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PRICE SUPPORT PROGRAMS IN AN OPEN ECONOMY:

A PARTIAL EQUILIBRIUM ANALYSIS

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by

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1. INTRODUCTION

The stated objectives of the Food and Agriculture Acts of 1977 and 1981 are "to provide price and income protection to farmers, assure consumers of an abundance of food and fibre at reasonable prices, continue food assistance to low income households and for other purposes." (3,4) In the case of the major crops - wheat, feed grains, rice, upland cotton and soybeans - the mechanisms currently used to achieve these objectives include nonrecourse loans, a deficiency payment scheme and acreage controls.

Nonrecourse loans are 9 to 12 month loans which the government makes available to farmers at a specified loan rate per unit of production. The farmer's crop is used as collateral. When the loan reaches maturity, the farmer may repay it, plus interest, in cash, or repay it in kind using his crop. This program is an example of a "minimum price scheme" in which the government maintains a floor price to both producers and consumers by acquiring or disposing of stocks of grain. It will be referred to by this term throughout the paper. Deficiency payments are made to wheat, grain and upland cotton producers when the average market price over the first five months of the marketing year falls below a specified "target price". The payment per unit production is the difference between the target price and the maximum of the market price and the rate at which nonrecourse loans are made available. To qualify for deficiency payments producers may be required to reduce their planted acreage from an assessed base level. Land

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* I would like to thank Dr. G. Edward Schuh for reading this paper and for making many helpful comments and suggestions.

diversion payments, in cash or in kind, may be received by farmers for land removed from production under this program. Further information on these programs can be found in (1).

This paper presents a partial equilibrium analysis of the separate and combined effects of these three price support programs in the context of a grain exporting country. It builds upon Schuh's examination of deficiency payments and explicit export subsidies in an open economy (2). However, a brief review of these programs in a closed economy setting is first presented for comparison purposes. This review makes use of Wallace's analysis of deficiency payments and acreage controls (5). Major results are: (1) A deficiency payment scheme in the domestic economy is less likely to result in lower prices to domestic consumers when part of domestic grain production is exported than when it is all sold on the domestic market. (2) In an open economy, deficiency payments increase both the volume of world trade in the product concerned and the domestic economy's share of that volume, whereas a minimum price scheme results in a contraction of world trade and a reduction in the domestic economy's share of the volume of world trade. (3) In an open economy, the volume of stocks accumulated in support of a minimum price is influenced not only by changes in domestic supply and demand conditions but also by changes in demand and supply in the rest of the world. Nevertheless, the level of stocks is likely to be smaller for an open economy than for a closed economy, ceteris paribus. (4) It is well known that programs such as nonrecourse loans and acreage reductions, which increase the price paid by consumers, also increase gross revenue to producers provided demand is inelastic, a condition which is likely to apply to agricultural products in a closed economy. However, in an open economy such programs are less effec-

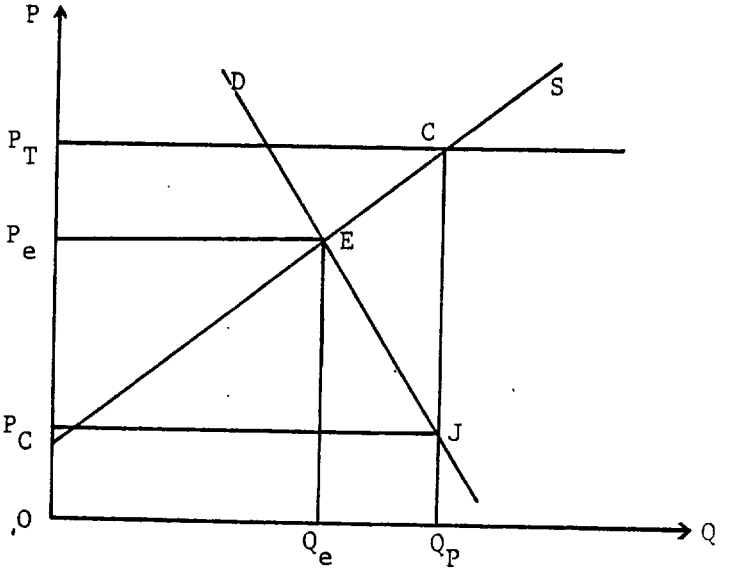
tive at providing income support and may even reduce gross revenue to producers if foreign demand is elastic and increases in domestic expenditure are offset by reductions in export revenue.

2. CLOSED ECONOMY ANALYSIS

2.1 Deficiency Payments

In a closed economy a deficiency payment scheme could simultaneously provide price and income protection to farmers and assure consumers of an abundance of food at low prices, albeit with some loss of efficiency and possibly at considerable expense to the taxpayer. Figure 1 shows how the system would work when the target price, P_T, is set above equilibrium.[1]

Figure 1



[1] If $P_T < P_e$ the deficiency payment scheme has no effect on the free market allocation of resources.

Producers supply Q_P and receive the (relatively high) price P_T per unit. Total revenue is OP_TCQ_P, made up of OP_CJQ_P from consumers who pay the (relatively low) price of P_C for each of Q_P units, and P_CP_TCJ in deficiency payments from the government which are ultimately provided by the taxpayer. The total resource costs[2] of the scheme are defined as the value of additional resources attracted into the sector and they equal Q_eECQ_P. Total benefits are defined as consumers' willingness to pay for the extra output and they equal Q_eEJQ_P. The overall efficiency loss is CEJ. However, both consumers and producers benefit from the program, consumer surplus increasing by P_CP_eEJ and producer surplus increasing by P_eP_TCE. The losers are taxpayers whose purchasing power is reduced by P_CP_TCJ.

2.2 Minimum Price Schemes

A mimimum price scheme guarantees producers a specified price for their output. Under a system of nonrecourse loans producers' miminum price is the loan rate, P_L, in Figure 2.

Consumers pay and producers receive a higher price, P_L, than the free market price.[3] However, consumers acquire a smaller quantity, Q_C, while farmers produce a larger quantity, Q_P, than the free market quantity. The difference, Q_P-Q_C, is accumulated as government owned stocks. Total revenue to producers is OP_LKQ_P.

Ignoring any potential value of the stocks, the net welfare loss of the scheme is Q_CGEKQ_P since resources equal to Q_eEKQ_P are induced into the sec-

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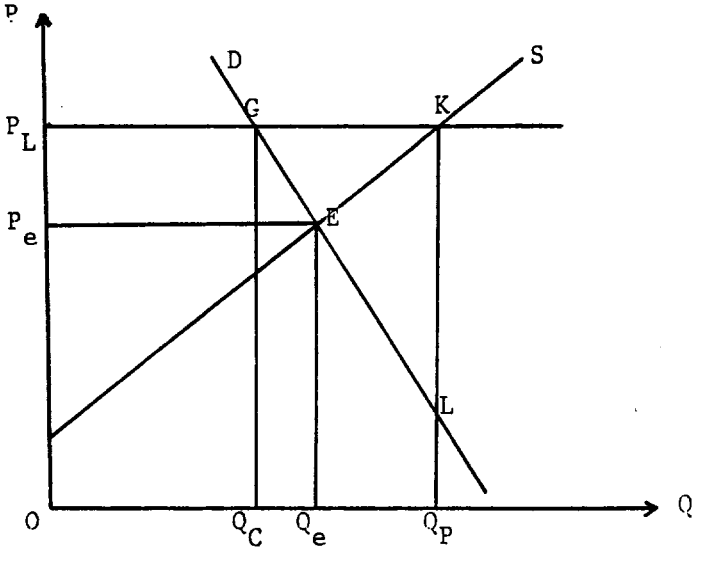
[2] These definitions of total resource costs and total benefits apply throughout this paper.

[3] If $P_L \leq P_e$ then the minimum price scheme does not alter the free market allocation of resources in this static, deterministic context.

Figure 2



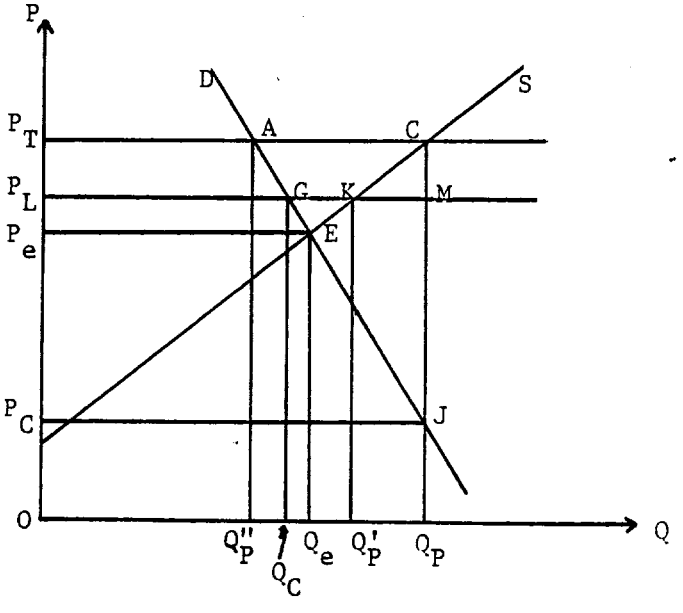
tor and consumers' total benefits fall by Q_CGEQ_e. However, unlike the deficiency payment scheme which benefits both consumers and producers, a minimum price scheme benefits only producers. Consumer surplus falls by P_eP_LGE, producer surplus increases by P_eP_LKE while government expenditure on stocks, ultimately financed by taxpayers, equals Q_CGKQ_P. The net efficiency loss of Q_CGEKQ_P is larger than the efficiency loss of KEL associated with a comparable deficiency payment scheme, namely one which sets the target price equal to P_L in Figure 2. The above analysis assumes that stocks have zero economic value to society. However, their maximum potential value is Q_CGLQ_P to the closed domestic economy, for this is the maximum amount consumers would be willing to pay for them. The government can, of course, dispose of these stocks by giving them away as income transfers to groups in the domestic economy, or can dispose of them abroad, either for a price or as

part of a foreign assistance program. These alternative uses of the stocks are ignored in this paper.

2.3 Deficiency Payments and Minimum Price Schemes

A system which combines a minimum price of P_L and deficiency payments with a target price of $P_T > P_L$ is portrayed in Figure 3.[4]

Figure 3



Producers receive price P_T, supply quantity Q_P and receive total revenue of OP_TCQ_P. Consumers pay P_L and purchase quantity Q_C, Q_P-Q_C being accumulated as government stocks. Note that the quantity $Q_P-Q'_P$, which represents the extra production over and above the level called forth by the minimum price, P_L, is simply absorbed into government stocks along with the quantity Q'_P-Q_C.

[4] If $P_T \leq P_L$ the deficiency payment scheme has no effect on the minimum price scheme.

Compared with the free market equilibrium, total utility falls by $Q_C GEQ_e$ and total resource costs increase by $Q_e ECQ_P$ giving a net welfare loss of $Q_C GECQ_P$. The latter is larger than the deadweight loss, CEJ, of a deficiency payment scheme alone, but smaller than the efficiency loss, $Q_P''AECQ_P$, of a minimum price scheme with P_L, set equal to P_T.

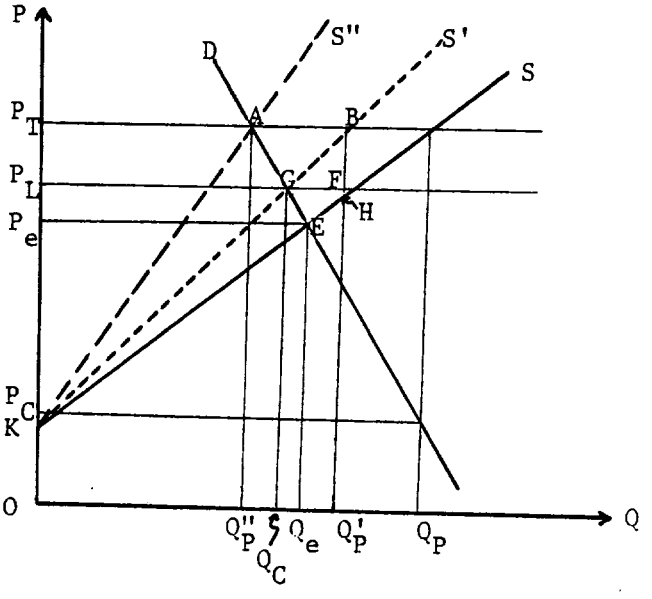
At first glance, the combination of policies might be viewed as a compromise. It can ensure that producers receive a given target price, P_T, and a given target gross income, OP_TCQ_P, with deficiency payments, $P_L P_T CM$, which are smaller than those of a deficiency payment scheme alone (i.e. $P_C P_T CJ$). Although food prices are higher than under a deficiency payment scheme, they are lower, and the accumulation of stocks is smaller, than under a minimum price scheme with $P_L = P_T$. (The latter would accumulate $Q_P - Q_P''$ in stocks and would charge consumers P_T.) However, the full Treasury costs of the program include the costs of acquiring stocks, $Q_C GMQ_P$, as well as deficiency payments, and their combined total may well exceed the Treasury costs of a deficiency payment scheme alone.

2.4 Deficiency Payments, Minimum Price Schemes and Acreage Controls

The political conspicuousness of deficiency payments and stocks may lead to the adoption of a three policy package which combines deficiency payments and a minimum price scheme with acreage controls (see Figure 4).

Acreage controls result in the least costly method of production not being used. They are represented by a shift to the left of the supply function (for example, to S' or S" in Figure 4). In the extreme case where supply decreases from S to S", the market clearing price is P_T, the quantity produced and consumed is Q_P'', no stocks are accumulated and no deficiency payments are made. Compared with the free market equilibrium the net efficiency loss is KAE.

Figure 4



A more moderate acreage reduction program which moves supply from S to S' would result in the following:

(a) Producers supply Q_P' and receive a price of P_T.

(b) Consumers acquire Q_C at a price of P_L.

(c) $Q_P'-Q_C$ are added to government stocks.

(d) Deficiency payments are equal to P_LP_TBF.

(e) Treasury costs are P_LP_TBF (for deficiency payments) plus Q_CGFQ_P' (for acquisition of additional stocks). These costs decrease as the amount of land withdrawn from production increases.

(f) The net welfare loss is Q_CGEQ_e (reduction in total utility), plus Q_eEHQ_P' (increase in resource costs from the free market level using the least costly method of production under no acreage controls), plus KBH (extra production costs as a result of not using the most

efficient method of production under acreage controls). The overall net welfare loss is not a monotonic function of the quantity of land withdrawn from production so no a priori conclusions can be drawn about the efficiency of this program compared with a combination of deficiency payments and a minimum price scheme without acreage controls. Given specific demand and supply functions there will be some optimal amount of land to withdraw so as to minimize the net welfare loss of the program.

(g) Gross income received by farmers from the sale of their output to consumers or to government, plus deficiency payments, decreases as the amount of land set aside increases. However, if farmers receive land diversion payments, their gross income may increase or decrease with acreage reduction. Whether total revenue increases or decreases, compared with the free market equilibrium, depends upon (i) the elasticity of demand, (ii) the amount of land withdrawn from production and (iii) payments per acre of land retired. However, even if enough land is retired to completely eliminate deficiency payments, and if no payments are made for land set aside, total revenue will increase if demand is inelastic. Those economists who have in mind a closed economy model when discussing agricultural policy, generally accept that demand for agricultural goods is inelastic. This belief is fundamental to the advocacy of policies which attempt to increase farm incomes by increasing farm prices (and restricting supply).

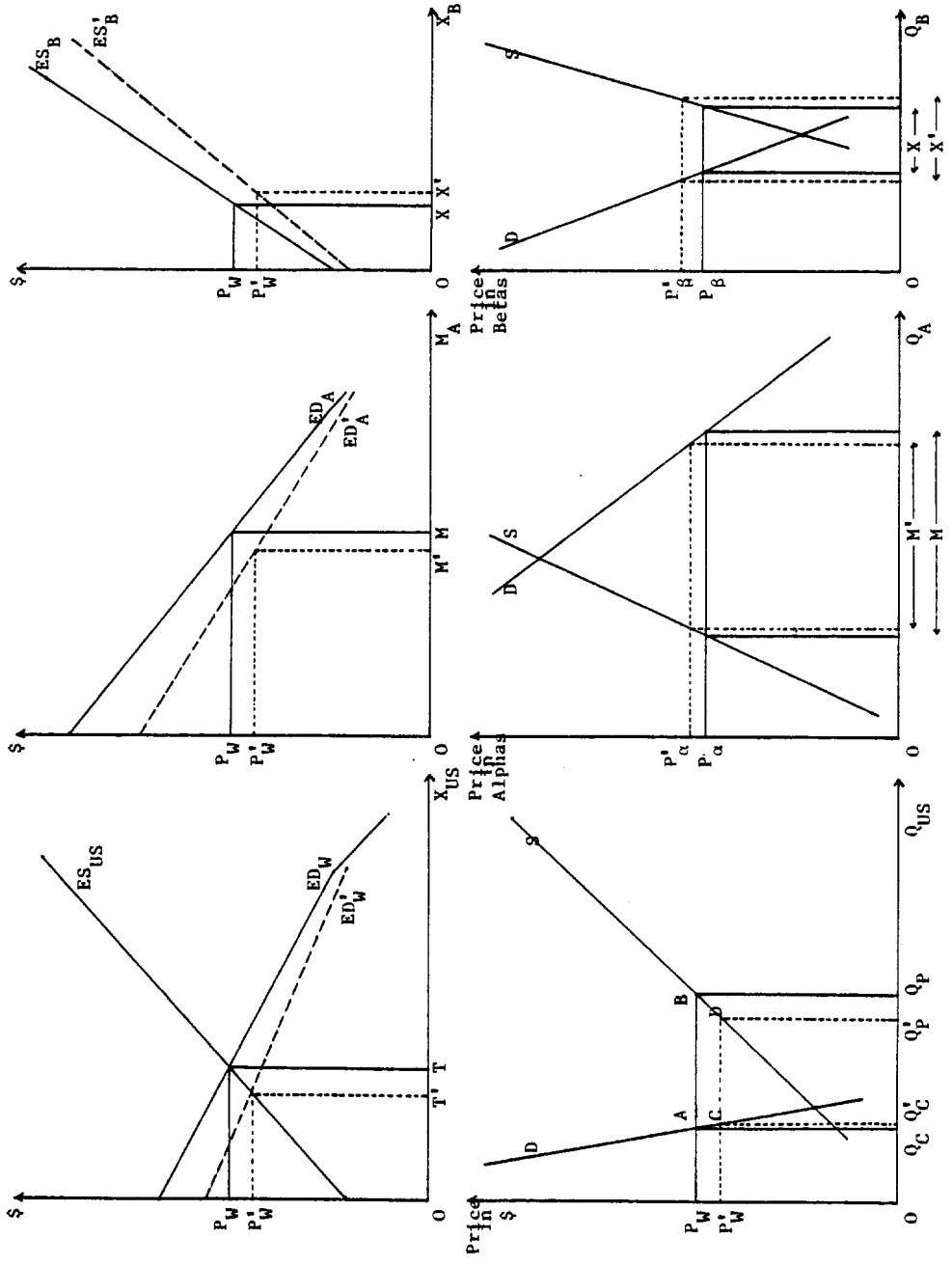
3. OPEN ECONOMY ANALYSIS

The policies discussed in section 2 will now be reexamined in the context of an open economy. Consider a three country world in which the United States and country B are net exporters of grain and country A is a net importer. For example, country A represents countries like Japan and the E.E.C., while country B represents countries like Canada and Australia. The currencies of the three countries will be called dollars (U.S.), alphas (country A) and betas (country B) and the initial exchange rate is assumed to be $\$1 = \alpha 1 = \beta 1$. It is assumed that there are no barriers to trade and no transportation costs.

The free trade equilibrium is depicted in Figure 5. The U.S. have excess supply ES_{US}, country A has excess demand ED_A and country B has excess supply ES_B. The excess demand function facing U.S. exporters is $ED_W = ED_A - ES_B$. The world price, P_W (expressed in dollars), clears the world market, country A importing T from the U.S. and X from country B. The world price is also the U.S. domestic price. U.S. production is Q_P, consumption is Q_C and the difference $T = Q_P - Q_C$ is exported. Total revenue received by U.S. producers is OP_WBQ_P, OP_WAQ_C of which is from domestic sales and Q_CABQ_P of which is export revenue.

The last few years have seen a steady appreciation in the value of the U.S. dollar, the effect of which has been to make U.S. exports less competitive in world markets. An appreciation of the U.S. dollar against the alpha and the beta reduces excess demand from country A, increases excess supply from country B, and thereby reduces world excess demand facing U.S. exporters from ED_W to ED_W' in Figure 5. The world price falls from P_W to P_W', imports by country A fall from M to M' (the price in alphas rises from

Figure 5


ES_{US}
ED_W
ED'_W
X_{US}
T' T
P_W
P'_W
O
Price in $
D
S
A
B
C
Q_C Q'_C Q'_P Q_P
Q_{US}
ED_A
ED'_A
M_A
M' M
Price in Alphas
P'_α P_α
Q_A
M' M
ES_B
ES'_B
X_B
X X'
Price in Betas
P'_β P_β
Q_B
X X'

P_α to P_α') and exports by country B rise from X to X' (the price in betas rises from P_β to P_β'). Consequently, U.S. exports fall, both in absolute terms from T to T', and as a percentage of world trade.[5] Within the United States the lower domestic price increases consumption from Q_C to Q_C', reduces production from Q_P to Q_P' and reduces gross revenue of grain producers from OP_WBQ_P to $OP_W'DQ_P'$.

3.1 Deficiency Payments

A deficiency payments scheme with target price $P_T > P_W$, in an open economy is depicted in Figure 6 and its effects are listed in Table 1. U.S. production equals Q_P' for all world prices not exceeding P_T so the U.S.'s excess supply function kinks rightward for prices less than P_T. The world price falls from P_W to P_W' in response to this increase in excess supply and world trade expands because the price in country A falls from P_α to P_α'. However, exports from country B fall (since the price in betas falls from P_β to P_β') while those from the U.S. expand both in absolute terms from T to T' and as a percentage of world trade. If the excess demand function facing U.S. exporters is elastic, export revenue earned by U.S. producers increases as a result of the deficiency payments scheme. Assuming domestic demand is inelastic, revenue from domestic sales will fall and total revenue from both sources could either increase or decrease.

Comparing Figures 1 and 6, we see that a deficiency payment scheme in an open economy is less beneficial to domestic consumers than it is in a closed economy. This is because the domestic price in an open economy

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[5] $OX' > OX$ and $OM' < OM$ imply $\frac{OX'}{OM'} > \frac{OX}{OM}$. Hence, $\frac{OT'}{OM'} = 1 - \frac{OX'}{OM'} < 1 - \frac{OX}{OM} = \frac{OT}{OM}$.

Figure 6

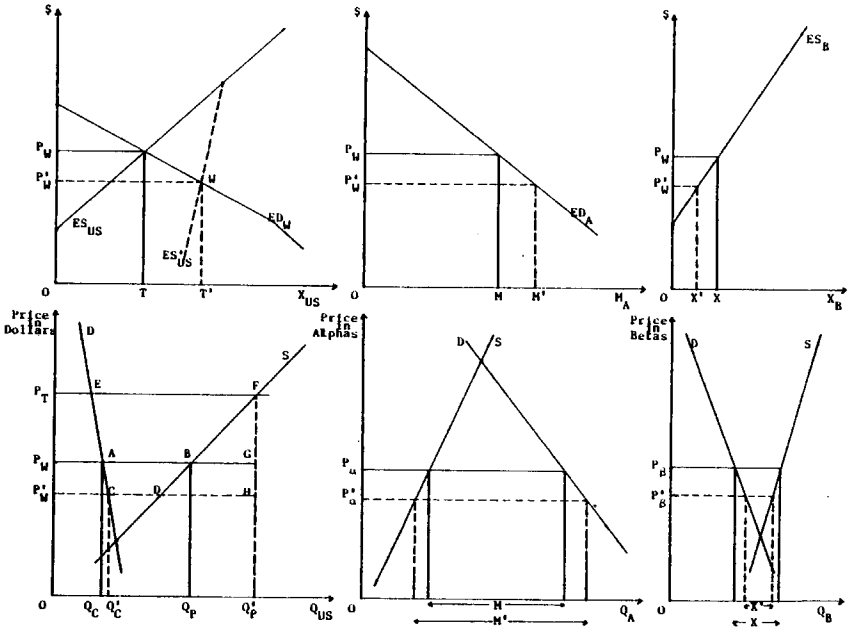

Table 1

Price received by U.S. producers = P_T
Quantity produced domestically = Q'_P
Price paid by U.S. consumers = P'_W
Quantity purchased domestically = Q'_C

World price = P'_W
World trade = Imports by country A = M'
Exports from U.S. = T' = $Q'_P - Q'_C$
Exports from country B = X'

Increase in total utility of U.S. consumers = $Q_CACQ'_C$
Increase in total costs of U.S. producers = $Q_PBFQ'_P$
Increase in foreign exchange earnings = $Q'_CCHQ'_P - Q_CABQ_P$
Net welfare loss in the U.S. = CABFH

Increase in consumer surplus in U.S. = P'_WP_WAC
Increase in producer surplus in U.S. = P_WP_TFB
Deficiency payments to U.S. producers = P'_WP_TFH
Net welfare loss in the U.S. = CABFH

equals the world price so domestic consumers benefit only to the extent that the extra exports resulting from the program manage to depress the world price. The more elastic is excess demand from the rest of the world, (that is, the smaller the country), the less the world price will fall and the smaller will be the increase in consumer surplus. However, the deficiency payments necessary to support a given target price are smaller in an open economy than in a closed economy so the burden on taxpayers is smaller.

3.2 Minimum Price Schemes

A minimum price scheme (based on nonrecourse loans) in the United States makes the domestic demand curve, and the excess supply curve from the U.S. to the rest of the world, perfectly elastic at the loan rate. In Figure 7 the loan rate, P_L, is above the free market world price, P_W,[6] and the effects of the program are catalogued in Table 2.

Notice that the world price rises from P_W to $P_W'=P_L$, the loan rate becoming in effect a price floor in both the U.S. domestic market and in the world market. This benefits both U.S. and foreign producers who experience increases in their producer surpluses as a result of price increases in their local currencies. However, domestic and foreign consumers experience reductions in their consumer surpluses due to these same price increases. In contrast to a deficiency payment scheme, the volume of world trade contracts from M to M', but country B's exports actually expand from X to X' while those from the U.S. decrease from T to T'. Export revenue earned by domestic producers will fall if excess demand from the rest of the world is

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[6] If $P_L \leq P_W$ the original free market allocation is unaffected.

Figure 7

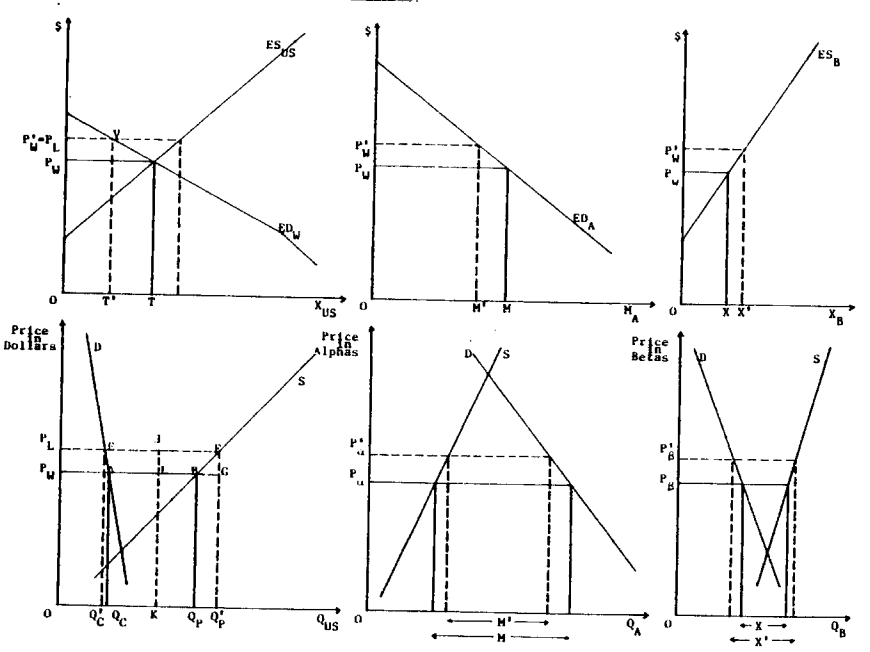

Table 2

Price received by U.S. producers = P_L
Quantity produced domestically = Q'_P
Price paid by U.S. consumers = P_L
Quantity consumed domestically = Q'_C
Increase in Govt stocks of grain = KQ'_P

World price = $P'_W = P_L$
World trade = Imports by country A = M'
Exports from U.S. = T' = Q'_CK
Exports by country B = X'

Decrease in total utility of U.S. consumers = Q'_CEAQ_C
Increase in total costs of U.S. producers = $Q_PBFQ'_P$
Increase in foreign exchange earnings = $Q'_CEJK - Q_CABQ_P$
Net welfare loss in the U.S. = $KLBFQ'_P - AEJL$

Decrease in consumer surplus = P_WP_LEA
Increase in producer surplus = P_WP_LFB
Government expenditure on stocks = $KJFQ'_P$
Net welfare loss in the U.S. = $KLBFQ'_P - AEJL$

elastic but, if domestic demand is inelastic, revenue from local sales will increase. Hence, the direction of change in total revenue from both sources cannot be predicted a priori.

The U.S. government's stocks of grain must increase by $Q_P'-Q_C'-T'=KQ_P'$ in order to maintain the minimum price, P_L. At price P_L domestic production is Q_P', domestic consumption is Q_C' and net consumption in the rest of the world is T', so the balance must be acquired by the government. This increase in stocks is smaller than it would be in a closed economy with the same minimum price, P_L, (namely $Q_P' - Q_C'$). However, in an open economy the change in stocks in any given period is affected by changing demand and supply conditions, not only at home as would occur in a closed economy, but also in the rest of the world. For example, an increase in supply in country B shifts ES_B to the right and ED_W to the left and thereby results in more than KQ_P' being acquired as stocks by the U.S. government. Similarly, a reduction in demand in country A, ceteris paribus, leads the U.S. government to acquire stocks in excess of KQ_P'. Indeed the very existence of a price support program in the U.S. may have a depressing effect on excess demand by the rest of the world if other countries, knowing that the U.S. government is willing to carry stocks, demand fewer stocks themselves. Nevertheless, Figure 7 shows that the maximum change in U.S. stocks in any given period is $Q_P' - Q_C'$, which is the stock change in a closed economy with the same loan rate. Hence a minimum price program such as nonrecourse loans will, ceteris paribus, result in smaller accumulations of stocks in an open economy than in a closed economy. This result occurs because some of the stocks which would be accumulated at price P_L in a closed economy, will, in an open economy, be sold to foreign consumers.

In an open economy, as in a closed economy, a minimum price scheme benefits producers at the expense of consumers and taxpayers. The fall in consumer surplus, $P_W P_L EA$, is more than offset by the rise in producer surplus, $P_W P_L FB$, but government expenditure on stocks is $KJFQ_P'$ and this represents a loss to the taxpayer. The net welfare loss is $KLBFQ_P'$-AEJL. Unlike the closed economy analysis, no a priori conclusions can be drawn about the relative net welfare losses of a deficiency payment scheme and a minimum price scheme in an open economy setting.

3.3 Deficiency Payments and Minimum Price Schemes

A combination of deficiency payments and a minimum price scheme is depicted in Figure 8, with the target price set higher than the price floor, which in turn is higher than the free market world price.[7] The effects of the program are given in Table 3. Both the domestic demand function and the U.S.'s excess supply function become perfectly elastic at the minimum price, P_L, and the excess supply function is kinked to the right for world prices between P_L and P_T.

The pattern of world trade is identical to that under a minimum price scheme at the same price floor, P_L, as is the level of consumption in the United States. The extra production, DH, called forth by the deficiency payments, over and above the production level under the minimum price scheme, is simply added to government stocks, along with quantity JD.

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[7] If $P_T < P_L$ and $P_L > P_W$ the deficiency payment scheme has no effect on the allocation of resources under the minimum price scheme. If $P_L < P_W$ and $P_W > P_T$, a minimum price and deficiency payments have no effect on the free market allocation of resources. If $P_L < P_W$ and $P_W < P_T$, a minimum price has no effect on the allocation of resources under a deficiency payment scheme.

Figure 8

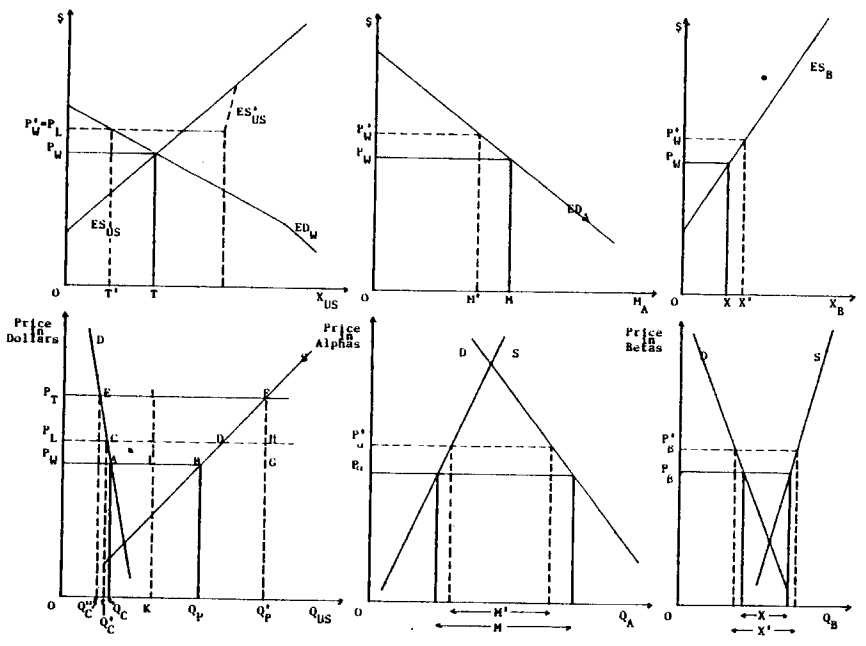

Table 3

Price received by U.S. producers = P_T
Quantity produced domestically = Q'_P
Price paid by U.S. consumers = P_L
Quantity purchased domestically = Q'_C
Increase in Govt stocks of grain = KQ'_P

World price = $P'_W = P_L$
World trade = Imports by country A = M'
Exports from U.S. = T' = Q'_CK
Exports from country B = X'

Total revenue to U.S. producers = $OP_TFQ'_P$
  Domestic expenditure = $OP_LCQ'_C$
  Export revenue = Q'_CCJK
  Revenue from nonrecourse loans = $KJHQ'_P$
  Deficiency payments = P_LP_TFH

Decrease in total utility of U.S. consumers = Q'_CCAQ_C
Increase in total costs of U.S. producers = $Q_PBFQ'_P$
Increase in foreign exchange earnings = $Q'_CCJK - Q_CABQ_P$
Net welfare loss in the U.S. = $KLBFQ'_P - ACJL$

Decrease in consumer surplus = P_WP_LCA
Increase in producer surplus = P_WP_TFB
Government expenditure on stocks = $KJHQ'_P$
Deficiency payments to U.S. producers = P_LP_TFH
Net welfare loss in the U.S. = $KLBFQ'_P - ACJL$

The system can support a given target price, P_T, and a given target gross income, OP_TFQ_P', with smaller deficiency payments than a deficiency payment scheme alone. However, when the cost of accumulated stocks is taken into account, the burden on taxpayers ($P_LP_TFH + KJHQ_P'$) may exceed that of a deficiency payment scheme by itself. The system can also provide consumers with cheaper food and will accumulate fewer stocks than a comparable minimum price scheme (i.e. one which sets the price floor at P_T) for the latter would raise the price to consumers to P_T and would accumulate stocks of $Q_P' - Q_C''$.

3.4 Deficiency Payments, Minimum Price Schemes and Acreage Controls

Currently in the United States, the target price and the loan rate are set by the political process, and production required to satisfy domestic demand, Q_C', and foreign demand, T', is estimated by the Secretary of Agriculture. Acreage controls can, in principle, then be instituted to achieve this level of production.

When the "correct" acreage controls are imposed, the domestic supply function shifts left from S to S' in Figure 9 and the excess supply function from the United States to the rest of the world assumes the shape of ES_{US}''. As can be seen from the diagram, world trade is not affected by the acreage controls, nor are the domestic price or domestic consumption. However, no stocks are accumulated by the government and deficiency payments are reduced from P_LP_TFH to P_LP_TIJ. Other effects of the scheme are given in Table 4.

There is a fundamental difference between this system and those discussed earlier in section 3; gross revenue to producers is OP_TIQ_P'' rather than OP_TFQ_P', a fall of $Q_P''IFQ_P'$. Of course if payments are made for

Figure 9

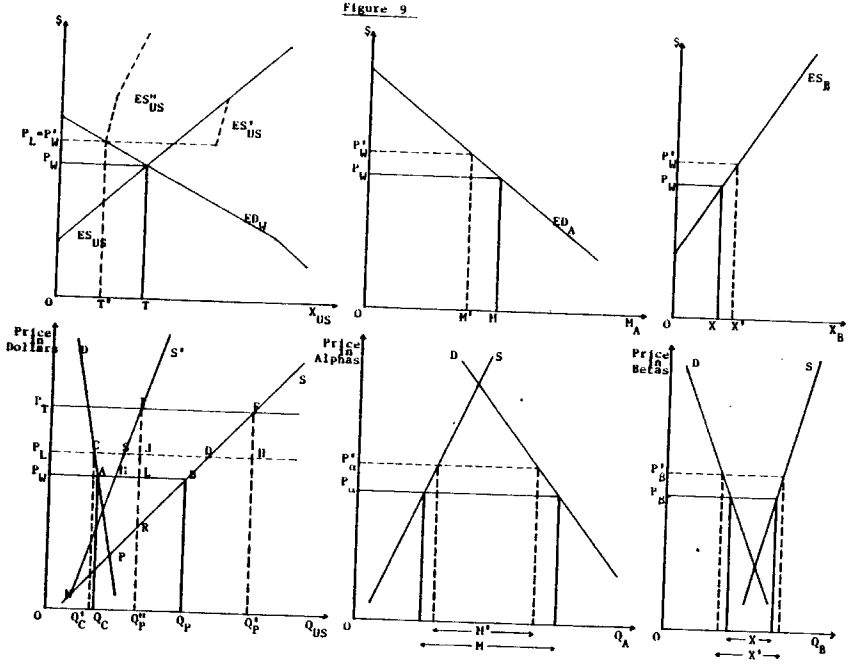

Table 4

Price received by U.S. producers = P_T
Quantity produced domestically = Q''_P
Price paid by U.S. consumers = P_L
Quantity produced domestically = Q'_C

World price = $P'_W = P_L$
World trade = Imports by country A = M'
Exports from U.S. = T' = $Q''_P - Q'_C$
Exports by country B = X'

Total revenue to U.S. producers = $OP_TIQ''_P$
Domestic expenditure = $OP_LCQ'_C$
Export revenue = $Q'_CCJQ''_P$
Deficiency payments = P_LP_TIJ

Decrease in total utility of U.S. consumers = Q'_CCAQ_C
Decrease in total costs of U.S. producers, assuming the most efficient method of production is used = Q''_PRBQ_P
Increase in total costs of U.S. producers, due to using inefficient production methods = NIR
Increase in foreign exchange earnings = $Q'_CCJQ''_P - Q_CABQ_P$
Net welfare loss in the U.S. = NMB + IJS - ACSM

Decrease in consumer surplus = P_WP_LCA
Decrease in producer surplus = NMB - P_WP_TIM
Deficiency payments to U.S. producers = P_LP_TIJ
Net welfare loss in the U.S. = NMB + IJS - ACSM

land diverted from production then gross revenue will be higher than OP_TIQ_P'' but then the net welfare loss of the program will also be correspondingly higher.

Given an objective of providing producers with a gross revenue of OP_TIQ_P'', it is relevant to ask whether this might be achieved more efficiently than under the current system without exceeding deficiency payments of P_LP_TIJ and without accumulating stocks. The answer is in the affirmative and the method is evident from a study of Figures 9 and 5, namely, by abandonning all three policies and returning to a free market allocation where gross revenue is $OP_WBQ_P = OP_TIQ_P''$, deficiency payments are zero and no government stocks are accumulated. In fact, the diagrams have been constructed to produce this result but the degree of "rigging" involved is slight. The result arises from the assumption that the foreign demand function is sufficiently elastic that a fall in the world price from P_W to P_W' will bring forth enough additional export revenue to compensate for (1) the loss of domestic revenue (assuming domestic demand is inelastic) and (2) the loss of deficiency payments.

For those who are willing to accept that foreign demand is elastic but not to the extent discussed above, a simple deficiency payment scheme with target price just high enough to make deficiency payments equal to P_LP_TIJ, might be more acceptable. The extra exports would reduce the world price below P_W, increase export revenue and reduce domestic revenue. It is likely that revenue from both sources plus the deficiency payments would exceed OP_TIQ_P''. It must be acknowledged that it is possible that domestic demand is so highly inelastic, foreign demand of such moderate elasticity, and the relative importance of domestic and foreign demand is such that the

reduction in domestic revenue will outweigh the increase in foreign revenue plus the deficiency payments of $P_L P_T IJ$; only an empirical analysis can settle such a dispute. Such a study is too ambitious for this paper but we can briefly outline what it would involve. Wheat and feed grains would need to be treated separately and the parameters of (domestic) demand and supply equations would need to be estimated. On the face of it, single equation estimation methods would appear to be suitable in the U.S. case since target prices and loan rates are set by administrative fiat. Consequently, price-quantity combinations such as $(P_T, Q_P^{"})$ can be identified as falling on a supply function, while combinations such as $(P_L, Q_C^{'})$ trace out a demand function. Variables other than own price, for example prices of other grains, should be included as explanatory variables in demand and supply equations. An estimate of the excess supply function of the United States could then be obtained by subtracting domestic demand from domestic supply. Similarly, supply and demand functions for grain in all other countries which import or export grain would need to be estimated. Their excess demand or supply functions could then be aggregated to form the excess demand function from the rest of the world which confronts U.S. exporters. Once these functions had been estimated we could not only settle the question regarding elasticities of domestic and foreign demand, we could also obtain numerical estimates of the various welfare measures listed in Table 4.

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