Comments

Export Policy, Deficiency Payments, and a Consumption Tax

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Agricultural economists in recent years have made progress in linking policy objectives to the optimal design of programs (*4, 7*)[1] Consider the problem of agricultural policy design such that the distributive effects among three groups—producers, consumers, and taxpayers—are taken into account With different weights attached to different groups (for example, more weight for farmers because their industry is depressed, or added weight for tax expenditures because of the high Federal budget deficit), we need to revise some standard welfare results This article considers a particular problem of policy choice, the use of an export subsidy compared with alternative means of agricultural price supports, and develops further the analysis by Gardner (*3*) and Paarlberg (*5, 6*) A numerical example and a more general algebraic formula show that a combination of direct producer payments and consumption taxes is preferable to an export subsidy The formula also generates the welfare-maximizing payment and tax rates for alternative weights on producers, consumers, and taxpayers

Numerical Example

Consider a country facing a perfectly elastic demand for its exports at a given world price The figure shows an export subsidy program The kinked curve, DD, is the total demand for the country's output, with the downward sloping segment being domestic demand and export demand being the flat segment at the world trading price, P_w The line S represents the country's supply, which exceeds demand at price P_w With no program, the domestic market price would be P_w ($2 per bushel) and exports would be 3 billion bushels Now a subsidy of s ($1 per bushel) increases exports to $Q - Q_d$ and increases producers' price to P_p ($3), above the world price P_w by the full amount of the subsidy (Even if s is paid to exporting companies, competition for grain for export will place P_p at $P_w + s$) The income redistribution compared with no program, when one uses numbers for concreteness, is given in table 1

With equal weights assigned to the welfare of each interest group, the export subsidy reduces total welfare $1 billion in relation to the free market solution With producers assigned a weight of 1 2, however, the total increases by $0 9 billion Under these assumptions, the export subsidy is preferable to the free market

Suppose a producer deficiency payment, rather than an export subsidy, is used to give producers a price of P_p The calculations appear in table 2 They show that the deficiency payment program is preferable to the export subsidy, if one uses the unweighted sum of gains as a criterion If one uses the weighted gains, both the export subsidy and deficiency payment program are preferable to the free market, but deficiency payments are still preferable to the export subsidy

Now suppose that G_c is weighted less than G_T For example, let the weight on consumers be reduced to 0 6 Then the new weighted sum of gains is $1 4 billion for the deficiency payment, whereas it is $3 1 billion for the export subsidy Therefore, the export subsidy is preferred to the deficiency payment The result is interesting because it violates the usual finding that purely domestic interventions are preferred to border interventions for the purpose of domestic income redistribution (*1*)

This is not the end of the story, however With three different weights on three different interest groups, we generally gain by using more than one policy instrument Some such instruments are counterproductive. For example, an export tax or a supply management program will make producers worse off since output is reduced, but the given world price does not rise (unless exports are completely choked off) In the case considered here, the appropriate instrument to add to the deficiency payment program is a domestic consumption tax In terms of the figure, a tax equal to the payment rate, s, makes consumers pay P_p The gains and losses are the same as those for the export subsidy This is an instance of the general result that the effects of any export subsidy can be duplicated by use of a production subsidy and a consumption tax

More important, with different weights on consumers and taxpayers, we can do even better by making the tax

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[1] Italicized numbers in parentheses refer to items in the References at the end of this article

Table 1—Redistribution caused by an export subsidy

Item	Area	Unweighted average		Weighted average	
		Weight	*Billion $*	*Weight*	*Billion $*
Producers' gain (G_p)	A + B + C	1 0	9 5	1 2	11 4
Consumers' gain (G_c)	-A - B	1 0	-5 5	1 0	-5 5
Taxpayers' gain (G_T)	-B - C - D	1 0	-5 0	1 0	-5 0
Sum	-B - D	—	-1 0	—	+ 9

— = Not applicable

rate differ from the payment rate In the example, suppose we raise the tax to 2s or $2 per bushel to make the consumer price $4 Then consumers lose a further amount A′ + B′ and taxpayers gain a further amount A′ There is an additional deadweight (unweighted sum) loss, but the weighted sum increases The results of the joint deficiency payment (s) and consumption tax (2s) program are shown in table 3 The weighted sum of gains is now $3 4 billion, which is larger than the $3 1 billion net gain for the export subsidy as calculated above

Optimal Tax and Deficiency Payment Rates

Raising the consumption tax further in the example could yield still more net benefits To find the optimal rates for general linear domestic supply and demand functions, we have the following welfare function

$$W = \Theta_1 G_p + \Theta_2 G_c + \Theta_3 G_T \qquad (1)$$

where Θ's are welfare weights, and G_p, G_c, and G_T are gains generated by intervention for producers, consumers, and taxpayers G_p and G_c are the changes in consumers' and producers' surpluses caused by the subsidy and tax

$$G_p = \int_{P_w}^{P_w + s} S(P)dP \qquad (2)$$

$$G_c = -\int_{P_w}^{P_w + t} D(P)dP \qquad (3)$$

Export subsidy compared with joint deficiency payment and consumption tax

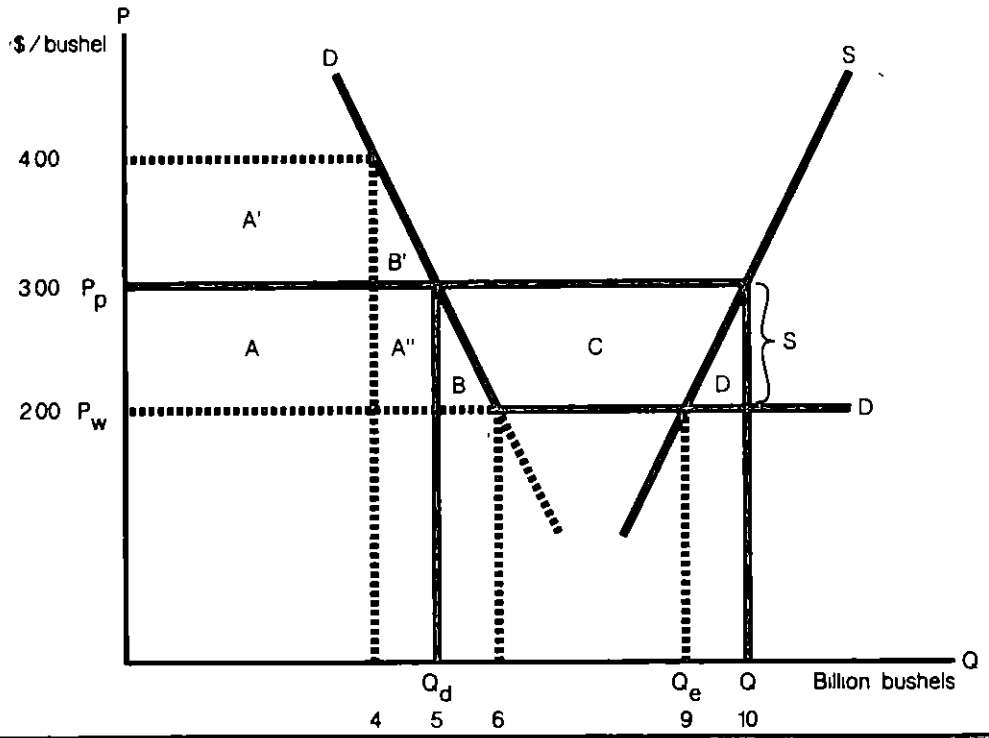

Table 2—Redistribution caused by a deficiency payment program

Item	Area	Unweighted average		Weighted average	
		Weight	*Billion dollars*	*Weight*	*Billion dollars*
G_p	A + B + C	1 0	9 5	1 2	11 4
G_c		1 0	0	1 0	0
G_T	−A − B − C − D	1 0	−10 0	1 0	−10 0
Sum	−D	—	− 5	—	+1 4

— = Not applicable

Table 3—Redistribution caused by a joint deficiency payment and consumption tax

Policy	Area	Unweighted average		Weighted average	
		Weight	*Billion dollars*	*Weight*	*Billion dollars*
G_p	A + B + C	1 0	9 5	1 2	11 4
G_c	−A − B − A' − B'	1 0	−10 0	6	−6 0
G_T	A' − A" − B − C − D	1 0	−2 0	1 0	−2 0
Sum	−B' − A" − B − D	—	−2 5	—	+3 4

— = Not applicable

$$G_T = tD(P_w + t) - sS(P_w + s) \quad (4)$$

where P_w is the given world price, s and t are the payment and tax per unit of output, and S(P) and D(P) are the supply and demand functions

$$S(P) = a_0 + a_1(P_w + s) \quad (5)$$

$$D(P) = b_0 + b_1(P_w + t) \quad (6)$$

Substituting equations 5 and 6 into equations 2 and 3, we have

$$G_p = s[a_0 + a_1(P_w + 1/2\ s)] \quad (7)$$

$$G_c = -t[b_0 + b_1(P_w + 1/2\ t)] \quad (8)$$

and for taxpayers, we have

$$G_T = t[b_0 + b_1(P_w + t)] - s[a_0 + a_1(P_w + s)] \quad (9)$$

If one substitutes equations 7, 8, and 9 into equation 1, the first-order conditions for the optimal s and t are

$$\frac{\partial W}{\partial s} = \Theta_1[a_0 + a_1(P_w + s^*)] - \Theta_3[a_0 + a_1(P_w + 2s^*)] = 0 \quad (10)$$

$$\frac{\partial W}{\partial t} = -\Theta_2[b_0 + b_1(P_w + t^*)] + \Theta_3[b_0 + b_1(P_w + 2t^*)] = 0 \quad (11)$$

where s* and t* are the optimizing values of s and t Because only relative political weights matter, we can without loss of generality divide equations 10 and 11 by Θ_3, which is equivalent to setting $\Theta_3 = 1$ In the numerical example of the figure, we have $a_0 = 7$, $a_1 = 1$, $b_0 = 8$, $b_1 = -1$, $P_w = 2$, $\Theta_1 = 1\ 2$, and $\Theta_2 = 0\ 6$ With these parameter values, equations 10 and 11 yield $s^* = 2\ 25$ and $t^* = 1\ 71$

Conclusions

The economic sense of these results can be restated as follows If reducing Government expenditures has a higher political weight per dollar than reducing consumers' costs and if one wants to support the price received by producers, an export subsidy can be a socially beneficial policy But a joint tax on domestic consumption and a payment program for producers is better still because it can both reduce Government outlays and raise revenues through the tax

In the case of the large country, which is relevant for U S grain policy at least in the short run, the situation is different because taxing exports or restricting output may dominate any of the policies considered here [2]

[2] Domestic interventions analogous to those discussed here can avoid the unconstitutionality of the export tax by imposing a joint domestic consumer subsidy and producer tax

However, if one compares domestic tax and payment with export subsidy policies, the former is preferred even more in the case of the large country than in the case of the small country In the case of the large country an export subsidy involves an additional transfer in favor of foreign consumers who buy at the subsidized price over and above their gains from a deficiency payment program (2) So long as foreigners have a smaller political weight in the United States than any U S interest group has, the large country case makes an export subsidy still less desirable

If equations 10 and 11 yield $t^* = s^*$, then the optimal tax and payment policy is equivalent to an export subsidy at level s^* But this outcome requires special combinations of parameter values Other notable special cases are (1) if $\Theta_2 = \Theta_3$, that is, consumers and taxpayers have equal weights, then $t^* = 0$, and we have a producers' subsidy only, and (2) if $\Theta_1 = \Theta_2 = \Theta_3$, then $t^* = 0$, and $s^* = 0$, that is, the free market is optimal

References

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Robert Overton
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