

AN ECONOMIC DEVELOPMENT POLICY FOR CAMBRIDGE:
EMPLOYMENT AND STABILITY

by

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Abstract

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This thesis is a presentation of a particular economic development policy for Cambridge based upon an analysis of the local economy and its external constraints. The analysis reveals that the two greatest economic problems facing Cambridge are the loss of manufacturing employment and an unstable industrial mix, caused by the dominance of the universities and durable manufacturing.

The policy focuses on these two problems. An analysis of several strategies indicates that the most feasible alternative is to attract industries which alleviate these problems. Criteria are established which select industries that would be most effective in providing employment for displaced workers and increasing stability. Additional criteria are used to limit the industries to those which might be attracted to Cambridge, permitting a more efficient search for firms.

Lists of effective and efficient industries are produced and recommendations are made for refining the criteria and the selection process.

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Chapter 1

INTRODUCTION

One of the major problems facing Cambridge is creating and maintaining a strong local economy. A healthy, properly functioning economy means more jobs, more tax revenues, higher incomes and happier politicians. (All this and apple pie, too!) Only the naive and the unelected stand in the way of economic development. However, Cambridge can ill afford to woo every prospective employer; its limited resources would soon be expended. Its efforts, therefore, should be directed towards attracting those industries which are best for Cambridge and at the same time might seriously consider locating there.

At this point the discussion could end for want of a cause. There is no "best" industry or group of industries for Cambridge. A firm in one industry might provide 100 people with \$5,000 jobs whereas another firm in a different industry might provide 5 people with \$100,000 jobs. Still another firm might only employ 10 people at \$3,000 jobs, but create an additional \$1,000,000 in property tax revenues to the city. There is no objective way to choose the best alternative among these until the purpose of economic development is defined. That definition can and should be made by the legislative arm of Cambridge, the City Council. It is the Council's responsibility to evaluate alternatives and set policies. Once this is done, the duty of the executive branch, the City Manager and the

agencies under him, is to carry out these policies in an efficient manner.

This paper is a presentation of a particular economic development policy for Cambridge based upon an analysis of the local economy, and the strategy that will most effectively and efficiently implement that policy. It will be argued here that the purpose of economic development in Cambridge should be

- 1) To provide employment for the unskilled and semi-skilled residents of Cambridge, and
- 2) To encourage stability in the Cambridge economy.

The significance of this policy lies in concentrating on the above goals, rather than including them in a broad spectrum of competing goals. For instance, it might be reasonable to include the attraction of high growth industries as one goal of economic development, but unless high growth industries employ large numbers of unskilled and semi-skilled workers or are very stable, such a goal would only diffuse the city's efforts. Directing those efforts at a limited but well chosen set of objectives is the best means of actually bringing about development that will help the city. However, it should be recognized that such a narrowly defined policy necessarily reflects subjective judgments which must be accepted before the policy itself is adopted. These judgments will be explicitly presented in Chapter 3.

If the policy is accepted as both legitimate and desirable for Cambridge, the problem of implementation still remains. It is argued here that the most effective program to implement the preceding policy is to attract those industries which:

- 1) Have a high percentage of unskilled and semi-skilled workers, and

- 2) Do not have strong economic links to the universities.

The industries which will fulfill the above criteria are the most likely to meet the objectives of the policy, but they are not necessarily the industries most likely to locate in Cambridge. A widget manufacturer might look perfect to the city, but if he is unwilling to move here, nothing will come of it. He must be induced to locate in Cambridge, either by market conditions or subsidies. It will be shown in Appendix VII that subsidies for this purpose are an extremely heavy burden on a community with questionable results. Therefore, the city will have to attract those industries which might locate in Cambridge based on market conditions. It will be demonstrated in this paper that the most efficient means of doing that is to select industries such that:

- 1) The industry has high growth relative to other industries in the United States.
- 2) The industry has grown faster in the Massachusetts region than in the rest of the United States.
- 3) The likelihood is great that a firm in that industry would desire a central city location.

The industries which meet these criteria are the ones which are most likely to be attracted to Cambridge. They are distinguishable from the previously stated criteria in that the latter are designed to select industries which are most effective in fulfilling the stated policy objectives, whereas these criteria, by selecting good prospects from among the effective industries, simply make the search for specific firms more efficient. Thus, failure to meet one or more of the efficiency criteria does not eliminate that industry from consideration; it merely gives that industry a lower priority since the risk of being unsuccessful in attracting the industry is higher.

What is meant by "attracting industries" is designating a full time staff which will advertise in appropriate trade or professional journals, make formal and informal contacts, conduct mail campaigns, provide information and otherwise attempt to persuade firms to locate in Cambridge. The underlying assumption of this program of selecting industries and trying to attract firms in those industries is that economic development is primarily salesmanship. (This assumption will be justified in Appendix VII). Selecting industries is, in effect, segmenting the market and focusing the sales efforts in areas with high potential "sales." Attracting industry then becomes a process of "selling" Cambridge to firms within the potential market on the basis of its desirability for them. This means that factors which affect that desirability must be inventoried and monitored to enable "customers" to make their decisions. Such an inventory and mo-

monitoring system, although a necessary component of the economic development process presented here, is beyond the scope of this work and will not be developed.

In summary, the purposes of this paper are:

- 1) To present and justify a specific economic development policy for Cambridge.
- 2) To outline how that policy can most effectively be achieved.
- 3) To outline how that policy can most efficiently be achieved.

In order to achieve these purposes, the paper analyzes the Cambridge economy and the external factors which significantly influence it.

Chapter 2

ANALYSIS OF THE CAMBRIDGE ECONOMY

Introduction

Cambridge is undergoing significant changes in its economy, its housing market and its population, changes which are at the root of difficult problems facing its citizens and government. Before solutions can be found to those problems, the changes themselves must be enumerated and understood well enough to evaluate the effects of suggested policies. The present discussion is not a comprehensive list of all of the interesting or important things that are happening in and to Cambridge; such a listing would be endless. Rather, it is a selection of those events which illuminate the policies offered in this paper. Since those policies deal with economic problems, the abbreviated list will consist primarily of economic changes but other relevant occurrences will be included as well.

To place the local events in perspective it is necessary to review the contexts in which they occur; the backdrop of national, regional and urban economic trends must be hung. This is so because a local economy is affected by many external forces which it cannot influence even with the aid of local government. Important economic forces, such as the size of the available labor force and the demand for products, are not limited by city boundaries. Additionally, in our federal system local government is the weak sister of economic policy; many of

the important economic variables such as interest rates are outside of its legal domain. Other tools which are within that domain such as taxation or expenditures on municipal services are ineffective without either the cooperation of surrounding municipalities and the higher levels of government or financial resources far beyond those presently available. Failure to realize this can result in undue importance being attached to local factors. For instance, the exodus of manufacturing firms from Cambridge might easily provoke criticism of the high tax rate as a significant cause of that exodus. However, when weighed against the long-run technological changes in manufacturing, the increasing importance of highway transport relative to railroads and the encouragement of new investment by the federal tax structure, the influence of the local tax rate diminishes in the manufacturers' decisions to move. Knowledge of such exogenous factors creates a better understanding of internal events and facilitates a more realistic assessment of the effects of city policies on the local economy.

The Nation: Structural Changes and Economic Cycles

The national economy influences Cambridge through both long-term structural shifts, largely related to technological change, and short-term fluctuations which are associated with business cycles and national politics. Fortunately, the structural shifts do not occur rapidly, and if properly monitored, at least foretell the economic prospectus; they can be planned for in a positive fashion, taking advantage of the favorable trends and

possibly avoiding unfavorable impacts. This can be done in detail due to the ample time for planning. Short-term fluctuations, by definition, do not permit such foresight. They can only be planned for in a tentative manner, contradictorally trying to insulate the local economy against the ill effects of unemployment or inflation while keeping it open during periods of expansion. Despite the inability to predict when and to what extent these various events occur, they will certainly occur at some point and judicious planning can at least dampen adverse impacts or amplify desired consequences. Nonetheless, both the long-term drift and short-term vacillations in the national economy must be accepted as rigid constraints in local economic development.

Two major changes that are taking place in the economy and have been at least since the turn of the century are the increasing use of capital equipment which contributes to more efficient production¹ and improvements in transportation such that its costs have decreased relative to other costs.² They are linked to several other significant changes. Decreasing transportation costs have made it economically feasible to expand both markets and sources of supply to a larger geographical area. Although the cause and effect relationships are not entirely clear, this expansion of supply and demand coupled with capital's additional production efficiency has certainly created an environment conducive to larger units of production and greater specialization among products. In fact, the average sizes of both the

physical and institutional units of production, factories and firms, are growing. Specialization also has occurred. Not only are there a greater number of distinguishable industries, but they are becoming increasingly concentrated in particular regions.³

At least partially related to these trends are long-term changes in the occupational structure. Much has been said about the effects of automation on jobs and the displacement of workers, but contrary to popular opinion, the increased usage of machines has not led to a need for more skilled workers. In fact, unskilled and semi-skilled workers, which were 57.27% of the work force in 1960, are expected to comprise 58.64% of the work force in 1975. However, within that group the type of work is changing. During the period 1960-1975 blue collar semi-skilled or unskilled occupations are expected to increase from 33.79% to 37.68% of the labor force.⁴ This reflects the growing importance of the service, finance, government and trade industries in the economy and the stabilization of manufacturing, at one time a significant growth sector. Manufacturing output and jobs have grown but not at a rate faster than the economy as a whole.⁵

The growing significance of the government sector is also a factor in short-term economic fluctuations. Although employment within the government structure itself has remained fairly stable, the subjugation of federal fiscal policy to volatile political and economic viewpoints make industries linked to

federal spending potential sources of instability. An example of this is the current cutback in federal defense contracts and its effects on Massachusetts industries.⁶ Durable goods manufacturing can also create instability, although it is not necessarily the initial cause as in the case of federal spending. During periods of recession, consumer and producer purchases of durable goods, such as refrigerators, cars or heavy machinery, are generally the easiest and, consequently, the first to be deferred, creating a drop in demand for durable goods. Therefore, significant cutbacks in production and employment are likely to occur, adding to the ill effects of an existing recession. Such secondary cutbacks are less likely to occur in production of nondurables such as food and clothing. The implications for Cambridge of these national changes in production and employment will be discussed in the summary at the end of this chapter when they can be integrated with information about the regional and local economies.

The Region: Slowing Down

Massachusetts, along with the rest of the New England region, suffers from three major economic handicaps. First, a dearth of natural resources makes it necessary to bring them in from other regions, and the additional transportation costs result in higher material costs relative to other regions. Similarly, a westward shifting population has pushed markets farther away, saddling finished products with higher transport costs as well. Finally, a number of elements make production costs higher.

Labor wage rates are high, power sources are scarce and therefore expensive, property taxes in many areas are burdensome and much of the state's industrial equipment and physical plant is obsolete.⁷

Massachusetts' disadvantages are partially balanced by several favorable factors. As one of the first "industrial" areas in the country it has developed a skilled and stable work force. A small but significant portion of that work force are the highly trained and specialized graduates of its fine universities. In addition, it has a relatively diversified industrial structure enabling it to support new firms. The large markets of the Washington-Boston seaboard region, although growing at a slower pace than the rest of the nation should still be a substantial attraction to demand-oriented industries.⁸

Generally the net effect of these favorable and unfavorable factors is growth in employment and production in Massachusetts, but at a rate slower than the U. S. as a whole. This has not however, been true for all industries. The textile industry and the shoe and leather industry have declined in absolute numbers employed in the post-war period.⁹ Electrical machinery and other defense-related industries have grown dramatically in the same period, but recent cutbacks throw their continued growth into question.¹⁰ These are just the most significant changes in the industrial structure; specific industries will be discussed in detail in Chapter 4.

The Cities: Moving Out

The two most salient facts about recent intra-urban economic changes are that both people and manufacturing firms are leaving the older central cities for the more spacious and peaceful suburbs. The possible reasons for the flight of the population are numerous: wider spaces, better schools, lower tax rates, less crime, fresher air, higher status, new jobs, more quiet, fewer riots or just the availability of a plot of green turf. But the pervading acceptance of these or other reasons is evident in the movement to the suburbs. The corollary to that movement should also be evident; the cities are left to those who on an economic basis cannot afford the suburbs or on a racial or social basis are excluded from them. The cities inherit those who need more services, but are least able to pay the taxes for them.

At the same time manufacturing firms, once virtually the economic *raison d'etre* of the cities, are moving out. Although the subjective factors which motivated the exodus of the population have probably influenced the manufacturers' decision, there have been more compelling reasons:

As for manufacturing and its satellite activities, the increasing volume of production and changing technology, with consequent requirement for more space, have made their move out to the periphery of the metropolis imperative. Three technical factors are at work: the increasing mechanization and automation of production, which calls for more floor area per worker; a switch from the traditional multistory loft building to the one-story plant, which demands more ground area; the new practice of providing open land around the

plant for parking, landscaping, and plant expansion. The combined effect of these three factors has been to raise the amount of land per worker in the modern factory as much as 100 times over that occupied by the old loft building.¹¹

It is the technological nature of these developments which makes them virtually irreversible. Public policy, even the higher taxes of the inner cities, seems to play a small role here.

Keeping these national, regional and urban economic factors in mind, let us consider the changes that have been taking place in Cambridge.

Cambridge: Multiple Problems

There are major changes taking place in the composition of Cambridge's population, its housing market and its industrial structure. Complicating these economic and demographic changes and at least partially linked to them are the city's fiscal troubles. Those various trends combine to increase the complexity of Cambridge's problems and at the same time to limit the available solutions.

Like most other central cities in older metropolitan areas, Cambridge is losing residents. Since 1950, its population has declined from 120,740 to 100,361 in 1970. An even greater decline has occurred in the family population (related persons living in the same household), going from 99,849 to 66,243 during the same period. This has been due in part to a decline in family size from 3.5 to 3.2 persons per family. However,

there has also been a net out-migration of 7,790 families which accounts for the greatest part of the loss of family population. This has been reflected in the age distribution as well. Of the total population the only age group that has increased has been the young adult group (18-34 years); the number of children, middle aged and elderly has declined.¹² These statistics simply confirm what long-time Cambridge residents have said repeatedly; families are leaving the city and being replaced by students and young professionals. Individuals familiar with the Cambridge housing market attribute this trend to the greater ability of the latter groups to pay ever-increasing rents. Since 1960 the average rent in Cambridge has gone up almost 90%. Students, by combining their incomes, and young couples, with smaller families to support, could afford the rents, but the older families were forced to move out.

Another contributing factor to the population changes has been a shift in the industrial structure. Between 1956 and 1969 total employment in Cambridge grew from 77,900 to 91,600, an increase of almost 14,000. However, 12,000 of these new jobs were accounted for by the universities, wholesale-retail trade and the service sector. Manufacturing employment, on the other hand, declined by about 5,000 during the same period. In addition, from 1969 to 1971, 64 more manufacturing firms left Cambridge while only 10 manufacturing firms moved to Cambridge, creating a net loss of another 2,600 jobs. The other sectors increased slightly in employment with the exception of construction which

declined by just one hundred.¹³ Thus, while total employment has gone up, the distribution of employment has changed dramatically. To the extent that job availability affects choice of residence, those employed in manufacturing would have an incentive to move out of Cambridge; those employed by the universities, in wholesale-retail trade or the service sector would have an incentive to remain or move into Cambridge.

A closer look at these rapidly growing sectors indicate that they offer relatively few job opportunities in them for people who were previously employed in manufacturing. In 1960, about 64% of those employed in manufacturing in the U. S. were unskilled or semi-skilled*, the balance being managers, highly trained professionals or skilled operatives.¹⁴ Assuming that job losses for a particular skill level are proportional to the number of jobs for that skill level, the decline in manufacturing employment would mean significant losses of low skill jobs. By and large, natural employment growth has not replaced those jobs. For instance, during the period 1963 to 1972, M.I.T.'s semi-skilled workers only increased from 1,302 to 1,385. (See Appendix VI). Although detailed historical data was not available for the service sector, 1970 Dun and Bradstreet Market Indicators show that just under half of employment in this sector is in

* For the remainder of this paper the terms "low skill" or "semi-skilled" will mean "unskilled and semi-skilled" unless otherwise noted.

research and development or business consulting firms, neither of which would be likely to employ large numbers of semi-skilled workers. The single growth sector which would provide such employment is wholesale-retail trade. In 1960, half of all jobs in wholesaling were for semi-skilled workers and in retailing the proportion was two thirds.¹⁵ Even so, the nature of the work is so different from that in manufacturing that there may be serious barriers to movement between the sectors. This will be discussed in detail in Appendix VII.

A detailed examination of the manufacturing sector itself also reveals some problems. In 1960, employment in non-durable manufacturing was 14,650, or 60.4% of total manufacturing employment, but by 1970 that figure had dropped to 8,614, just 45.7% of total manufacturing employment.¹⁶ This means durable manufacturing has an increasing share of total manufacturing. As previously discussed, a shift towards durable manufacturing increases the instability of the local economy. Simultaneously, much of the manufacturing sector is probably tied to the universities. Although there are no available statistics, persons intimately acquainted with manufacturing in Cambridge characterize both the professional and scientific instruments and electrical machinery industries as being closely associated with the universities. These two industries, according to Dun and Bradstreet, accounted for 38.5% of all manufacturing employment in Cambridge during 1970. This, too, is a potential source of instability in that the universities' fortunes are largely subject to the

whims of the federal government.

Thus the city faces the multiple problems of losing many of its families as a result of the pincers of rising rents and a changing job market while at the same time suffering a movement towards instability in its largest sector of employment, manufacturing. What are the resources that it can bring to bear on these problems? Unfortunately, the above discussion concerning property taxes and municipal services for central cities applies to Cambridge as well. Increased demand for services (in both quantity and quality) and inflation have continued to push city expenditures upward while inflation has decreased the real value of the tax base.¹⁷ The natural consequence has been a spiraling tax rate. This has only served to exacerbate the situation by placing more upward pressure on rents and encouraging additional out-migration of industry. Barring an unforeseen Caesar who would fill the general coffers, there is likely to be little help available from the city to the city.

Summary of the Cambridge Economic Situation

Cambridge faces severe constraints on its economic development imposed by national, regional and urban economic conditions. These constraints limit the possible solutions to the city's own specific problems. Moreover, fiscal difficulties further limit feasibility even among the possible solutions.

Conditions in the national economy have implications for Cambridge's industrial mix, occupational structure and economic stability. Decreasing relative transport costs and increased size of physical plant make it feasible for firms to locate outside of Cambridge while giving them an incentive to do so. This effect is amplified in the case of industries which serve regional or national markets - a condition which, through increasing specialization, is becoming characteristic of more and more industries. At the same time, manufacturing, the largest employment sector in Cambridge, has a decreasing relative share in the national economy, giving way to the service, finance, government and trade industries as the growth sectors of the future. Although this has increased the proportion of low skill jobs, the semi-skilled worker is being shifted from the factory to the office as manufacturing stabilizes and these other sectors grow. In Cambridge, which has relied so heavily on manufacturing jobs in the past, this means its less skilled residents will face diminishing employment opportunities if they continue to seek jobs in manufacturing. Moreover, efforts to obtain a greater local share of those jobs would have to overcome strong structural changes - not impossible, but likely to be expensive. Conversely, attracting the new growth sectors would align with equally strong trends. However, such an alignment is not necessarily a panacea; the last minute loss of the NASA center for Cambridge is a recent lesson on the unreliability of one sector, government, despite its overall growth. This fact of national life adds a precautionary note to pursuing the new

growth sectors, particularly since the local manufacturing sector has become increasingly dependent on unstable durable production.

Regionally, prospects for employment growth are relatively poor. Relative to other regions Massachusetts is generally an economically unattractive location. The major factors which make it unattractive, lack of natural resources, distance from markets and obsolete physical plants, could only be overcome by large investments and therefore, will continue to make it unattractive. Cambridge, without a massive influx of funds, could not hope to overcome those factors. The city can, at best, hope to attract those industries which still find Massachusetts a relatively desirable location or whose rapid growth overcomes locational disadvantages enough to produce net growth for that industry in the Massachusetts region.

The ubiquitous retreat of people and manufacturing from the center cities leaves little hope for Cambridge to recoup its own losses. They certainly might be lured back, but certainly at a price the city can ill afford (See Appendix VII). Any economic policy which Cambridge might set for itself will have to accept the fact that the forces which created this dual out-migration might be diverted, but certainly not reversed.

Even facing these general problems, Cambridge has several of its own. The presence of the universities, due to the clus-

tering of students and young professionals around them, contribute to the upward pressure on rents. Additionally, their influence is pervasive in both the manufacturing and service sectors of the Cambridge economy where university-related industries account for approximately one-third and one-half of employment in each of those sectors. The effect of this is essentially to create a "company town", substantially dependent on the universities. This in itself does not create a problem. However, this "company town" effect, the dependence of higher education on the federal government, the failure of employment growth to suitably replace manufacturing jobs, and the increased instability of the remaining manufacturing combine to create a local economy that is potentially volatile. In addition, these circumstances place undue economic pressure on semi-skilled residents through diminishing job opportunities, growing job uncertainty and rising rents. Moreover, Cambridge can muster few economic resources to deal with these long-term problems because it is already forced to raise expenditures simply in order to maintain its present level of services.

Chapter 3

An Economic Development Policy for Cambridge

Introduction

The underlying assumption in the following policy analysis is that people who are systematically harmed by the normal functioning of the economy and who lack the resources to overcome such injury, deserve either protection against that injury or some form of compensation from the rest of society. The basis of this assumption is that the society as a whole benefits if the economy runs smoothly and efficiently, but the costs that are incurred are unevenly distributed. A clear example of this concept is the relationship between unemployment and inflation. In order to obtain price stability it is necessary to have a certain amount of unemployment. Here, the minority which must remain unemployed or go through frequent periods of unemployment are "paying" for the price stability which the whole society enjoys. Unemployment compensation, although it serves other purposes, is also recognition that unemployment costs, as a function of the economic system, should be borne by everyone rather than just a few. It is this assumption which has compelled the following policy, but accepting the assumption is not a prerequisite to adopting the policy.

The Proposed Policy

The purpose which the City Council should set for economic development in Cambridge is:

- 1) To provide employment for the semi-skilled residents

of Cambridge, and

- 2) To encourage stability in the Cambridge economy.

Thus stated, the policy establishes no specific objectives and delineates no particular program. It is a statement of values which includes a particular set of goals and excludes others. Nonetheless, these goals are based on the preceding analysis of the Cambridge economy and will be justified and compared to alternative goals within the context of that analysis.

The most apparent reason for making employment of semi-skilled residents a part of the economic development policy is that manufacturing employment has declined, and manufacturing employs a high percentage of semi-skilled workers. Most of the decline has been caused by firms leaving Cambridge, rather than by cutbacks within existing firms. The movement of a firm to the suburbs poses three alternatives to the firm's employees who reside in Cambridge:

- 1) Retain the same place of residence, and commute to the new place of work.
- 2) Move to a new residence near the firm's newer location.
- 3) Quit working for that firm and seek a new job.

For the semi-skilled, low-income worker it is likely that each of these alternatives will either not be available to him or substantially harm him.

If he chooses the first alternative, he will be commuting a greater distance at greater expense to himself. This is further

aggravated by the fact that it will be imperative that he own a car in order to commute to the suburbs, and it is likely there was no such necessity when the firm was located in the city. A study of Route 128 firms showed that 60% of the firms' employees used a car to commute to work before the firm moved to Route 128, and 98% of them used cars afterwards.¹⁸ Car ownership and the associated costs may well prove an insurmountable barrier to continued employment with the firm.

The second alternative also creates higher costs for the worker. Although housing costs are higher in the city measured on a per square foot basis, zoning regulations in the suburbs generally require so much space that housing costs will be higher in the suburbs. These zoning regulations, coupled with greater effective demand for home ownership during the post-war development of the suburbs, create a scarcity of rental housing in the suburbs. Since renting has both lower initial and lower periodic costs than those associated with ownership, the lack of rental housing pushes the cost of relocation to the suburbs even higher. The rental housing available is quite likely to be more expensive than the older, more dilapidated inner city housing. Another study of relocated Route 128 firms by Everett J. Burt showed that employees who remained with the company did, in fact, have to pay more for housing than previously.¹⁹ These factors combine to make housing costs a formidable obstacle to continued employment with the firm.

If the costs of the first two alternatives are perceived by the worker to be too high, he may choose to look for another job within the central city. Burt found that 58% of the workers who separated from relocated firms lived in the core city. The typical worker who separated from the firm had less education, more dependents, lower wages and fewer skills than the worker who remained with the firm.²⁰ In the context of a declining local economy, with firms leaving rapidly and hundreds or even thousands of displaced workers looking for jobs as well, his prospects for a new job are dismal. For the semi-skilled worker the local economy does not even need to be declining to make him worse off; a sufficient condition is that there be a declining number of semi-skilled jobs in the city with a constant or rising number of semi-skilled workers seeking those jobs.

The jobs which have been lost in the manufacturing sector are not being replaced by the natural growth of employment. Most new jobs that are being created are for highly trained, predominantly professional workers. The one sector which has created a significant number of semi-skilled jobs is wholesaling and retailing where an estimated 2,000 such jobs have been added; this only begins to replace the estimated 3,000 to 5,000 semi-skilled jobs lost in manufacturing. In addition, it is likely that jobs in retailing, because of their low pay and differences in job styles, would not be taken by displaced manufacturing workers.

The conclusion, then, is that the movement of manufacturing firms out of Cambridge has removed a large number of jobs from the city, creating higher costs for workers who originally resided here. In the case of semi-skilled, low-income workers these costs are likely to be so high as to create unemployment, thus causing greater individual harm than for persons in a more highly skilled, more employable group. Also, since manufacturing employs a higher percentage of semi-skilled workers, the number of jobs lost has been greater than for skilled workers, so that the costs to them as a group have been higher. Finally, the failure of employment growth in other sectors to replace those lost jobs and the continuing loss of manufacturing firms mean that this group will probably face diminishing job opportunities in Cambridge in the future.

The goal of stability is dictated by the shift of the manufacturing sector towards durables production and the near dominance of the local economy by the universities, resulting in a potentially unstable local economy. An increased proportion of durables manufacturing creates the risk of locally amplifying the effects of a recessionary economy, because of production cutbacks that generally occur under such conditions. The greater danger, however, lies with the universities. Not only are they major employers in the city, they are also closely tied to large portions of the service and manufacturing sectors. Any cutbacks in either their spending or employment are likely to have serious effects on Cambridge. In view of their dependence on the

federal government, such cutbacks must be treated as a definite possibility. The previous examples of defense contracts and the NASA site should be ample warning of potential instability. In addition to simply reducing this risk, increased stability reinforces the goal of providing employment for semi-skilled workers; in periods of high unemployment, these are generally the first people to be laid off.

Alternative Policies

Several alternative goals for an economic development policy are presented here and discussed briefly. This should not be considered an exhaustive set of alternatives. They have been selected because they are commonly mentioned as desirable goals and they provide contrast to the proposed goals. Nor are these alternatives given a full and fair presentation; each of them deserves time and space beyond the limits of this paper. Instead, those features which distinguish the alternatives from the proposed policy and which reveal their weaknesses are emphasized. The purpose here is not merely to knock down straw men, but to have a background for contrasting the suggested policy and to illuminate areas where subjective judgments were made.

The first alternative is to promote the growth of employment in Cambridge. The basic idea here is similar to that of providing employment for semi-skilled workers. Although new jobs in Cambridge are not necessarily filled by Cantabrigians,

increased accessibility to more jobs increases the employment opportunities for residents. However, such a policy ignores the capability of workers to fill those new jobs. Cambridge itself is an excellent example of decreasing job opportunities for a part of the labor force while total employment continues to expand. The choice of total employment growth does not necessarily imply neglect of that fact. It could be preferred on a philosophical basis; the responsibility of policy makers is to provide the opportunity for employment, and it is the responsibility of the individual to prepare himself for it. Under this philosophy everyone has equal opportunity, equal responsibility, and equal capability. The basic premise in focusing on semi-skilled workers, however, is that there are differences in capability, at least under present conditions, and these create unequal opportunities.

A second frequently offered goal is to attract or promote the expansion of high growth or technically sophisticated industries. The purpose of this is to achieve employment growth in the future as well as the present by being at the leading edge of the economy and avoiding the retarded growth of a maturing industrial base. This embraces the philosophy of total employment growth, and would be subject to the same criticisms. However, there is some evidence that high growth industries would have little effect on the local economy as a whole.²¹ In addition, high growth can sometimes mean high risk because it frequently occurs in new, unproven markets. The producer

of runless stockings must have had tremendous sales-- the first year.

The final alternate objective is to increase the tax base. The concept here is that enterprise, unlike housing, does not bring along a bunch of kids who go to school and cost the city a lot of maney, but it does pay taxes. So the more industry, the less of a tax burden for residents. There is apparently a great deal of truth to that line of reasoning, even if a higher usage of non-educational services is allocated to commercial land. One thing it overlooks is that the people who pay more property taxes (the wealthy) would benefit proportionally more. This is a minor criticism, though. The worst effect such a goal could have is that industries or firms would be evaluated on the basis of the size of their physical plant rather than how many or what kinds of people they employ. There would be a tendency to favor office buildings over less dense developments which might be more aesthetically pleasing and provide more "needed" jobs.

In a sense, the disparagement of these goals is too harsh. Generally, pursuit of them would not be harmful to Cambridge or its citizens. The point that hopefully has been made is that they do not aim specifically at the urgent needs revealed in the economic analysis. Perhaps the greatest calamity of their inclusion in an economic development policy would be diverting attention from those needs and diluting effects to meet them.

Attracting Industries

Accepting the policy as stated does not imply a strategy of attracting selected industries. The goal of stability does leave little choice; the industry mix could only be changed by adding new firms or deleting old ones. The latter seems somewhat suicidal, so in this case attraction is really the only viable policy. Contrarily, reducing local unemployment among the semi-skilled could be accomplished in several ways. The options are somewhat technical and are given a complete treatment in Appendix VII. It is sufficient to say here that attracting specific industries seems to be the cheapest means of reducing local unemployment in a particular labor market. Other options have potentially greater effectiveness, but Cambridge's precarious fiscal position dictates the pursuit of a more modest and less expensive strategy.

Effectiveness Criteria

Given the strategy of selecting and attracting specific industries, it is necessary to establish criteria as a basis for selection. The initial criteria should be designed to identify the industries which are most effective in meeting the goals of the policy. These are the ideal industries, just what the doctor ordered. No reference is made at this point to the probability of attracting them.

The industries which would be most effective in achieving the designated policy,

- 3.
- 1) Have a high percentage of semi-skilled works, and
 - 2) Do not have strong economic links to the universities.

As previously discussed, simply increasing the number of jobs available in Cambridge does not guarantee them for Cambridge residents; it simply increases the job opportunities. Although it is impossible to determine how many of these new jobs would go to residents, if they qualified for the work their greater accessibility should give them a significant portion of the jobs.

Selecting industries which have a high proportion of jobs with low skill requirements takes care of the qualification factor and allows accessibility to run its course. Selecting criteria for stability is not so straightforward. There are two centers of potential instability in Cambridge, durable manufacturing and the universities. However, manufacturing industries generally employ large percentages of semi-skilled workers, and the availability of labor with experience in manufacturing increases the likelihood of attracting those industries. In the interest of achieving both parts of the policy, durable manufacturing was not eliminated. The universities, on the other hand, employ relatively few semi-skilled people. In addition, Cambridge's role as an educational center hardly needs publicity; its reputation is global. Therefore, university-related industries were excluded.

Efficiency Criteria

Once the effective industries are chosen they should be distinguished on the basis of how easily they might be attracted to Cambridge. This permits a more efficient use of time and money; there is no benefit in pursuing a high risk objective when there are equally desirable, but low risk objectives. The criteria used to make this distinction were to choose industries such that:

- 1) The industry has high growth relative to other industries in the United States.
- 2) The industry has grown faster in the Massachusetts region than in the rest of the United States.
- 3) The likelihood is great that a firm in that industry would desire a central city location.

Firms in high growth industries have an increasing need for new facilities, new markets and, therefore, new locations. This means that these firms only need to be persuaded to locate rather than relocate in many cases. This is easier to do since they are seeking a new location and are not as concerned with giving up their existing facilities.

In making location decisions, most firms select a region first, either formally or informally.²² If the region does not meet the needs of the firm in terms of markets, raw materials or other factors, it is unlikely that a particular location within that region can supply them. So if a firm is not attracted

to the region, the chances of bringing it to Cambridge are diminished.

Whereas growth and regional share are related to "coarse" variables and appropriately measured at a high level of aggregation, location within an urban area is a very specific and detailed decision. Thus any evaluation of an industry's disposition towards inner city location is more appropriately made in an industry by industry analysis, based on at least some knowledge of the industries' cost structures, marketing patterns and other intimate information. Such detail is beyond the scope of this paper. However, this criterion was included because it is an integral part of the selection process, and should be consciously applied in the final analysis.

Selection of Industries

The effectiveness criteria were operationalized using Bureau of Labor Statistics manpower projections for 1975²³, and the 1958 Input-Output study of the Department of Commerce.²⁴ (See Appendices II, III, IV, and V) The industries which met the established parameters are listed in Table I.

According to the BLS projections, the percentage of total jobs classified as semi-skilled will be 59% in 1975. In order to achieve a higher than average proportion of semi-skilled jobs in new industries, 50% low skill jobs was the minimum criterion established.

Table I
EFFECTIVE INDUSTRIES

<u>Industry category¹</u>	<u>Industry names²</u>
Lumber, wood and furniture mfg.	Furniture and fixtures mfg.
Electrical and other machinery mfg.	Electrical machinery, equipment and supplies mfg. Misc. machinery mfg.
Motor vehicles and equipment mfg.	Motor vehicles and equipment mfg.
Other transportation equipment mfg.	Railroad and other transportation equipment mfg.
Textile mill products mfg.	Textile mill products mfg.
Apparel mfg.	Apparel and related products mfg.
Chemicals and allied products mfg.	Synthetic fibers mfg. Paints, varnishes and related products mfg.
Leather and related products mfg.	Leather tanning and finishing Footwear, except rubber mfg. All other leather products mfg.
Miscellaneous and other mfg.	Glass and glass products mfg. Cement, concrete and plaster mfg. Structural clay products mfg. Pottery and related products mfg. Misc. nonmetals and stone products mfg. Fabricated metals products mfg. Paperboard containers and boxes mfg. Miscellaneous mfg.
Transportation, communications and public utilities	Telephone Telegraph
Services	Private household services
Public administration	Postal services

Table II

EFFICIENT INDUSTRIES

<u>Industry category</u> ¹	<u>Industry names</u> ²
Electrical and other machinery mfg.	Electrical machinery, equipment and supplies mfg. Misc. machinery mfg.
Other transportation equipment mfg.	Railroad and other transportation equipment mfg.
Apparel mfg.	Apparel and related products mfg.
Chemicals and allied products mfg.	Synthetic fibers mfg. Paints, varnishes and related products mfg.
Miscellaneous and other mfg.	Glass and glass products mfg. Cement, concrete and plaster mfg. Structural clay products mfg. Pottery and related products mfg. Misc. nonmetals and stone products mfg. Fabricated metals products mfg. Paperboard containers and boxes mfg. Miscellaneous mfg.
Transportation, communications and public utilities	Telephone Telegraph
Public administration	Postal services

1. These are the classifications used in Commonwealth of Massachusetts, Profile and Analysis of Economic Data for Massachusetts, Boston, 1968.
2. These are the classifications used in U. S. Department of Labor, Tomorrow's Manpower Needs - Volume IV: The National Industry - Occupational Matrix and Other Manpower Data, Washington, D. C., U. S. Government Printing Office, 1969. They are less aggregated than Profile and Analysis.

The input-output tables measure the effect that a change in final demand for a given industry has on all other industries. Both the forward and backward (supply and demand) linkages are established on a national level for each of 82 industrial classifications. For instance, for every additional thousand dollars of final demand required from the research and development industry, the medical, educational and nonprofit organizations industry has to produce \$104.27 of additional output. This is a forward linkage for the latter industry. A backward linkage for this industry occurs when for each additional thousand dollars of final demand from it, the real estate and rental industry must produce \$83.16 of additional output. Using these tables as a measure of dependence of other industries, a coefficient of .005 (\$5 per \$1,000 of final demand) was set as the maximum dependence of an industry on the medical, educational and non-profit organizations industry.

Either of these parameters can be criticized on the basis of the inadequacy, age or level of aggregation of the supporting data or the exact levels of the parameters themselves. The data was the best available, but any improvements would strengthen the validity of the results. The levels of the parameters necessarily have an element of discretion and should be varied if the results they give are irreconcilable with other information.

The efficiency criteria of high growth and regional share were applied to the effective industries based on their 1950 - 1960 growth relative to other industries and the rest of the U. S. (See Appendix I). The industries' propensities for an inner city location are briefly discussed in Chapter 4. None of the effective industries met both criteria. Since these criteria were designed to narrow the number of industries rather than eliminate them from consideration, those that met one or the other criteria were included in Table II, the list of efficient industries. Technically, the telephone and telegraph industries should not be included, but the industry mix effect was only slightly negative and the net rate of employment growth was positive, so they appear in the table. Most of the other efficient industries showed a positive industry mix effect and a negative regional share effect. The single exception was apparel and related products manufacturing which has slower employment growth than the average for all industries, but is growing faster in Massachusetts than in the U. S. as a whole.

Chapter 4

CONCLUSION AND CRITIQUE

Conclusion

Taken at face value, the preceding analysis leads us to the following conclusions:

- 1) Cambridge's options for an economic development policy are severely restricted by conditions in the national, regional and urban economies and its own lack of fiscal resources.
- 2) The two major problems in the Cambridge economy are the loss of jobs for semi-skilled workers and increasing potential for instability. The jobs have been lost largely as a result of the relocation of manufacturing firms and the instability has been caused by the increasing dominance of the universities in Cambridge industry, and an increase of durable manufacturing.
- 3) The goal of Cambridge's economic development program should be to alleviate these problems, and it should concentrate strictly on that goal.
- 4) The most feasible program of economic development for Cambridge is to attract industries by "selling" Cambridge rather than investing in large subsidies.
- 5) The industries which the city should try to attract are several manufacturing industries (primarily durables), telephone, telegraph and postal services. Before this is done they should be scrutinized at a finer level of

aggregation, and the likelihood of their moving to a center city such as Cambridge should be assessed.

There are substantive problems with this final conclusion for reasons discussed below. However, the basic analysis and structure of the policy is a sound one which deserves refinement.

Critique

This approach to the economic development of Cambridge can and should be evaluated on the dual basis of technical validity and subjective values. This is so because it presents not only an analysis of what is happening in the Cambridge economy; it also presents an opinion of what should be happening. Where possible, the following critique will attempt to separate analysis from opinion.

The most damning criticism of the approach is that it does not take a broad view of the problems of economic development. It immediately concedes a lack of resources, thereby severely limiting the feasible solutions by imposing a severe although indefinite budget constraint. This precludes a more thorough examination of such fundamental problems as lack of training programs and lack of mobility for displaced workers. The decision to do so was based on a personal judgment of realistic constraints and a need to confine the problem to manageable proportions.

Another limitation is that the proposed policy is directed at benefiting a narrowly defined segment of the population, the semi-skilled and unskilled displaced worker. This is based in part on the results of the analysis but also on the feeling that these are the people who have grown up in Cambridge, are being squeezed out of their neighborhoods and deserve jobs which will enable them to remain where they are. One result of this pre-occupation with the semi-skilled population is that possible structural problems between the skilled occupations have been largely ignored. This amounted to an assumption that skilled individuals would be able to make whatever transitions would be necessary to overcome such problems. This assumption was made more in the interest of brevity than realism.

Considering the technical aspects of the approach, there are several shortcomings which must be considered when evaluating or using the results. First, much of the data is either old or unreliable. However, in every case it was the newest and most reliable information available to the author. For instance, employment statistics from the Division of Employment Security are quite likely to exclude smaller firms, but they are the best annual statistics available at the citywide level. Fortunately, most of the analysis is not so refined as to be invalidated by anything less than a gross error in the data. Another weakness in the analysis is that it deals primarily with long-term trends, treating short-term problems only superficially. Significantly, the difficulties of mounting an economic development effort during

a recession are never presented; this is largely due to the author's feeling of incompetence in this realm and a bias towards saying nothing rather than the wrong thing. Finally, the most severe technical limitation of this paper is that much of the data and conclusions may be at so high a level of aggregation that both opportunities and problems may be overlooked. A specific industry which might meet all of the criteria would be ignored if it were included in a broader industrial classification which did not meet the criteria. Likewise, the use of the broad categories of "semi-skilled" and "unskilled" workers neglects many very real differences between occupations within these categories. Nonetheless, the level of aggregation was the result of weighing detail against usefulness within the constraints of time and available data; the level chosen is sufficient to support the policies and conclusions presented here.

The most severe substantive problem is that most of the industries selected through the criteria are in durable manufacturing. Attracting them may not be possible, since most manufacturers are finding Cambridge an unsatisfactory location. One optimistic note is that durable manufacturing employment increased from 9,612 in 1960 to 10,251 in 1971. Even if this is an indication that there may be some success in attracting other durables, the problem simply changes its face. The almost complete dominance of the new industries by the durables sector might create enough instability to offset the benefit of new jobs. This dilemma can be solved within the context of the present

policy through one of two mechanisms:

- 1) Relax the parameter for dependence on the universities. There were many industries whose coefficient fell between .005 and .025. This is not an excessive degree of dependence and might well be allowed in the interest of achieving stability.
- 2) Disaggregate the industries as much as possible, retaining the same criteria and selection method. This might unearth some industries which were previously hidden by being thrown together with "undesirable" industries.

Whatever refinements are made in the policy, the goals of economic development should remain the same: jobs for the less skilled and stability for everyone.

APPENDIX I

Relative Employment Change in Massachusetts
Industries 1950 - 1960

<u>Industry Name</u>	<u>Industry Mix</u>	<u>Regional Share</u>	<u>Absolute Growth</u>
Agriculture	-	+	-
Forestry & Fisheries	-	-	-
Mining	-	+	-
Contract Construction	-	-	-
Food & Kindred Mfg.	+	-	+
Textile Mill Production Mfg.	-	-	-
Apparel Mfg.	-	+	+
Lumber, Wood, Furniture, Mfg.	-	+	-
Printing & Publishing Mfg.	+	-	+
Chemical & Allied Products Mfg.	+	-	+
Electrical & Other Machinery Mfg.	+	-	+
Motor Vehicle & Equipment Mfg.	-	-	-
Other Transportation Equipment Mfg.	+	-	+
Other Miscellaneous Mfg.	+	-	+
Rails & Railway Express	-	-	-
Trucking & Warehousing	+	-	+

<u>Industry Name</u>	<u>Industry Mix</u>	<u>Regional Share</u>	<u>Absolute Growth</u>
Other Transportation	-	-	-
Communications	-	-	+
Utilities & Sanitary Services	-	-	-
Wholesale Trade	-	-	-
Food & Dairy Product Stores	-	-	-
Eating & Drinking	-	-	-
Other Retail Trade	+	-	+
Financial, Insurance, Real Estate	+	-	+
Hotels & Other Personal Services	-	-	-
Private Household Services	+	-	-
Business & Repair Services	+	-	+
Entertainment & Recreational Services	-	-	-
Medical & Other Professional Services	+	-	+
Public Administration	+	-	+
Armed Forces	+	+	+
Industry Not Reported	+	+	+

APPENDIX II

Total Requirements Per Dollar of Delivery To Final Demand For
 Medical, Educational and Nonprofit Organizations Industry, 1958

<u>Name</u>	<u>Forward Linkage</u>	<u>Backward Linkage</u>
Livestock & Livestock Products	.00799	.00899
Other Agricultural Products	.00194	.00791
Forestry & Fishery Products	.00186	.00056
Agricultural, Forestry, & Fishery Services	.00253	.00055
Iron & Ferroalloy Ores Mining	.00134	.00042
Nonferrous Metal Ores Mining	.00178	.00055
Coal Mining	.00189	.00176
Crude Petroleum & Natural Gas	.00142	.00688
Stone & Clay Mining & Quarrying	.00174	.00073
Chemical & Fertilizer Mineral Mining	.00169	.00040
New Construction	.00256	-----
Maintenance & Repair Construction	.00146	.04314
Ordnance & Accessories	.00258	.00094
Food & Kindred Products	.00435	.02123
Tobacco Manufactures	.00206	.00066
Broad & Narrow Fabrics, Yarn & Thread Mills	.00308	.00405
Misc. Textile Goods & Floor Coverings	.00264	.00212

<u>Name</u>	<u>Forward Linkage</u>	<u>Backward Linkage</u>
Apparel	.00292	.00248
Misc. Fabricated Textile Products	.00311	.00211
Lumber & Wood Products Except Containers	.00246	.00390
Wooden Containers	.00260	.00018
Household Furniture	.00254	.00012
Other Furniture & Fixtures	.00235	.00015
Paper & Allied Products, Except Containers	.00221	.01757
Paperboard Containers & Boxes	.00250	.00392
Printing & Publishing	.00238	.03215
Chemical & Selected Chemical Products	.00253	.01093
Plastics & Synthetic Materials	.00265	.00272
Drugs, Cleaning & Toilet Preparations	.00229	.02897
Paints & Allied Products	.00267	.00262
Petroleum Refining & Related Industries	.00224	.00948
Rubber & Misc. Plastics Products	.00231	.00574
Leather Tanning & Industrial Leather Products	.00182	.00014
Footwear & Other Leather Products	.00240	.00033
Glass & Glass Products	.00214	.00177
Stone & Clay Products	.00217	.00268
Primary Iron & Steel Mfg.	.00239	.00595

<u>Name</u>	<u>Forward Linkage</u>	<u>Backward Linkage</u>
Primary Nonferrous Metals Mfg.	.00233	.00458
Metal Containers	.00261	.00131
Heating, Plumbing & Structural Metal Prod.	.00251	.00259
Stamping, Screw Machine Products & Bolts	.00239	.00219
Other Fabricated Metal Products	.00230	.00248
Engines & Turbines	.00296	.00045
Farm Machinery & Equipment	.00241	.00039
Construction, Mining & Oil Field Machinery	.00239	.00036
Materials Handling Machinery & Equipment	.00241	.00010
Metalworking Machinery & Equipment	.00212	.00080
Special Industry Machinery & Equipment	.00234	.00048
General Industrial Machinery & Equipment	.00233	.00062
Machine Shop Products	.00219	.00053
Office, Computing & Accounting Machines	.00190	.00137
Service Industry Machines	.00254	.00039
Electric Industrial Equipment & Apparatus	.00226	.00147
Household Appliances	.00243	.00052
Electric Lighting & Wiring Equipment	.00228	.00073
Radio, Television & Communication Equipment	.00244	.00155

<u>Name</u>	<u>Forward Linkage</u>	<u>Backward Linkage</u>
Electronic Components & Accessories	.00235	.00115
Misc. Electrical Machinery, Equipment & Supplies	.00233	.00088
Motor Vehicles & Equipment	.00278	.00200
Aircraft & Parts	.00224	.00153
Other Transportation Equipment	.00254	.00138
Scientific & Controlling Instruments	.00231	.01307
Optical, Ophthalmic & Photographic Equipment	.00212	.00424
Misc. Manufacturing	.00235	.00401
Transportation & Warehousing	.00172	.02586
Communications; Except Radio & Television Broadcasting	.00125	.01231
Radio & TV Broadcasting	.00193	.00262
Electric, Gas, Water & Sanitary Services	.00159	.02821
Wholesale & Retail Trade	.00168	.03671
Finance & Insurance	.00731	.02369
Real Estate & Rental	.00134	.08316
Hotels; Personal & Repair Services Except Auto	.00191	.00951
Business Services	.00136	.04172
Research & Development	.10427	.00185
Automobile Repair & Services	.00222	.00418
Amusements	.00204	.00645

<u>Name</u>	<u>Forward Linkage</u>	<u>Backward Linkage</u>
Medical, Educational Services & Nonprofit Organizations	1.01414	1.01414
Federal Government Enterprises	.00120	.00402
State & Local Govern- ment Enterprises	.00084	.00555
Gross Imports of Goods & Services	-----	.00928
Business Travel, Enter- tainment & Gifts	.00812	.02430
Office Supplies	.00233	.00496

APPENDIX III

1958 Transactions Between Medical, Educational And Nonprofit
Organizations Industry And All Other Industries

<u>Name</u>	<u>Forward Linkage</u> (1958) ($\$10^6$)	<u>Backward Linkage</u> (1958) ($\$10^6$)
Livestock & Livestock Products	142	5
Other Agricultural Products	12	5
Forestry & Fishery Products	1	-
Agricultural, Forestry, & Fishery Services	1	-
Iron & Ferroalloy Ores Mining	1	-
Nonferrous Metal Ores Mining	1	-
Coal Mining	3	(*)
Crude Petroleum & Natural Gas	9	-
Stone & Clay Mining & Quarrying	1	-
Chemical & Fertilizer Mineral Mining	(*)	-
New Construction	58	-
Maintenance & Repair Construction	10	680
Ordnance & Accessories	5	-
Food & Kindred Products	64	170
Tobacco Manufactures	6	(*)
Broad & Narrow Fabrics, Yarn & Thread Mills	11	2

<u>Name</u>	Forward Linkage	Backward Linkage
	(1958) (10 ⁶)	(1958) (10 ⁶)
Misc. Textile Goods & Floor Coverings	2	23
Apparel	16	38
Misc. Fabricated Textile Products	2	34
Lumber & Wood Products, Except Containers	9	3
Wooden Containers	(*)	-
Household Furniture	4	-
Other Furniture & Fixtures	2	-
Paper & Allied Products, Except Containers	10	85
Paperboard Containers & Boxes	4	20
Printing & Publishing	14	322
Chemical & Selected Chemical Products	11	4
Plastics & Synthetic Materials	4	-
Drugs, Cleaning & Toilet Preparations	6	588
Paints & Allied Products	2	-
Petroleum Refining & Related Industries	16	70
Rubber & Misc. Plastics Products	7	64
Leather Tanning & Industrial Leather Products.	1	-
Footwear & Other Leather Products	4	3
Glass & Glass Products	2	6

<u>Name</u>	<u>Forward Linkage (1958) (\$10⁶)</u>	<u>Backward Linkage (1958) (\$10⁶)</u>
Stone & Clay Products	8	(*)
Primary Iron & Steel Mfg.	20	-
Primary Nonferrous Metals Mfg.	9	-
Metal Containers	2	-
Heating, Plumbing & Structural Metal Prod.	8	-
Stampings, Screw Machine Products & Bolts	4	20
Other Fabricated Metal Prod.	6	(*)
Engines & Turbines	2	-
Farm Machinery & Equipment	2	-
Construction, Mining & Oil Field Machinery	3	-
Materials Handling Machinery & Equipment	1	-
Metalworking Machinery & Equipment	3	-
Special Industry Machinery & Equipment	2	-
General Industrial Machinery & Equipment	4	-
Machine Shop Products	2	(*)
Office, Computing & Accounting Machines	2	3
Service Industry Machines	2	-
Electric Industrial Equipment & Apparatus	5	-
Household Appliances	4	-
Electric Lighting & Wiring Equipment	2	(*)

<u>Name</u>	Forward Linkage	Backward Linkage
	(1958) <u>($\\$10^6$)</u>	(1958) <u>($\\$10^6$)</u>
Radio, Television & Communication Equipment	6	11
Electronic Components & Accessories	3	-
Misc. Electrical Machinery, Equipment & Supplies	1	12
Motor Vehicles & Equipment	23	2
Aircraft & Parts	12	-
Other Transportation Equipment	4	20
Scientific & Controlling Instruments	3	260
Optical, Ophthalmic & Photographic Equipment	2	72
Misc. Manufacturing	6	32
Transportation & Warehousing	31	120
Communications; Except Radio & Television Broadcasting	9	190
Radio & TV Broadcasting	1	-
Electric, Gas, Water & Sanitary Services	17	418
Wholesale & Retail Trade	95	420
Finance & Insurance	140	265
Real Estate & Rental	38	1,557
Hotels, Personal & Repair Services Except Auto	12	110
Business Services	4	573
Research & Development	539	40

<u>Name</u>	<u>Forward Linkage (1958) (\$10⁶)</u>	<u>Backward Linkage (1958) (\$10⁶)</u>
Automobile Repair & Services	8	49
Amusements	5	83
Medical, Educational Services & Nonprofit Organizations	296	296
Federal Government Enterprises	-	16
State & Local Government Enterprises	(*)	12
Gross Imports of Goods & Services	-	5
Business Travel, Entertainment & Gifts	36	444
Office Supplies	-	87
Intermediate Inputs, Totals	-	7,241
Value Added	-	15,462
Total	-	22,703

* Less than \$500,000

APPENDIX IV

Percentage of Unskilled And Semi-Skilled Workers By Industry, 1960

<u>Industry</u> ¹	<u>Total</u> ²	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Construction	31	4	*	8	1	18
Furniture & Fixtures	66	10	*	49	2	5
Glass & Glass Products	75	11	*	53	2	9
Cement, Concrete & Plaster	67	9	*	40	1	16
Structural Clay Products	77	7	*	36	1	33
Pottery & Rela- ted Products	80	9	*	60	2	10
Misc. Nonmetallic Mineral & Stone Products	65	14	*	40	2	9
Fabricated Metal Products	58	14	*	37	2	5
Office Machinery	50	15	*	33	1	1
Misc. Machinery	53	13	*	35	2	3
Electrical Machi- nery, Equipment & Supplies	60	15	*	41	2	2
Motor Vehicles & Equipment	68	10	*	52	2	4
Aircraft & Parts	48	18	*	27	2	1
Railroad & Other Transportation Equipment	60	12	*	39	2	7
Instruments & Fire Control Equipment	52	18	*	32	2	1

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Watches & Clock Devices	67	14	*	51	1	1
Misc. Mfg.	67	13	*	49	2	3
Meat Products	80	10	*	57	2	11
Dairy Products	73	12	*	52	2	7
Canning, Preser- ving & Freezing	76	14	*	48	3	12
Bakery Products	56	9	*	39	4	4
Beverage Indus- tries	66	11	*	41	2	12
Other Food Products	71	13	*	43	4	11
Textile Mill Products	83	8	*	68	2	5
Apparel & Rela- ted Products	87	8	*	77	1	1
All Other Paper Products	71	15	*	49	2	5
Paperboard Con- tainers & Boxes	73	12	*	52	2	7
Printing, Publi- shing, & Allied Products	35	19	*	12	1	1
Synthetic Fibers	62	8	*	47	3	5
Drugs & Medicine	51	21	*	24	3	3
Paints, Varnishes & Related Prod.	59	21	*	30	2	7
Other Chemicals	55	15	*	29	3	8
Rubber Products	69	13	*	52	2	1
Misc. Plastic Products	76	12	*	54	7	3

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Leather Tanning & Finishing	81	7	*	58	2	14
Footwear, Except Rubber	89	9	*	76	1	2
All Other Lea- ther Products	82	10	*	68	1	3
Railroad Trans- portation	52	20	*	20	5	12
Local & Inter- Urban, Except Taxis	79	12	*	59	5	3
Taxis	91	9	*	81	0	0
Trucking	83	12	*	59	0	11
Warehousing	71	21	*	23	3	24
Telephone	60	56	*	1	2	1
Telegraph	72	65	*	5	2	1
Radio & Tele- vision	19	15	*	1	3	1
Electric, Gas & Steam	45	24	*	12	2	7
Water & Irriga- tion	53	21	*	16	2	14
Sanitary Services	84	3	*	30	1	50
Motor Vehicles & Equipment	39	24	*	11	1	3
Drugs & Chemicals	49	30	*	14	1	4
Dry Goods & Apparel	42	28	*	12	1	1
Groceries & Re- lated Products	63	15	*	38	1	10

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Elec. Goods, Plumbing & Heat- ing Supplies	44	30	*	9	1	4
Machinery & Equipment	34	23	*	7	1	3
Misc. Wholesale Trade	54	20	*	23	1	10
Building Mater- ials, Hardware & Farm Equipment	57	14	22	13	1	8
Limited Price Stores	77	12	53	1	8	3
Other General Merchandise	74	19	44	5	5	2
Food & Dairy Stores	70	18	25	17	2	8
Automobile Dealers	44	11	22	5	2	5
Gas Stations	58	2	1	52	0	2
Apparel & Ac- cessories	68	12	44	7	3	1
Furniture, Etc.	55	15	27	9	2	3
Eating & Drink- ing Places	78	3	1	1	73	0
Drug Stores	63	9	34	4	13	2
Other Retail Stores	59	12	31	11	2	4
Banks & Credit Agencies	71	65	*	0	6	0
Stock Brokers & Investment Co.	43	41	*	1	1	0
Insurance	49	47	*	0	2	0

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Real Estate	43	16	*	1	20	6
Private Household	100	0	0	1	89	10
Motels & Other Lodging Places	74	10	0	2	61	1
Laundry, Cleaning & Valet Services	78	13	2	60	2	1
All Other Personal Services	86	3	1	6	76	0
Advertising	39	32	*	5	1	1
Other Misc. Business Services	56	28	4	9	15	2
Automobile Repair Services & Garages	25	4	1	12	1	7
Motion Pictures & Theatres	47	18	3	4	21	1
Misc. Entertainment & Recreation	61	8	1	2	41	9
Hospital	59	12	*	3	44	1
Other Medical & Health Services	42	23	*	1	18	0
Legal Services	43	42	*	0	1	0
Educational Services	27	9	*	2	14	1
Welfare & Re- ligious Organ.	46	15	1	2	26	1
Other Non-profit Organizations	64	34	1	1	26	2
Engineering & Architectural	21	17	*	3	1	1
Accounting & Bookkeeping	39	38	*	0	0	0

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
All Other Professional Services	25	18	*	4	3	0
Postal Services	90	83	0	1	2	4
Other Federal Public Administration	57	43	*	5	5	4
State Government	58	38	*	2	17	2
Local Government	73	20	*	3	45	5
Total All Industries	57	15	7	18	13	6

* Sales workers in this industry are not predominantly semi-skilled.

1. S.I.C. codes for these categories can be found in Appendix C in U.S. Department of Labor, Tomorrow's Manpower Needs - Volume IV: The National Industry - Occupational and Other Manpower Data, U.S. Government Printing Office, Washington, 1969.

2. Categories may not add to totals due to rounding.

APPENDIX V

Projected Percentage Of Unskilled And Semi-Skilled Workers
By Industry, 1975

<u>Industry</u> ¹	<u>Total</u> ²	Clerical & Sales		Operatives & Service		<u>Laborers</u>
		<u>Kindred</u>	<u>Sales</u>	<u>Kindred</u>	<u>Service</u>	
Construction	32	6	*	12	1	14
Furniture & Fixtures	66	10	*	49	2	3
Glass & Glass Products	69	10	*	52	2	5
Cement, Con- crete & Plaster	62	9	*	41	1	9
Structural Clay Products	72	9	*	39	2	23
Pottery & Rela- ted Products	75	11	*	57	2	5
Misc. Nonmetallic Mineral & Stone Products	62	12	*	44	1	5
Fabricated Metal Products	54	13	*	37	1	3
Office Machinery	45	14	*	30	1	0
Misc. Machinery	50	12	*	35	1	2
Electrical Machi- nery, Equipment & Supplies	53	12	*	38	1	1
Motor Vehicles & Equipment	66	9	*	51	2	4
Aircraft & Parts	44	16	*	26	2	0
Railroad & Other Transportation Equipment	59	11	*	39	2	7
Instruments & Fire Control Equipment	48	16	*	31	1	1

<u>Industry</u>	<u>Total</u>	<u>Clerical</u>		<u>Operatives</u>		
		<u>& Kindred</u>	<u>Sales</u>	<u>& Kindred</u>	<u>Service</u>	<u>Laborers</u>
Watches & Clock Devices	63	15	*	47	1	1
Misc. Mfg.	66	14	*	49	1	2
Meat Products	77	11	*	58	2	6
Dairy Products	73	15	*	53	1	3
Canning, Pre- serving, & Freezing	73	14	*	50	3	7
Bakery Products	61	9	*	46	3	2
Beverage Indus- tries	63	10	*	43	2	8
Other Food Prod.	64	15	*	40	4	6
Textile Mill Products	78	9	*	65	2	3
Apparel & Re- lated Products	87	8	*	77	1	1
All Other Paper Products	65	14	*	48	2	2
Paperboard Con- tainers & Boxes	69	12	*	51	2	4
Printing, Pub- lishing, & Allied Products	35	19	*	13	1	1
Synthetic Fibers	54	7	*	42	3	2
Drugs & Medicine	41	18	*	19	3	2
Paints, Varnishes & Related Products	53	19	*	28	2	5
Other Chemicals	48	14	*	31	2	2
Rubber Products	67	12	*	51	2	2
Misc. Plastic Products	71	15	*	49	5	2

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Leather Tan- ning & Finishing	74	7	*	54	2	10
Footwear, Except Rubber	86	11	*	72	1	2
All Other Lea- ther Products	82	12	*	65	1	3
Railroad Trans- portation	55	20	*	23	3	9
Local & Inter- Urban, Except Taxis	83	9	*	67	5	2
Taxis	92	11	*	81	0	0
Trucking	83	14	*	58	1	10
Warehousing	71	23	*	30	2	16
Telephone	54	50	*	1	2	1
Telegraph	62	57	*	3	2	0
Radio & Tele- vision	20	16	*	2	2	1
Electric, Gas & Steam	38	21	*	10	2	4
Water & Irri- gation	49	24	*	15	1	9
Sanitary Ser- vices	82	3	*	37	1	41
Motor Vehicles & Equipment	38	24	*	10	1	3
Drugs & Chemicals	48	29	*	15	1	3
Dry Goods & Apparel	40	27	*	11	1	1
Groceries & Re- lated Products	64	14	*	41	1	8

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Electrical Goods Plumbing & Heating Supplies	38	27	*	8	1	3
Machinery & Equipment	32	22	*	6	1	2
Misc. Whole- sale Trade	55	21	*	24	1	9
Building Water- ials, Hardware & Farm Equipment	57	16	18	16	1	6
Limited Price Stores	80	17	48	1	9	4
Other General Merchandise	79	23	45	4	4	3
Food & Dairy Stores	75	29	19	18	2	9
Automobile Dealers	44	11	19	7	1	6
Gas Stations	62	3	0	55	0	2
Apparel & Accessories	74	17	45	7	3	2
Furniture, Etc.	58	17	25	11	2	2
Eating & Drink- ing Places	81	5	1	1	73	0
Drug Stores	70	15	35	5	12	2
Other Retail Stores	65	15	35	11	1	3
Banks & Credit Agencies	62	57	*	0	6	0
Stock Brockers & Investment Co.	39	37	*	0	1	0
Insurance	47	46	*	0	2	0
Real Estate	36	19	*	0	10	6

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
Private House- hold	99	0	0	0	86	12
Hotels & Other Lodging Places	74	11	0	3	59	1
Laundry, Clean- ing & Valet Services	79	16	1	59	2	1
All Other Per- sonal Services	92	2	1	3	86	0
Advertising	39	33	*	4	1	1
Other Misc. Business Services	59	28	4	9	15	2
Automobile Repair Services & Garages	32	7	1	17	1	7
Motion Pictures & Theatres	41	18	3	3	17	0
Misc. Entertain- ment & Recreation	63	8	1	2	43	8
Hospital	60	11	*	3	46	0
Other Medical & Health Services	52	25	*	1	26	0
Legal Services	45	44	*	0	1	0
Educational Services	33	15	*	2	16	1
Welfare & Reli- gious Organ.	51	18	1	2	29	1
Other Non-Profit Organizations	60	34	1	2	22	1
Engineering & Architectural	17	13	*	2	1	0
Accounting & Bookkeeping	37	37	*	0	0	0

<u>Industry</u>	<u>Total</u>	<u>Clerical & Kindred</u>	<u>Sales</u>	<u>Operatives & Kindred</u>	<u>Service</u>	<u>Laborers</u>
All Other Professional Services	27	20	*	4	3	0
Postal Services	89	82	0	1	2	7
Other Federal Public Administration	49	38	*	4	4	2
State Government	53	34	*	1	16	1
Local Government	70	22	*	3	42	3
Total All Industries	59	17	7	17	14	4

* Sales workers in this industry are not predominantly semi-skilled.

1. S.I.C. codes for these categories can be found in Appendix C in U.S. Department of Labor, Tomorrow's Manpower Needs - Volume IV: The National Industry - Occupational and Other Manpower Data, U.S. Government Printing Office, Washington, 1969.

2. Categories may not add to totals due to rounding.

APPENDIX VI

M.I.T. Employment of Semi-Skilled Workers
1963 and 1972

<u>NON-AFL HOURLY</u>	<u>1963</u>	<u>1972</u>
Reproduction Workers		
Reproduction Worker B	4	5
Reproduction Assistant	7	8
General Helper	4	5
Animal Caretakers		
Animal Caretaker	1	3
Jr. Animal Caretaker	-	4
Truck Driver		
Truck Driver	-	1
Driver	-	-
Driver-Utilityman	9	13
Machinists		
Shop Helper A	2	3
Shop Helper B	1	3
Stock Clerks		
Sr. Stock Clerk	13	18
Stock Clerk	13	11
Photographers		
Photographer C	2	-
Technicians		
Lab. Assistant	30	25
TOTAL	86	99

<u>AFL HOURLY</u>	<u>1963</u>	<u>1972</u>
Carpenter's Helper	1	-
Mason-Tender	1	-
Maintenance Operator A	3	-
H & V Utilityman	-	-
Glazier's Helper/Shademan's Helper	1	-
Fireman 2nd. Class	5	2
Fireman's Helper	-	-
Stockman-Storekeeper	1	1
Senior Stock Clerk	1	-
Stockman	1	2
Head - Swimming Pool	1	1
Swimming Pool Attendant	4	3
Garage Mechanic's Helper	1	-
Head Custodian	15	23
Polisher/Machine Operator	-	73
Custodian	125	176
Head Window Washer	1	1
Window Washer	5	4
Stagehand Custodian	5	7
Shipper	2	2
Shipper's Helper	2	3
Service Man	-	3
Sub-Foreman Custodian	3	-
Mailman	5	7
Head Watchman	1	2
Watchman-Information	1	-

<u>AFL HOURLY</u>	<u>1963</u>	<u>1972</u>
Watchman	19	25
Electrical Utilityman	2	10
Truck Driver	6	10
Spare Driver	2	1
Head Mover	-	-
Mover	5	7
Gardener	1	3
Groundsman	23	38
Night Cleaner - Light	12	4
Elevator Operator	3	2
Matron	11	16
Boatman	1	1
Boathouse Attendant	1	2
Head Houseman	1	-
Houseman	29	25
Linen Stockman	3	3
Handyman	4	3
Dorm. Maintenance Mechanic	5	6
Dormitory Patrol	6	8
Maids	4	7
Housekeeper	-	9
	<hr/>	<hr/>
TOTAL	323	490

OFFICE BIWEEKLY

	<u>1963</u>	<u>1972</u>
Grade I	41	12
Grade II	301	201
Grade III	551	583
TOTAL	<u>893</u>	<u>796</u>

TOTAL SEMI-SKILLED

Non-AFL Hourly	86	99
AFL Hourly	<u>323</u>	<u>490</u>
Total Hourly	409	589
Office Biweekly	893	796
TOTAL	<u>1,302</u>	<u>1,385</u>

APPENDIX VII

Analysis of Policies to Reduce Unemployment of Semi-Skilled Workers Caused by Relocation of Firms

Introduction

The primary reason that firms are relocating in the suburbs is to reduce their production costs by avoiding the higher rents and higher taxes of the city, taking advantage of the greater efficiency of a new plant or having an abundance of relatively cheap land for possible future expansion. One of the effects of this relocation is to create unemployment among semi-skilled presumably low-income workers (see pages 25-27 in Chapter 3). Since the causes of unemployment in this case are high costs of production for the firm in the center city and both high commuting costs and high housing costs for the worker, there are four policy options which might alleviate unemployment:

- 1) Subsidize firms to induce them to locate in Cambridge.
- 2) Subsidize housing in the suburbs to allow unemployed Cambridge workers to move there.
- 3) Reduce commuting costs so that workers could remain in Cambridge and commute to the suburbs.
- 4) Let market forces reach an equilibrium.

The following is an analysis of each of these options.

Subsidizing Firms

There would be two means of subsidizing firms:

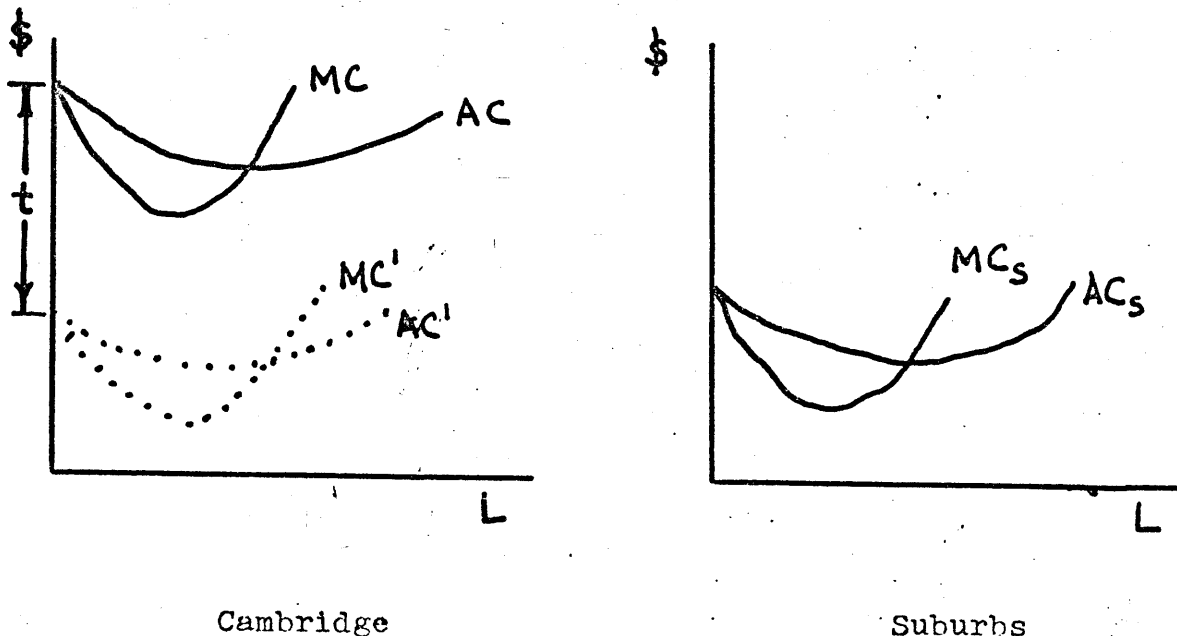
- (a) Reducing the firm's property tax.
- (b) Paying an on-the-job-training (OJT) subsidy at a

fixed rate per worker.

The first of these could be accomplished only through preferential treatment in property assessment since the tax rate applies to all properties. This treatment could be given to individual firms, industrial classifications or all commercial (non-residential) uses. The OJT subsidy could be paid directly to the firm or to the trainees thus allowing the firm to reduce the wage it pays them. Economically, the effect is the same.

Reducing the property tax by an amount equal to the difference in land costs between Cambridge and the suburbs would offset the advantage of locating in the suburbs. Assuming that marginal costs (MC) are the same in both locations, this would reduce fixed and, therefore, average costs such that there would be equal incentive for firms to locate in Cambridge and the suburbs:

Illustration I



$t = (\text{Cost of land in Cambridge}) - (\text{Cost of land in suburbs})$

$MC' = MC_S$

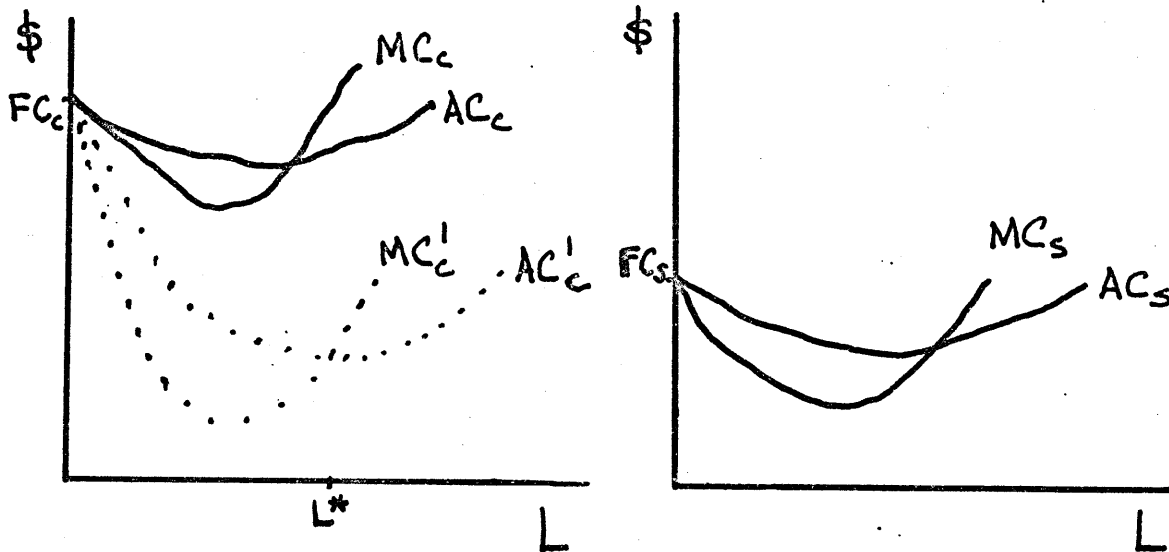
$AC' = AC_S$

However, there are several problems with such a subsidy. First, state law requires that all properties be assessed at full value. Although, as a practical matter, assessments are not kept up to date, to make it public policy to deliberately underassess places the city in a very awkward legal position. Nonetheless, the basis for assessment is so ill-defined that such a policy could be maintained sub rosa. As stated in one report, "Negotiating the assessment of new industrial property solely at the local level may produce a discriminatory tax system that is open to abuse."¹ Second, it is generally found that "... tax incentives are at best a relatively unimportant secondary factor of location. Given the governing factor, the tax incentive may induce a specific location within the area defined by the basic factor."² Yet another reason for not pursuing this policy is that it would probably be quite expensive to subsidize every new firm or even a few large ones. Finally, the most crushing blow to this policy is that the suburbs could make retaliatory tax cuts, and since they have the initial advantage of cheaper land Cambridge would be likely to lose.

Paying an OJT subsidy to either the firm or the worker would reduce the firm's marginal costs per worker. If the OJT program is carried out properly it will also have the effect of giving the worker additional skills and increasing his economic mobility

permanently. For the firm the effect of the program is described by the following illustration:

Illustration II



Cambridge

Suburbs

- (1) a = net subsidy per worker
- (2) $MC_c = MC_s$
- (3) $MC'_c = MC_s - a$
- (4) $aL^* = \text{total net subsidy}$
- (5) $aL^* = FC_c - FC_s$

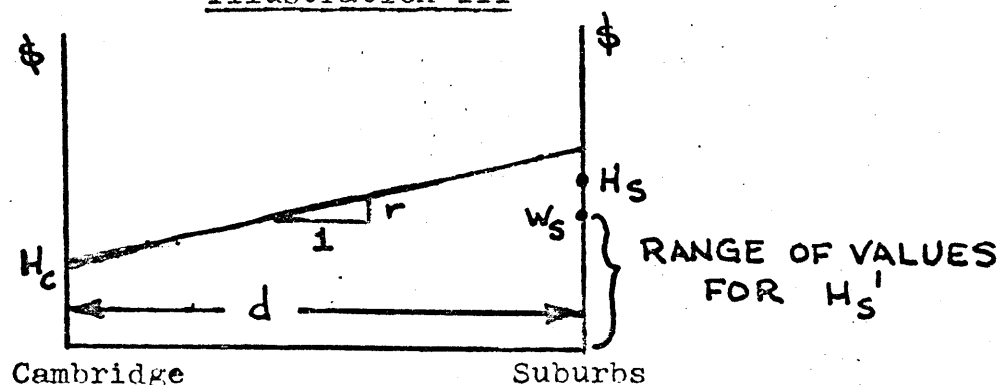
Assuming the firm is in a perfectly competitive market such that $P = MC = AC$, then equations (4) and (5) would hold when the firm was perfectly neutral between Cambridge and the suburbs. This policy, too, has its problems. Since marginal costs are being used to adjust for fixed cost differentials, it is only at the equilibrium point that both the Cambridge and suburb cost curve coincide. Therefore, it would be more sensitive to market fluctuations and the subsidy rate, to be maintained at an optimum,

would have to be frequently adjusted. Also, the net subsidy to the firm would be less than the actual subsidy the city would have to pay. Most OJT programs have substantial direct costs over and above the payments made to trainees and there are other indirect costs such as supervision and lower productivity that the firm must absorb. The net subsidy, a , in the diagram is simply the difference between the compensation the firm pays and the total compensation the trainee receives less the additional costs incurred by the firm. Hence, the sum of these additional costs, the direct costs of training and the net subsidy per worker would be the cost to the city in order to shift the firm's cost curve. The benefits here are greater since reducing unemployment is complemented by upgrading the skill levels of the trainees, but it is a very expensive process.

Subsidizing Housing

If the costs of living in the suburbs are greater than the costs of living in Cambridge plus the commuting costs, then subsidizing commuters is the better policy. If not, the following situation exists:

Illustration III



- (1) H_c =living costs in Cambridge
- (2) H_s =living costs in suburbs
- (3) W_s =wages in suburbs for semi-skilled labor
- (4) r =commuting cost rate
- (5) d =distance from Cambridge to suburban location
- (6) $H_s \leq H_c + rd$

If subsidizing housing in the suburbs is to be effective, the amount of the subsidy, H_a , would have to be greater than $H_s - W_s$. In other words, if $H_s' = H_s - H_a$, then $W_s \geq H_s'$. There would be incentive in that case for the unemployed to move to the suburbs and take jobs.

The basic problem with this policy is that those who stand to benefit, unemployed workers in Cambridge, have nothing to say about housing policy in the suburbs. The only means of controlling such a policy is at the state and federal level. Although the federal subsidies exist and the Commonwealth has an "anti-snob zoning" bill to aid the development of subsidized housing in suburban locations, the combination has not worked. Suburban municipalities have succeeded in selecting their own subsidies, which means that housing for the elderly gets built while low-income developments are restricted to the center cities. A law similar to Massachusetts' has been in existence for some time in New York and is apparently equally ineffective.

Reducing Commuting Costs

The situation would be the same as Illustration III except that housing costs in the suburbs would be greater than housing costs in Cambridge plus commuting costs, yielding:

$$(1) H_s \geq H_c + rd$$

$$(2) W_s \leq H_c + rd$$

In order to give workers an incentive to commute to the suburbs, the commuting cost rate, r , must be reduced to a new rate, r' , such that:

$$(3) W_s \geq H_c + r'd$$

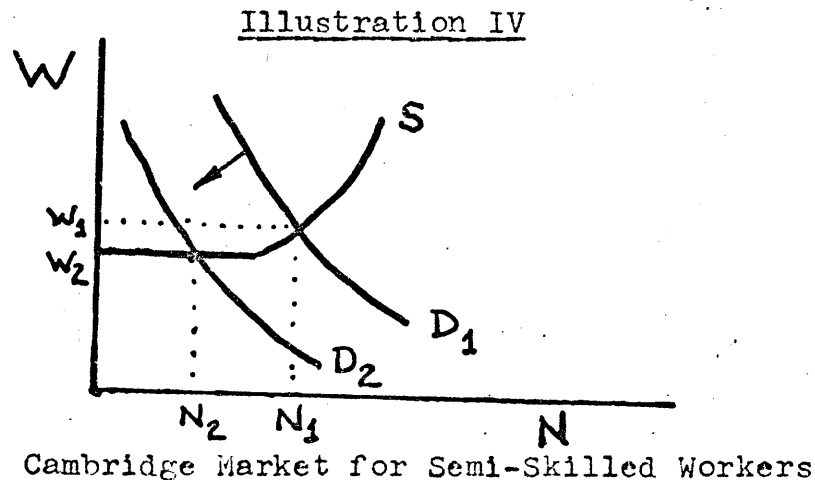
If this cost reduction is effected by improving mass transit, then everyone using mass transit would receive the benefits, making it a very expensive policy. If direct travel subsidies are paid, or special transportation provided for unemployed workers, several questions arise concerning equitability. If income criteria are used in awarding the subsidy, then all low-income workers should receive it rather than just those who work in the suburbs. Should the subsidy be enough for bus fare or for operating a car? Subsidizing car ownership is probably too expensive, but mass transit would be workable in only a few cases since job destinations are widely dispersed in the suburbs. If a relatively few job locations supplied a large number of jobs, bus transportation specifically for those locations might be justified. For example, if a large factory in Needham agreed to hire 50 Cambridge residents, it might be feasible for the city to provide bus transportation at cost for these residents. However, such cases would probably be extremely rare and not a viable,

systematic means of reducing unemployment.

Relying on Market Forces

If the barriers to relocating or commuting in fact remain rigid for a significant number of workers, then, in classical theory, the wage demand curve will shift down enough to create a marginal cost curve for the firm similar to MC' in Illustration II. In an effort to obtain employment workers would bid down wages sufficiently to "subsidize" the firm and induce it to locate close enough for them to work. However, minimum wage laws, union wage structures and the welfare system tend to make wages rigid downwards. Accepting this model, it is unlikely that workers would be willing to accept a wage low enough to induce firms to move back into Cambridge. Nonetheless, on closer inspection here is a policy which could overcome even this wage rigidity.

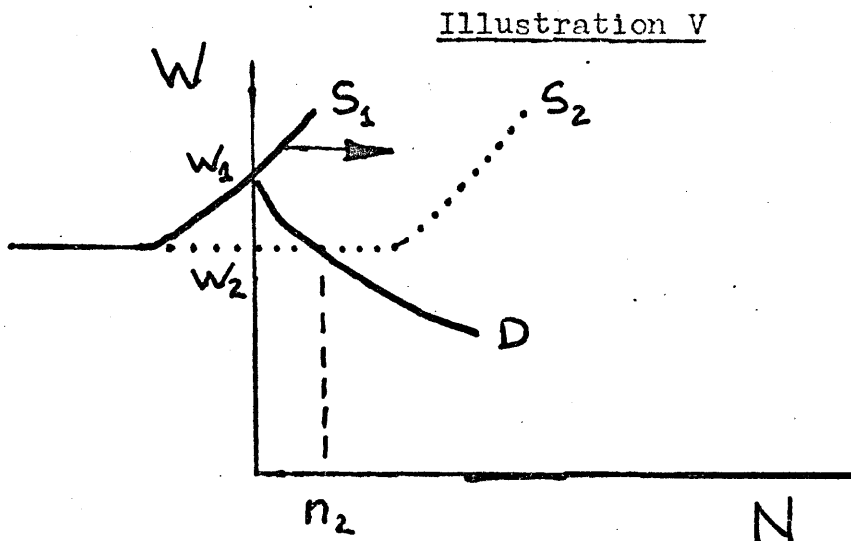
Illustration IV shows the effects of firm relocation on the Cambridge labor market;



- (1) W_1 =equilibrium wage in period 1
- (2) N_1 =equilibrium level of low skill employment in period 1
- (3) S =supply schedule for low skill labor
- (4) D_1 =demand schedule for low skill labor before relocation of firms
- (5) D_2 =demand schedule for low skill labor after relocation of firms

Since this is the low skill market, the equilibrium wage was presumably close to the acceptable wage minimum prior to the relocation of firms. The loss of firms is likely to have shifted downward enough to have reached the minimum, creating an increase in unemployment of $N_1 - N_2$.

The significance of this increase in unemployment is the effect it may have on firms which were previously unwilling to locate in Cambridge, as shown in Illustration V:



Supply-Demand Schedule for Firms Outside of Cambridge

- (1) S_1 =supply schedule for low skill labor facing outside firms before relocation
- (2) S_2 =supply schedule for low skill labor facing outside firms after relocation
- (3) D =demand schedule for low skill labor of outside firms
- (4) n_2 =potential employment by outside firms
- (5) W_1 =equilibrium wage before relocation
- (6) W_2 =equilibrium wage after relocation

Whereas the outside firms would have had to pay W_1 before, they can now get a good deal on low skill labor at W_2 . However, Cambridge has not been overrun by bargain hunting firms.

This could be so for two possible reasons:

- (1) Wages and the availability of labor are not important factors in location decisions of firms.
- (2) Firms which do consider these important factors, and would locate in Cambridge on the basis of them are simply ignorant of Cambridge's economic advantages.

Evidence from several reports indicate that wages and particularly availability of labor are extremely important influences on location decisions.^{3,4} If ignorance is, then, a significant defect in the functioning of the market, a logical policy would be to eliminate it. This could be accomplished through any number of sales devices: media advertising, personal contacts, letters, etc. The precise mechanism is of little concern here. The point is that such a sales campaign, if the analysis is correct, is quite likely to have an impact if focused on the

proper industries. Moreover, it is probably the least expensive of all of the proposed policies because it would require a relatively small staff for a limited period rather than large and continuous subsidies. It is, therefore, an excellent policy in view of its likely effects and its feasibility, and should be adopted prior to the other policies.

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1. U. S. Advisory Commission on Intergovernmental Relations, State-Local Taxation and Industrial Location, Washington, D. C., U. S. Government Printing Office, 1967, pp. 84-85.
 2. Melvin L. Greenhut, Plant Location in Theory and in Practice, Chapel Hill, University of North Carolina Press, 1956, p. 139.
 3. Zenon S. Malinowski and William N. Kinnard, Jr., Highways as a Factor in Small Manufacturing Plant Location Decisions, Storrs, Connecticut, University of Connecticut, 1961, p. 19.
 4. Chamber of Commerce of U. S. of America, Construction and Commercial Development Department, "Why Industries Locate", Case Studies in Community Development, Washington, D. C., 1963, p. 147.

FOOTNOTES

1. P. Sargent Florence, Economics and Sociology of Industry, Baltimore, The Johns Hopkins Press, 1969, pp.13-14.
2. Ibid., p. 2.
3. Ibid., p. 2.
4. U. S. Department of Labor, Tomorrow's Manpower Needs - Volume IV: The National Industry - Occupational Matrix and Other Manpower Data, Washington, U. S. Government Printing Office, 1969, pp.38-39.
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