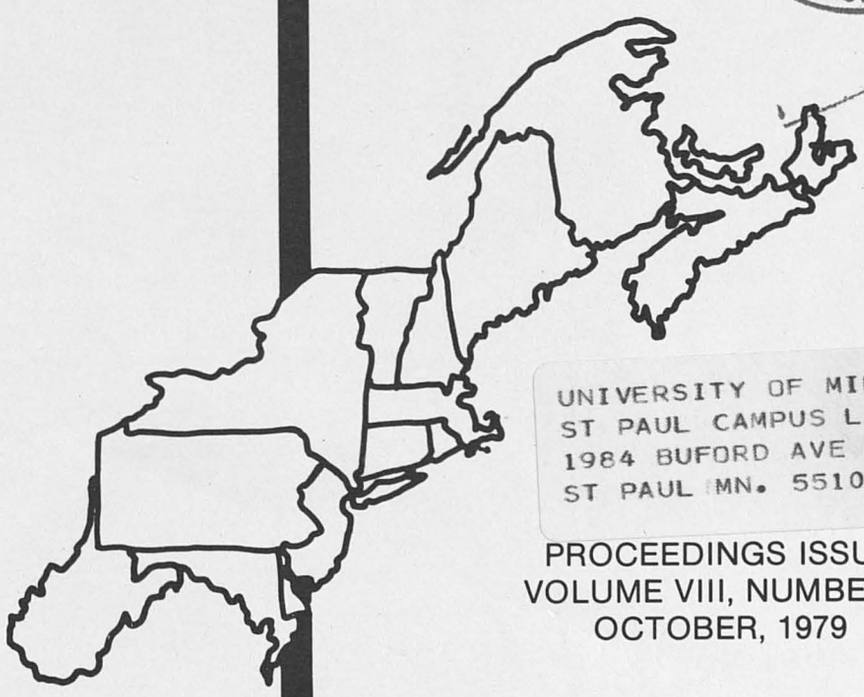
JOURNAL OF THE

Northeastern Agricultural Economics Council



PROCEEDINGS ISSUE
VOLUME VIII, NUMBER 2
OCTOBER, 1979

THE ROLE OF THE ECONOMIST IN NATURAL RESOURCES POLICY

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On April 5 of this year President Jimmy Carter addressed the Nation on energy. After a brief introduction the President said:

> "Federal government price controls now hold down our own production and encourage waste and increase dependence on foreign oil."

The President then went on to say:

> "--I have decided that phased decontrol of oil prices will begin on June 1 and continue at a fairly uniform rate over the next 18 months. The immediate effect of this action will be to increase the production of oil and gas in our own country."

The President commented briefly on the Three Mile Island accident and turned his attention to petroleum. He spoke of the immediate steps that need to be taken to reduce the consumption of petroleum and of the relation of energy to inflation. He then turned his attention to the windfall profits tax. He spent more time on this subject than any other, but also said that regulation hampered energy production. He identified five steps he intended to take to bring about energy conservation. But all of these would require more regulation and only one - tax credit for wood burning stoves - would employ the use of economic incentives. He closed his speech with a statement of how the Energy Security Fund might be used to enhance long run energy supplies.

In listening to the speech and in reading it, one does not find any rationale presented as to why price decontrol is necessary for improved energy supplies. Rather the emphasis was placed on what will happen to the income which will be generated from energy decontrol. Almost no attention was given to economic incentives.

In this Spring of our Energy Discontent, Resources for the Future is bringing out two major books on energy policy. One will deal with energy for the next twenty years; the other will take an even longer run perspective. These books will provide an evaluation of the economic and environmental options which we face and considerable attention will

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be given to the ecomomic feasibility of different means of increasing energy supplies. Environmental considerations will generally be treated as constraints. The ecomonics of energy importation versus domestic energy production will be treated in depth.

I have described the President's speech and RFF research because I believe(1) the President is a good politician and knows of the concerns that people have today and (2) the RFF energy research is typical of the approach being taken in the academic community to problems of resource scarcity. If I am correct in these beliefs, it demonstrates a major gap between analysis and decision making.

What is the explanation for this gap? What should be done, if anything, to narrow or eliminate the discrepancy? These are not trivial questions. To answer the first we have to understand the aspirations and the capacity of each group. Neither is it obvious that elimination of the gap by any means, and certainly not by some means, would, on balance, be desirable.

Let us first reflect on two conditions that confront public sector decision makers. There are two major influences that must be considered if we are to understand and appreciate the behavior of this group.

The first is the planning horizon. In our system no elected official has more than six years before another election must be faced. The typical agency head from the executive branch must justify a budget every year. Thus, the planning horizon for most public sector decision makers is quite short.

A second is that public sector decision-making must accomodate the essence of the political process. A particular politician or an individual bureaucrat may maximize a particular objective but certainly the political system generally does not. Employment, inflation, income distribution and the adequacy of goods and services are all objectives with varying amounts of political value.

The typical resource economics study of resource adequacy has a very different orientation. The time periods typically are usually intermediate or long run in nature. Often the time period is imposed on the study (say) "the next twenty years" or "after the year 2000." Sometimes the time frame is determined by economic variables, such as the discount rate, or the length of time for long run demand and supply elasticities to be reflected.

In such studies economic efficiency usually is assumed, implicitly or explicitly, to be the primary objective. Despite considerable recent work on multiple objective planning, we have not progressed very far unless we can reduce the objectives to some common denominator and maximize net social product. We do not have a very good way of relating (say) long run efficiency to short run price stability because economists use different models for such problems. The welfare efficiency model abstracts from changes in the price level and deals only with relative prices. The Keynesian Model, indeed most macro models, either abstract from supply or treat it in the most crude way. Thus the resource economist usually deals with single objective and long run problems. Even though the macro

economist tends to emphasize shorter run objectives which are more attractive politically, their models are usually inadequate to deal with questions of resource adequacy which are of the greatest interest to the resource economist.

The results of the research of the resource economists has tended to be reassuring with respect to resource adequacy for those resources valued in the market place if a longer run perspective is taken. The adequacy of common property resources such as air, water, open space, and the oceans for which markets do not exist do emerge as question marks in such studies. It may be well to examine one such study in some depth to demonstrate why economics has tended to become the optimistic rather than the dismal science in certain circles.

I make reference to the classic study on resource scarcity by Harold Barnett and Chandler Morse. In its 27 years of existence, Resources for the Future has published approximately 230 books. If these were ranked in terms of influence, Scarcity and Growth by Barnett and Morse would surely rank near the top. Since I have been at RFF, I have heard two Nobel prize winning economists say it is the definitive work on the subject. One even went so far as to say there was little which could be added.

What is it that they said? And what is it that they have said which has been so influential? I address the last question first.

Barnett and Morse examined data for the United States from the 1870-1900 period to 1957. (Their book was published in 1963). They describe their result as follows:

> In the aggregate, the results of the various tests were overwhelmingly negative. Labor-captital cost per unit of gross national product fell rapidly, without retardation, over the entire period; and there was no observable tendency for the cost of extractive output to fall more slowly, as might have been expected if resource scarcity had been increasing. In terms of our models, resource conversion cost - as represented by the unit cost of extractive output - declined throughout the period. When particular extractive sectors were examined repeatedly, only the cost of forest output was found to have risen over the period as a whole.

Barnett and Morse have recently been subjected to intensive scrutiny. An updating of their empirical work tends either to confirm earlier findings or at least fails to establish a contrary case. Alternatives to their measure of resource scarcity have been advanced but I do not believe their emperical findings would be greatly different if alternative measures of scarcity were used.

There are at least three considerations that should be kept in mind in interpreting their findings. These were all recognized by them and are discussed at some length in their book. But it is typically the result of their empirical work which is cited and tends to be equated

with their contribution.

(1) Barnett-Morse analyzed the U.S. data from the 1870-1900 period to 1957. This, of course, is a relatively short time in the sweep of human history. Even if the time period analyzed was very long, empirical investigations might be misleading if underlying relationships were to change.

(2) The period analyzed by Barnett-Morse coincided with unprecedented growth of knowledge and the application of knowledge. Is it reasonable to believe that technical change will always occur at this same rate? If not, what rate is more probable and what are the resource implications?

(3) Non-market resource limitations are not adequately reflected in their empirical measurements. Market processes may fail to reflect the declining availability of such common property resources as the atmosphere, open space, and the oceans.

Can these deficiencies be accommodated by the economic model? The economics of technical change should be combined with investigations of resource availability so that the possibilities of resource substitution can be evaluated. Significant progress has been made in resource economics on the study of non-market problems generally and environmental quality in particular. But this research has not been related to problems of resource availability in a more general sense even though there is no inherent reason why this cannot be done and interest currently exists among researchers in doing so. Progress can be anticipated.

I now contrast the findings and the considerations which come from the Barnett and Morse study to a description of some contemporary policy issues affecting three important resources - food, land and energy.

Food. In the early years of this decade we witnessed a dramatic change in demand and supply signals for food. Poor weather conditions in a part of the globe, improved incomes in many countries which revealed their income elasticity of demand for food, and changed institutional arrangements combined to improve greatly domestic agricultural prices. This gave rise to at least two major concerns. One was the cost of food (an issue in income distribution) and the other was the impact of agricultural prices on the general price level. (Even then inflation was an item of great concern.)

I doubt that anyone in this room is not happy that we resisted the temptation to intervene to hold down agricultural prices. The consequence was that more resources were attracted to food production. In approximately three years these increased resources resulted in a dramatic reversal in food production relative to consumption, and agricultural prices

became a positive factor in holding down general price level increases.

But all is not well in American agriculture. We are now reaping the income distribution consequences of this expanded resource base. New land came into production, more exploitative practices were adopted, and human resources were attracted. While our interventions (or lack of intervention) in American agriculture may be more successful than for many areas of public policy we should not be smug until we have answers to the following questions:

1. Did the increased production in the mid-70's come about optimally? Was the combination of land, capital and human resources that resulted from the expansion in the early 1970's the best that we could do?

2. Does the amount of price instability in American agriculture serve a socially useful purpose or is it excessive? We have tended to protect farmers from highly depressed prices but are there perhaps also excessive social costs from very high prices? If so, who bears these excessive costs?

3. Have we witnessed a shift in the planning horizon of farmers? If so, why? Is the rate of soil loss greater, equal to, or less than a social optimum? If its is greater than an optimum, what might be done to bring it closer to an optimum?

Land. From 1960 to 1969 agricultural land prices deflated by the consumer price index went from approximately 131 to 171. From 1970 to 1978 the index increased from about 168 to 251. Yet farm income deflated by the CPI stood at 12.54 billion in 1960, at 12.16 in 1970 and was 14.43 billion in 1978. Thus land prices become a matter of real concern in agricultural policy. Can land prices be sustained by agricultural income? If not, will land tend to become increasingly concentrated in the hands of larger operators? Are we headed toward a sharp adjustment in land prices which could trigger substantial financial adjustments by farmers?

There are three major components of land prices. One is the direct contribution of land to agricultural earnings. The other is the indirect contribution to net worth which results from land prices increasing more rapidly than the general price level. Still another component is the contribution to net worth that is realized if debt is held and if the value of debt depreciates during inflation. I have dubbed these components (1) the earnings effect, (2) the relative price effect and (3) the inflation effect.

Using national data, I found that the ratio of the earnings effect to the inflation effect stood at 38:1 in 1960 but by 1977 the ratio had changed to about 5.4:1. Two conclusions can be drawn. (1) Land purchase provides an opportunity to acquire debt and debt may be a very good thing

to hold during inflation. From 1960 through 1977 the rate of interest charged on mortgages by insurance companies less the change in the general price level never exceeded five percent. In 8 years it was between 4 and 5 percent, and in 6 years it was between 3 and 4 percent. In two years it was between 2 and 3 percent and in two years it was between 1 and 2 percent. (2) Debt in land during inflationary periods becomes a powerful device for the redistribution of income. In 1978 the amount of farm real estate debt amounted to approximately 63 billion dollars. The CPI increased 7.66 percent in 1978 which resulted in a 4.83 billion decrease in the value of that debt. This can be contrasted with 1.6 billion, estimated by the White House to be the 1980 revenues available to the Energy Security Program resulting from the excess profits tax on petroleum.

My conclusion is that current resource prices, in this case land, reflect not only long run scarcity but are also affected mightily by contemporary macro policies.

Energy. I now return to the topic with which the paper was introduced - energy. While the economic rent being earned by those controlling access to the supply of energy should provide incentive for an increased supply, it is viewed as an unearned increment by many. The crux of the problem is whether policies designed to distribute an unearned increment will destroy the incentive for increased production and more efficient use. This central problem is further complicated by two other issues - employment and inflation. There is a fear that rising energy prices will not only reduce the productivity of our economy but that it will also exacerbate inflation.

It is interesting to contrast our public policies with respect to food and energy. We became conscious, in a general way, of changes in the demand-supply situation for both in the early 1970's. In the case of food the market was permitted to reflect higher prices and within three years the production response brought about lower prices. For energy, there has been substantial control at all levels and the supply situation has worsened. It is tempting to draw sweeping conclusions from this sequence of events, but even though the two situations have some similarities, there are also significant differences. The elasticity of supply is undoubtedly different for the two resources, but three other considerations may be more important.

1. The environment problems associated with increased energy production are generally perceived to be more severe for energy than for food.

2. We are a net importer of energy, but a net exporter of food.

3. The concentration of ownership is different for energy than it is in agriculture.

Increased energy prices are feared because they may enrich a few large privately held companies domestically or those in other countries.

The concepts of economics are relevant to these important policy issues. Information is being obtained on the elasticities of demand and supply of energy and the elasticity of substitution of labor and capital in the production of energy. Yet because the range of experience is limited, there may be a limit as to what an analysis of past experience can show. My colleague, Charles Hitch, in an unpublished paper prepared for the Duke Universtiy Round Table entitled Energy in Our Future advances several propositions relative to energy. I repeat them here:

1. The size of the economy, as measured, for example by GNP, strongly influences the demand for energy.

2. Conversely, the effect of energy availability or energy prices on the economy, in the long run and within wide ranges, is much less for two reasons:

   a) The cost of supplying energy is small in relation to GNP.

   b) There are many ways of substituting capital and labor for energy.

3. While the economy can adapt to scarcer and more costly energy in the long run, it cannot do so in the short. (Hitch probably should have said it cannot do so without severe disruption in the short run.)

The following conclusions can be drawn when this review of contemporary developments for food, land and energy is contrasted with longer run studies of resource availability.

1. The actual long run availability of resources are affected by contemporary policies and interventions. On balance, our interventions in the case of food have probably been supply enhancing. It is not clear this has been true either for land or energy.

2. Given the short run planning horizons in the public sector, it seems probable that public sector interventions, on balance, have tended to shorten planning horizons in the private sector. However, this conclusion should be viewed as tentative prior empirical investigation.

3. It is clear that many public sector interventions are made to further objectives that are not considered in typical studies of resource availability.

What, then, of the role of the resource economist? Four suggestions occur to me.

1. The resource economist should not abandon her or his traditional orientation which I describe, somewhat loosely, as the neo-classical welfare model. This model permits the analyst to estimate the effect of public policies on net national income; it encourages the analyst to consider both positive and negative externalities and it facilitates the comparison of market and non-market values. While economic efficiency may not be the sole objective in our society, it is an important objective. Efforts to measure economic efficiency, even if it is defined somewhat arbitrarily, is surely a worthy activity. Economists are the sole professional group with the competence and the interest to insure that such considerations are not neglected in public debate.

2. But the neo-classical welfare model is incomplete and it should be recognized by the resource economist as being incomplete. In the first place, statements of what is "more or less" efficient if dependent on the income distribution which is assumed, hence the element of arbitrariness referred to earlier. But, as we have seen, it has deficiencies in treating many of the short run problems which are faced by policy makers. To this end ties should be strengthened between short and longer run approaches to economic issues.

   There are some economic concepts which can be useful in relating the contemporary to the longer run. One is the economic concept of rent. The crux of both the supply and the income problem is whether payment to the scarce factor will, over time, increase the quantity available for consumption. If the return commanded by the factor is truly unearned - that is, if it will not increase the amount available for consumption - then the equity problem can be separated from problems of resource scarcity. On the other hand if there is a relationship, then the analyst has an opportunity to deal with the stuff of which policy decisions are made.

   Another economic concept linking the contemporary to the longer run is the relation of changes in relative prices to the general price level. The discount rate, of course, is the economists principal tool for relating time periods, yet the conceptual base underlying the discount rate is undergoing considerable revision at present. Furthermore,

contemporary policy developments are affecting greatly the potential role of the discount rate in private sector decision making.

Agricultural economists have an admirable tradition of knowing about and using different conceptual approaches without becoming wedded to them. In farm management many different approaches drawn from several bodies of thought have been drawn upon to explain the gap between what farmers actually do and what naive theory would suggest. We hear much these days about multi- and inter-disciplinary approaches. Far be it from me to detract from this desirable trend, but for the problems described in this paper we need not go outside our own discipline to make considerable progress. Resource and agricultural economists concerned with policy issues should become as adept at using the concepts of macro economics as they are with micro concepts.

3. My third suggestion is that social scientists and economists, in particular, view public sector decision-making as a legitimate field of study. Political scientists and economists have established a field of study called public choice. By utilizing the self interest hypothesis they are better able to explain many public sector actions. Even though this approach has yielded useful results, undoubtedly there are other ways of approaching this area of study that should be tried.

   Reference was made earlier to the short term horizon of public sector decision-makers; I doubt few would dispute the plausibility of this assertion. Yet what do we really know about this important subject as contrasted to decision-making in the private sector?

   Let me be clear with respect to what I am suggesting. The public sector should be studied and analyzed with a positive rather than a normative orientation. We need to understand "what"and "why" with respect to the public sector. I certainly do not advocate the academic economist use the prestige of his position and the power of his analysis to accomplish the ends of the policy maker, whatever they may be. Nevertheless, the activities of the public sector are more likely to be improved if recommendations and policies are based on objective research capable of being generalized and verified.

4. Yet there is a limit as to what can be done from outside the system. There is no way that an outsider can appreciate

> the pressures and the relevance of all considerations in the absence of direct participation. To be on the outside and attempt to simulate the policy context of the problem is to play poker with make believe money. Such activities may be fun and useful to a point but reality will never quite be captured.
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> Thus I view the movement of research economists into and out of government with favor. I believe it is healthy for a Charles Schultz and a Dale Hathaway to spend part of their careers in policy making and policy executing positions. Even if social science research often cannot be generalized, the conduct of that research has an impact on the person doing the research. Not only does such a person learn a great deal of a factual nature, but they also develop diagnostic skills as social problems are encountered. Such knowledge and skill can be put to good use in the public sector.

This brief list exhausts my capacity for advice to those resource and agricultural economists who aspire to influence public policy. There is an alarming gap between what serious students of resource economics are suggesting is responsible public policy and what, in fact, is being practiced. I am not suggesting that the message of our studies is wrong, nor that such studies should be discontinued. I am suggesting that we approach the problem of the gap as good scientists should, and that we find out why the gap exists before we abandon our framework, willy nilly, in the pursuit of relevance.