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Research On
Economic and Social Effects
of
Highway Improvements

AN INVENTORY OF THE ECONOMIC FACTORS
INFLUENCED BY A HIGHWAY DEVELOPMENT PROGRAM

by

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Michigan State University
Highway Traffic Safety Center
and
Department of Economics

Joint Research by
Michigan State University
and
Michigan State Highway Department
with participation of
U. S. Department of Commerce
Bureau of Public Roads

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This report represents one study which was part of a joint research program on the Economic and Social Effects of Highway Improvements made possible through financial support from Highway Planning Survey funds, under an agreement between Michigan State University Highway Traffic Safety Center and the Michigan State Highway Department with the participation of the U. S. Department of Commerce Bureau of Public Roads. The research program was administered by the Michigan State University Highway Traffic Safety Center and was made possible through the cooperation and interest of a large number of university departments both in planning the research and in making available competent research staff qualified in different subject matter areas.

The research program included some 17 studies in the following areas:

An Inventory of the Economic Factors Influenced by a
Highway Development Program

Effects of Highway Development on Rural Lands and
Communities

Land and Property Values in Relation to an Urban
Highway Improvement

Small Communities and Controlled Access Highways

Effects on Businesses in Small Cities of By-Pass
Highways

Effects of Highway Development on Social Groups and
Interactions

Geographical Analysis of Land Use Changes in Relation
to Highway Development

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FOREWORD

For two years a broad scale research approach from the point of view of several different disciplines has been used to study the Social and Economic Effects of Highway Improvements under the Highway Traffic Safety Center, Michigan State University, with the cooperation of some ten departments of the University. This work has been sponsored by the Michigan State Highway Department with the participation of the Bureau of Public Roads, U. S. Department of Commerce.

The general plan for this research was to make certain specialized investigations of the effects on land and property values, effects on businesses and to such study various phases of social change brought about by the development of new and better highways. In addition, to these more specialized research approaches, it was also planned to put together inventories of all possible benefits and disbenefits to highway users and also to non-users.

Such inventories of user and non-user benefits must of necessity rest upon the expert opinion of researchers in different specialized fields of knowledge. This inventory of the economic factors influenced by a highway development program, therefore, represents an attempt by a trained economist to show all the possible influences and interrelationships which such a highway development program may have. Before compiling this inventory, Dr. Schenker participated in a study of the effects of an urban by-pass highway upon land and property values in the surrounding area. He also participated in the many original orientation and planning sessions for the program as a whole prior to drawing up this inventory.

It is hoped that this inventory will be of value (1) in suggesting the very wide-spread influence and interrelationship of highway developments with all phases of business and economic life of Michigan and of the United States, and (2) by stating certain hypotheses with which others may agree or disagree and thus being stimulated to carry out objective research to further evaluate them.

The opinions stated are those of the author and not necessarily of any of the organizations connected with the research. Similarly any hypotheses or formulations presented are in no way to be taken as statements intended to influence policy, but rather as statements based on expert opinion which are included for completeness of such an inventory.

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AN INVENTORY OF THE ECONOMIC FACTORS INFLUENCED
BY A HIGHWAY DEVELOPMENT PROGRAM

Eric Schenker

SUMMARY

The purpose of this study has been to compile an inventory of economic factors influenced by a highway development program and to state the writer's hypothesis for each factor. These hypotheses can be used as a basic framework for subsequent research work. They are not intended to suggest policy but rather they represent alternatives which can be investigated.

The direct impact of a highway development program is felt by every citizen of the United States. Some of these effects are very obvious and definite, others are more general and indirect, while still others are so indirect that it is difficult to determine with certainty whether they are really economic or belong to some other category.

One obvious impact of a highway development program is on employment. The U. S. Department of Labor has estimated that each billion dollars spent on highway construction will result in 102 million man-hours of employment on the site of the construction, and 126 million man-hours off the site. This means that a program of the size that Michigan usually undertakes each year generates 25.5 million man-hours of work on the site of construction plus 31.5 million man-hours elsewhere; i.e., a total of 57 million man-hours.

Another of the more obvious effects of a highway development program, which is consistent with full employment, is to increase the aggregate level of personal income. The reason for this is that highway expenditures involve capital investment, i.e., the purchase of nonconsumable goods and services. Through what is known as the multiplier effect, these expenditures induce further private investment and thus a further increase in aggregate income will be realized by additional productive resources becoming employed.

There will also be a long run effect of highway improvements on personal income. This will, of course, be due to the improvements per se. These improvements will increase the productive efficiency of resources whose values are influenced by transportation cost. Consider, for example, a factor of production for which no fixed ratio exists by which it must be combined with other factors.

Increase in efficiency of such a resource due to lower cost will cause the user of such resources to use greater quantities, thus increasing the income received by the owner of that resource. Unless other factors of production are used in a less abundant amount equal to the increase in the amount of the more efficient resource, the net result will also be increased total personal income.

One of the more general and indirect effects of a highway development program is the reduction in the cost of goods and services which it induces. Obviously, transportation costs are productive costs and as such are reflected in the value of goods and services. Not only are the final products shipped to the consumer via the highways but so are the raw materials which are needed in the processing, assembling the final products. Better highways mean lower maintenance and shipping costs. This further assumes that any reduction in production cost will be reflected in the final sales price of the goods or service.

Another of the more general and indirect effects of a highway development program is that it may extend markets by allowing distant manufacturers' products to become competitive with local products. This is due to the fact that improved highway transportation may reduce transportation cost as a factor of production and thus serve to become competitive with local products. Thus improvements in highways may serve to reduce consumer prices and facilitate diversification of industry.

Above are just some of the obvious and general effects of a highway development program. Some of the more general and indirect effects of a highway development program are introduced in the discussion of the more obvious factors listed below but do not receive individual attention. The text of this study treats individually the following economic factors:

- | | |
|--|-------------------------------------|
| 1. The Gross National Product | 13. The Marginal Propensity to Save |
| 2. Net National Product | 14. Gross Private Investment |
| 3. National Income | 15. Net Private Investment |
| 4. Personal Income | 16. Capital Consumption |
| 5. Federal Personal Income Tax | 17. Government Expenditures |
| 6. Disposable Income | 18. Multiplier |
| 7. Wages | 19. Accelerator |
| 8. Interest | 20. The Propensity to Consume |
| 9. Rent | 21. Marginal Propensity to Consume |
| 10. Personal Consumption | 22. The Liquidity Preference |
| 11. Savings | 23. The Money Supply |
| 12. The Marginal Efficiency of Capital | 24. Monetary Policy |

- | | |
|--|-----------------------------------|
| 25. Federal Reserve Open Market Operations | 38. Economic Growth |
| 26. Fiscal Policy | 39. Income Distribution |
| 27. State and Local Finance | 40. Market Structure |
| 28. Excise Taxes | 41. Industrial Centralization |
| 29. The Sales Tax | 42. Specialization |
| 30. Corporation Income Taxes | 43. Urbanization |
| 31. Highway Revenue | 44. Motor Vehicle Insurance Costs |
| 32. Securities | 45. Motor Vehicle Operation Cost |
| 33. Speculation | 46. Motor Freight Transportation |
| 34. Business Cycles | 47. Intercity Bus Transportation |
| 35. Unemployment | 48. Air Transportation |
| 36. Production Cost | 49. Railroad Capital Improvements |
| 37. Productivity | 50. New Construction |
| | 51. Tourist Trade |

AN INVENTORY OF THE ECONOMIC FACTORS INFLUENCED
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by

Eric Schenker*

Introduction

Alfred Marshal once said that the dominant fact in the industrial development of the western world was not manufacturing but transportation. Since this judgment preceded the full impact of the automotive revolution, it would certainly be even more true today. This revolution has brought about for the nation a new way of life, affecting every citizen. It has influenced nearly all activities of the individual, the family, and the community; it has reshaped the process of industry, commerce, and agriculture. Unlike other modes of transportation, the motor vehicle provides direct access to homes, recreation areas, factories, offices, etc.

To provide this direct access, the various levels of government had to provide highways. For example, the transportation requirements of Michigan today are served by a highway, road, and street system totaling 108,036 miles. Of this mileage, 93,428 miles are rural, while 14,608 are in municipalities. State trunklines total 9,355 miles. As one might suspect, highway development requires government expenditures. Table 1 shows the total direct expenditures for highways by all levels of government.

With the passage of the Federal Aid Highway Act of 1956, the trend toward greater annual expenditures for highway development can be expected to continue. Congress pledged its support for the construction or reconstruction of 41,000 miles of the National System of Interstate and Defense Highways. In approximately 16 years this new system will connect 48 of the states, linking all but 23 of the nation's 232 cities of more than 50,000 population.

The purpose of this paper is to compile an inventory of the economic factors influenced by a highway development program and state hypotheses which may be used as a basis for subsequent research work.

*Assistant Professor of Economics, Michigan State University. Samuel E. Harris, Graduate Assistant, performed some of the basic research for this paper.

TABLE I
Total Direct Expenditures For Highway Purposes by All Units of Government; Gross National Product and Total Government Expenditures (in Millions)

Year	Total Direct Expenditures for Highways	Per Cent Change	Gross National Product	Per Cent of GNP	Total Government Expenditures	Highway Expenditures as Percentage of Total
1929	\$2,237	.024	\$104,436	.021	\$10,227	.218
1930	2,536	.134	91,105	.027	11,022	.230
1931	2,398	.058	76,271	.031	12,318	.194
1932	1,908	.257	58,466	.032	10,607	.179
1933	1,722	.108	55,964	.030	10,676	.161
1934	2,033	.181	64,975	.031	12,830	.158
1935	1,784	.140	72,502	.024	13,340	.133
1936	2,491	.396	82,743	.030	15,882	.156
1937	2,314	.076	90,780	.025	14,827	.156
1938	2,659	.149	85,227	.031	16,589	.160
1939	2,486	.070	91,095	.027	17,522	.141
1940	2,381	.044	100,618	.023	18,467	.128
1941	2,140	.113	125,822	.017	28,753	.074
1942	1,725	.241	159,133	.010	64,032	.026
1943	1,374	.255	192,513	.007	93,399	.014
1944	1,369	.004	211,393	.006	103,072	.013
1945	1,419	.037	213,558	.006	92,943	.015
1946	2,035	.434	210,663	.009	47,004	.043
1947	2,848	.400	234,289	.012	43,811	.065
1948	3,433	.205	259,426	.013	59,995	.057
1949	3,898	.135	358,054	.010	59,527	.065
1950	4,123	.058	284,599	.014	61,116	.067
1951	4,525	.098	328,975	.013	79,357	.057
1952	5,019	.109	346,999	.014	94,425	.053
1953	5,597	.115	365,385	.015	102,040	.054
1954	6,511	.163	363,112	.017	96,741	.067
1955	6,864	.054	397,469	.017	98,578	.069
1956	7,702	.120	419,214	.018	104,142	.073

Source: Highway Statistics, Department of Commerce, Bureau of Public Roads, Washington, D. C.

1. The Gross National Product (GNP)

The GNP is the money value of a nation's entire output of final commodities and services during a given time period. It represents the sum of (a) consumption purchases of goods and services; (b) government purchases of goods and services; and (c) gross private investments (both foreign and domestic). Although there have been a few years since 1929 during which this value has decreased from one year to the next, the trend has been upward. Expressed in current dollar values, GNP in 1957 was approximately four times its 1929 value. The total direct expenditures of highway development by all units of government during this time span was approximately .02 per cent of the yearly GNP, varying from .006 per cent to .032 per cent as shown in Table 1.

Although expenditures on highway development represent a small percentage of the GNP, the effect of these expenditures is greater than indicated by the percentages. The reason for this is that highway expenditures involve capital investment, i.e. the purchases of nonconsumable goods and services.

Through what is known as the multiplier effect, these expenditures induce further private investment. Why does an increase in investment produce a multiplied effect on the GNP? If the amount spent by various levels of government increases by 1 billion dollars, this sum will be received by various individuals as additional income. What they will do with it depends on the marginal propensity to consume and the marginal propensity to save. Let us assume that the marginal propensity to consume is 75 per cent and the marginal propensity to save is 25 per cent. In that case, $3/4$ billion dollars of the extra 1 billion will be devoted to consumption and $1/4$ billion dollars will be saved. Then $3/4$ billion dollars will be received as income by various individuals, and 75 per cent of it will be devoted to consumption and 25 per cent of it will be saved. And so on and on. By the time the increase in highway expenditures has had its full effect on the GNP, the rise in the GNP will have reached 4 billion dollars.

2. Net National Product (NNP)

The NNP is equal to the GNP minus capital consumption allowances. Capital consumption allowances refer to the gradual wearing out or destruction of durable capital goods. As a money sum, it is the value of these capital goods worn out or used up in a given period. The NNP gives us a more accurate picture of the net contribution of the productive system to the volume of goods available for consumption and to the economy's total stock of

capital goods. The reason is that all capital goods produced in a given year are included in the GNP whether they represent a net increase in the stock of capital goods or merely go to replace others which, for one reason or another, have become or are becoming no longer useful.

The effect of highway expenditures upon the NNP depends largely upon the use of the expenditure, the multiplier, and the rate of depreciation. For example, intensive use of existing highways, floods, or other accidental factors increases capital consumption and thus reduces the NNP.

3. National Income

National income is the sum of the money incomes which individuals and firms receive for supplying units of the productive agents during a given period. It is equal to NNP minus indirect business taxes, business transfer payments, and current surpluses of government enterprises, plus subsidies paid by the government to business firms. The distributive shares or classes of factor incomes regularly identified in national income statistics are interest payments, wages and supplements, dividends, rents, undistributed profits, and the unincorporated net income.

National income, the NNP, and the GNP as expressed in money are useful concepts. The effect of highway expenditures on each was explained in previous sections of this paper. It should be pointed out, however, that when one compares any changes expressed in monetary units from one year to another, changes in the value of the monetary unit should be considered. For example, in a period of prosperity, if prices rise and dollar declines in purchasing power as national real income increases, the increase in national income expressed in money exaggerates the increases that occur in national real income.

4. Personal Income

Personal income is the total amount of income which individuals receive from all sources, except gifts from other individuals. It is national income plus transfer payments and minus certain portions of the national income not received by individuals, such as undistributed profits, corporate taxes, and social security taxes. Included in personal income are transfer payments, wage receipts, unincorporated net income, rents, interest payments, and dividends.

Expressed in constant 1939 dollars, the increase in aggregate personal income over the past 20 years has more than doubled its

1939 volume of 67.7 billion dollars. Expressed in per capita terms to account for population increases, the 1957 disposable income was \$940 per capita as compared to \$556 per capita in 1939 (constant 1939 dollars).

A highway program financed with the objective of being consistent with full employment will have a net effect of increasing the aggregate level of personal income. This increase in aggregate income will be realized by additional productive resources becoming employed. There will also be a long run effect of highway improvements. This will of course be due to the improvements per se. These improvements will increase the productive efficiency of resources whose values are influenced by transportation cost. Consider for example a factor of production for which no fixed ratio exists by which it must be combined with other factors. An increase in the efficiency of such a resource due to lower cost will cause the users of such resources to use greater quantities, thus increasing the income received by the owners of that resource. Unless other factors of production are used in a less abundant amount (dollar value) equal to the increase in the amount of the more efficient resource, the net result will also be to increase personal income.

5. Federal Personal Income Tax

The federal personal income tax is a progressive tax which applies a higher rate to a larger income than to a smaller one. That is, the higher the level of income of the individual, the greater percentage of his income will be taxed by the federal government. The taxation of individual incomes is far and away the most important source of federal revenue, since it constitutes about half of the federal government's annual tax receipts. Highway expenditures, as indicated, will increase the aggregate level of personal income and result in an increase in total tax revenue. Individuals in those sectors of the economy which experience net increases in earnings will find themselves bearing a greater percentage of the tax burden if the net income has placed them in a higher income bracket.

6. Disposable Income

Disposable income is personal income minus personal taxes. It is the amount of personal income available to individuals for purchasing the commodities and services produced in private sectors of the economy and for personal savings. More important to the individual than the size of his gross income is the

amount of goods and services he can purchase with his disposable income. Thus, as long as the economy is not at full employment, increased highway expenditures will mean greater aggregate disposable income unless taxes are increased by more than enough to offset the multiplier effect.

7. Wages

Wages are the payments which are made per year for the use of labor in production. The wage usually reflects the value of a productive service to the entrepreneur as well as the value the worker places upon his services. Many wages are commonly determined by collective bargaining, and generally express the above values in the light of further economic determinants such as government policy. Real wages reflect only the purchasing power of the remuneration to labor. When the prices of consumer items increase more rapidly than wages, then real wages decrease. The reverse effect is observed when wages rise faster than prices. Real wages usually move with the productivity of labor, conditioned of course by other economic phenomena. One effect of an increase in the efficiency of resource allocation via highway improvements is to increase labor productivity. As such it also increases real wages. An exception to this would be found in the short run if the economy is at full employment and highway expenditures are not properly balanced by government revenues; in this case the effect could be inflationary, and thus reduce real wages.

Another factor that should be mentioned is that the Federal Aid Highway Act of 1956 applied the Davis Bacon Act to all contractors and sub-contractors working on highway projects. This means that all workers working on highway projects are subject to the minimum wage law.

8. Interest

Interest, from the long-run point of view, is the payment which is made per year for the use of savings. In the short run it may be defined as a reward for not hoarding. The rate at which interest will be paid on the short run in part depends on the strength of the preference of liquidity of money in relation to the quantity of money.

The rate of interest is important because it determines the form in which money will be held, and, in conjunction with the marginal efficiency of capital, the level of net investment. Assuming that

the marginal efficiency (income earning potential) of capital remaining the same, the higher the rate of interest, the smaller will be the total net private investment in the economy. High interest rates increase the cost of highway construction since states usually finance road construction through the sale of bonds.

At the present time the Board of Governors of the Federal Reserve Board can manipulate the interest rate by controlling the money supply and the rediscount rate. The rediscount rate is the rate at which a bank can discount, at a Federal Reserve Bank, a piece of commercial paper already discounted by a member bank for a customer. Due to the fact that increases in highway expenditures will induce net private investment, it will stimulate the demand for the use of money thus creating an inter-tendency for a rise in interest rates. Whether or not a rise in interest rates actually supervenes, depends upon the level of existing economic activity and the Board of Governors' appraisal of the potential consequences of a higher demand for money.

9. Rent

Rent is a term which has been given a variety of meanings, but for this paper it refers to the payments which are made per year for the use of land. Rent is received by the owner of a piece of land, whether he uses it himself or lets it out to a tenant. If he uses the land himself, the rent comes in as a part of his income and is called implicit rent. On the other hand, a payment received from a tenant for the use of land is known as explicit rent.

Rent would not exist were it not for the relative scarcity of high-grade land and the tendency to diminishing physical productivity in the use of land. Under actual conditions rent does exist and tends to increase in amount as the population grows and the supply of capital expands. A highway development program will probably result in an increase of the aggregate value of a community's property, and it is also likely to increase the national aggregate level of rental incomes.

10. Personal Consumption

Personal consumption includes all consumer expenditures for services, all purchases and nondurable consumer goods, and all purchases of durable goods except housing. This is the largest single item of the gross national product. The total national

income for a given time period which is not saved or invested is considered as personal consumption expenditures. The level of aggregate consumption is a function of the level of aggregate income during the succeeding period, the level of employment and the consumption function. The consumption function is the ratio of the total volume of consumption which results from various levels of national income.

The effect of a highway development upon personal consumption is discernible through its effect upon the consumption determinants. There does not seem to be anything inherent within highway development which would shift the consumption function of the economy; but, the tendency for highway expenditures to raise the level of national income will likewise raise the level of consumption. The increase in the level of consumption will, of course, not be as large as the increase in the income; the higher the level of income, the more will be saved.

11. Savings

Personal savings are the part of disposable income which is not spent for consumption, and total planned savings consists of the national money income received by factory owners minus the amount spent for consumption. The level of current planned savings is dependent upon the level of income and the current propensity to save. The higher the level of income, the greater is the tendency to save from additional increases in income. Since the propensity to save for various income levels is stable for short spans of time, the immediate effect of a highway development program is to raise the level of planned savings; therefore a highway development program may increase the schedule of planned savings, by increasing the aggregate level of income. The exact effects of these expenditures depend upon the relationship of the government expenditures, the timing, and method of financing. If these things are done at the right time, a highway development program may have a stabilizing effect on the economy.

12. The Marginal Efficiency of Capital

The marginal efficiency of capital is the rate of discount which, when applied to the whole series of future incomes from a capital good, will bring the sum of their present values equal to the cost or supply price of the capital good. In other words, the marginal efficiency of capital is the expected rate of percentage profit per year from a real investment of the most efficient type. It is determined by expectations of income yields from potential income earnings assets.

The marginal efficiency of capital for a particular firm is a function of both the level of future national income and the activities of other firms. The expected income stream from an investment of an individual firm will surely be affected by the further expansion of other firms in that potential incomes will have to be spread thinner, because such concerted expansion will bid up the supply price of assets by making them scarcer. Thus we find that as larger volumes of investments are made, the efficiency of investment decreases. Investment continues as long as the expected rate of return exceeds the interest rate.

The impact of a highway development program will depend upon the net effect of rising incomes creating further demand for products and the resulting potential increase in supply cost. As the costs of production rise under the impact of increasing demand, the expected rate of return and therefore the marginal efficiency of capital, tends to fall. This, in turn, tends to lessen the volume of private investment to some extent unless the rate of interest falls. This decrease in private investment will tend to neutralize part of the employment and income creating effect of induced private investment.

13. The Marginal Propensity To Save

The marginal propensity to save refers to the percentage of an additional amount of money income which will be saved. As the level of aggregate income increases, the proportion saved from additional income increments tends to increase.

Consumption patterns determine the marginal propensity to save and it, like the marginal propensity to consume, is a function of the level of national income. Any phenomena which tends to increase the level of net income will also increase the marginal propensity to save. This must be qualified, of course, in that there must be no other factors working to depress the level of income, or at least the net effect of other factors must not be depressing. An increase in the level of income may be offset by more rapid increases in the price of consumer goods, or by an increase in taxes such as to leave the savings proclivity unchanged or even depressed if the economy is in an inflationary period.

Given the necessary assumptions it seems safe to indicate at least the potential increase in the marginal propensity to save via higher incomes from highway expenditures.

14. Gross Private Investment

Gross private investment includes all expenditures forthcoming from the private (excluding government spending) sector of the economy for capital replacement and expansionary purposes. The level of spending for capital goods depends upon (a) economic activity in the immediate past (whether or not investment was delayed because of future uncertainty), (b) the present conditions, and (c) the outlook for the future.

The net effect of any sizeable increase in government expenditures for highway development is generally to brighten future expectations and stimulate neglected capital replacements. For example, the steel, concrete, petroleum, and machinery industries will feel the direct impact of the highway expenditures. Soon other sectors of the economy will experience the impact. Thus, a highway development program has both a direct, indirect, and cumulative effect on gross private investment.

15. Net Private Investment

Net private investment is defined as the addition to the existing stock of real fixed capital assets such as extensions of new factories, office buildings, transportation facilities, and additions to inventories (not replacement cost, i.e., capital consumption of existing goods). The volume of investment is dependent upon factors such as growth of population, geographical expansion, and technological progress as these dynamic factors affect the profit expectations of entrepreneurs.

For purposes of economic growth and the efficient use of resources, large volumes of net private investment must continue to flow into the production process. The volume of net private investment is dependent upon the rate of interest and the marginal efficiency of capital as discussed in previous sections of this paper.

16. Capital Consumption

Capital consumption or depreciation consists of obsolescence changes and accidental damage to capital goods. It is derived by subtracting the net national product from the gross national product. Some depreciation on existing equipment will occur over a period of time, whether or not the equipment is used.

The extent of the effect of highway improvements on capital depreciation is best measured in terms of its effect upon industries which have more than negligible percentages of its

total capital investment involved in motor vehicles, or movements of resources and/or final products. Better roads usually mean lower operating costs for the trucking industry through longer vehicle life, safer highways and speedier service. A direct result of this might be a reduction of capital consumption by reducing damage to capital goods. There is also a possibility, although slight, that a highway development program could increase capital consumption in certain sectors of the economy. This would, however, be dependent upon the level of employment.

17. Government Expenditures

The functions of governments, though they differ in many particulars, are all alike in requiring the expenditures of funds. In recent decades, all units of government - federal, state, and local - have shown a marked tendency to increase expenditures. For example, the expenditures of the federal government of the United States increased from \$517,000,000 in 1903 to \$67,579,000,000 in 1954. This amount was about 132 times the 1903 expenditures. Many of these expenditures have been in excess of revenues and thus have built a large public debt.

The relationship between public expenditures and revenues at any given time has an important effect on the aggregate levels of production, employment, and income of the whole economy. Thus if the government consciously adjusts highway revenues and expenditures, desirable effects upon these aggregates will result.

18. Multiplier

The multiplier is a figure by which we must multiply a change in investment in order to find the resulting change in national income which will result. The magnitude of the multiplier is determined by the amount of aggregate savings which results from each additional increment to national income, i.e., the marginal propensity to save. The smaller the marginal propensity to save or the larger the tendency to consume additional increments to income, the larger will be the value of the multiplier. The higher the level of real income, the smaller will be the multiplier. Induced income resulting from investment is greater when the multiplier is large. The size of the multiplier operating in the United State's economy has empirically been estimated to be between three and four.

The size of the multiplier is likely to be affected by highway expenditures since highway expenditures may lead to higher

incomes and thus present a potential increase in the marginal propensity to save. The general multiplier formula is always:

$$\text{Change in Income} = \frac{1}{\text{Marginal Propensity to Save}} \times \text{Change in Investment}$$

$$\text{Change in Income} = \frac{1}{1 - \text{Marginal Propensity to Consume}} \times \text{Change in Investment}$$

19. Accelerator

The acceleration principle states that a given change (plus or minus) in the production and sales of final products tends to bring about greatly magnified changes in the production and sales of capital goods. Let us illustrate this definition from the affairs of a hypothetical firm as shown below:

Period	Total Output & Sales	Total Stock of Machines Needed	Machines Purchased for Replacement	Machines Purchased for Net Investment
1	1,000,000	1000	100	0
2	1,000,000	1000	100	0
3	1,100,000	1100	100	100
4	1,200,000	1200	100	100
5	1,250,000	1250	100	50
6	1,250,000	1250	100	0
7	1,150,000	1150	0	0

As shown in the above hypothetical situation, the firm produces and sells 1,000,000 units of product in the first period. To provide this amount, the firm requires a stock of 1000 machines. The average life of the machine is 10 periods and 100 of the 1000 must, therefore, be replaced each period. In the first period, 100 machines are purchased for replacement and none for net investment. The same thing is true in the second period since output and sales do not increase. In the third period output and sales increase by 10 per cent or to 1,100,000 units. The firm needs a stock of 1100 machines, and this means that it must buy 100 for replacement and another 100 for net investment. Note what has happened! An increase of only 10 per cent in the output and sales of the final product has resulted in an increase of 100 per cent in the volume of business turned over to the capital goods industry which produces the machines. This tendency for given changes in the production and sales of final

products to bring about greatly magnified changes in the production and sales of capital goods is called the acceleration principle. Of course, one can immediately see how highway expenditures can influence total output and sales and thus bring about greatly magnified changes in the production and sales of capital goods.

If one can visualize the acceleration principle at work all over the economy, one will realize that much net investment is necessary as production and national income increase. Highway expenditures may be a good source of net investment for the economy.

20. The Propensity to Consume

The propensity to consume is a functional relationship between the aggregate income and the amount of net income which is spent for consumer or noncapital commodities. This concept is meaningful in the sense that not all the current income which is generated by current production is spent on consumer goods. It is the expenditures on consumer goods along with investments which are the determinant of income for succeeding income periods. In our economy this propensity to consume or amount of income spent on consumption items increases as the level of income increases and has been empirically determined in the vicinity of .88 of income. It may be represented by a schedule which expresses what the dollar value of actual consumption expenditures will be at various levels of the national income. This schedule is fairly stable during periods of normal economic conditions because it is determined by psychological characteristics of human nature and by the general social structure and practices of society.

The effect of the highway development program on the propensity to consume can only be indirect insofar as the extent such a program brings about changes in the taxing and spending policy of the federal government or induces in conjunction with other factors a rapid change in capital values. The direction of change in the propensity to consume which would result from such influences probably will be in the opposite direction. For example, if government expenditures on the program helps to promote rapid increases in capital value such as during a boom the propensity to consume will decrease.

21. Marginal Propensity to Consume

The marginal propensity to consume is the ratio of the increase or the additional amount of income which is spent for consumption

out of an additional increment to aggregate income. This ratio is usually less than the average propensity to consume, which is a measure of total consumption out of total income. An increase in income will result in a smaller increase in consumption. That is, the marginal or additional consumption to the level of existing consumption will be less than the addition to income. In other words, consumption increases at a decreasing rate as the level of aggregate real income increases. It follows, then, that the marginal propensity to consume is different for each level of national income. Unless, of course, the level of income is at such low levels that all income is spent on consumption.

The value of this ratio is very important, because it will determine the marginal propensity to save which yields the multiplier. (The multiplier determines the multiple of income which is generated from a dollar's investment). The greater the marginal propensity to consume, the greater will be the multiplier, and hence greater the effect of a change in the level of investment in the absence of heavy taxes.

Since the marginal propensity to consume is primarily determined by the level of income, the effect of a highway development program should be to decrease the marginal propensity to consume unless, as stated above, the level of income is at such a level that all income is spent on consumption.

22. The Liquidity Preference

The liquidity preference is the preference for holding money rather than such things as mortgages, securities, and physical assets. It is customary to analyze this demand for money in terms of the motives which determine the quantity of cash balances which are held by the constituents of the economy at any given point of time. For convenience, it is customary to group these motives into the following groups:

A. Transactions motive: That is the quantity of money which is to bridge the interval of the receipt of incomes for purposes of incurred expenses.

B. Precautionary motive: The desire to hold the money for the purposes of contingent liabilities or unforeseen opportunities to make advantageous purchases.

C. Speculative motive: One desires to hold money because of the uncertainty of the future rate of interest which makes possible the derivation of profit by outguessing the market.

Any effect of highway development must be considered in the manner in which it influences any of the above motives. The liquidity preference may become intensified by highway department programs if the program has the effect of stimulating production and employment because as prices and wages increase the transactions demand for money increases. If the net effect is to stimulate business confidence, assuming that the economy is at less than full employment and the Board of Governors of the Federal Reserve System follows with an easy money policy, individuals and businesses will feel assured of ready access to extra cash by temporary borrowing. If the Board of Governors does not follow with an easy money policy, the rate of interest will rise thus causing a decrease in net private investment.

23. The Money Supply

Money consists of coins, paper currency, and demand deposits in banks. Metallic money, whether full-bodied or fiduciary, makes up a small part of the total money supply for the use of paper money has many conveniences and advantages. Most important of all is bank money or bank deposits which are payable on demand as the owners draw checks against them. Bank deposits make up over three-fourths of the total money supply of the United States.

When the Federal Reserve System was established, many people hoped that, by controlling the money supply, it could exert an important stabilizing influence on the economy. However, the original powers of the Federal Reserve System for controlling the money supply involving open market operations and changes in rediscount rates, proved rather ineffective in practice. In 1933 and 1935, the powers of the Federal Reserve System for controlling the money supply were greatly strengthened, and they may now be adequate if the Board of Governors is ever free to use them.

The Board of Governors has several instruments available to control the money supply among which is the power to raise or lower the legal reserve requirements of member banks. Other supplementary methods of affecting the money supply are open market operations, changing the rediscount rate, the regulation of margin requirements for buying securities and moral suasion of member banks to expand or contract credit operations. These powers can be used to offset an increase on demand of money caused by a highway development program. Board action will depend upon the amount of money in circulation, political pressure and particular monetary policy being pursued at that time.

24. Monetary Policy

Monetary policy means the manipulation of the money supply and the interest rate in an attempt to produce results regarded as desirable on national income, production and employment.

Monetary policies are affected through the central banking system which can alter the volume of money in the economy by expanding or contracting credit or demand deposits. Demand deposits are the primary source of money in our economy and are regulated by the reserve requirements of the Federal Reserve System. Through the regulation of reserve requirements, the monetary authorities are able to determine the limits of the amount of outstanding bank credit and, hence, the money supply. In conjunction with the above method, the Board of Governors of the Federal Reserve System buy and sell government securities on the open market which injects or drains money into or from the system. Other methods of manipulating the money supply and the rate of interest were mentioned in the money supply section of this paper.

Since the volume of net new investment affects the level of income and ultimately public welfare, monetary policy attempts to function in accord with public welfare. Which set of principles will be pursued at a given period of time is given consideration by the economic conditions of the economy. One immediate effect of the highway development program will be to create a greater demand for money and an expansion of the money supply if the banks do not have any idle reserves. If the increased demand for money becomes inflationary, the policy will be one of contracting the money supply.

25. Federal Reserve Open Market Operations

The member banks of the Federal Reserve System which account for most of the economy's banking reserves create money in the form of demand deposits. By law a determined fraction of the total value of demand deposits must be deposited in the form of cash with the Federal Reserve Bank within the member bank's district. This determined fraction is known as the legal reserve and acts as a limitation on the money supply. Changes in the legal reserve requirement are too cumbersome for short range adjustments in the money supplies. Therefore, the Federal Reserve System has several short range functions. The most important of all is the day to day monetary stabilizing activities of the Federal Reserve Banks in its open market operations.

In response to indications of an unstable flow of credit and money, either too sluggish or too active, the Federal Reserve may alter its holdings of U. S. Government securities. If money and credit are expanding too rapidly with threats of inflation, the Board of Governors of the Federal Reserve System will sell its holdings of government securities on the open market. These securities are in the form of treasury bills and certificates of indebtedness and treasury notes and bills. The sale of these securities, which represent assets of the Federal Reserve, will result in a contraction of the money supply because the individuals who purchase such securities must draw a check on some bank in favor of a Federal Reserve Bank. The Federal Reserve Bank deducts the amount from the reserves of the member bank. This reduction in legal reserves will result in a several-fold reduction in the money supply. On the other hand, in order to meet the demand for money, securities may be bought by the Board of Governors to get more money into circulation. The financial activities brought forth by industries affected by highway construction will cause a greater demand for money, provided that the economy is near full employment. This increase in the demand for money will call for a greater supply. Since this demand need not be permanent, the Federal Reserve System may meet this response by buying government securities.

26. Fiscal Policy

Fiscal policy means the manipulation of government revenues and expenditures in an effort to produce effects regarded as desirable on national income, production, and employment. This policy directly controls the amount of disposable income in the hands of all spending units of the economy. Aside from being necessary for the financing of the social services which the government provides, this policy may also contribute to economic growth and stability.

When there exists a sizable discrepancy between total aggregate demand and total consumption, undesirable consequences may result, for example, inflation or deflation. Through manipulation of government revenues and expenditures, it is possible to produce remedial effects on national income, production, and employment. A highway development program becomes important because such sizable expenditures will certainly represent a potential fiscal instrument designed to stabilize the economy.

During peak periods highway expenditures would certainly augment existing inflationary elements unless taxes were increased. During depression periods it might be desirable for the government to

intensify the highway development program so as to make up for the deficit of private investment which characterizes such a period. Contrariwise, during inflationary periods these expenditures could be reduced or taxes increased; otherwise, they would only be bidding up the prices of resources which are currently fully employed.

27. State and Local Finance

State and local governments derive revenue from some taxes (inheritance, income, and excise) which are at least roughly similar to those used by the federal government. However, these governments, considered together, also depend heavily upon general property, sales, and use taxes. The percentage of the total tax receipts levied by all units of government which accrues to local governments has declined from 51.1 per cent in 1902 to 14.3 per cent in 1958. The decline in the percentage of state revenue has not been nearly so drastic. This shift of government level of taxation has not lessened the social responsibility of state and local governments, but it has shifted a greater percentage of the state and local government functions to the federal government. One of the most obvious results has been the financing of low cost housing units to replace the eyesore slums which characterize many of our larger cities. Another result has been a corresponding decrease in the proportion of state funds going to highway development (total amount might have increased for some states). This is due to the increasing importance of the interstate highway system. The Federal Aid Highway Bill of 1956 changed the state finance burden from one-half to one-tenth the cost. The present trend of highway finance will further decrease the proportion of revenue from total taxes received by state and local governments.

28. Excise Taxes

Excise taxes of various kinds produce a fair amount of revenue for the federal government (for example, tobacco, liquor and manufactured retail items, such as automobiles, jewelry and other luxury goods). Excluding tobacco and liquor, the majority of the items which are taxable by the federal government are not the essentials of life such as food, shelter, and clothing; they are primarily durable goods whose purchases may be postponed. The amount of aggregate income devoted to such purchases is a function of the level of real income and the level expected in the immediate future; therefore, the volume of tax receipts from such items is a direct function of the income level.

While excise taxes are usually collected from the producers in the first instance, their burden is ordinarily borne by the ultimate consumer when the taxed good is made under competitive conditions. It should also be pointed out that people with large incomes pay these taxes in greater absolute amount than people with small incomes, but the proportion of total income spent for economic goods subject to excise taxes tends to decline as a person's total income increases. As a result, these taxes are regressive in operation and, if used to finance a highway program, take away a smaller percentage of a large income than of a small income.

29. The Sales Tax

The sales tax has come into prominence in recent years as a source of revenue. The sales tax as the excise tax is regressive in operation. People with large incomes, for example, spend a smaller percentage of their incomes on gasoline subject to the tax than do poorer people so that the tax takes a higher percentage of small incomes than large incomes. When a tax of this nature is levied to finance any highway program, this fact should be taken into consideration.

30. Corporation Income Taxes

The corporate income and excess profits tax was the second largest producer of federal revenues in 1958. Corporate income taxes may be defined as levies on the earnings of corporate profits. Corporate profits is that portion of income which remains in the hands of the corporation after all expenses have been met. These earnings are usually in the neighborhood of 10 to 12 per cent of the national income except, of course, during years of abnormal business activity. These earnings are becoming increasingly important because of the present trend among the larger corporations to finance expansions internally, that is, by not borrowing from banks.

The chief merit of the corporation income tax is that it produces a good deal of revenue although, as in the case of the personal income tax, its yield diminishes greatly in poor business years. Thus the level of earnings by corporations and the amount of tax collected by the federal government is determined by the general level of economic activity. To the extent that a highway development program will stimulate business activity, assuming that no other economic phenomena will offset the expansion effect of the programs, it can thus be assumed that these activities will increase profits and in turn increase tax returns collected by the government.

31. Highway Revenue

Highway revenue is defined as that revenue which is levied against highway users. These funds consist primarily of the following: excise taxes on automobiles and tires, sales tax on diesel fuel, gasoline, trucks, truck-trailers, and buses; local transit systems and vehicles used by them are, of course, exempt. The Federal Highway Act of 1956 provided an increase in all of the above sources of highway revenue. This law provided that the revenue from the above sources accrue to the federal government so as to insure maximum benefits from well-coordinated planning in order to encompass the needs of the nation as a whole.

As indicated in a previous section, excise taxes are usually shifted through changes in the prices of the taxed articles since excise taxes are costs of production to the producers of the goods and must be covered by income. However, the process of shifting is not the simple one of adding the taxes to the old price. It was also indicated in previous sections of this paper that the sales and excise taxes are regressive in operation. Thus the primary burden of these taxes fall on people with small incomes. Since the highway program is supposed to be shouldered by those who will benefit most from such development, a re-evaluation of the method of financing and who it is that benefits would seem desirable.

32. Securities

Securities are titles to existing or potential capital. Securities traded on the stock market are old stocks and bonds already outstanding in the hands of the public. When real investments are made, new securities may be floated through investment banking channels and, thereafter, the securities may be traded on the stock exchange. The ability to float new securities will encourage the formation of new capital (that is, buildings, machines, etc.). It is this new capital formation which requires the employment of men and materials. The values of securities which are constantly re-evaluated are determined by expectations of the mass of participants concerning future events which will influence future yields or dividends on the investments. Any phenomena which affect the long-term financial expectation of existing securities influence the value of these securities.

A highway development program might have the following effect on securities:

Assuming that highway development does not influence the rate of interest, the induced new investment which it causes will cause the value of some existing stocks and securities to fall and others to rise depending upon the degree to which consumers shift their preferences to the goods and/or services produced by the new capital stock.

33. Speculation

Speculation is the attempt to forecast the future value or earning capacity of capital stock. Such forecasts indicate the profitability of buying or selling existing securities. The present market value of bonds or securities is determined by equating their income yields with the current rate of interest. Otherwise, there would be no inducement to invest. A security must be at least as attractive as holding money in the bank, and there would be no point of a firm floating new stocks yielding more than the interest which would be paid on a bank loan. Any change in the rate of interest will affect the market value of securities, because it will determine the form in which assets will be held.

At very low rates of interest, cash is the preferable form of holding. Due to the fact that the stock market is super-sensitive to slight disturbances, the individual speculator is prone to convert his holdings into money upon relatively slight provocation. This accounts for the easy breakdown of the expectations (marginal efficiency of capital) of prospective yields which, in turn, weakens the inducement to invest, and, of course, affects the volume of employment. Since individual knowledge of the future is uncertain, what other people think the value of securities to be, largely determines their actual value. The most successful speculators are those who are most accurate in forecasting what the average opinion will be. The highway development program will intensify speculation, because it will alter the future earning capacity of existing stocks. Certain existing securities will possess less future value because of the improvement in highway transportation. The marginal efficiency or earning capacity of some capital stock may improve. The net effect is to stimulate speculation barring the action of countervailing factors.

34. Business Cycles

Business cycles are alternating waves of prosperity and depression or of business expansion and contraction which affect the economy as a whole. Because the actions of businessmen are contingent

upon what other businessmen do, they all react similarly to the same indices of economic conditions. These determinants of business behavior are both financial and monetary as well as physical and psychological. These determinants interact to varying degrees such that no successive cycles are alike even though they have common characteristics. The common elements of cycles are as follows: (a) Revival from the previous recession and cumulative expansion, (b) the peak beyond which no further expansion can occur despite the very extensive demand for goods and services at that point, (c) contraction which results from the inability of the economy to meet the extensive demands which eventually push the limited goods and services to price levels above their actual value, (d) recession which results from the cumulative nature of the contraction.

The enterprises which have built up their inventories to meet the rising demands decrease production until the inventories reach a level more commensurate with the fallen demand. The falling prices which occur during a recession stimulate demand and employment and lead to the next revival. The wide fluctuations in employment caused by these cycles are a major problem for the government. To control at least part of the effects of business cycles, the government may use monetary and fiscal policy in accord to the economy's needs. Highway and street construction represent an alternative for private investment which is deficient during the recessive stage and excessive during the booming stage of the cycle; therefore, an increase or decrease in appropriations for highway development provides a source of government investment which may be used to mitigate the dire effects of business cycles.

35. Unemployment

Unemployment is a condition under which human resources are idle. In any economy, the existence of idle resources is an indication of inefficiency. Three aspects of unemployment are: (a) frictional - due to workers in the process of changing jobs and miscalculations on the part of employers; (b) voluntary - refusal to accept the going wages; and (c) involuntary - a willingness to work for the going wage but with no jobs available. It is this third aspect which is of primary concern.

The level of employment (absence of unemployment) depends upon the size of the change in investment, which may result from changes in income from a previous period, the decisions of investment makers, both private and public, and the rate of interest and the earning power of a potential investment.

A highway development program will by its very nature implement an increase or offset potential decreases in employment. Studies by the Bureau of Labor Statistics and the Department of Labor indicate that highway and street construction provides the greatest amount of direct and indirect employment per dollar spent (102 million man hours of employment on the site of construction, and 126 man hours off the site). The current highway development program affected by the Federal Aid Highway Act of 1956 promises to have an estimated labor force of nine hundred thousand working either directly or indirectly on these highways by the year 1960. Employment in this sector of the economy may also serve as an impetus to the expectation of businessmen and hence stimulate greater net private investment which in turn means further increased employment.

36. Production Cost

The value of a good or service is reflected in the selling price of said good or service. This selling price expressed in monetary terms is an expression of both what people are willing to pay and the effort involved in making the good or service available. This latter expression is the product cost. Involved in such cost is the price of utilizing each factor which contributes to the production of a commodity. Such cost of product includes: wages and salaries; returns on the use of land and capital; and the cost of shipping. In many instances, transportation cost may represent a large percentage of total production cost.

Perhaps the most important effect of improved highway transportation is the reduction in the cost of goods and services which it induces. Obviously, transportation costs are real productive costs and as such are reflected in the value of goods and services. Not only are the final products shipped to the consumers via the highways but so are the raw materials which are needed in processing and assembling the final products. Better highways mean lower transportation costs due to the fact that shorter and faster routes reduce maintenance and shipping costs. It is further assumed that any reduction in production costs will be reflected in the final sales price of the good or service.

37. Productivity

Productivity may be defined as the amount of output produced per unit of income. It may be measured in terms of physical output per man hour or the net output per man hour which is

also referred to as the GNP or value added approach. This value will, of course, vary for different sectors of the economy; but, for most purposes the aggregate value is used.

The value of the measurement of productivity also depends upon whether long range or short run periods are being considered. The average annual long run (1909-56) increase in total (aggregate) productivity is approximately 2.2 per cent per year. For a short and more recent time span, 1947-56, the average rate of increase has been 3.4 or 3.9 per cent per year, depending upon the measure used. Changes in productivity need not necessarily be due to improvements in the quality of the providers of the services. These changes may be associated with improvements in managerial skill, technology, quantity and quality of capital, and the increased efficiency of the allocation of resources.

To the extent that a highway development program may increase the efficiency of resource allocation, it may also serve to increase the productivity of those resources. These efficiencies are derived through savings in time, and hence cost which result from the faster and more effective movements of resources from their source to the place of production. Resources which were formerly nonproductive because of the cost involved in moving them to the productive source may now become productive as a result of better highways.

38. Economic Growth

Economic growth may be defined as continued long-term increase in real income per capita. It is most important to the satisfaction of the economic wants of the people of a country. The full employment of existing productive resources, the best possible allocation of these resources, or the more nearly equal distribution of the national income would leave us considerably short of our goals of want satisfaction without continued economic growth and development.

In a mature economy such as ours an investment of 15 per cent of the national income is required for continual growth. At present, this rate of growth in the United States is between 3 and 4 per cent per year as measured by per capita income. A balanced economy is essential to economic growth; that is, one in which production is diversified and no one sector advances at too rapid a pace relative to the others and, by like token, no sectors act as a brake on the rest of the economy. The present concern for highway development as an expression of the fear that

our highway transportation system has a bottlenecking potential which could retard our economic growth is well founded. In fact the nation's highways have never quite kept pace with the needs.

The result of well-planned highways will be a facilitation of the expansion of our economy by creating more efficiencies in the system and avoiding the hampering of economic growth.

39. Income Distribution

An economic system must function so as to provide some form of remuneration to the productive resources for their services. Under the assumption of pure competition, the free enterprise economy pays each factor of production in accord to its contribution to the productive process. Any inequalities of income are assumed to be the result of the command or the lack of command over productive resources. In our economy the major sources of income are wages, rents, and returns from investments. Due in part to the lack of competition in our economy, the degree of income distribution is quite sizable. Any major policy designed to reduce this distribution must involve a progressive income tax and/or increases in the extent of competition.

Part of the disproportionate income distribution as measured for a particular year can be attributed to full or partial unemployment and income fluctuations. To some degree, although not to a very great extent, a highway development program can alleviate this problem if utilized as a tool of fiscal policy designed to combat unemployment. The stimulus given to the economy by government investment in highways can certainly stimulate other business activity, thus reducing the level of unemployment and raising the annual income of some who otherwise have been totally or partially unemployed during a particular income period.

Therefore, the only manner by which highway development programs can affect income distribution is through correcting the inequality which occurs from partial or total unemployment. This is not to discount the possibility of the program being financed by heavier taxes on higher incomes or the possibility that a highway development program may improve the competitive environment in our economy.

40. Market Structure

The market which is not necessarily a spatially located place is best defined in terms of its functions as the determiner of what is to be produced. The market refers to any system of

arrangements by which productive services or products are exchanged with buyers in return for money. In other words, the market solves the problem of determining the kind and quantities of various economic goods which are to be produced. A community's evaluation of a given commodity or service is reflected in the price which the community is willing to pay. The market organizes these valuations and relays the community's desires for these commodities to the producers. Market structure refers to the manner in which this organization of preferences and resource allocation occurs. The efficiency of the market's function is related to the different types of market structure such as pure competition, monopolistic competition, oligopoly, and monopoly.

The goal of the economy is to achieve maximum satisfaction by supplying the most important material wants of the society in the most plentiful quantities. When economic efficiency is related to social welfare, the structure based upon the competitive norm obtains the economic goal of society most effectively. A highway development program will result in cheaper transportation which is a factor of production and enable more remotely located producing areas to compete with the firms more favorably located to the source of resources and/or to the markets for the product. This will reduce the economic advantage which some firms may have as a result of their location and hence lessen that particular firm's monopoly potential.

The net effect is to increase the potential for competition. Of course, this potential will not be realized if political and social arrangements limit competition.

41. Industrial Centralization

Industrial centralization refers to the tendency of industries utilizing similar processes, markets or resources (including labor supply) to locate relatively close to each other because of economies derived from the particular areas which are conducive to the particular productive process. Included in such conduciveness is the availability of natural resources, skilled or cheap labor, transportation facilities, and so forth. Location decisions are primarily determined by production costs and the extent of the product market.

Improved highway transportation may reduce transportation cost as a factor of total production and thus serve to extend the

markets by allowing distant manufacturers' products to become competitive with local products. This reduction of transportation cost may serve as an incentive for new and old firms alike to locate in areas which are more distant from their market or their raw materials. Thus improvements in highways may serve to reduce industrial centralization and facilitate diversification.

42. Specialization

Specialization is the tendency of individuals and firms in geographical areas to concentrate productive energies in particular field of production or parts thereof. This tendency exists because of the inherent economies involved in this principle. On account of the fact that the productiveness of individuals and/or particular processes is in part a function of their particular geographic location, specialization is a more efficient use of resources; that is, the fractionalization of production with each unit performing each operation would demand the use of resources which may not be readily available to all units. Obtaining the less abundant resources would involve higher cost and waste of time in production.

As any economic system will tend toward more efficient means of production (barring political or social obstacles), it will also tend to increase the amount of specialization which occurs through what is known as the geographical division of labor. The effects of a highway development program become apparent when the cost of transportation is introduced as a limiting factor. It is to the advantage of a particular region to produce those goods and services which it has a comparative advantage and to buy those economic goods in the production of which it has a comparative disadvantage. Comparative advantage refers to the greater absolute advantage or the smaller absolute disadvantages which a region has in production as compared with other regions. An absolute advantage in the production of a good refers to a region's ability to produce an economic good with greater efficiency than some other region.

If the transportation costs between two areas are such to offset their comparative advantage, no exchange will take place. Obviously high transportation costs will act as a barrier to trade and profitable specialization; hence, improved highway systems will reduce the transportation costs and will favor more intensive specialization.

43. Urbanization

Urbanization is characterized by concentrations of populations engaged in nonagrarian activities which are primarily of the business nature. The growth of cities is dependent upon cheap transportation. This is true since cheap transportation relieves a city from the necessity of relying on a local source of supply for all its goods and services. Cheap transportation is a positive stimulus to the concentration of population by influencing large-scale production and geographical division of labor. This division of labor also increases the amount of trade that will take place. The activities that accompany trade, such as storing, processing, packaging, advertising, merchandising, financing, and professional risk bearing, tend to be performed in urban centers. Inasmuch as improved highways mean cheaper transportation, they also mean greater urbanization. To some areas, a greater intensity of existing urbanization trends will occur; and to others which have had little urbanization, this trend will be initiated.

44. Motor Vehicle Insurance Costs

Insurance is a commodity which alleviates the financial risk involved in the uncertainty of future events, which if it occurs will entail financial loss. The uncertainty of the future can be predicted on the basis of the relative frequency of the occurrences of a particular event in the past. Insurance is based upon such predictions. Motor vehicle insurance is based upon the relative frequency of traffic accidents. The greater the relative frequency of accidents, the greater the risk involved and, hence, the greater the cost of being insured against such risks. The present United States Interstate Highway Plan incorporates safety improvements which are designed to reduce the highway accident frequency by two-thirds and the fatality rate by 50 per cent. The net result of this plan, therefore, will be to reduce the cost of motor vehicle insurance premiums.

45. Motor Vehicle Operating Cost

Included in the operating cost of motor vehicles are the following: gasoline, oil, maintenance, tires, garage, license fees, taxes, depreciation, interest, and insurance. The operating costs of motor vehicles are inversely related to the quality of roads. Dirt and gravel roads require greater tractive effort than paved roads; therefore, more fuel is required per mile. Tires and parts replacement and servicing

costs in general are greater for vehicles using unpaved roads. Relocation of some present routes in construction of new routes will occur primarily in rural areas because of the economies involved in securing the necessary right-of-ways. Access roads or bypasses which intersect the new highways will also be located in rural areas, thus increasing the availability of paved roads by raising the general level of the quality of roads and directly reducing the operating costs of vehicles which travel them.

46. Motor Freight Transportation

During 1958 nearly 20 per cent of all freight transported between cities was handled by motor carriers, who handled only about 10 per cent of all the freight in 1939. A great deal of this increase can be attributed to the improvement of the nation's intercity highways. Improvements in the nation's highways will reduce freight costs in three ways: 1. By reducing the operating cost of motor trucks through savings in fuel, maintenance costs, and insurance, lower rates can be charged. 2. Travel to some areas will be more direct and faster on account of being able to bypass many congested districts. 3. The reduction in rates by truckers will cause other competing modes of transportation either to lower their costs or lose business to truckers. The lowering of freight costs will increase the market for many commodities by increasing the total volume of transportation resulting in the well-being of all.

47. Intercity Bus Transportation

Travel by motor bus accounts for the largest volume of commercial passenger travel for short distances. There are numerous reasons for this fact. Perhaps the most important of these are the lower rates and the more frequent and faster service for short distances made possible by the small carrying capacity of buses.

The percentage of passengers utilizing travel by motor buses has varied during the past 20 years. The percentage was 26.0 in 1939 and 21.5 in 1943 during World War II, whereas, in 1957, the percentage was 30.6 (passenger miles in private automobiles not included). Retarding the growth of bus operations has been the unsatisfactory nature of the buses used and the long delays caused by travel through congested districts. Improvement in highways should greatly reduce the travel time and thus add to the comfort of passengers, thereby causing travel by bus to become more attractive. In addition, this increase in bus transportation should lead to reduced rates.

48. Air Transportation

Travel by air competes with surface travel especially when the distance to be traveled is greater than 100 miles or so. When the premium is on speed and comfort, air travel does have the advantage. Air lines accounted for about .01 per cent of all freight movement and approximately 35 per cent of passenger travel. (passenger miles in private automobiles not included)

The improvement of air transportation is related to improvements in highways, because airports cannot be located within the urban areas of cities which they serve. Since the time between the point of destination and the airport is just as important as the high speed in the air travel to persons who value time highly, reduction in time on access highways will reduce the total origin to destination time. The net effect of an improvement in access highways will be to increase the practicalness of air travel over short distances, which could conceivably increase the volume of air travel, thereby reducing rates.

49. Railroad Capital Improvements

Railroad capital improvements include investments in plants and equipment as well as operational facilities. Despite the fact that extensive development of the railroads has ceased as indicated by declines in the railroad mileage, there has been an increase in total capital expenditures. During 1916, railroad mileage totaled 254,037 and in 1950 the mileage totaled 223,779 miles. Yet the investment in plant and equipment increased from 17.8 billion to 30.2 billion during the same time span. These improvements have been by way of the utilization of internal economies, which the railroads have been forced to develop because of the heavy competition in new forms of transportation. Certainly not the least of the influencing factors has been highway transportation. Improvement in the nation's highways will divert more traffic from the railroads unless they meet the challenge by further capital improvements. Since the railroads are very much aware of their competition from motor transportation, they can be expected to make further intensive capital improvements.

50. New Construction

New construction may be defined as increases in the physical volume of all private, commercial, and public structures, as measured by the dollar value of such structures. Estimates of expenditures for construction are issued jointly by the United States Department of Commerce and the Bureau of Labor Statistics. Annual new construction, given in constant dollar

figures, although revealing a long-range upward trend, fluctuates with the level of national income. Such expenditures are, therefore, reliable indices of the level of economic activity if the annual percentage change is used.

Since 1923, the annual per cent of change in the previous year has been, except in between 1931 and 1932, less than one per cent. Highway construction is not a major item in the total volume of new construction, but it does serve to stimulate non-highway construction projects; for example, suburban residential districts, commercial shopping centers and new industrial sites as well. The effects of highway development programs on new construction are realized in two respects: 1. Meeting the increased demand for consumer goods results from the stimulated increase in national income, and 2. New construction in response to opportunities for profit from the locating in region served by new highways. The net effect is an increase in total new construction in the absence of other depressing factors.

51. Tourist Trade

Touring is simply traveling with the explicit purpose of viewing scenic landscapes and historic sights. Touring is quite a booming trade, since expenditures for touring include not only travel and lodging expenditures, but also spending for luggage, cameras, sporting goods, and other accessories.

Each year more than 10 billion dollars is spent for the purpose of vacations, most of which are spent within the continental United States. More than one-half of American families take trips which may be considered as vacations (more than three days). Touring occurs primarily by way of the nation's highways since more than four-fifths of vacation travel occurs by automobile, and at least one-tenth by motor-bus.

Better highways will stimulate the touring trade in at least two ways: 1. An indirect stimulus is provided through the employment effect of the highway development program (vacations are functionally related to the level of income), and 2. The direct stimulus arising from the ease, comfort and safety of the new highways, making travel to less accessible areas more attractive.

Conclusion

The purpose of this inventory has been to compile an inventory of the economic factors influenced by a highway development program and state the writer's hypothesis for each factor. These hypotheses can be used as a basic framework for subsequent research work.