A CONCEPTUAL FRAMEWORK FOR AN ASSESSMENT OF SWEDISH REGIONAL POLICY

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FOREWORD

Declining rates of national population growth, continuing differential rates of regional economic activity, and shifts in the migration patterns of people and jobs are characteristic empirical aspects of many developed countries. In several instances, they have combined to bring about a relative (and in some cases absolute) population decline of highly urbanized areas, e.g., New York, Tokyo, and Stockholm. In other cases, they have brought about rapid metropolitan growth, e.g., Houston, Miami, and Moscow.

The objective of the Urban Change Task in IIASA's Human Settlements and Services Area is to bring together and synthesize available empirical and theoretical information on the principal determinants and consequences of such urban growth and decline.

This paper is the last of three focusing on the Swedish case study. In it the author sets out a conceptual framework for assessing regional policy in Sweden. Particular attention is accorded to the various aspects of "employment effects". It is argued that the concept is a multidimensional one which must be interpreted within the context of a clearly defined conceptual framework.

A list of related publications in the Urban Change Series appears at the end of this paper.

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ABSTRACT

In the literature on the employment effects of regional policy, the concept of employment effect is often discussed as if it had a single, well-defined meaning. That this is not at all the case is argued in this paper, which focuses on the derivation of a more clearly defined conceptual framework that is then applied in an assessment of Swedish regional policy.

It is demonstrated that for the choice of instruments of regional policy, it is important to strive for estimates of a variety of consequences possibly producing employment effects. Moreover, the analysis suggests that different estimation methods often produce answers to different questions rather than different answers to a given question. For this reason the problem specification is more important for the choice of methods than is often recognized.

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A CONCEPTUAL FRAMEWORK FOR AN ASSESSMENT OF SWEDISH REGIONAL POLICY

Lennart Ohlsson

I. BACKGROUND AND AIM OF STUDY

In the year 1965 an active job creation policy for northern Sweden was born. This policy was based on the notion that the manufacturing industry had to be expanded at a more rapid rate in order to absorb unemployed labor from the forestry and farming sectors. From 1970 on, the fiscal outlays of the original policy were expanded and new instruments were introduced. In the spring of 1979 a proposition on regional policy is to be proposed by the Swedish government to Parliament.

The Expert Group on Regional Studies (ERU)* proposed in 1976 to undertake an assessment of the policy employed in the 1965-75 period to provide a basis of knowledge for the formation of this proposition. In contrast to earlier studies by ERU, which merely described the development of employment, wages, productivity, and

*Established in 1965, the ERU is a committee of regional experts (researchers and central administrators) now under the Ministry of Industry, whose aim is to initiate and coordinate university based research on regional problems. To date it has completed two research phases. Each phase has been concluded by research reports and a summarizing, interpretative volume aimed at regional planners, politicians and the research community at large. The ERU is, in 1978-79, in the process of completing its third research phase.

and financial situation of supported firms, the newly published assessment (SOU, 1978;47 and 48) constitutes a major effort from researchers of four social sciences (business administration, economics, geography, and sociology) to estimate the various effects of this policy. Most of this was in-house research done by the ERU secretariat.

An integral part of a research methodology is the use of well-defined concepts. A policy analysis requires, in addition, the clarifying and classifying of the policy ends and means. A key concept in a regional policy evaluation is "employment effect". It contains so many possible interpretations that almost all discussions tend to be obscured by often unrevealed differences in the definition of this concept.

The present paper gives the conceptual framework for the Swedish assessment. This framework is, with some minor changes, applicable to the evaluation of regional (and some industrial) employment policies in other market economies as well. The results of the assessment will be presented elsewhere, including some studies of possible effects on non-supported regions.

After a short presentation of the declared goals of Swedish regional policy (Section II), the possible meanings of employment effects at the plant level are discussed (Section III). Section IV continues the discussion for aggregates of firms in a region. The regional level closely resembles the spatial specification of the actual policies undertaken. The concepts of ex ante and ex post effects are introduced in Section V. An attempt at clarifying the timing and dating of effects is made in Section VI, after which follows an overview of possible methods to estimate employment effects. Finally, the broad issues analyzed in the Swedish assessment are then presented.

II. THE GOALS

In 1964 when the Swedish parliament voted to pursue an active location policy, it was decided that this policy should aim at promoting a location of industry:

- that makes the supply of capital and manpower fully utilized and allocated in a way that supports rapid economic progress
- that the rising prosperity will be distributed in a way that people in various parts of the country are offered satisfactory social and cultural services*
- that the structural development and economic expansion take such forms and keep such a pace that the security of individuals will be protected
- that the defense of the country will be facilitated

The proposition by the government accepted as inevitable the gradual decline in population of the most sparsely populated, mountainous regions and also smaller localities regardless of governmental actions. Hence location aid to northern Sweden should aim at fostering the growth of the more developed localities that stand a good chance of maintaining development in the future by providing a good service level for individuals, a sufficiently large local labor market to provide varied job opportunities, and a large enough size of the industrial sector.

Although these general formulations of regional policy goals are not very precise the actual choice of policy instruments are detailed enough for a quantitative assessment of the outcome. It suffices to summarize the basic idea of these instruments in the following way: In order to promote employment expansion in the industrial sector of designated regions, *aid should be given only to projects, plants, and firms that are competitive even without that aid.* This implies that regional resource reallocation encouraged by regional aid should not go to a severely deteriorating

*A number of sectoral goals in Sweden have been rather strictly specified with respect to the types of services produced or planned by the public sector.

"sectoral" resource allocation. In other words, the expected positive economic growth from a higher level of employment in the country as a whole through regional policy was not expected to compensate enough for losses incurred by giving aid to non-competitive production.

In 1970 the Parliament decided to prolong the period of an active location policy. The basic idea that the alternative cost of regional policy in terms of economic growth, should, at worst, be small enough to be negligible, then lost some ground. Although economic growth remained as a more important goal than the regional goals, the change of instruments reveals a change in emphasis between the goals. Especially in the extremely sparsely populated area (the so called Inner Aid Area) temporary employment gains, even in contracting or stagnating firms, became more acceptable from 1970 onwards. The demand for increased aid, regardless of the consequences for economic progress of the nation as a whole, influenced the formulation of regional policy goals emphasizing more the equity aspects of regional aid at the expense of the efficiency aspects.

For the first time in 1970, a so called Inner Aid Area was spatially defined, although in fact, investments in this area were already granted before at a much higher subsidy rate than in locations along the coastline of northern Sweden. A Grey Zone was also designated along the boundary of the Outer Aid Area (Figure 1). Thus the main regional policy instrument, the location aid, became more formally established with respect to the degree of subsidization with the highest subsidies for the Inner Aid Area and only subsidies in the form of soft loans for the Grey Zone. The formal recognition of three aid areas differing with respect to choice of instruments and degree of subsidization also implied an evaluation of where the employment effects needed to be the largest. Thus the (relative) size of the employment effects was specified, establishing a better case for an empirical assessment of Swedish regional policy against its declared goals.

The efficiency restriction of the goal formulation and instrument construction became even less pronounced in 1972, when Parliament for the first time approved a "plan for the regional

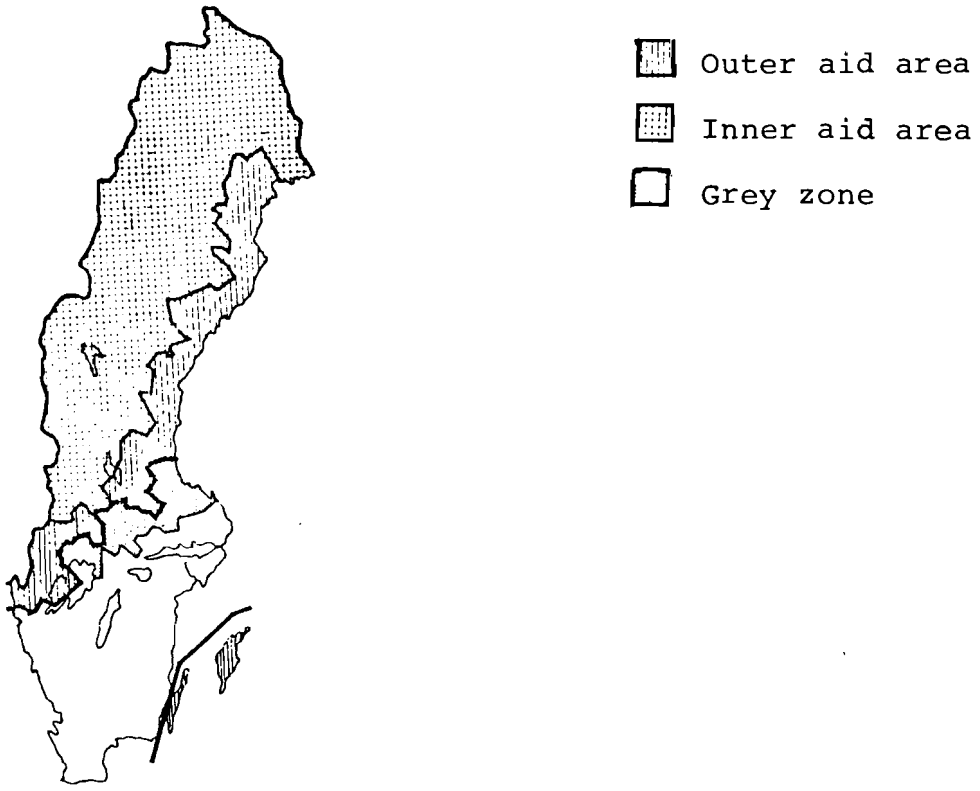

Figure 1. Division of Aid Areas

structure". The idea behind this plan was to create growth poles in each one of the 24 counties and to encourage the establishment of urban systems that could be relatively robust in the sense of withstanding external influences. The relocation of central governmental bodies was seen as a necessary condition for expanding the internationally small middle-sized cities, especially at the expense of the capital city of Stockholm. However, the instruments of industrial location policy remained largely unaffected by the regional structure plan,* in the sense that the governmental authorities accepted the final locational decision by the firm without penalties.

*Opponents of this plan claim that its very existence might have influenced the locational decision of firms, since a location with a low priority could eventually obtain less subsidies or less public investment in transportation, services, etc.

The complexity of regional policy goals as well as the fact that there are other goals with a higher priority probably accounts for the choice of selectively functioning instruments with complicated constructions. As shown in a recent comparison of the regional incentives in the European Community (Kevin Allen et al., 1977) this complexity seems to be common. In any evaluation of regional policy effects, it is important to sort out the relatively more effective incentives from the ineffective ones. In this paper, however, we touch only on the complications introduced by the very selective nature of the various incentives.

III. EMPLOYMENT EFFECTS AT THE PLANT LEVEL

Types of Effects

Regional aid may increase a firm's employment through a lowering of its product prices, factors costs, or risk, or through a reduction of possible shortages of a production factor. Directly or indirectly, these four consequences might in turn produce expansion and entry (and exit) effects, product mix effects, and technique effects. Such effects can be temporary, prevail for a longer period of time, or even cause the firm to choose a different long-run development path. Some aspects of the time dimension of the effects is discussed in a later section. The following three sections clarify only what is meant by technique, specialization, and expansion and entry effects in a comparative static framework.

Technique Effects

Much of the disagreement in Sweden and elsewhere about whether investment subsidies are preferable to employment premiums is attributable to different opinions with regard to the substitution possibilities between the two production factors. If there is agreement on one point however, it seems to be that the elasticity of substitution should be larger in the ex ante (micro) production function than in the ex post production function. The ex ante production function can be regarded as the long-run production function facing a firm when it decides to invest in new production capacity. The ex post production function on the other hand, can be

looked upon as the short run production function of a going firm with relatively small changes in production capacity. Accordingly the long-run elasticity of substitution is larger than the short-run one. Even so, it remains an empirical issue whether the ex ante substitution possibilities are large or small in a small region of a small open economy, which cannot devote much resources on the development of new techniques. Accordingly, if they are large it must be attributable to the ex ante substitutabilities of internationally given production functions.

Suppose first, that the elasticities of substitution of both micro production functions are small for all (or most) products. Then there is a freedom of choice between capital or labor subsidies after their possible product mix, expansion and entry effects on employment. If, on the other hand, the elasticity of substitution is negligible only with respect to the ex post production function, then the construction of incentives might also have to consider whether or not to distinguish between aid to small versus large production capacity increases.

A third possibility* is that both elasticities are large enough to generate significant employment effects. Obviously, the preferable subsidy in the long-run may then be a labor subsidy. However, in the short-run one also has to consider possible capital vintage effects on the competitiveness of the producers of the supported region. If the existing capital stock has an unfavorable age composition and this hampers the producers from gaining larger market shares, the positive expansion effect on employment of encouraging investments may overrule the negative capital/labor substitution effect.

Another important aspect of whether production methods are affected differently by capital, as compared to labor subsidies, relates to the type of investment which receives support and whether a subsidy on building costs will also affect the machinery investment of the firm. In other words, the eligibility of activities might be of considerable importance.

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*Notice that we have already precluded the fourth possibility by assuming that the elasticity of substitution is larger in the ex post production function than in the ex ante.

Summarizing, *an analysis of whether and how subsidies, which are not neutral with respect to factor use, generate substantial employment effects due to large elasticities of substitution, must be considered to be of prime importance for the construction of an incentive system effective in generating long-term employment effects.* Moreover, the ex ante substitution appears to be of particular importance and therefore of interest for further study.

Specialization Effects

The use of factor subsidies may also have considerable effect on the composition of production. Specifically, investment subsidies have been assumed to unfortunately stimulate a capital-intensive specialization in individual firms as well as in the whole supported region. Such a specialization effect can be particularly significant for new firms or for large expansion of existing firms (plants), i.e., the ex ante product mix effect should be larger than the ex post product mix effect in existing plants. This again might suggest the need to differentiate the incentive schemes with respect to subsidies to existing production and subsidies for new entries.

Here it is also of interest to distinguish analytically between intra-industry product and inter-industry specialization effects. If the regional incentives are not discriminating between industries, it is of particular importance to find out whether or not the inter-industry specialization effects, with respect to factor use, are large or small--ex ante and ex post.

Expansion and Entry Effects

So far the effects discussed have been fairly well defined within the framework of neoclassical production theory. This is not the case for every type of expansion effect. A simplistic and admittedly unrealistic framework will be used in the following, merely to illustrate how important the choice of a proper norm of comparison is in the estimation of expansion effects. Since the first and still most important Swedish regional incentive is an investment subsidy, the analysis is carried through in

terms of effects on investments, although these effects can be readily translated into employment effects.

Let us assume that there are four different types of investors facing the same investment projects, which are represented by the marginal efficiency of investment curve (MEI) of Figure 2. The MEI curve has rearranged the projects according to their respective expected marginal return of capital. The curve labelled I indicates in turn how the marginal cost of capital for the firm increases by increasing investment levels, while the curve labelled II shows the equivalent curve under the assumption that the investment is made within the aid area and thus qualifies it for regional investment subsidies. It goes without saying that it is assumed here, for simplicity, that the subsidy is not causing reversals between the investment projects with respect to their expected net return.

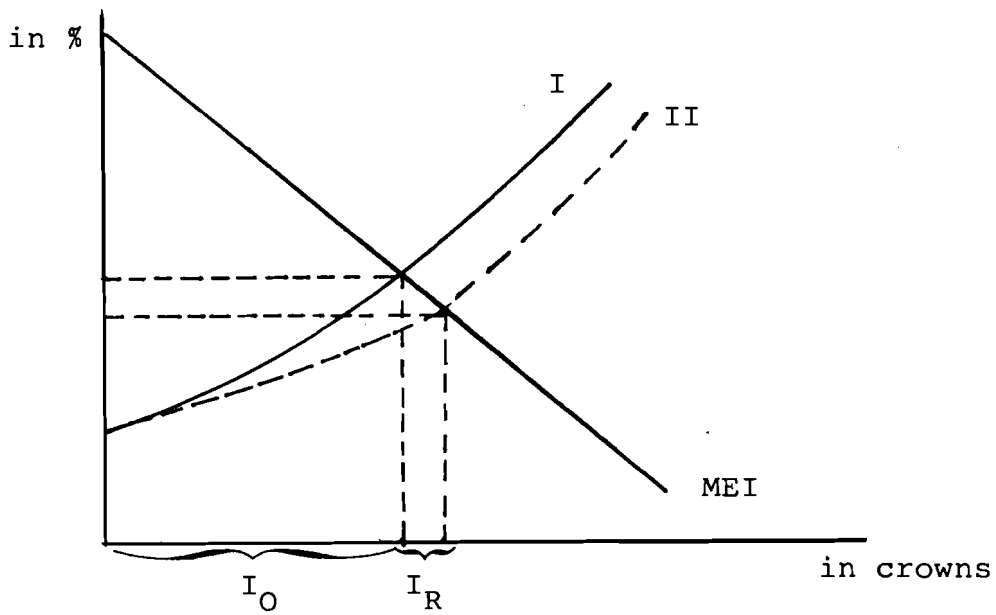

Figure 2. Investments with and without aid.

Suppose we now consider four types of firms:

Case 1 single plant firm located within the aid area
Case 2 single plant firm located outside the aid area considering the establishment of a new plant within this area
Case 3 multiplant firm with plants inside and outside the aid area
Case 4 potential new independent firm

The first type of firm should obviously invest I_O without any aid at all, but should invest $I_O + I_R$ with aid. This being the simplest case, we shall regard I_R, the investment effect of the investment subsidy, as the case against which the other three cases can be compared.

Case two represents the single plant firm considering an affiliated plant within the aid area. Suppose first that the only reason for the firm to consider this is the subsidy it may receive, i.e., that without this aid any expansion would have been located outside the aid area. If there are no extra costs involved in investing in the new location within the aid area (over and above those prevalent for the single plant firm of case one), the total potential investment would be $I_O + I_R$, an amount which will also be the effect of the investment subsidy. Even if the firm in case two should have some additional costs, and the total investment will be less than that of case one, the investment effect may still be larger for the former firm. To the extent that some of its investments would have been made in the aid area, even without the investment subsidy, the derived effect would be smaller.

The firm in case three is a multiplant firm with plants both inside and outside the aid area. Compared to the firm in case two one may note two possible differences affecting the definition of investment effect. First, the multiplant firm would not have the information costs etc. that the case two firm is likely to have. Hence, the total investment will tend to be larger for the multiplant firm than for the single plant firm located outside the aid

area. Secondly, the multiplant firm might have placed some proportion of its total investment in the aid area location even without aid. Consequently, it is not possible to judge whether or not the effect of the subsidies in this case will be larger or smaller than for the single plant firms located inside (case one) or outside (case two) the aid area. However, since total investment will amount to the same $I_O + I_R$ as for the case one firm, the effect in the multiplant firm case is at least as large as in case one, provided that the multiplant firm decides to invest the full amount in its aid area plant.

The fourth case is a new, independent firm considering its first manufacturing investment. This case is somewhat more complicated than the earlier ones since it involves the evaluation of whether or not a) the firm could be established without the subsidies, and if so, b) the firm would choose a site inside or outside the aid area. The simplest possibility is if the firm enters into production inside the aid area, even without regional subsidies. Then this case would be equivalent to the case of the single plant firm inside the aid area (case one, i.e., the aid effect would amount to I_R. To reach this conclusion one must, however, assume the two types of firms to have the same evaluation of risks which is unlikely.

Suppose instead, that the entrepreneur in question was a) living in the aid area and therefore only considering to set up production there, but b) would not have been able to raise the capital* necessary for it had not the government offered regional investment subsidies. Then the aid effect is nearer to the effect of the case of the single plant firm outside the aid area (case two), i.e., the effect is at least I_O and might even reach the amount of $I_O + I_R$. The aid effect will lie in the same interval also for a new firm entry, which would have established itself outside the aid area without aid, as well as for a new firm entry, which could not have established itself anywhere without aid.

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*Due to imperfect functioning capital markets, for instance because of spatial segmentation of the markets, or segmentation with regard to firm size, whether the firm already exists or not.

Summarizing, *the comparison of various firm categories*, in the unlikely situation of all having the same investment projects, *demonstrates that the norm of comparison necessary to subtract from actual investments to obtain the aid effect on investments, may vary a great deal. Hence the aid effect is not at all easily calculated even at a plant level and under extremely simplified assumptions* regarding the investment situation.

So far, one important aspect of the aid effects has been deliberately assumed in our discussion, namely the proper dating of the effects. It is obvious that an aid effect on the rate of production growth of an *existing* plant might alternatively be a) a pure (or partial) redistribution over time of expansion, b) a pure (or partial) momentary capacity effect with no ensuing effect on the rate of growth of production and c) a pure (or partial) effect on the long run growth rate of production. In contrast, none of the above discussed cases, in which the aid effect was connected with the establishment of a new plant within the aid area, can be a pure time redistribution of production expansion. Therefore, the aid effect on the region has, at least in principle, a radically different time profile for new firm entries and affiliation entries in the region than for existing plants. Moreover, a comparison of aid effects during two subsequent periods of time involves, *ceteris paribus*, a bias favoring the second period if the first period had such entries. This is explained by the fact that part of the job effects during the second period are attributable to the momentary capacity and growth rate effects of new firm and affiliated entries in the first period.

Another simplified assumption of the above was that the rate of return on investment projects did not vary among different locations. Generally, one would expect two kinds of cost differences influencing the rate of return, namely differences in absolute and comparative costs. Absolute cost differences are typically due to the abundance of cheap labor and the scarcity of cheap transportation facilities. In terms of Figure 2, absolute cost differences imply the need for explicit recognition of (at least) two MEI curves. They typically increase the complexity of the measurement of regional policy effects with regard to comparisons between time periods and different aid areas.

Far more complexity is, in principle, introduced by comparative cost differences between regions, since they imply different orderings of investment projects according to rates of return in the regions. In the case of absolute cost differences there are only four basic types of relationships between the MEI-curves of two regions.* If, in addition, comparative costs differ, the number of possible cases multiplies.

However, an introduction of comparative cost differences brings the discussion of types of effects beyond the purpose of this paper. It also takes us far out of the partial equilibrium framework used in this section merely to identify the difficulties in estimating expansion and entry effects for various firm categories. The analysis points out an intricate timing problem of regional policy connected with the proper identification or diagnosis of the regional disequilibrium. Is it sufficient to speed up the adjustment of the region's present (initial) industrial sector by removing some bottlenecks for its expansion *or* is it necessary to reallocate part of the industry of the south? The former case is more likely if the regional employment problem stems from the development of other sectors, e.g., agriculture, and the industrial composition of the region is good with respect to growth of demand and international competitiveness.

If, on the other hand, the regional employment problem stems from the industrial sector, it may be necessary to organize the means of regional policy in a way which attracts new firms and affiliation entries. Means, which are attractive for such entries may differ from means which attract existing firms, if the two firm categories have different bottelneck factors.

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*Two cases of intersecting MEI-curves and two non-intersecting ones. However, for the two non-intersecting cases it also matters whether or not even the projects with the lowest rates of return of the region with an absolute cost advantage have higher rates of return with an absolute cost disadvantage. It should also be noted that a region contrary to a nation can experience such a general cost disadvantage, since there are no equilibriating mechanisms correcting prices through exchange rate adjustments. Instead, factor flows, i.e., outmigration of labor, might prevail to the extent that the region is drained of most of its productive labor force.

This section has demonstrated the various possible effect concepts that are connected with expansion and entry effects at the plant level. A complete classification should also have included effects which limit the stagnation, contraction or closure of firms in the aid area. However, for the purpose of the present paper, the analysis of effects at the plant level may stop at this point. The ensuing section will, instead, introduce a few concepts which are necessary at the regional level of aggregation.

IV. TYPES OF EFFECTS AT THE REGIONAL LEVEL

The preceding section treated types of effects at the micro or plant level. However, it is the regional (or county) level which is the most politically appropriate or empirically suitable level of aggregation for evaluation of the possible employment effects of regional policy. At this level, it is of interest to sum up not only all primary effects in the directly supported plants, but also indirect effects of various kinds. The "gross" effects obtained by summing all (non-negative) primary or direct derived effects are in many ways less interesting than the "net" effects derived by taking account of all types of positive and negative employment effects. A full-blown analysis of all types of effects requires, however, first of all an extremely good knowledge of the structure and development of the regional economic system and its various linkages with other regions (and countries). Secondly, it demands information about all regional aid translated into a regional incentive system. No requirement was fulfilled in the Swedish case. Partly for this reason the evaluation of possible employment effects was not directed towards a coverage of all the effects in a single net effect measure. Instead, it was considered more reasonable and interesting to find out the relative importance of certain possible effects, in order to throw some light upon the working of the reginal economic system during a period of heavy and varied subsidies.

One way of structuring the impact of regional subsidies is to distinguish between positive and negative effects on regional employment. The following five *job creating effects* are among the

most obvious and interesting:

1. the primary and direct effects in supported plants (see Section III for a discussion of various types of effects at the plant level),
2. the indirect, intra-regional effect due to increased regional purchases of raw materials and intermediate goods from directly supported plants (the intra-regional, intermediate trade effect),
3. the indirect, inter-regional effect due to increased purchases of intermediate goods from supported plants in other regions (the inter-regional intermediate trade effect),
4. the induced, household consumption effect, attributable to enhanced regional purchases following increased household incomes of the direct and indirect job effects,
5. other indirect effects and multiplier effects of the enlarged size of the regional economy.

Likewise, the most obviously interesting negative job effects or *job distinguishing effects* are the following:

1. the intra-regional impact of competition in commodity markets (local, regional, and national or international markets),
2. the inter-regional impact of competition in commodity markets due to aid in other regions,
3. the indirect effects of the intra- and inter-regional competition effects due to reduced purchases of intermediate goods,
4. the indirect effect of reduced purchases of intermediate goods from those producers inside and outside the region, which have been negatively affected by regional support,
5. the intra-regional impact of increased competition for regionally limited production resources, whose impact is attributable to price and quantity responses of regional factor markets to expansion effects of regional aid.

The general conclusion of this simple listing of possible job effects at the regional level, is that the same incentive system might work very well in one region but poorly in another due to the differences in the structure and complexity of the regional economic system. Suppose, for instance, that we compare two regions of equal size and that the only notable differences between them is that Region A has a diversified production structure in contrast to Region B, which is highly specialized in certain products. Suppose further that regional aid is constructed mainly in order to foster expansion of existing industries. Such an incentive system can be assumed to promote employment better in Region A, than in Region B, since the latter consists of producers competing in the same commodity and factor markets. Hence, the employment effects counted net for the region, will be relatively small, even though the gross effects may be large. In the latter case, the aid may even have had unwanted, distorting, intra-regional effects on local labor markets. The subsidies may spill over into the factor markets, inflating local factor prices with secondary, negative effects on the competitiveness of the producers in external markets.

This case exemplifies the difficulties of constructing an incentive system of regional policy, which has an effective *regional differentiation*. Typically, the regional policy means in Sweden and other countries, although complex in other dimensions, do not take into account these difficulties. Instead, demands on new means or increased subsidies arise after a while in regions which have not benefited substantially from past regional policy. At least in the Swedish case, this has led to an incentive system in the middle of the 1970s which has not been understood with respect to its inherent regional, industry, and type of firm differentiation.

V. EX ANTE AND EX POST EFFECTS

Ideally, an assessment of employment effects of regional policy should try to separate between so called ex ante and ex post effects. To some extent, we touched upon the distinction between these two types of effects in our discussion of technique effects. However, the same distinction can be applied to other effects also.

A general definition of the ex ante effect is the following. The ex ante effect is the impact of regional policy under the restrictions

a) that there are no changes in the uncontrolled exogeneous variables of the regional economic system,
b) that there are no (unexpected) side-effects from changes in government controlled variables, which are not considered as means of regional policy,* and
c) that the government's expectations of the functioning of the economic (and social) system are correct.

Suppose that, as was true for Sweden in 1978, past regional policy had not reached its goals to the extent that it was possible to reduce the aid to at least parts of northern Sweden. Instead, the regional problems were regarded as being serious enough to motivate a proposal, made by a parliamentary committee, of a drastic increase in, for instance, the subsidies to industry. In this case, it would have been extremely valuable to have separate estimates of what might be called partial ex ante effects** namely the three partial ex ante effects obtained when one of the assumptions a), b), or c) above are abandoned. Such a separation could lead to completely different conclusions as to how to improve the construction of the regional aid system. However, no effort was made to distinguish between alternative causes to the lack of fulfillment of regional policy goals.

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* Notice that such side effects are not treated at all in L. Johansen (1977). However, the size and complexity of the public sector in developed countries means that the actions of the public sector is extremely difficult to coordinate.

** Or partial ex post effects.

Obviously, the ex post effects of regional aid (measured in net terms for the aid areas) must have been considered too small. By ex post effects we mean the actual realized impact of regional policy when in fact circumstances (see a-c above) may have been different from the expectations at the point of construction of the aid system. The fact that there are only slight changes in the means of this policy but substantial increases in the degree of subsidization may be assumed to imply that the main reason for the non-fulfillment of regional policy goals for any part of northern Sweden, is implicitly believed to be an earlier under-dimensioning of the level of subsidization.

In summary, an assessment of regional policy effects to be used in policy work needs, ideally, estimates of both ex ante and ex post effects. Only an ex post estimate of the total employment effect (net or gross) for a given area cannot usually be used to guide policy makers on how to improve the construction of the regional aid system. It may, however, under restrictive assumptions, lead to conclusions regarding the dimensioning of the regional subsidies.

VI. THE TIMING AND DATING OF EFFECTS

Two aspects of the time dimension are the timing of effects and the dating of effects. The former concept relates more to the actual policy problem, whereas the latter is more related to the time specification of the measurement of employment effects. They are, however, interrelated, as suggested for instance by the discussion above in Section III about the choice of a proper norm of comparison for various firm categories. As the construction of regional policy means is actually made in Sweden, it would be extremely difficult to empirically illuminate the timing of the effects of, say, aid in a given year or for a given plant. Therefore, the timing effects are not discussed further.

The dating of effects is an important empirical problem, which will be treated here, merely for ex post effects. It has important bearings upon the issue of whether or not it is possible to design an aid system under the principle that it can be

abandoned after a distinct time period. For this reason, one would ideally not like to limit the scope of an evaluation to only the estimation of (net, ex post) effects in a given year, but rather have the ambition to estimate sequences of effects (gross, ex post) year by year for separate vintages of aided firms. In the latter case it would be possible to get an idea of whether or not the early effects declined by the passing of time for instance, as a consequence of ex post changes in technique or of the initial expansion effect proving to be a mere time redistribution effect.

Obviously, the dating (and timing) of effects has important consequences on the interpretation of the results. An employment effect for a period, which is calculated in end year technologies (a point in time effect) tells a different story from the one which is estimated in man-years for the sequence of years (a cumulative effect) of the same period. Thus, the actual choice of dating of the effects is not primarily a matter of methodology or data availability, but rather very much a concern of the possible users of the effect estimates.

This section ends the typological part of the present paper. An apparent conclusion of the above discussion of employment effects is that the choice of methods of measurement is not at all a matter that can be left completely to the economist to decide. It is primarily a matter that has to be decided by the user with a good knowledge of the purpose for which the estimates are needed. Considering that even the incomplete coverage above includes roughly two hundred effect concepts, the choice of definition to be used is far from an easy task. Theoretical, methodological, and data restrictions will actually put a much lower limit to the number of possible effect definitions. It is not often explicitly recognized that these restrictions also limit the field of application of the empirical results.

VII. AN OVERVIEW OF METHODS TO ASSESS EMPLOYMENT EFFECTS OF REGIONAL POLICY

The abundance of effect definitions is far from matched by a similar richness of the number of efforts to estimate employment effects of regional policy. Only in the 1970s did such studies of British regional policy appear. The Swedish study of 1978 is the first among the Nordic countries, which includes such estimates. In this respect, studies of the possible effects of changes in trade policies have a longer history. The first estimates of ex ante effects were published in the late 1950s, then stimulated by the establishment of the EEC and EFTA.* The following review of possible methods includes some references to trade policy effect studies, because of the apparent similarity in the analytical structure of the analyses of the two policy fields.

The following review does not aim at full coverage.** It begins with a critical evaluation of earlier Swedish efforts to assess regional policy. The ensuing section covers possible methods of studying ex ante effects. The discussion of ex post effects is divided into two parts, the first one of which treats so called implicit methods and the second, explicit ones. The distinction between the two kinds of ex post effect methods lies in the fact that the latter ones utilize explicit measures of regional incentives in the calculation of their effects.

Earlier Swedish Attempts at Evaluation

There have been three types of figures on "employment gains" through regional policy, two of which have even been declared to be estimates of job effects. One is based on the figures revealed by the individual firms on the application for so called location aid (investment subsidies and soft loans). They have

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*For references see Williamson and Bottril (1971) and Lundberg (1976), chapter 8.

**According to Stöhr, W. and F. Tödling (1977) there are extremely few studies which have aimed at quantifying effects of regional policy.

occassionally been summarized and compared to the second type of figures more or less strongly claimed to be measures of job effects, namely the "job effect" according to the individual firm at the end of a selected year. A third type of "employment gain" figures have been published in earlier reports from the Expert Group on Regional Studies. They simply contain changes in total employment of supported plants before and after support with some subdivisions of "aid vintages" of firms.

The three figures come up with the same values for the employment gains or effects. Considering the basic differences in methodology this is surprising. Under certain assumptions,* the first type of figures may be called ex ante, gross primary effects of directly supported firms. As with all gross, ex ante effects they do not arrive at estimates of the individual firms which are consistent with each other. Summarized to the regional level they do not, therefore, add up to a consistent estimate of the ex ante, primary employment effect in directly supported firms.

The ex post employment effects reported by the same firms are very different in nature.** Being ex post figures, they form perhaps more consistent aggregates than ex ante figures in the sense that the expectations of the firms have been exposed to the same factual development. If the firm's average expectations of the business cycle and general economic growth are approximately correct, one might perhaps argue that ex ante and ex post figures will be more or less similar. However, there is one major reason to believe that they should normally be different. The reason is, of course, that the individual firm cannot know the future regional aid that will be given to other firms, some

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*Two obvious prerequisites are: a) the firms must all use the same norm of comparison e.g., the employment development without any location aid or any regional aid at all, and b) the figures that the firms report should not affect whether or how much aid they are granted.

**Moore and Rhodes (1976) report on an effort to estimate certain effects of the Regional Employment Premium from an enquiry to aided firms. It is difficult to judge from this report whether or not distinct and similar enough norms of comparison were imposed on the firms asked.

of which may compete with that firm directly in local factor markets or in commodity markets. Therfore, it would be unlikely to obtain the same aggregate ex ante and ex post estimates of gross effects in directly supported firms, if the firms on each occasion try to do the calculations properly.

Even more suspect is the fact that the official, industrial statistics show that the total increase of employment of the supported firms are about the same as the two mentioned ex ante and ex post "effects". Of course, it is tempting to draw the conclusion that what the firms have reported is the *expected total* increase in employment of the supported plant, and the *factual total* employment increase (to two different collectors of statistics). It is, in any case, safe to say that none of the three types of figures reporting "employment gains" of plants supported under the location aid in Sweden do reach the level of quality and preciseness that an estimate of *employment effects* would have to stand up to.* The same conclusion probably holds for similar industrial countries.

Ex Ante Effect Methods

To our knowledge there have been no estimates of ex ante effects of regional policy published in English.** Allen et al., (1977) take the first step towards such estimates for a number of EG countries, by modeling the regional incentives of the aid systems of these countries.*** However, the subsequent and difficult steps of transferring the cost reducing incentives into employment effects are not undertaken here.

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*Earlier Swedish reappraisals of regional policy have met better quality standards in analyzing, for instance, how the wage level, wage structure, labor productivity, and factor use of supported firms are related to those of comparable non-supported firms. Hence, these reappraisals have been focused more on another goal of regional policy, namely that of supporting or at least not sizeably limiting, Sweden's economic growth.

**The Swedish assessment of 1978 (SOU, 1978b) contains, however, an effort to estimate possible ex ante effects on choice of technique in firms receiving investment and wage costs subsidies, respectively.

***A more full-blown approach to modeling a regional incentive system is used in the 1978 Swedish assessment, but it is mainly used to a) illuminate construction failures of the Swedish aid system, b) reveal whether declared changes in regional policy goals have led to factual changes in the means used, and c) to establish hypotheses regarding the relative size of employment effects (estimated ex post) by aid areas, sub-period and categories of industries.

In comparison to regional policy studies, the literature on effects of tariff policies is fairly rich in its analyses of ex ante effects. Examples of ex ante effects estimated for EEC, EFTA and some recent proposals put forward in multilateral tariff negotiations are Balassa (1967); Balassa and Kreinin (1976); Cline, Kornsjö, Kawanabe and Williams (1975, 1976) and Krause (1968).* The methods used are based on more or less detailed estimates of import elasticities of various commodity groups. The possible price cutting effect of the tariff costs can then be handled using assumptions about which countries or group of countries are price-takers or respectively, price-leaders.

Similar calculations of regional policy cannot be done because of the non-availability of regional trade statistics. It may, however, in some cases be possible to estimate ex ante effects for small regions which can be assumed to be price-takers for their traded products, by calculating supply elasticities of their total production.

Although total employment effects which are measured ex ante may be difficult to calculate for regional policy, the measurement of other types of ex ante effects meet with less data problems. For instance, the calculation of ex ante effects on choices of technique and product mix require more easily obtainable data. Even in this case, however, the measurement is a quite laborious procedure due to the fact that one has to combine register data of mixed quality (at best) and regular production statistics for rather long periods of time.

Summarizing, the estimation of total employment effects, ex ante, can probably be ruled out for practical purposes. Ex ante effects are normally studied best for historical time periods when focused on issues of importance for the actual choice between means which are, in principle, not neutral with respect to their effects on factor use, product mix, and entry and exit rates, and which may be applied under different selectivity schemes. Another important field of application for ex ante methods is the modeling of regional incentive structures from

*These studies have not attempted to calculate employment effects.

proposals of various regional aid systems in order to detect, before actual introduction, basic unwanted construction failures, with respect to their inherent regional, sectorial or firm category differentiation.

Implicit Methods of Estimating Ex Post Effects

In most fields of economic policy, government action must be taken before much knowledge can be gathered in a systematic way through research. The study of ex post effects* is therefore perhaps more useful than that of ex ante effects, at least if the results can be published and digested well before the policies are to revised. Another reason for the relative abundance of studies about ex post effects is the fact that some of the methods are more easily applied on existing data.

Most studies of ex post effects of trade policies and almost all such studies of regional policies rely on methods which do not explicitly include measures of the incentives actually assumed to have caused the "revealed" effects. These methods can, therefore, be labelled "implicit methods". They are more or less based on an approach which, in regional economic literature, is known as shift-share analysis.** In this literature, the change in regional (production or employment) growth is attributed to three components, namely a national growth, an industry-mix and a competitiveness component. Foreign trade literature is sometimes also distinguishing a country-mix component to take account of the influence of differential growth rates of a nation's (export) market.

The cited studies and other studies using shift-share techniques do not have a strong theoretical underpinning of approach; they more or less explicitly acknowledge the fact that the decomposition analysis is based on an identity. In contrast, the studies of effects of regional and trade policies must rely

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*And ex ante effects for a historical period of time.
**Recent contributions, including background references are from Herzog Jr. and Olsen (1977) and Paraskevopoulos (1974). The first well known international contribution was Tyszynski (1951) whose study for Swedish postwar export growth was complemented in Ohlsson (1969). Maizel (1963) was another early contributor to this field.

on the existence of some theoretical basis for the approaches used. The theoretical basis of "shift-share analysis" is somewhat better established in the trade policy field.* Nevertheless, even in this field, the theoretical underpinning must be considered relatively weak.

As partly indicated in earlier sections, the theories needed for estimating regional policy effects must normally be more complex than those for estimating tariff policy effects. The prime reason for this is the use of selective rather than general policy instruments. In addition, the analysis of regional policy effects must be formally based on multi-country models, in the usually small Western European economies (distinguishing at least between the supported region, the rest of the country and the rest of the world). Moreover, regional policy analysis is sometimes complicated by the gradual extension of the supported regions.

Applied tariff policy and regional policy studies differ from each other in two respects. The former usually directs interests on commodity trade and in some cases production effects while the latter have, so far, concentrated on employment effects. To some extent, this may explain the fact that, while tariff policy effect studies are using a market share analysis, regional policy effect studies seem to rely on employment share methods.** The two methodologies applied to estimate the same regional policy effects will arrive at different estimates unless the labor/output coefficients of the supported region develops at the same

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*Compare for instance with theories of trade creation and trade diversion dating back to Viner's pioneering work (1937). A recent contribution is Lundberg (1976). One of the main problems in using trade theories in the context of the present study is the fact that the relevant trade theories fall apart into two methodologically separate approaches. One approach is the multi-country models of the trade creation, trade diversion literature, which is based on partial equilibrium analysis, and the other, the multi-sectoral, two country framework of general equilibrium analysis. However, see the recent contributions by Horiba (1973, 1974).

**A contributing factor may be that all regional policy effect studies are for Great Britain, a country without published regional breakdowns of manufacturing production.

rate as the national average. One reason why they may not do so is, of course, the earlier discussed technology effects of using regional policy instruments which are not neutral with respect to factor use.

The second difference between applied studies in the two fields, is that regional policy effect studies are typically based on norms of comparisons derived from the employment share trend in a period (almost) without regional policy aid. Tariff policy effect studies have, instead, departed from a situation with high tariffs and with distorted commodity and factor markets. They are either constant market share methods or trends in market share methods,* i.e., they rely on two distinctly different assumptions about what the future development would have been without the studied tariff decreases. Usually the actual choice of assumption is not motivated by theoretical and/or empirical analysis.

The implicit methods of calculating ex post effects of British regional policies are more or less all trend projection methods.** Apart from an econometric time series analysis used by Moore and Rhodes (1976, 1977) no method introduced explicitly any measure of, or proxy variable for, the regional aid actually distributed.

In conclusion, available methods used in the study of regional or tariff policy effects can all be criticized on two fundamental points. First, the effect concept is not defined very well; in fact some studies which are ambitious enough to include results from more than one method do not clarify that the underlying effect concepts are, at least in principle, different.

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*Williamson and Bottril (1971); Lundberg (1976).

**See Brown (1972); Buck and Atkins (1976a); MacKay (1976); Moore and Rhodes (1973, 1976, 1977); Randall (1973); and Weeden (1974). Compare also Buck and Atkins (1976b) who report the first results of an analysis of possible technology choice effects of regional policy. However, the methodology used is to estimate CES-production functions, which restricts the field of applicability to factor substitution without distinguishing between ex ante and ex post substitution. Moreover, the analysis did not separate supported from non-supported firms, which leaves open to some doubt whether or not substantial ex post substitution has in fact taken place in supported firms. Finally, it is possible that the results obtained are influenced by the heterogeneity of the industry aggregates for which estimates were made.

Secondly, the theoretical underpinnings of the various methods are weak. In the case of regional policy effect studies it is apparent that data availability has put a limit to the possibilities to actually choose between alternative methodologies. Some methodologies are extremely data consuming.

Explicit Methods of Estimating Ex Post Effects

To our knowledge, there are as yet no published studies of ex post effects which have explicitly relied on measures of regional aid for the estimation. Weeden (1974) and Buck and Atkins (1976a) used in their analysis of variance methods, regional and industrial dummy variables, where the regional dummy variable may be looked upon as a very rough proxy variable for regional aid. The main reason for the complete lack of explicit methods for calculating ex post effects is the lack of complete computerized registers of the regional aid systems.

VIII. CONCLUSIONS FOR THE SWEDISH STUDY

The abundance of effect concepts reported in Sections III-V, stand in sharp constrast to the limited number of studies of regional policy effects. Such effects have earlier been calculated only for Great Britain, where data shortcomings seem to have restricted the freedom of choice with regard to possible methodologies.

At the point in time when the methodological choices were made for the Swedish regional policy effect study, the following data shortcomings were foreseen. First of all, no computerized registers on regional aid were available. In fact, only registers on two kinds of regional incentives could be handled manually.* Therefore, pure explicit methods had to be left out of

*Namely the investment aid and a marginal employment premium. The time spent on manufacturing these two registers to a form, which could be used for putting together industrial statistics and for establishing a data based on entries and exists of supported firms (from a special enquiry), are estimated at roughly half a man-year.

consideration. Only some pseudo-explicit methods could be used for the study of the existence of certain *possible* technology, specialization, and entry effects.

Secondly, the raw data for the year 1975, which had to be picked as the end year of the period 1965-75 for business cycle reasons, could not be delivered earlier than half a year before the final results of the entire study were to be reported to a Parliamentary committee.* Apparently, the shortage of time for manufacturing data tapes, correction of errors of data, etc., severely limited the time for testing methodologies on actual data. Partly as a consequence of the risks this involved with regard to the possibility of utilizing the results in the ongoing revision of the regional policy, it was decided** that the analysis should not be restricted to one single issue and be based on only one methodology.

When the effect study was planned, four basic analytical issues could be distinguished from the governmental guidelines of the parliamentary committee mentioned above, and from discussions with the public and non-public debate. These four issues were the following:

1. How many jobs have been created?
2. Where were the jobs created? Is it possible to improve the geographical distribution of effects and is it preferable for economic or other reasons?
3. Which means have been functioning best from the point of view of job creation (in the long run) and economic growth? Is it true that investment subsides affect positively the capital intensiveness of production?
4. How does regional aid affect the local labor markets and the welfare of human beings? Is it true that it mainly helps the labor categories with an already high labor market status? If so, what might be an alternative type of policy?

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*This committee has the task of revising the Swedish regional policy system.
**A decision taken by the author of the present paper, who was responsible for the research design of the whole study.

The emphasis of the Swedish regional policy effect study was deliberately laid on the third and fourth issues. Although estimates of the job effects were quantified, they were originally considered to be of minor importance. One reason for this evaluation is evident in Sections III - V. There are simply too many possible effect concepts around to bring over the full message to the users of the estimates. The second issue was not considered to be empirically possible at a point in time when no earlier studies of policy effects were available. Therefore, the Swedish study distinguishes only between three aid areas with regard to the full-blown analysis of job effects. However, this analysis is complemented by more geographically detailed descriptions of the development of labor participation rates and the distribution of regional aid.

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