

# LARGE WATER PROJECTS (STATE + FEDERAL)

➤ issue 1 is the projects themselves: massive efforts

• B.C.A. -- surely didn't count dead fish

• FOSTER ET AL., distributional effects

ARTICLE

(1)

➤ larger issues of water supply (public vs. private) efficiency in water provision and and Ag. policy

ARTICLE

(2)

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\*\* THESE ON-LINE NOTES  
FOCUS ON ARTICLES (1) + (2),  
THEMSELVES AVAILABLE ON-LINE  
FROM THE COURSE WEB SITE

THE REST OF THESE  
NOTES FOCUS ON THESE ARTICLES

## Distributional Welfare Implications of an Irrigation Water Subsidy

William E. Foster, Linda S. Calvin, Grace M. Johns,  
and Patricia Rottschaefer

The distributional welfare implications of a subsidy for irrigation water for California rice producers are analyzed. A more general equilibrium approach than that used in previous studies is taken in order to determine the effects of subsidy on consumers, subsidized producers, and unsubsidized producers. The two important policy conclusions of the results are that unsubsidized producers bear part of the cost of a subsidy through lower prices, and that consumers (taxpayers) may gain by sponsoring increased production through a selective subsidy.

*Key words:* production subsidy, rice, water, welfare.

... the return to the development of water

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## The Welfare Economics of Price Supports in U.S. Agriculture

By ERIK LICHTENBERG AND DAVID ZILBERMAN\*

Government regulations aimed at furthering social goals such as environmental quality and equitable income distribution often reduce productivity. Estimating these costs of regulation is one of economists' main contributions to the policy evaluation process. Assessments of the economic impacts on product markets are generally based on an assumption of competitive market clearing. As Arnold Harberger (1971) pointed out, this assumption is inappropriate when market distortions are present. Preexisting government programs are an important source of such distortions. Because they may have profound effects on resource allocation—and hence on the impacts of new regulations—in the markets affected, their presence makes necessary modification of the standard welfare analytic procedures.

This paper examines the welfare effects of regulation on product markets affected by revenue-support programs (price supports, marketing orders, and import quotas). Because monetary estimates of regulatory benefits are often not used in policy assessments and because in any event benefits tend to be evaluated separately from costs, we focus only on the latter. In addition, we deal only

the case of regulation restricting productivity of three major U.S. crops falling under current support programs.

### I. Welfare Evaluation in Revenue-Supported Industries

Mechanisms such as price supports, import quotas, and marketing orders are used in a number of important industries—notably, those with low elasticities of demand, like agriculture—to support producers' incomes. These policies create situations where the effective price received by producers exceeds consumers' willingness to pay as measured by the demand curve. This gap may arise either from explicit government subsidies, or from government policies that effectively increase market-clearing prices above competitive levels. In the case of agricultural price supports, the difference between average revenue and the demand price represents an explicit subsidy paid out of tax revenues. Agricultural marketing orders essentially set up discriminating monopoly schemes for allocating an industry's output among markets so that the pooled price (average revenue)

FOSTER ET AL.

IN CONSIDERING EFFECTS OF  
WATER DEVELOPMENT PROJECTS, MUST  
NOT ONLY CONSIDER DIRECT EFFECTS  
(EG. HOW PRODUCERS THAT WILL USE THE  
WATER, FROM THE PROJECT)  
BENEFIT

ALSO INDIRECT EFFECTS ON THE  
LARGER MKT WITHIN WHICH  
PRODUCERS OPERATE,  
E.G. EQUILIBRIUM EFFECTS

SEE THAT IRRIGATION WATER PRICING  
HAS LITTLE RELATION TO COSTS.

WOULD EXPECT THIS DEPARTURE FROM  
THE M.C. PRICING RULE TO  
HAVE EFFICIENCY COSTS

FOSTER ET AL. examine distributional effects of a water subsidy to a subset of farmers.

THEY FIND

- (1) PRODUCERS WITHOUT ACCESS TO THE SUBSIDY LOSE UNAMBIGUOUSLY (due to lower output price)
- (2) PRODUCERS WITH ACCESS TO THE SUBSIDY MAY WIN or MAY LOSE (costs are lowered, but so is output price)
- (3) CONSUMERS ( $\equiv$  TAXPAYERS):  
MAY WIN OR LOSE:  
gain from lower prices  
lose from lost income to taxes

DISTRIBUTIONAL EFFECTS of a subsidy  
on the <sup>use of a</sup> resource (such as water)  
by producers in a region called 'C'  
(such as California)

Region 'R' is everywhere else (Rest of world)

$S_C$  = supply in region C (where subsidy  
will take place)

$S_R$  = supply in region R

$S_T$  = total supply :  $S_T = S_R + S_C$

with a subsidy in region C  
supply there shifts to  $S'_C$  (supply in  
C w/subsidy)  
and so total supply with the subsidy is

$$S'_T = S_R + S'_C$$

NOW COMPARE BEFORE + AFTER  
SITUATION WITH AN EYE TOWARD  
CHANGES IN PRODUCER SURPLUS (AKA "RENTS")  
and CONSUMER SURPLUS.

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AFTER THE SUBSIDY, PRICE FALLS TO  $P'$   
and...

→ Subsidized producers:

lose  $\boxed{PadP'}$  and gain  $\boxed{defg}$   
(lose b/c of price fall) (gain on cost saving)

→ Unsubsidized producers

(unambiguously) lose  $PbhP'$

→ Consumers

lose by the amount of tax revenue  
that the subsidy / project requires

gain by the area  $PijP'$

this is a gain in consumer's surplus

My supposition:

Lobbying by agricultural interests to keep water subsidies suggests that those producers receiving the subsidies do in fact gain.

FOR THIS NOT TO BE TRUE,  
MUST BE THAT THEY ARE MYOPIC,  
IGNORE THE PRICE EFFECTS.

BUT RECENT HISTORY SUGGESTS  
FARMERS CAN BE SOPHISTICATED  
IN THEIR ASSESSMENT OF MARKETS.

Shapes of the curves will depend

on :

elasticity of demand for output  $\rightarrow$  in both regions  
" " supply of output  
w.r.t. output price

elasticity of derived demand for water  
( to know how the subsidy  
shifts supply )

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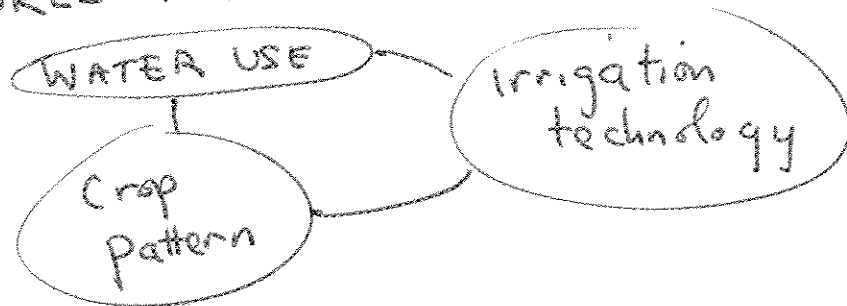
plus effect on consumers  
will depend on the relative  
market share in 'C' + 'R'

and the amount in taxes that  
must be raised to fund the subsidy

the article goes into a somewhat  
more detailed discussion of the  
conditions under which consumers and  
farmers in 'C' may be winners

## SOME CRITICISMS OF FOSTER ET. AL.

IGNORES INTER-LINKING OF CHOICES



there model is a single crop model produced with a single technology.

→ it is a partial equilibrium analysis

CONSUMERS  $\equiv$  TAXPAYERS; assumption breaks down when start thinking specifically about California, and CVP and SWP

IGNORES ENVIRONMENTAL COSTS

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## WELFARE IMPACTS OF REGULATION in an INDUSTRY WITH PRICE SUPPORTS

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REG: Such as tighter environmental controls (banning certain pesticides is a concrete example one might imagine) on agriculture.

Notion of EPA as a "policy taker"  
can't do away with price supports in ag.

SEE that the Regulation makes ag.  
production more expensive  
→ shifts supply

L + Z (cont.)

w/ "distorted" environment of target price, net effect of policy change is

- positive on consumers
  - negative on producers
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The opposite conclusion is reached if it is a competitive market

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Analysis is motivated by N.A.S.  
Study on economic effects of pesticide bans which assume perfect competition

D represents global demand

$D_C$  represents demand in 'C'

what they call residual demand =  $D - S_R$

(global demand less amount

supplied by the

rest of the world)

and

$P$  = price before subsidy

$Q_t$  = total production before subsidy

$Q_c$  = 'C' " " "

$Q_t - Q_c$  = 'R' " " "

$P_T$  : target price producer's are guaranteed

$S_1$  supply curve before regulation

$S_2$  " " after "

$D$  demand curve

for now ignore  $\hat{S}_1 + \hat{S}_2$

Shift from  $S_1 \rightarrow S_2$

causes  $Q_1 \rightarrow Q_2 + P_1 \rightarrow P_2$

thus regulation causes:

→ loss in consumer's surplus =  $g+h+i+j+k+l$

→ loss in producer's surplus =  $a+b+c$   
( $P_T$  : target price does not change)

→ govt expenditures are reduced  
by  $c+e+f+g+h+i+j+k+l$   
=  $(Q_1 - Q_2)(P_T - P_1)$

→ net change in social welfare  
=  $e+f - (a+b)$