	0.0
56.	-0.0137	0.0089	-0.0417	-0.0131	-0.0348	C.0591	0.1135	0.0126
59.	C.0507	C.0596	0.0145	C.0920	0.0151	0.0584	0.0720	0.0785
62.	0.0127	0.0326	-0.0096	0.0083	0.0017	C.0421	0.0920	-0.0448
65.	-0.0032	C.0008	0.0129	-0.0240	0.0029	-0.0020	0.0227	0.0324
67.	0.0285	-0.0042	-0.0114	-0.0012	0.0068	0.0137	0.0277	0.0520
69.	-0.0175	0.0174	-0.0079	-0.0002	C.0105	0.0054	0.0234	0.0345
71.	0.0120	0.0273	C.0026	-0.0012	-0.0329	0.0025	0.0359	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	C.0	C.0	C.0	0.0	0.0	C.0	0.0	0.0
56.	-0.0269	-0.0239	C.0053	-0.0198	-0.0356	-0.0295	0.1135	0.0126
59.	-0.0018	-0.0080	-0.0193	-0.0211	-0.0051	-0.0242	0.0720	0.0785
62.	-0.0203	-0.0208	-0.0055	-0.0175	-0.2950	-0.3635	0.0920	-0.0448
65.	-0.0182	-0.0226	-0.0091	-0.0144	C.1910	2.1257	0.0227	0.0324
67.	-0.0416	-0.0161	-0.0076	-0.0150	0.0308	-0.0218	0.0277	0.0520
69.	0.0086	-0.0183	-0.0135	-0.0188	C.0522	-0.0352	0.0234	0.0345
71.	-0.0146	-0.0094	-0.0093	-0.0172	0.4703	-0.0142	0.0359	-0.0028

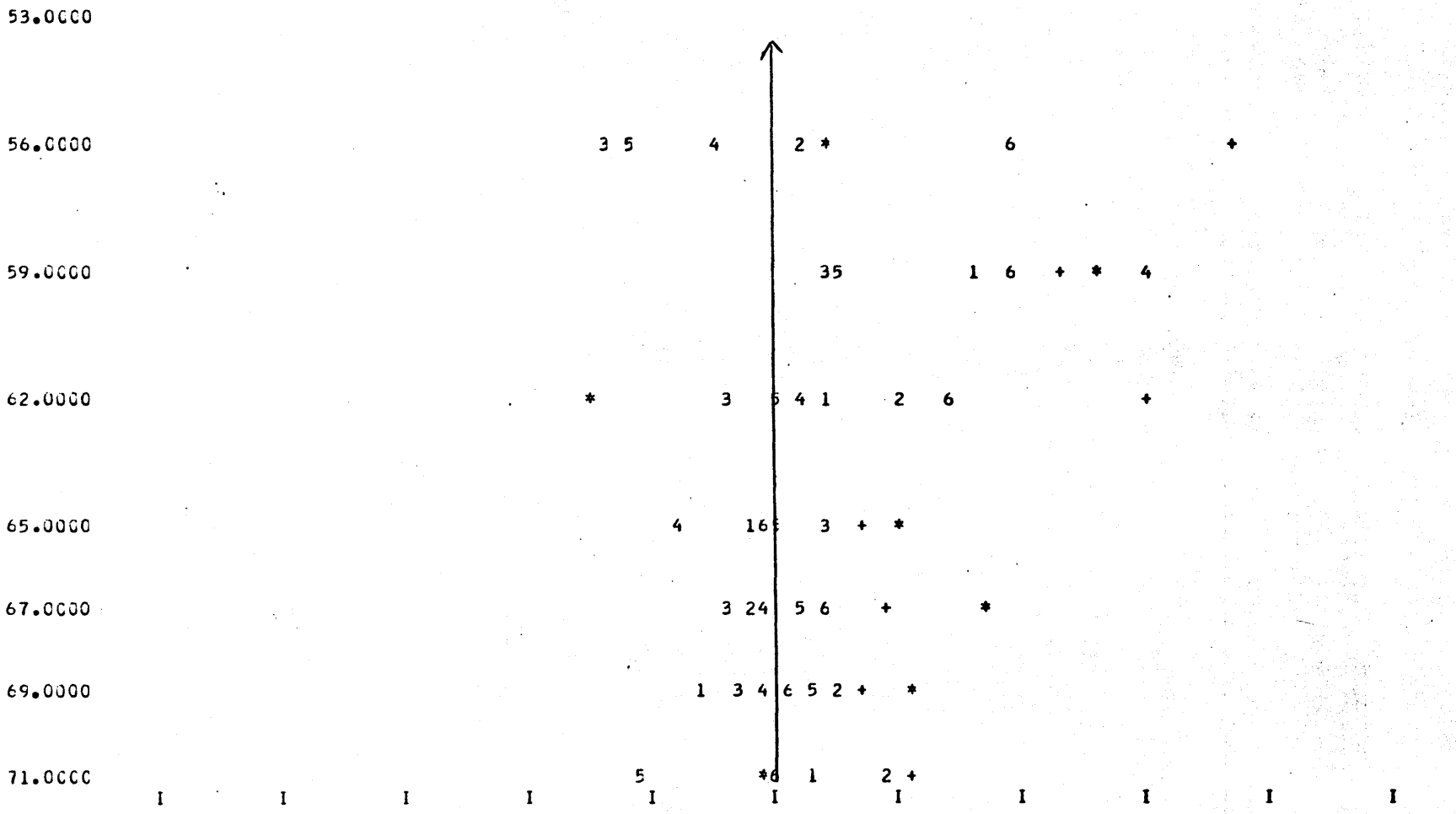
CHART 20 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 7089; SERVICES

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 20 R



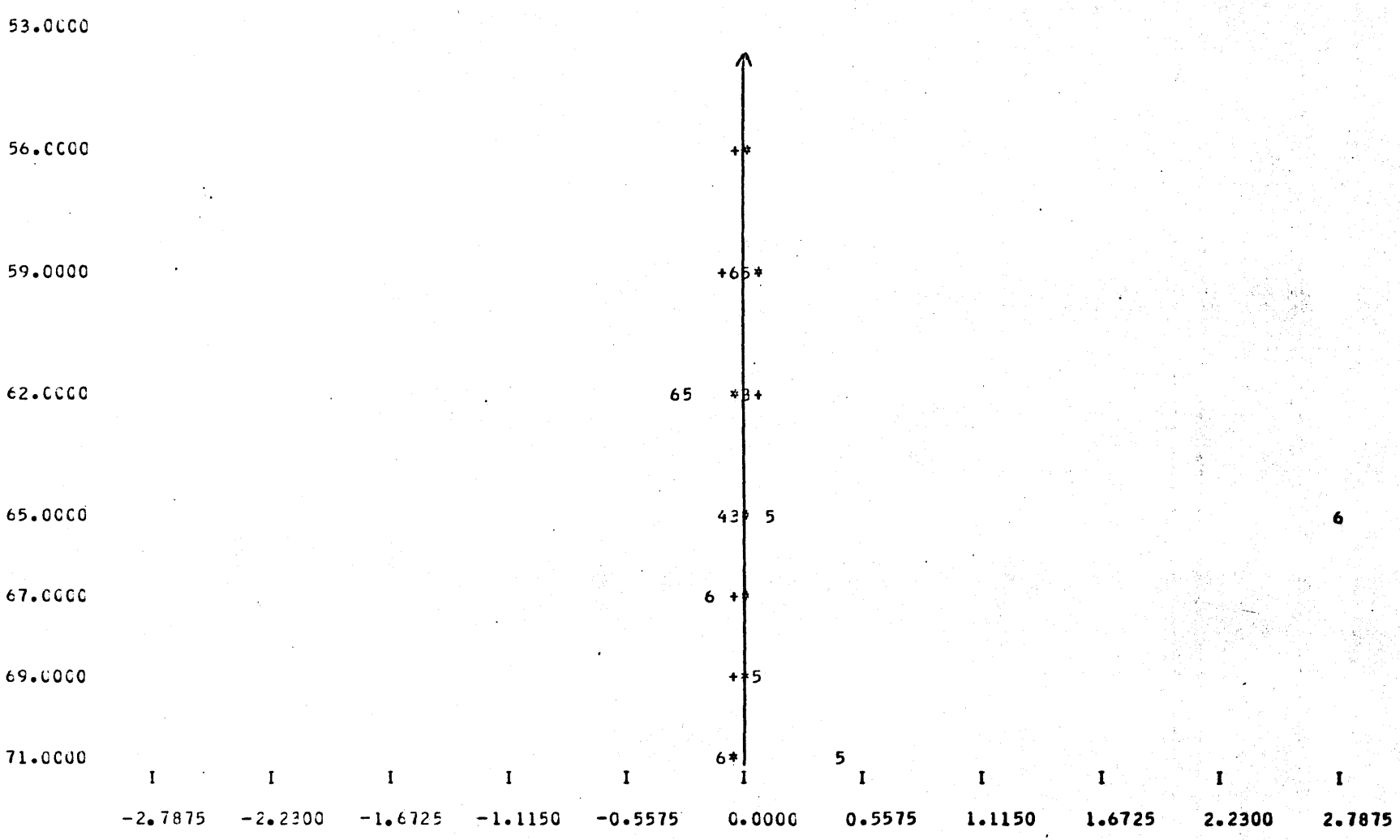
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 7089; SERVICES

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 7072; HOTEL PERS

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0088	0.0009	0.0159	-0.0147	-0.0215	0.0110	-0.0080	0.0126
59.	-0.0019	0.0189	0.0154	0.0032	-0.0162	0.0102	-0.0725	0.0785
62.	0.0039	0.0887	-0.0155	-0.0050	-0.0200	0.0202	0.0590	-0.0448
65.	-0.0288	-0.0545	-0.0135	0.0287	0.0078	-0.0277	0.0078	0.0324
67.	0.0146	0.0059	0.0256	-0.0497	0.0248	0.0706	-0.0153	0.0520
69.	-0.0321	0.0382	-0.0071	-0.0257	-0.0081	-0.0794	-0.0180	0.0345
71.	-0.0058	0.0378	-0.0129	-0.0256	-0.0488	0.0643	-0.0074	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0182	-0.0121	-0.0099	-0.0061	-0.0277	-0.0132	-0.0080	0.0126
59.	-0.0116	-0.0074	-0.0114	-0.0117	0.0107	-0.0151	-0.0725	0.0785
62.	-0.0214	-0.0078	0.0002	-0.0132	-0.2388	-0.3281	0.0590	-0.0448
65.	-0.0329	-0.0175	-0.0154	-0.0608	0.1278	2.7875	0.0078	0.0324
67.	-0.0358	-0.0089	-0.0100	0.0288	-0.0155	-0.1268	-0.0153	0.0520
69.	-0.0329	-0.0466	-0.0218	-0.0480	0.0682	0.0282	-0.0180	0.0345
71.	-0.0332	-0.0002	-0.0118	-0.0188	0.4792	-0.1011	-0.0074	-0.0028

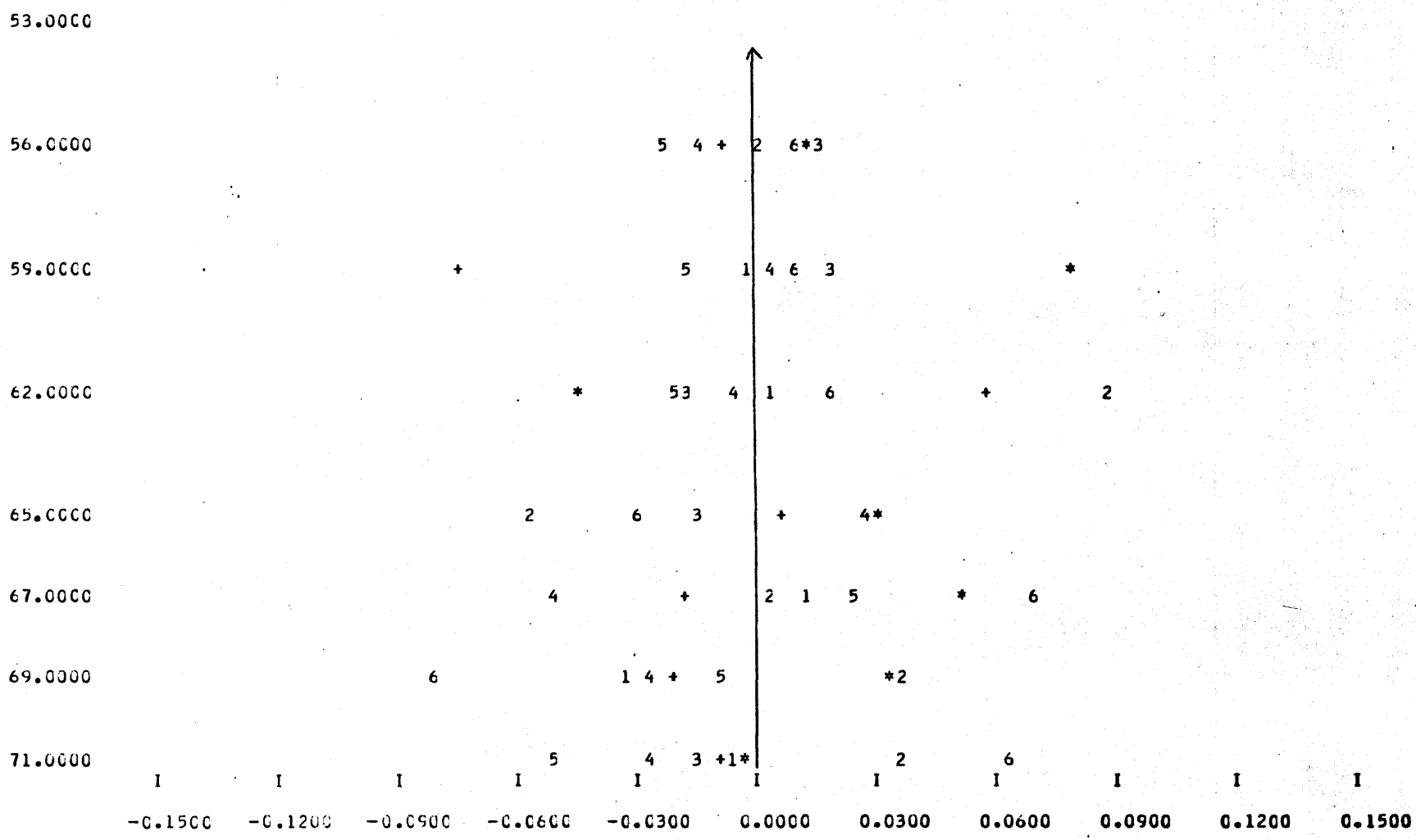
CHART 21 5



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 7072; HOTEL PERS

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 21 R

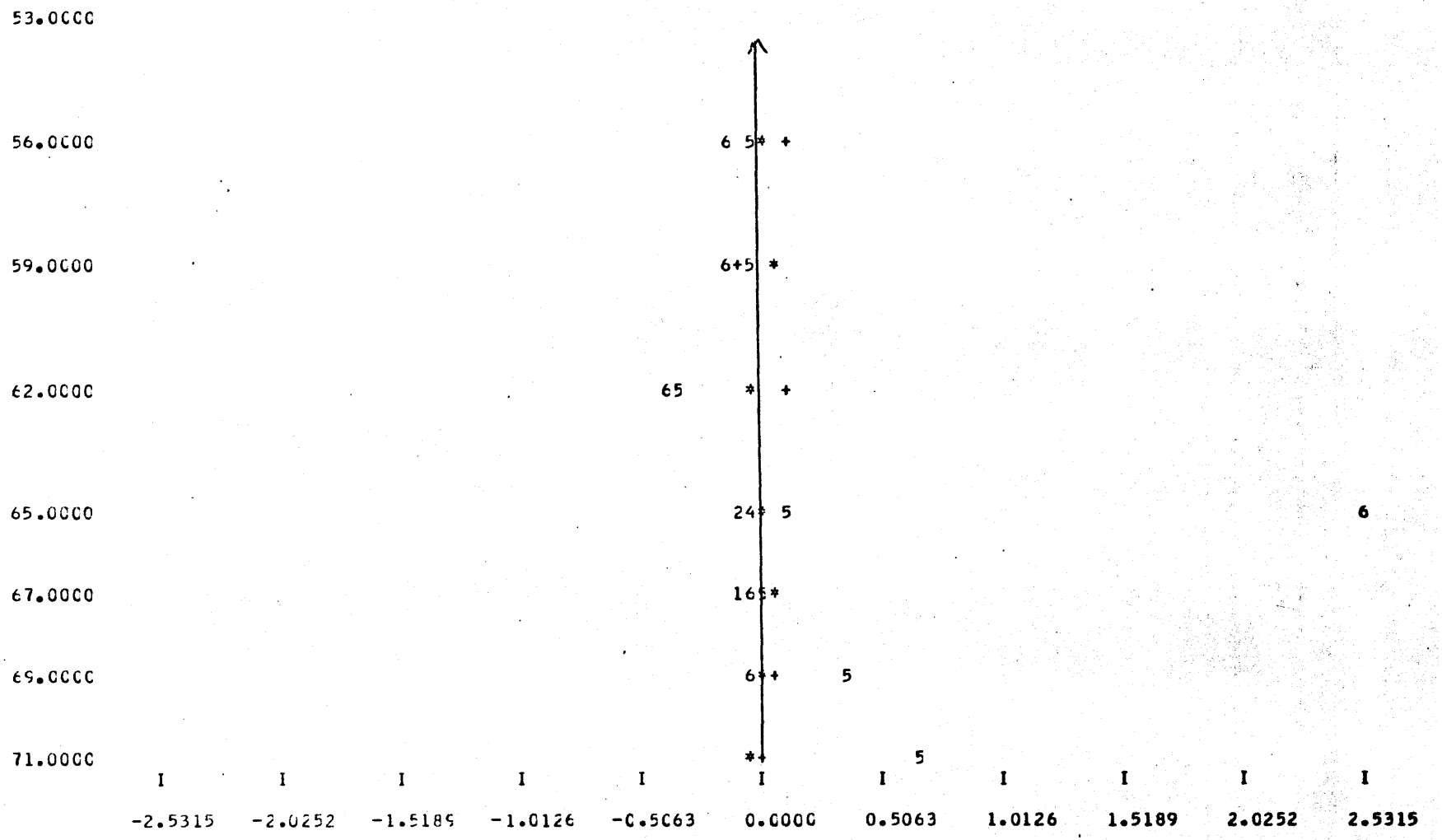


REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 7072; HOTEL PERS

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 7373; BUSINESS SER

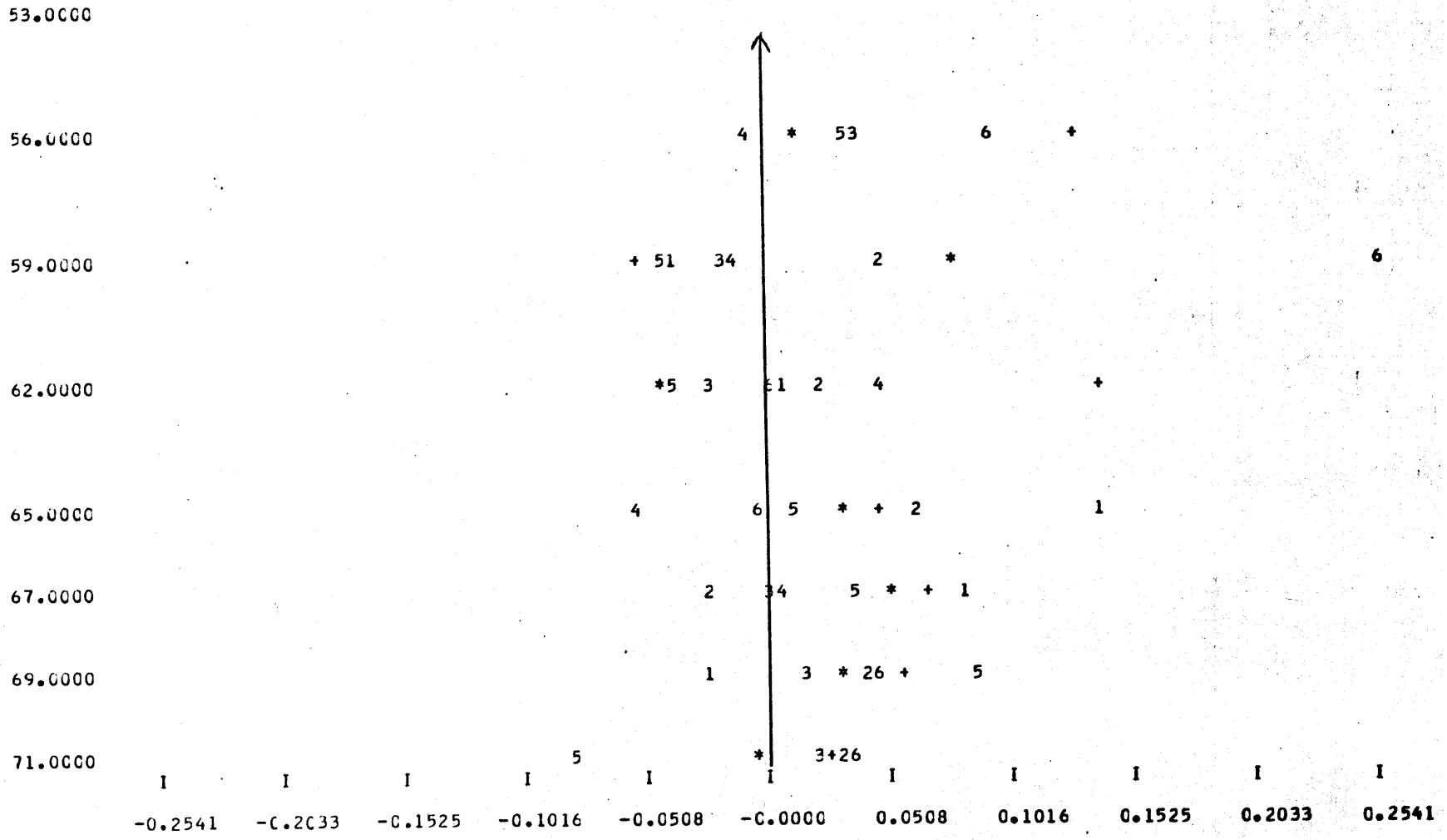
YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0112	0.0113	0.0369	-0.0092	0.0319	0.0933	0.1292	0.0126
59.	-0.0389	0.0490	-0.0182	-0.0102	-0.0440	0.2541	-0.0544	0.0785
62.	0.0085	0.0251	-0.0230	0.0465	-0.0361	0.0031	0.1411	-0.0448
65.	0.1373	0.0646	0.0346	-0.0548	0.0149	-0.0040	0.0483	0.0324
67.	0.0814	-0.0219	0.0023	0.0055	0.0363	0.0541	0.0701	0.0520
69.	-0.0238	0.0422	0.0186	0.0501	0.0912	0.0479	0.0579	0.0345
71.	0.0306	0.0350	0.0244	-0.0006	-0.0769	0.0371	0.0303	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0009	-0.0206	0.0031	0.0121	-0.0147	-0.1349	0.1292	0.0126
59.	-0.0159	-0.0233	-0.0077	-0.0172	-0.0003	-0.1053	-0.0544	0.0785
62.	-0.0262	-0.0350	-0.0223	-0.0232	-0.3354	-0.3724	0.1411	-0.0448
65.	-0.0479	-0.0540	-0.0288	-0.0359	0.1285	2.5315	0.0483	0.0324
67.	-0.0712	0.0136	-0.0032	-0.0293	0.0331	-0.0505	0.0701	0.0520
69.	0.0918	0.0077	-0.0135	-0.0336	0.4000	-0.0487	0.0579	0.0345
71.	-0.0333	-0.0253	0.0188	-0.0246	0.6678	0.0073	0.0303	-0.0028



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 7373; BUSINESS SER

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 22 R



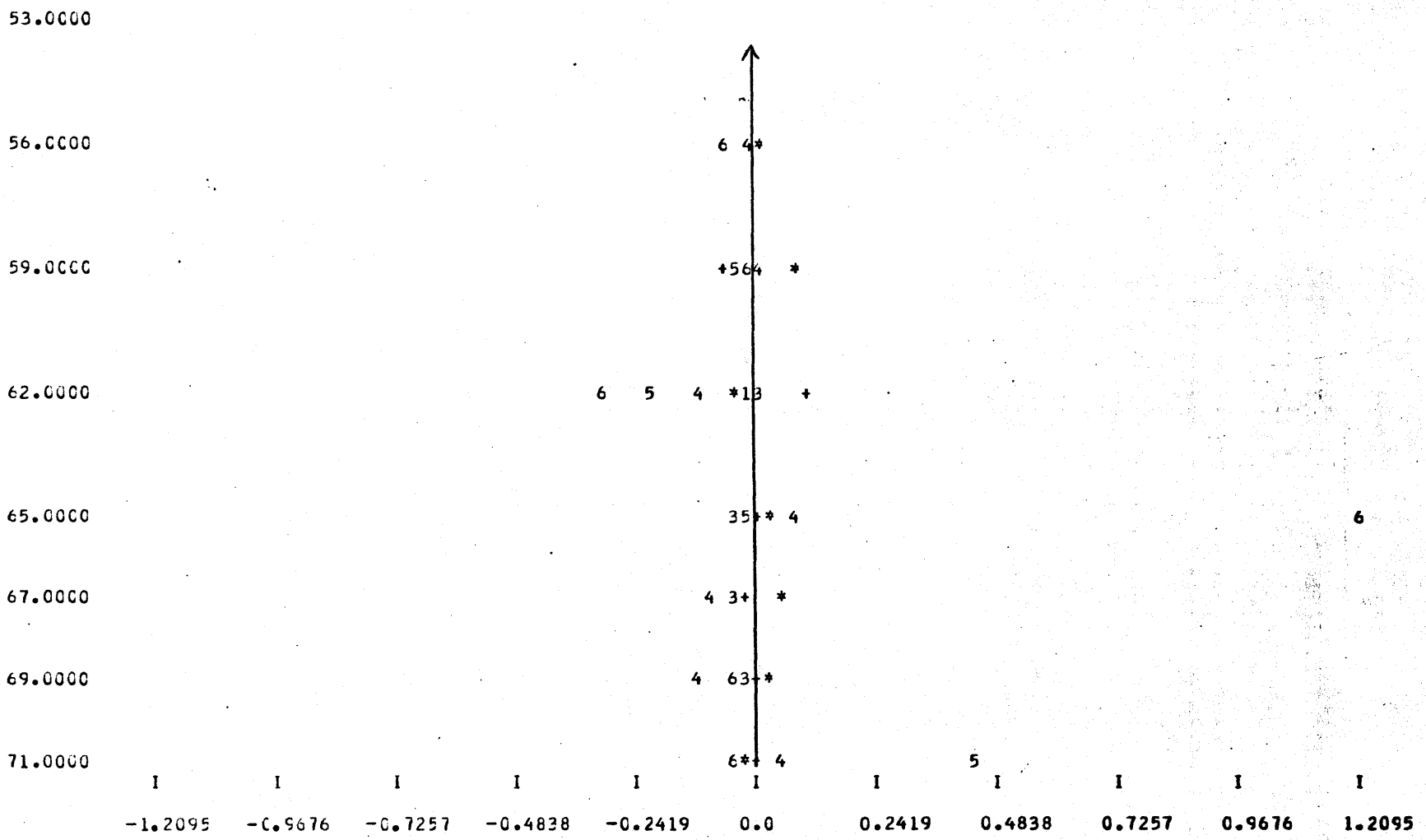
REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 7373; BUSINESS SER

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 7576; AUTO REP

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0273	0.0025	-0.0192	0.0192	0.0148	0.0111	0.0124	0.0126
59.	0.0467	0.0472	0.0623	-0.0079	0.0226	0.0318	-0.0538	0.0785
62.	-0.0182	0.0401	-0.0390	0.0428	-0.0357	-0.0034	0.0976	-0.0448
65.	-0.0055	-0.0289	0.0618	-0.0516	0.0127	0.0022	0.0066	0.0324
67.	0.0080	0.0131	0.0246	0.0177	-0.0175	0.0232	-0.0020	0.0520
69.	0.0141	0.0245	-0.0532	0.0765	0.0263	0.0221	0.0016	0.0345
71.	0.0328	0.0248	0.0114	-0.0962	-0.0245	-0.0063	0.0218	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0111	-0.0090	-0.0074	-0.0141	-0.0513	-0.0658	0.0124	0.0126
59.	-0.0215	-0.0177	-0.0235	0.0127	-0.0290	-0.0135	-0.0538	0.0785
62.	-0.0124	-0.0264	0.0118	-0.1101	-0.1945	-0.3071	0.0976	-0.0448
65.	-0.0322	-0.0185	-0.0405	0.0855	-0.0158	1.2095	0.0066	0.0324
67.	-0.0201	-0.0065	-0.0297	-0.0795	-0.0027	-0.0011	-0.0020	0.0520
69.	-0.0071	-0.0030	-0.0119	-0.0982	0.0191	-0.0465	0.0016	0.0345
71.	-0.0202	-0.0261	0.0020	0.0649	0.4380	-0.0276	0.0218	-0.0028

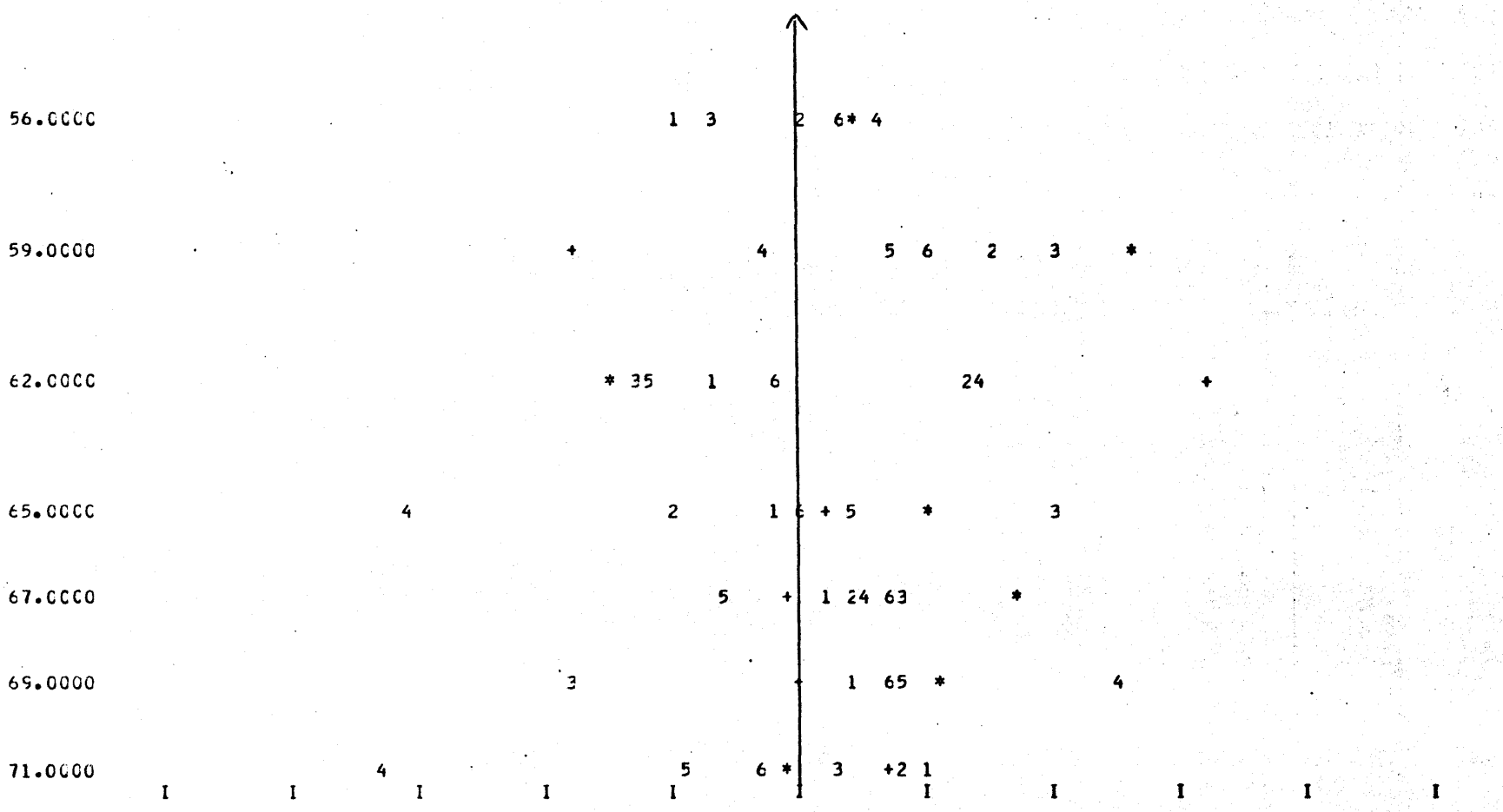
CHART 23 S



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 7576; AUTO REP

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 23 R

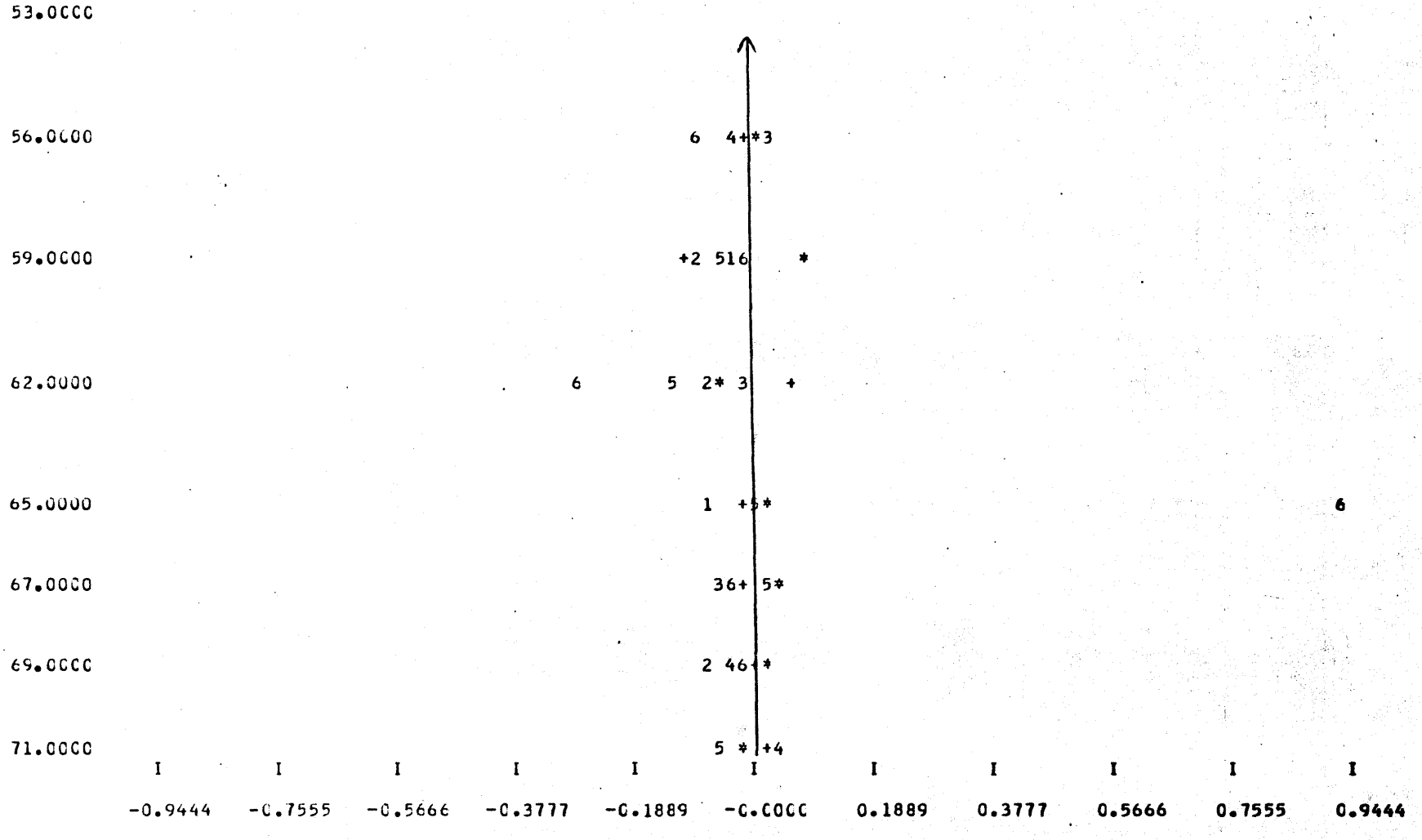


REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 7576; AUTO REP

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 7879: ENTERTAIN

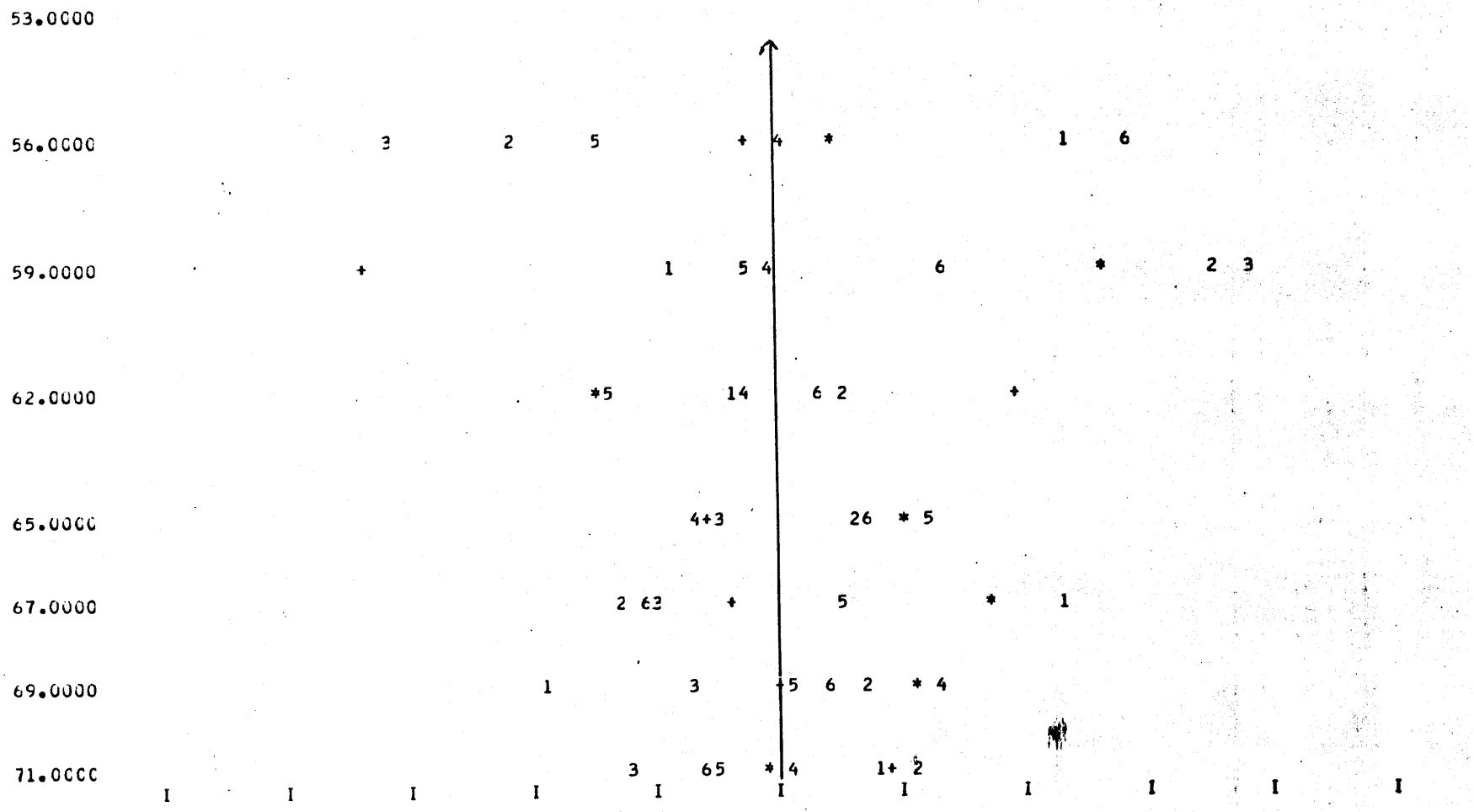
YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	0.0696	-0.0654	-0.0934	0.0009	-0.0426	0.0856	-0.0077	0.0126
59.	-0.0253	0.1057	0.1167	-0.0004	-0.0078	0.0409	-0.1012	0.0785
62.	-0.0116	0.0160	-0.0445	-0.0064	-0.0409	0.0119	0.0571	-0.0448
65.	0.0181	0.0183	-0.0142	-0.0210	0.0386	0.0212	-0.0170	0.0324
67.	0.0703	-0.0371	-0.0272	-0.0104	0.0173	-0.0326	-0.0098	0.0520
69.	-0.0552	0.0230	-0.0182	0.0412	0.0034	0.0129	0.0019	0.0345
71.	0.0260	0.0346	-0.0348	0.0056	-0.0136	-0.0160	0.0279	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.0189	0.0142	0.0352	-0.0323	-0.0105	-0.0844	-0.0077	0.0126
59.	-0.0333	-0.0796	-0.0564	-0.0143	-0.0450	-0.0159	-0.1012	0.0785
62.	-0.0465	-0.0708	-0.0104	-0.0441	-0.1170	-0.2763	0.0571	-0.0448
65.	-0.0597	0.0143	0.0196	0.0011	0.0125	0.0444	-0.0170	0.0324
67.	0.0516	-0.0180	-0.0513	0.0234	0.0213	-0.0333	-0.0098	0.0520
69.	-0.0247	-0.0626	0.0282	-0.0242	0.0350	-0.0179	0.0019	0.0345
71.	0.0205	0.0281	-0.0046	0.0443	-0.0461	-0.0079	0.0279	-0.0028



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 7879; ENTERTAIN

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 24 R



REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 7879; ENTERTAIN

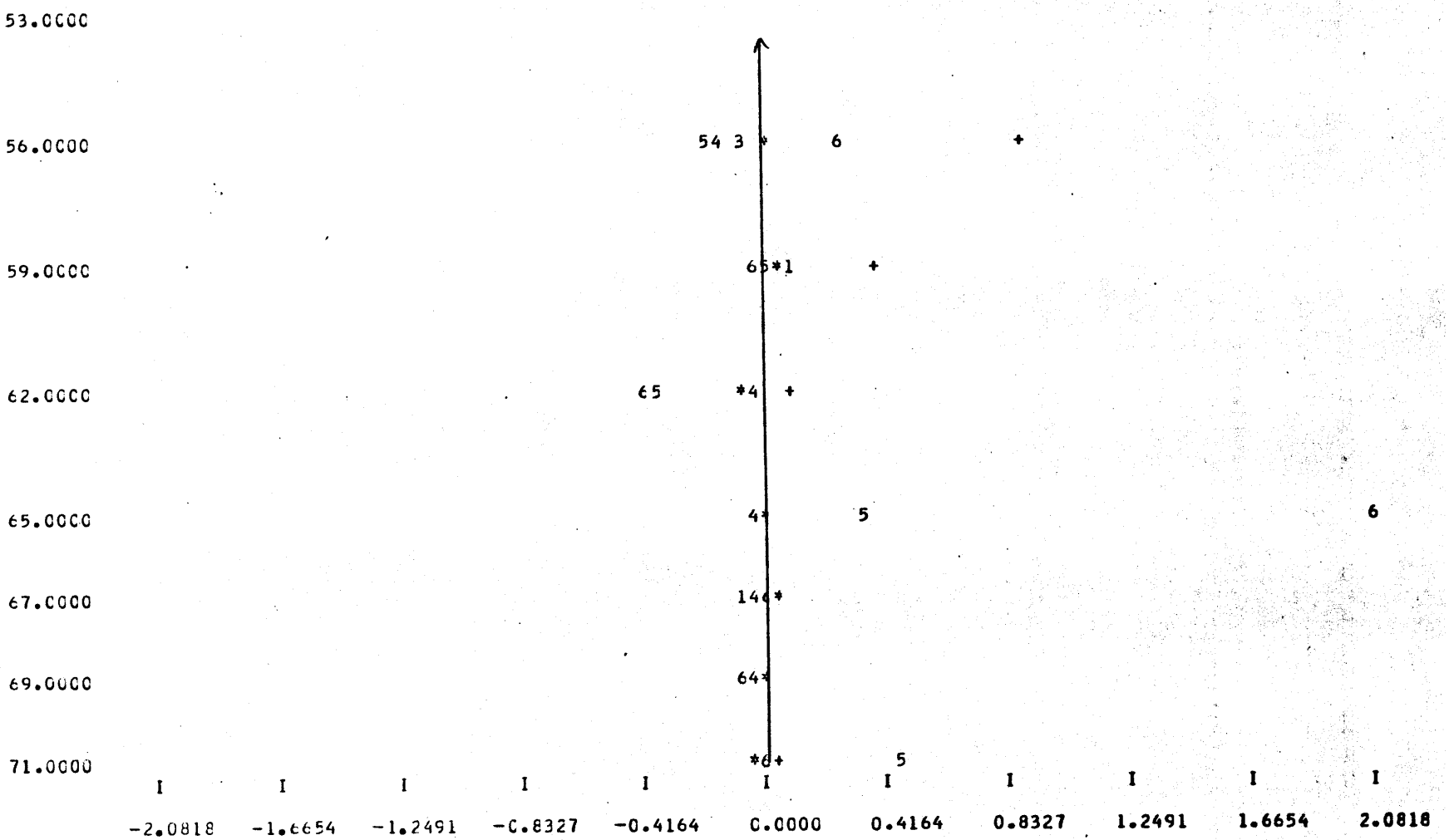
1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
3=REGIONAL SHIFT COEF FOR NEW ORLEANS
4=REGIONAL SHIFT COEF FOR PHILADELPHIA
5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTON, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

REGIONAL AND SUBURBAN SHIFT COEFFIENTS FOR SIC CODE 7970; OTHER SER

YEAR	BALT. MD	DENVER	N.ORLEANS	PHIL. PA	ST.LOUIS	WASH. DC	IND GROW	NAT EMPL
REGIONAL SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.1357	0.1306	-0.1633	-0.2671	-0.1695	-0.0519	0.8854	0.0126
59.	0.2786	0.0378	0.0532	0.2993	0.1552	-0.0453	0.4098	0.0785
62.	0.0242	0.0108	0.0171	-0.0030	0.0289	0.0641	0.1017	-0.0448
65.	-0.0217	0.0132	0.0212	-0.0256	-0.0074	-0.0004	0.0305	0.0324
67.	0.0127	-0.0042	-0.0318	0.0050	-0.0057	-0.0212	0.0423	0.0520
69.	-0.0145	0.0007	-0.0064	-0.0206	-0.0038	0.0085	0.0339	0.0345
71.	0.0041	0.0210	0.0080	0.0089	-0.0202	-0.0276	0.0537	-0.0028
SUBURBAN SHIFT COEFFICIENTS								
53.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56.	-0.1454	-0.1823	-0.0639	-0.1639	-0.1997	0.2630	0.8854	0.0126
59.	0.1013	0.0609	-0.0123	-0.0155	0.0342	-0.0224	0.4098	0.0785
62.	-0.0198	-0.0180	-0.0089	-0.0084	-0.3445	-0.3905	0.1017	-0.0448
65.	-0.0059	-0.0221	-0.0030	-0.0112	0.3406	2.0818	0.0305	0.0324
67.	-0.0468	-0.0284	0.0019	-0.0238	0.0617	0.0204	0.0423	0.0520
69.	-0.0034	-0.0147	-0.0173	-0.0027	0.0085	-0.0478	0.0339	0.0345
71.	-0.0092	-0.0078	-0.0209	-0.0300	0.4853	0.0024	0.0537	-0.0028

CHART 25 S

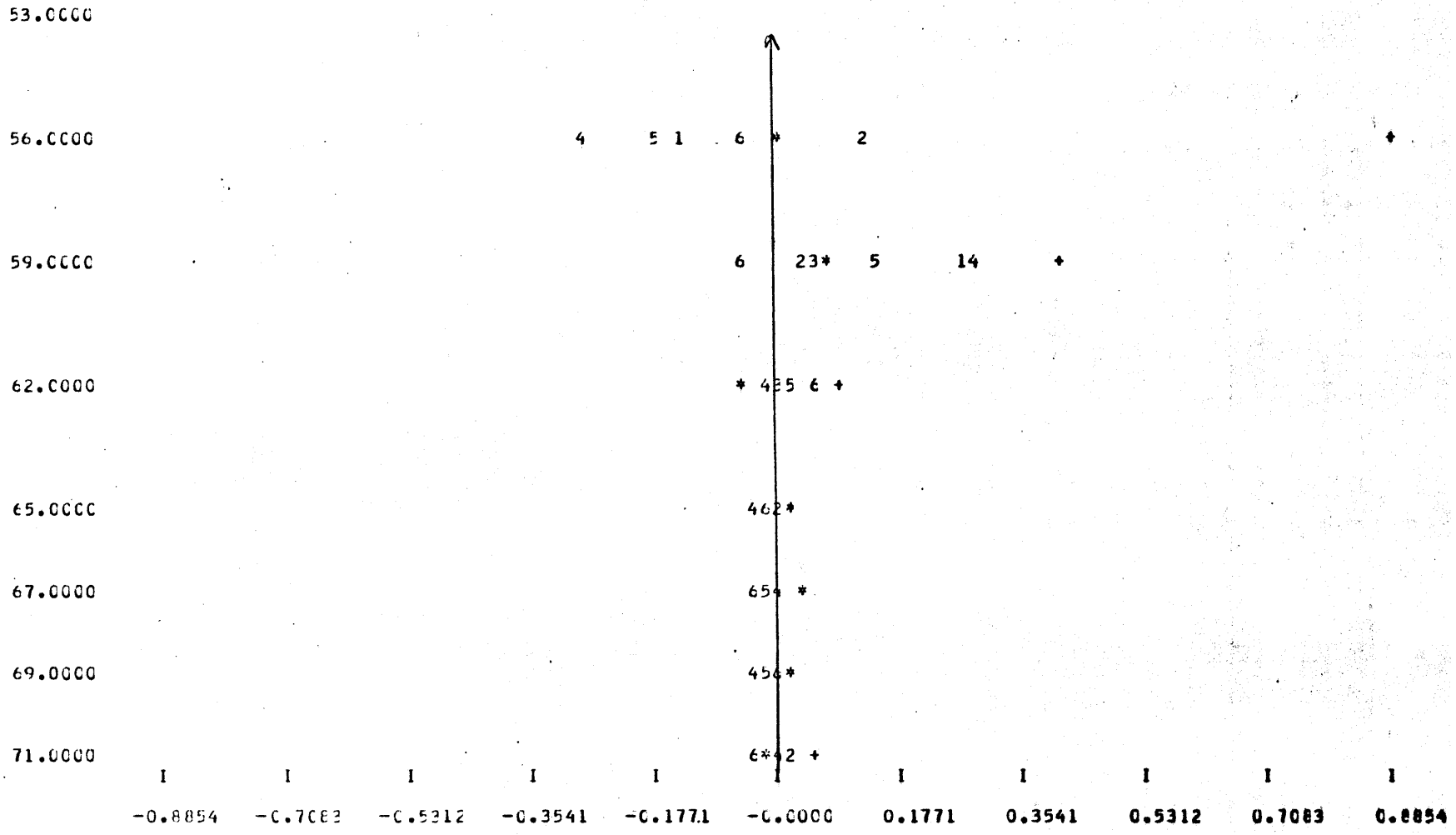
170



SUBURBAN SHIFT COEFFICIENTS FOR SIC CODE 7970; OTHER SER

1=SUBURBAN SHIFT COEF FOR BALTIMORE
2=SUBURBAN SHIFT COEF FOR DENVER
3=SUBURBAN SHIFT COEF FOR NEW ORLEANS
4=SUBURBAN SHIFT COEF FOR PHILADELPHIA
5=SUBURBAN SHIFT COEF FOR ST. LOUIS
6=SUBURBAN SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY

CHART 25 R



REGIONAL SHIFT COEFFICIENTS FOR SIC CODE 7970; OTHER SER

1=REGIONAL SHIFT COEF FOR BALTIMORE
2=REGIONAL SHIFT COEF FOR DENVER
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5=REGIONAL SHIFT COEF FOR ST. LOUIS
6=REGIONAL SHIFT COEF FOR WASHINGTION, DC
+=NAT.GROWTH RATE OF INDUSTRY
*=NAT.GROWTH RATE OF EMPLOY