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ON A CONSISTENT DEFINITION OF INTENSIVE USE OF A RESOURCE

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It would seem, for the sake of convenience and in the interest of imparting exact information, that the terms used in a discipline should have one and only one meaning. Unfortunately economics terminology is not in such a completely refined state that all terms have unambiguous meanings. In some instances different meanings are attached to the same terms which is a source of confusion. This is especially the case for the term "intensive" use of a resource which frequently has been used to describe the relative abundance of a resource in production. The term has been used inconsistently in two opposing senses when applied to land and labor on the one hand and capital and labor on the other hand. While this may not pose a serious problem for a seasoned scholar who can construe the proper meaning in each context, beginning teachers and students need to be made aware of the inconsistency to avoid confusion and unnecessary debate.

The word intensive is commonly used to connote the ratio between productive resources in the production process. When it is used in the context of capital and labor, production is referred as either capital intensive or labor intensive depending on the relative abundance of capital or labor. If capital is the abundant factor relative to labor, the capital to labor ratio is high, and the production is termed as capital intensive. If labor is the abundant resource relative to capital, the labor to capital ratio is high and the production is termed as labor intensive. In the former case capital is regarded as being intensively employed while in the latter situation labor is regarded as being intensively used.

However, when the term intensive is used with respect to land and labor, diametrically opposite meanings compared to the above are being implied by the same word. For instance, in agricultural contexts where land is the scarce input and labor is relatively abundant, the land to labor ratio is low, and the cultivation is termed as land intensive. Here land is regarded as being intensively used. In a situation where the land to labor ratio is high, production is referred as land extensive implying nonintensive use of land. In line with this usage, the concept of intensity of land use is frequently applied in farm management and land economics. According to this concept the more production there is from an acre of land by the greater application of cooperant factors, the higher is the intensity of land use.

Clearly the use of the word intensive is not consistent in the two situations related above. In going from production involving capital and labor to a situation involving land and labor, the meanings of the same word are being inverted. It seems that for the sake of having unambiguous terminology the term intensive should be used consistently to convey only one meaning irrespective of the factors involved in production. The choice could be based on the original usage of the word and the extent of its current usage in the modern literature.

A review of literature reveals that originally the term in-

tensive (and its opposite term extensive) was used in the context of the land resource to denote its intensive or extensive cultivation. Marshall (1891) appears to be one of the first economists who used this terminology.¹ While explaining the law of diminishing returns he referred to the intensive or extensive cultivation of land as follows:

"When land that requires no clearing is to be had for nothing, everyone uses just the quantity which he thinks will give his capital and labor the largest return. His cultivation is "extensive" not "intensive." He does not aim at getting many bushels of corn from any one acre, for then he would cultivate only a few acres. His purpose is to get as large a total crop as possible with a given expenditure on seed and labor; and therefore he sows as many acres as he can manage to bring under a light cultivation." (p. 206).

This represents the first usage of the term in his *Principles of Economics*. Later in his discussion he defined intensive cultivation as bearing a large total produce per acre.

By extensive and intensive cultivation in these statements, Marshall is implying extensive and intensive use of the land resource as made clear in the following reference in a later edition of the *Principles* (1910):

"... if the nation as a whole finds its stock of planning machines or ploughs inappropriately large or inappropriately small, it can redistribute its resources. It can obtain more of that in which it is deficient, while gradually lessening its stock of such things as are superabundant: *but it cannot do that in regard to land: it can cultivate its land more intensively, but it cannot get any more.*" (p. 170).

J. B. Clark, a contemporary of Marshall, used the terms in a similar sense when he wrote:

"For one man who finds work by pushing the boundary of the tilled area into no-rent territory, there are a number who find it by harder tillage of rent-paying lands. Whenever one waste farm is brought into use, new men are likely to be set at work on many good ones. Indeed, the crowding of the good lands comes first in time; for it is the diminishing returns that the workers get, as they *till more and more intensively these lands* of high quality, that cause an overflow of the working force to inferior lands." (pp. 98-99, italics added for emphasis)

Both these authors are clearly implying that when the labor to land ratio is high the situation is that of *intensive use of land* and when this ratio is low, the situation is that of *extensive use of land*.

In the modern literature, when references are made to resource use involving labor and land inputs in agriculture, the original usage of the word "intensive" in the above sense is being followed. One encounters statements saying that, in countries like Japan and Taiwan where labor to land ratio is high land is intensively used compared to the extensive cultivation of land in Australia or colonial America where labor to land ratio is low. Earl O. Heady recently used the term in the original sense when he said "We could have much more food available for human consumption—both through employment of more land for crops, *a more intensive use of that (land) now cropped* and through a reallocation of grains from livestock to people." Some micro-

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economics and related texts also employ this term in the original sense when discussing the law of diminishing returns (Ferguson, Barlowe).

However, in the modern literature dealing with labor and capital the term intensive is being used with a complete reversal in its meaning. For instance, in the macroeconomics literature on growth and development discussions frequently revolve around labor and capital. Production is described as labor intensive when labor to capital ratio is high and capital intensive when labor to capital ratio is low (Baerwald, Burmeister and Turnovsky, Chenery, Eckaus, Gans, Hagen, Kelley and Williamson, Kellman and Perez, Meir, Mingo). Here the intensive use of labor means relatively greater use of labor vis-a-vis the other input. The predominant use in the modern literature is in this form. In line with this usage, production of heavily populated underdeveloped countries is labelled as labor intensive while production of developed countries is labelled as capital intensive. And yet in terms of the original meaning of the word in the land-labor context, production of the former countries would be capital intensive while those of the latter countries would be labor intensive.

It is clear that the use of the word intensive with varying meanings can be confusing. This is especially the case in agricultural economics where land and labor contexts arise as frequently as capital and labor contexts. There is a need for standardization of terminology concerning the intensive use of a resource.

FOOTNOTES

¹According to Joseph A. Schumpeter the "late followers of Ricardo" were the first economists who used this terminology.

REFERENCES

- Baerwald, Friedrich. *History and Structure of Economic Development*. Scranton, Pennsylvania: International Textbook Company, 1969.
- Barlowe, Raleigh. *Land Economics*. Englewood, New Jersey, Prentice-Hall, Inc., 3rd Edition, 1978, pp. 155-159.
- Burmeister, Edwin and Stephen J. Turnovsky. "Capital Deepening Response in an Economy with Heterogeneous Capital Goods." *The American Economic Review*, 62(1972):842-853.
- Chenery, Hollis B. "The Role of Industrialization in Development Programs." *The American Economic Review*, 45(1955):40-57.
- Clark, John Bates. *The Distribution of Wealth: A Theory of Wages, Interest and Profits*. London: Macmillan and Co., Limited, 1902, pp. 98-99.
- Eckaus, R. S. "The Factor Proportions Problem in Underdeveloped Areas." *The American Economic Review*, 45(1955):539-565.
- Ferguson, C. E. *Microeconomic Theory*. Homewood, Illinois: Richard D. Irwin Inc., 3rd Edition, 1972, pp. 150-151.
- Gans, Herbert J. "Jobs and Services: Toward a Labor Intensive Economy." *Challenge*, July-August, 1977.
- Hagen, Everett E. *The Economics of Development*. Homewood, Illinois: Richard D. Irwin Inc., 1968.
- Heady, Earl O. "Agricultural Production Economics in the Future," *Lectures in Agricultural Economics*. U.S. Department of Agriculture, p. 162.
- Kelley, Allen C. and Jeffery G. Williamson, "Modeling Economic Development and General Equilibrium Histories," *The American Economic Review*, 63(1973):450-458.
- Kellman, Mitchell and Lorenzo L. Perez, "Soviet Postwar Economic Growth and Capital-Labor Substitution: Comment," *The American Economic Review*, 62(1972):679-681.
- Marshall, Alfred, *Principles of Economics*, London: Macmillan and Co., Limited, Second Edition, 1891, p. 206.
- , *Principles of Economics*, London: Macmillan and Co., Limited, Sixth Edition, 1910, p. 170.
- Meir, Gerald N., "The Problem of Limited Economic Development," *Economia Internazionale*, 6(1953) No. 4.
- Mingo, John J., "Capital Importation and Sectoral Development: A Model Applied to Postwar Puerto Rico," *The American Economic Review*, 64(1974):273-290.
- Schumpeter, Joseph A., *History of Economic Analysis*, New York: Oxford University Press, 1954.