December 1979

A.E. Res. 79-27

# AN ECONOMIC ANALYSIS OF THE U.S. DAIRY PRICE SUPPORT PROGRAM AND ALTERNATIVE POLICIES

Andrew Novakovic
and
Emerson Babb

Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York 14853

It is the policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, age or handicap. The University is committed to the maintenance of affirmative action programs which will assure the continuation of such equality of opportunity.

## Preface

Andrew Novakovic is an Assistant Professor in the Department of Agricultural Economics at Cornell University. Emerson Babb is a Professor in the Department of Agricultural Economics at Purdue University. This paper summarizes Novakovic's dissertation work at Purdue.

Some of the results presented here are obtained from a model of the U.S. dairy sector, referred to as the Dairy Market Policy Simulator or DAMPS. Additional information on DAMPS is available in the following publications:

A.M. Novakovic, E.M. Babb, D.R. Martella, and J.E. Pratt, A Computer Program Documentation of the Dairy Market Policy Simulator (Model A), Staff Paper 79-4, Department of Agricultural Economics, Cornell University, May 1979.

A.M. Novakovic, E.M. Babb, D.R. Martella, and J.E. Pratt, Input Forms and Output from the Dairy Market Policy Simulator (Model A), Staff Paper 79-5, Department of Agricultural Economics, Cornell University, May 1979.

Both papers can be obtained by direct request to the following address:

Dr. Andrew Novakovic
Department of Agricultural Economics
312 Warren Hall
Cornell Univeristy
Ithaca, New York 14853

## Abstract

A spatial model of the U.S. dairy sector is used to analyze support prices at 75 and 80 percent of parity, supports based on the cost of production, a policy of minimal or non-support, and the possibility of increasing dairy imports. Results indicate that the current program of parity based price supports could lead to large and increasing federal expenditures on dairy products over a five year period, whereas support prices based on the full cost of production would imply much lower expenditures. In fact, it is likely that support prices based on the full cost of production would be below market prices by 1980. Under those conditions, it would be possible to increase imports, perhaps as much as four times their level in 1976 by 1981, without requiring abnormally large federal expenditures. This would provide an opportunity to enhance U. S. bargaining power at the multilateral trade negotiations.

The results of the analysis follow from the expectation that the parity price will increase much more sharply than the cost of milk production. The divergence between parity and cost is in large part due to the different weightings assigned to inputs in the two measures, feed inputs in particular. Furthermore, productivity gains are taken into account in the cost of production but not in the parity price.

Actual results will differ from projections, particularly if production costs would increase more sharply than projected due to weather, exports, or government feed grains programs, for example.

## Introduction

In the fall of 1977, the support floor for manufacturing grade milk prices was raised from 80 percent to 82 percent of parity. Representing a substantial increase in dairy prices, this action led to concern that U.S. Department of Agriculture (USDA) dairy product expenditures would soar to unacceptable levels. Dairy stocks did build for a while. In the fiscal year ending September 30, 1977, net government expenditures on dairy products reached $711.5 million. This was not a record, but it was higher than the sum of net expenditures in the three previous years. In 1978, unexpectedly brisk consumption led to expenditures one-third lower than the previous year, accompanied by a decline in concern for the level of support. In early 1979, legislation has been proposed to continue supporting prices at 80 percent of parity. One proposal in Congress calls for an extension through September 30, 1981.

Although the experience with supports at 80 percent of parity has not been as bad as expected in the past year, it seems desirable to consider the potential impacts of continuing supports at that level for the next several years. In this paper, the impacts of such a policy and alternate policies, in particular support prices based on cost of production, are compared.

## Methodology

Impacts of the various support policies are estimated with a spatial model of the U.S. dairy sector, referred to as the Dairy Market Policy Simulator or DAMPS.[1] Model components include:

- supplies of Grade A milk
- supplies of Grade B milk
- processing activities
- demands for fluid (Class I) products, soft (Class II) manufactured products, cheese, butter, nonfat dry milk, and miscellaneous hard (Class III) manufactured products.
- imports of cheese, butter, nonfat dry milk, and miscellaneous Class III products
- commercial stocks of cheese, butter and nonfat dry milk
- government stocks of cheese, butter and nonfat dry milk.

---

[1] DAMPS evolved from a model of the Federal Order system, known as the Federal Milk Marketing Order Policy Simulator or FMMOPS. Details on FMMOPS are available in Banker, et. al. (1, 2).

The dairy sector is split geographically into Federal Order areas, state regulated areas, unregulated Grade A regions, and Grade B or manufacturing milk regions. Each regulated area has a production center, a processing center, and a consumption center. Unregulated regions have production centers and consumption centers. Grade B regions have production-manufacturing, import, stocks, and consumption centers.

DAMPS is a quarterly model and can simulate from one to five years of dairy sector activity. Dynamic elements of the dairy sector are represented in DAMPS by the carryover of dairy stocks between quarters and by supply and demand being a function of lagged prices. Projected Grade B prices (M-W prices) are the basic model input. The Class III price in regulated areas is equal to the Grade B price. Class I and II prices in regulated areas are based on Class I and II differentials added to the Class III price. Differentials default to values in the base year, 1976, but can be set at any level. Retail prices are based on farm level prices and marketing costs or margins. Other model data include exogenously specified import levels, desired stock levels, the level of exogenous factors affecting supply and demand, and restrictions and pricing mechanisms used in regulated markets.

Given a matrix of prices and exogenous factors, quarterly production and consumption can be computed in each area or region. DAMPS determines the spatial allocation that minimizes marketing costs, using a capacitated network algorithm to solve the transshipment problem.

Further details on DAMPS can be obtained from Novakovic (3).

## Results and Analysis

A number of changes in dairy support policy have been considered. These range from adjustments in the level of parity to which supports are tied under the current program to entirely new programs, such as a direct payments plan. Other alternatives include support prices based on cost of production, support prices with supply controls, support prices with reduced Class I differentials, cow culling incentives, and base-excess pricing plans.

Three sets of experiments with DAMPS are reported here.[2] In the first set, support prices are set at 75 and 80 percent of parity (SUP75 and SUP80, respectively). The basic legislation authorizing price supports, requires prices to be supported between 75 and 90 percent of parity. Currently, legislation exists which moves the support floor up to 80 percent. Although higher levels have been called for, the 75 and 80 percent levels seem the more politically likely alternatives, under the current program.

The second experiment, referred to as BASE, approximates a minimum support or equilibrium scenario. A set of prices are found which limit government purchases to one percent of production. The one percent level is chosen to

[2] Other experiments were also performed, the results of which are reported elsewhere by Novakovic (3). These experiments involve policies of support prices set at 90 and 100 percent of parity, support prices with reduced Class I differentials, and increasing dairy imports.

to reflect the need for stocks to satisfy military and welfare requirements and the speculative component of commercial stocks that is held by the government.

In the third set of experiments, support prices are tied to the cost of production. In one experiment (COST2), changes in the direct cost of production are matched in the support price. In the second experiment (COST4), changes in the full cost of production are matched in the support price. In both experiments, it is postulated that the average price of all milk is supported to the full cost of production, beginning in 1977. Changes in costs are added to the Grade B support price.

All other conditions, restrictions and exogenous factors are treated the same across all experiments. Exogenous factors are permitted to vary, as specified in the base data (see Novakovic (3)), and imports are held constant.

The prices projected as Grade B or Class III prices under these five experiments are listed in Table 1 and graphed in Figure 1. In Figure 1, simple averages of the quarterly prices under COST2 and COST4 are shown as annual prices. The reader is reminded that DAMPS allows no deviation from these prices, regardless of how realistic or reasonable the situation they imply. For this reason, the price used in 1977 under SUP75 is not 75 percent of parity for that year. The true 75 percent price of $8.20 led to an infeasible solution; such that is could not be assumed that is was an effective support price. That is, the market price would exceed $8.20 under the SUP75 scenario in 1977. The actual 1977 market price was about 30 cents higher than the 75 percent support price; this led to the use of $8.55 as a 1977 market price in SUP75. In addition, the prices in COST2 led to an infeasible solution starting in 1979, again implying that market prices would exceed the COST2 level. Production and consumption under COST2 prices are mentioned below only for comparison. Otherwise, the COST2 experiment is not discussed.

This should not be construed as implying that a policy leading to an infeasible solution in DAMPS is a bad or undesirable policy. DAMPS gives a feasible solution only when prices are such that quantity supplied equals or exceeds quantity demanded for all products. An infeasible solution means that the prices submitted to the model are less than equilibrium prices. The purpose of BASE is to help identify where equilibrium might be in the dairy sector over the next five years.

Raw milk production[3] and total returns over direct cost are affected under the five experiments as shown in Tables 2 and 3 and Figures 2 and 3. As can clearly be seen from the figures, there is a high correlation between farm prices (Figure 1) and production and returns over direct cost. Production, farm prices, and returns are initially lower with price supports based on 75 to 80 percent of parity than under the BASE or COST plans. By

[3] What is called production in this paper is actually milk sold to plants and dealers, which excludes milk consumed on the farm and producer-dealer milk sales. Although the conceptual distinction is significant, the numerical difference between milk sold to plants and dealers and production is slight.

1978 or 1979, the situation is reversed. In 1981, production, farm prices, and returns are lower in the BASE and COST experiments. Compared to BASE results in 1981, production is 2.5 percent higher with price supported at 80 percent of parity, 1.3 percent higher with price supported at 75 percent of parity, and 0.7 percent lower with price price supported at the full cost of production (COST4). Total returns over direct cost vary more. Compared to BASE results in 1981, returns are 35 percent higher at 80 percent of parity, 18 percent higher at 75 percent of parity, and 10 percent lower at the full cost of production.

The impact of the various support policies on consumers is illustrated in Tables 4 through 6 and Figures 4 through 6. As would be expected, experiments having higher prices have lower consumption. Compared to BASE results in 1981, fluid products consumption is 0.9 percent lower and manufactured products consumption is 4.7 percent lower with price supports at 80 percent of parity. When price supports are set at 75 percent of parity, consumption of fluid products is 0.5 percent lower and manufactured products consumption is 2.6 percent lower, than 1981 BASE results. Support prices equal to the full cost of production result in fluid products consumption that is 0.3 percent higher and manufactured products consumption is 1.5 percent higher than corresponding figures in the BASE experiment.

Figure 6 illustrates that retail prices increase somewhat faster than consumption, in all experiments. Fluid products consumption is fairly stable across all experiments and manufactured products consumption even declines with parity based supports; yet consumer expenditures increase over time in all experiments and are higher under experiments with higher prices.

The impact of the various support policies in the government sector is shown in Tables 7 and 8 and Figures 7 and 8. Impacts are measured in terms of two variables - net government expenditure and net government purchases as a percent of total raw milk produced (called percent net purchases, for brevity). Net government expenditure is the cost of new stocks purchased less the value of old stocks sold by the USDA; it is measured in dollars. The difference between the quantity of new stocks purchased and the quantity of old stocks sold is net government purchases; purchases are measured in pounds on a raw milk equivalent (M.E.) basis.

Both measures reveal distinct differences between the policies examined. Net expenditure expands rapidly under the parity based support policies. By 1981, net expenditure reaches $670 million when prices are set at 80 percent of parity and $364 million when prices are set at 75 percent of parity. Although less than actual expenditures in 1977, these expenditures are much greater than net expenditures in 1974 through 1976. Expenditures under the BASE experiment, designed to be low, are held to the low level achieved in 1976. At this level, expenditures would scarcely be noticed by those concerned with fiscal outlays. Net expenditures are even lower when prices are supported to the full cost of production. In fact, by 1980, government sales exceed purchases. The same overall picture is seen when looking at percent net purchase. By 1981, net purchases could be as high as 5.9 percent of total production with prices at 80 percent of parity, and are 4.0 percent of total milk production at 75 percent of parity.

In all the experiments discussed above, imports are held constant at their base year (1976) level. If imports are increased at a time when government support prices are an effective price floor, the USDA also supports world prices, to the extent that the support level is above the world price and import quotas are relaxed. The experiments using cost of production as a support price base (COST2 and COST4) used prices that were, for all but the first year or two, below prices likely to occur in the absence of supports. Under such a scenario, it would be feasible to relax import quotas without burdening the support program.

Given the prices and all the other assumptions in COST2 and COST4, three quota relaxation policies are explored. In the first group, imports are permitted to increase by 15 percent of the base year imports each year (COST2A and COST4A). This would mean that imports would double by 1981. In the second group, imports increase by 32 percent per year (COST2B and COST4B). Imports would quadruple by 1981. In the last group, 52 percent of the 1976 imports are added each year (COST2C and COST4C). At this rate, imports in 1981 would be 8 times their level in 1976.

It perhaps should be recalled that DAMPS treats imports as an exogenous variable. This means that it is assumed that the level of imports specified in the six experiments above is indeed the level that would be imported. As long as the quota effectively restricts imports, this is a reasonable assumption. It should be recognized, however, that at some point, the quota would no longer be effective and imports would not exceed that level, ceteris paribus. Experience and the amount of excess dairy supplies in foreign countries indicate that import levels in all of the above experiments are possible.

Results of the COST2A and COST2B experiments reveal that supporting prices to the full cost of production in 1977 and then guaranteeing to meet changes in the direct cost of production is still infeasible after 1979, even with increased imports at the levels used in COST2A and COST2B. Because only the level of imports varies across each experiment, the only difference between COST4 and COST4A through COST4C is the impact on the government sector. Table 9 and Figure 9 show net government expenditures among the feasible import experiments. Net government purchases as a percent of total milk production (percent net purchases) for those experiments are given in Table 10 and Figure 10.

With the COST2 prices, massive imports, relative to the base year, are required to satisfy consumption requirements. If a policy such as that represented by COST2C was adopted it would imply providing consumers with dairy products at a declining real cost, at a very low support cost to the USDA. It would also imply that the nominal returns to dairy farmers' fixed assets would stay constant at the level established at the start of the program, thus implying declining real returns. It is unlikely that a COST2 type policy would be politically viable, if imports were used to keep prices at the support level.

COST4 prices are more likely to be accepted politically than COST2 prices, and, as Figures 9 and 10 illustrate, they could have the added political appeal or permitting dairy imports to increase. Dairy quota relaxations could ease some pressures resulting from the current round of multilateral trade

negotiations. Based on COST4B results, government expenditures could be held to low or moderate levels even when imports are quadrupled by 1981. Net expenditures under COST4B are about double those under BASE, but they are still relatively low. With a policy such as that represented by COST4B, consumers could enjoy lower prices than with current programs, but producers could also enjoy increasing returns over direct cost, albeit not as high as returns under the current program. The government could enhance their position to bargain for important foreigh trade restriction concessions, while keeping support program costs at low levels. Opinions would undoubtedly vary, but COST4B could be interpreted as representing a bargain for consumers of dairy products, without requiring a great sacrifice by dairy farmers or great cost to the USDA.

Going the next step, to COST4C, would not alter conditions for either consumers or producers. The additional imports are simply absorbed by the USDA. It may be interesting to note that the results indicate that the cost of a program represented by COST4C to the USDA falls in between the cost of supporting prices at 75 and 80 percent of parity, with no change in import policy.

## Implications

First, it should be recalled that DAMPS is not designed to answer the question: What will prices be?; rather it answers the question: What would happen if prices are at a certain level? Accepting that the BASE experiment is a plausible equilibrium pricing scenario, it can be assumed that support prices set at 75 percent of parity or higher will be effective in supporting the price of milk above what the price of milk would be in the absence of supports. This might not be the case only in 1977. The BASE price in 1977 is about 81 percent of parity. Prices set at 75 percent of parity are still below the BASE price in 1978, but diverge fairly rapidly afterwards. In 1981, the BASE Grade B price is 69 percent of parity. Based on this it may be concluded that prices at 80 percent of parity may have been appropriate in the last two years, but could lead to large government expenditures if they are extended. Even at 75 percent of parity, expenditures could exceed acceptable levels.

The cost of production experiment offers even greater insights. As would be expected of a policy that increases prices rapidly to meet the full cost of production in 1977, expenditures begin at a higher level under this plan. However, by 1979 prices under COST4 are slightly lower than under BASE. The COST4 plan comes very close to approximating an equilibrium scenario, but, with USDA sales exceeding purchases by 1980, under the COST4 policy, it must be concluded the support prices based on full cost of production would not be effective for long. That is, the results indicate that it is likely that market prices would exceed a support price based on the full cost of production by 1980, given the assumptions in COST4.

If market prices are above the support price, it would be possible to relax import quotas on dairy products. Results of COST4B indicate that imports could be quadrupled by 1981 at a fairly low CCC cost, by historical standards. Unless such a large increase in imports was necessitated by foreign trade policy objectives, imports at half the COST4B level, as in COST4A, or slightly higher would

provide adequate supplies to consumers with virtually no government purchases of dairy products. This is not to say that such a policy is advocated. The results do indicate that if it was decided that a bargaining chip was needed for the multilateral trade negotiations and that relaxing dairy quotas contributed to the overall improvement of domestic economic conditions, then the support policy represented by COST4B would provide legislators with an opportunity to relax dairy quotas without causing large USDA expenditures on the support program and without leaving Congress with an indefensible support policy.

Whether or not imports could be increased, the difference between parity based supports and cost of production based supports should give policy makers plenty to think about. The key to the rather startling difference between parity based supports and supports based on the cost of production seems to lie in the growing divergence between parity prices and the cost of production. If parity continues to be used as a base for support prices, the evidence provided by this research strongly suggests that this divergence be investigated. It is possible that an alteration in the parity formula could reduce its declining relevance to dairy prices. Nevertheless, it also seems that cost of production should be further reviewed as a base for price supports.

One must, however, be careful not to interpret the results as giving a sure sign that the full cost of production can be supported with no exposure by the USDA. There are several ways that cost of production could be computed and tied to price supports. The particular methods chosen could make a significant difference. If the results reported here are indicative of what would happen with full cost supports, it seems that there is a high probability that farmers would protest against the method used to compute costs of production, when the full cost falls short of the market price.

Despite the necessary qualifications noted above, the results lead to the following conclusions. Prices supported at 80 percent of parity should be expected to lead to large government expenditures within five years. Supporting prices at 75 percent would cut those expenditures almost in half. Even at 75 percent of parity, the support price would diverge from prices likely to occur in the absence of supports or under a minimum support plan. It is possible that the full cost of production could be supported at no appreciable expense to the USDA. With supports based on the cost of production, it is possible that imports could be allowed to increase from two to three times their level in 1976 by 1981, without requiring any or much expense by the USDA.

Table 1. Manufacturing Grade Support Prices* at Five Experimental Levels

| | BASE | SUP75 | SUP80 | COST2 | COST4 |
|---|---|---|---|---|---|
| 1977 | | | | | |
| I | 8.90 | 8.55 | 8.74 | 8.78 | 8.88 |
| II | 8.90 | 8.55 | 8.74 | 8.81 | 8.91 |
| III | 8.90 | 8.55 | 8.74 | 8.85 | 8.95 |
| IV | 8.90 | 8.55 | 8.74 | 8.88 | 8.98 |
| 1978 | | | | | |
| I | 9.30 | 9.20 | 9.81 | 8.89 | 9.31 |
| II | 9.30 | 9.20 | 9.81 | 8.91 | 9.33 |
| III | 9.30 | 9.20 | 9.81 | 8.93 | 9.35 |
| IV | 9.30 | 9.20 | 9.81 | 8.94 | 9.36 |
| 1979 | | | | | |
| I | 9.77 | 9.95 | 10.61 | 8.96 | 9.62 |
| II | 9.77 | 9.95 | 10.61 | 8.99 | 9.65 |
| III | 9.77 | 9.95 | 10.61 | 9.01 | 9.67 |
| IV | 9.77 | 9.95 | 10.61 | 9.04 | 9.70 |
| 1980 | | | | | |
| I | 10.27 | 10.78 | 11.50 | 9.06 | 9.97 |
| II | 10.27 | 10.78 | 11.50 | 9.08 | 9.99 |
| III | 10.27 | 10.78 | 11.50 | 9.11 | 10.02 |
| IV | 10.27 | 10.78 | 11.50 | 9.13 | 10.04 |
| 1981 | | | | | |
| I | 10.80 | 11.67 | 12.45 | 9.15 | 10.30 |
| II | 10.80 | 11.67 | 12.45 | 9.17 | 10.32 |
| III | 10.80 | 11.67 | 12.45 | 9.19 | 10.34 |
| IV | 10.80 | 11.67 | 12.45 | 9.20 | 10.35 |

*Dollars per hundredweight

Table 2. Total Milk Production Under Alternate Price Support Policies, in million pounds

| | BASE | SUP75 | SUP80 | COST2 | COST4 |
|---|---|---|---|---|---|
| 1977 | 118,552 | 117,900 | 118,256 | 118,398 | 118,583 |
| 1978 | 119,327 | 118,996 | 120,159 | 118,611 | 119,418 |
| 1979 | 120,177 | 120,448 | 121,815 | 118,621 | 119,990 |
| 1980 | 121,045 | 121,972 | 123,396 | 118,641 | 120,546 |
| 1981 | 121,972 | 123,578 | 125,056 | 118,650 | 121,076 |

Table 3. Total Returns Over Direct Cost Under Alternate Price Support Policies, in Million Dollars

| | BASE | SUP75 | SUP80 | COST2 | COST4 |
|---|---|---|---|---|---|
| 1977 | 3675.1 | 3313.0 | 3500.4 | 3599.3 | 3699.8 |
| 1978 | 3985.5 | 3879.3 | 4530.0 | 3795.6 | 4024.4 |
| 1979 | 4386.5 | 4577.0 | 5286.8 | 1/ | 4271.6 |
| 1980 | 4696.5 | 5257.0 | 6046.4 | 1/ | 4412.0 |
| 1981 | 5269.2 | 6228.3 | 7115.7 | 1/ | 4758.3 |

1/ Infeasible solutions were obtained in COST2 after 1978.

Table 4. Consumption of Fluid Products Under Alternate Price Support Policies, in Million Pounds

| | BASE | SUP75 | SUP80 | COST2 | COST4 |
|---|---|---|---|---|---|
| 1977 | 42,709 | 42,799 | 42,750 | 42,731 | 42,706 |
| 1978 | 42,836 | 42,894 | 42,730 | 42,933 | 42,821 |
| 1979 | 43,023 | 42,991 | 42,787 | 43,242 | 43,046 |
| 1980 | 43,205 | 43,079 | 42,871 | 43,542 | 43,273 |
| 1981 | 43,391 | 43,170 | 42,959 | 43,850 | 43,513 |

Table 5. Consumption of Manufactured Products Under Alternate Price Support Policies, in Million Pounds*

| | BASE | SUP75 | SUP80 | COST2 | COST4 |
|---|---|---|---|---|---|
| 1977 | 78,181 | 79,330 | 78,699 | 78,407 | 78,086 |
| 1978 | 78,936 | 79,240 | 77,438 | 80,128 | 78,821 |
| 1979 | 79,554 | 79,046 | 77,277 | 81,865 | 79,870 |
| 1980 | 80,171 | 78,844 | 77,100 | 83,568 | 80,895 |
| 1981 | 80,795 | 78,710 | 76,998 | 85,314 | 82,019 |

* In whole milk equivalent

Table 6. Consumer Expenditures on All Dairy Products Under Alternate Price Support Policies, in Million Dollars

| | BASE | SUP75 | SUP80 | COST2 | COST4 |
|---|---|---|---|---|---|
| 1977 | 22,186 | 21,799 | 22,010 | 22,111 | 22,221 |
| 1978 | 23,233 | 23,129 | 23,811 | 22,800 | 23,274 |
| 1979 | 24,411 | 24,623 | 25,365 | 1/ | 24,283 |
| 1980 | 25,667 | 26,266 | 27,093 | 1/ | 25,353 |
| 1981 | 26,992 | 28,033 | 28,947 | 1/ | 26,420 |

1/ Infeasible solutions were obtained in COST2 after 1978.

Table 7. Net Government Expenditures Under Alternate Price Support Policies, in Million Dollars

| | BASE | SUP75 | SUP80 | COST4 |
|---|---|---|---|---|
| 1977 | 98.3 | -20.2 | 43.6 | 107.1 |
| 1978 | 55.4 | 14.5 | 228.5 | 69.2 |
| 1979 | 51.8 | 110.8 | 356.8 | 15.1 |
| 1980 | 49.0 | 228.1 | 503.4 | -41.6 |
| 1981 | 49.7 | 364.1 | 670.5 | -111.7 |

Table 8. Net Government Purchases as a Percent of Total Production Under Alternate Price Support Policies

| | BASE | SUP75 | SUP80 | COST4 |
|---|---|---|---|---|
| 1977 | 1.0 | - .2 | .5 | 1.1 |
| 1978 | 1.0 | .4 | 2.6 | 1.2 |
| 1979 | 1.0 | 1.7 | 3.7 | 0.4 |
| 1980 | 1.0 | 2.9 | 4.8 | -0.4 |
| 1981 | 1.0 | 4.0 | 5.9 | -1.4 |

Table 9. Net Government Expenditures With Support Prices Based on Cost of Production and Increasing Imports, in Million Dollars

| | COST4 | COST4A | COST4B | COST4C | COST2C |
|---|---|---|---|---|---|
| 1977 | 107.1 | 119.0 | 132.4 | 148.2 | 113.5 |
| 1978 | 69.2 | 93.4 | 125.2 | 168.8 | 22.6 |
| 1979 | 15.1 | 54.1 | 113.4 | 207.0 | -27.5 |
| 1980 | -41.6 | 15.3 | 115.0 | 296.3 | -32.1 |
| 1981 | -111.7 | -33.4 | 124.4 | 467.7 | 31.7 |

Table 10. Net Government Purchases as a Percent of Total Milk Production with Support Prices Based on Cost of Production and Increasing Imports

| | COST4 | COST4A | COST4B | COST4C | COST2C |
|---|---|---|---|---|---|
| 1977 | 1.1 | 1.2 | 1.3 | 1.3 | 1.1 |
| 1978 | 1.2 | 1.4 | 1.6 | 2.0 | 0.5 |
| 1979 | .4 | 1.0 | 1.7 | 2.4 | -0.4 |
| 1980 | -.4 | .4 | 1.8 | 3.3 | -0.4 |
| 1981 | -1.4 | -0.2 | 2.1 | 4.7 | 0.6 |

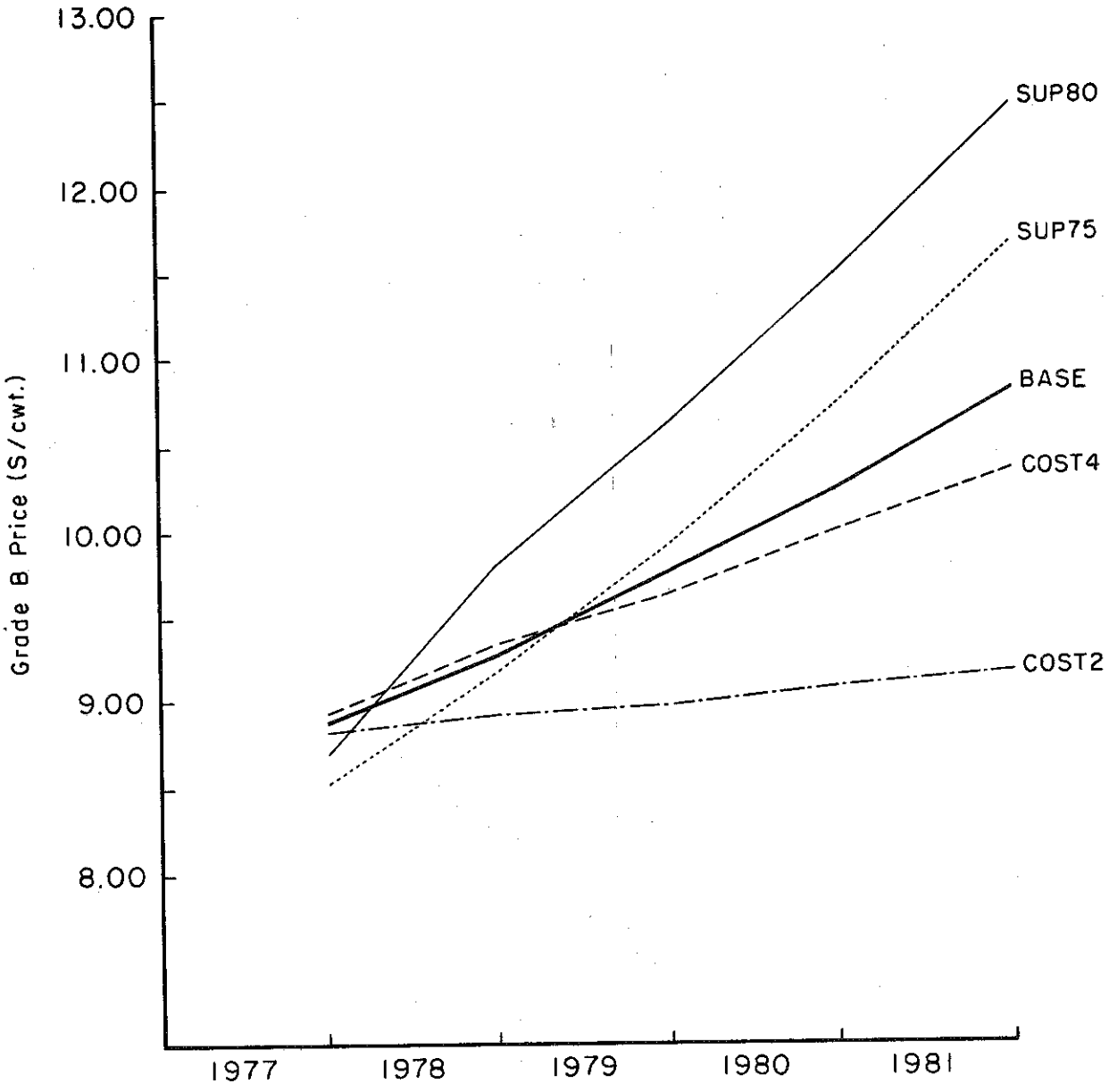


FIGURE 1. MANUFACTURING GRADE SUPPORT PRICES AT FIVE EXPERIMENTAL LEVELS

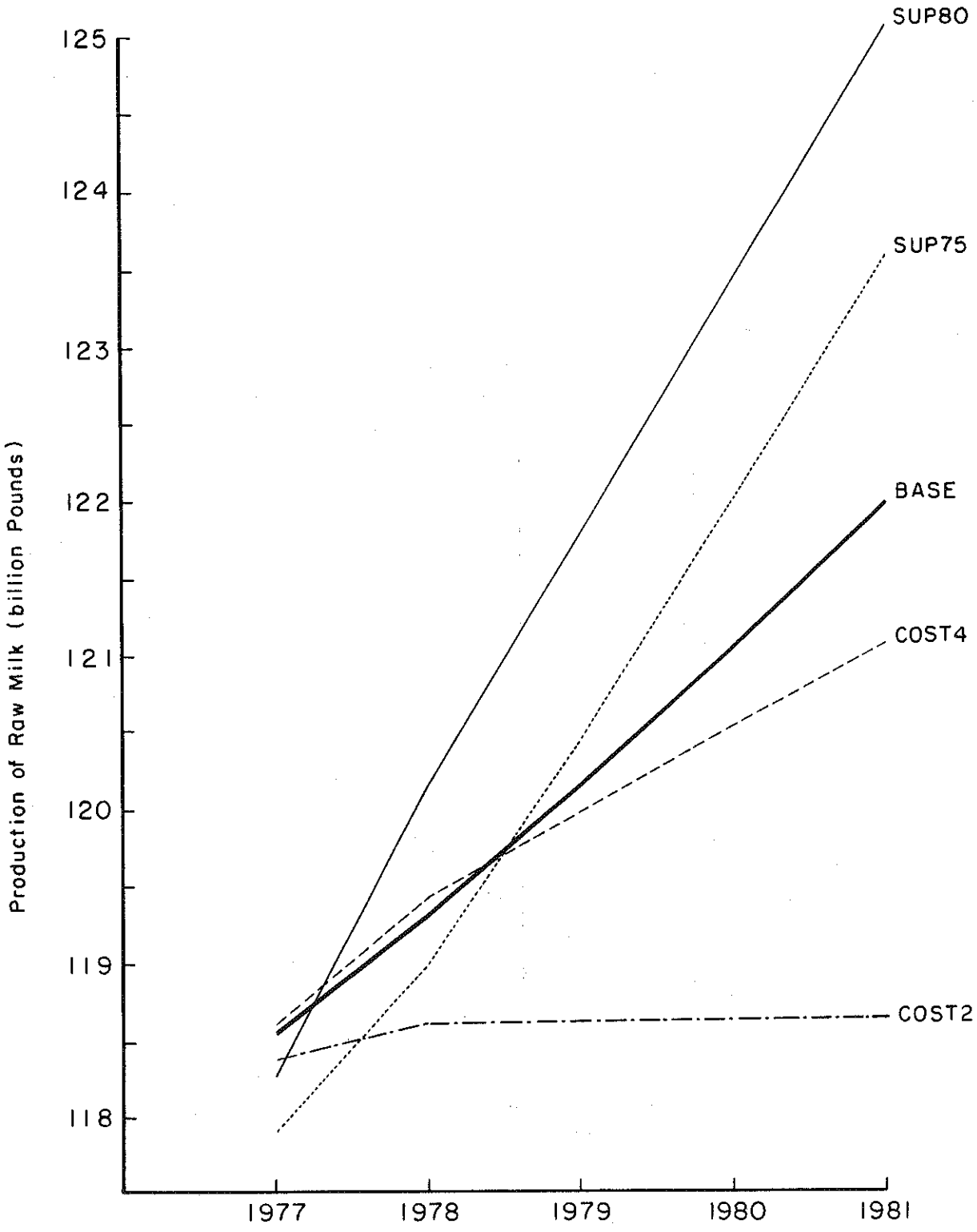


FIGURE 2. TOTAL MILK PRODUCTION UNDER ALTERNATE PRICE SUPPORT POLICIES, IN BILLION POUNDS

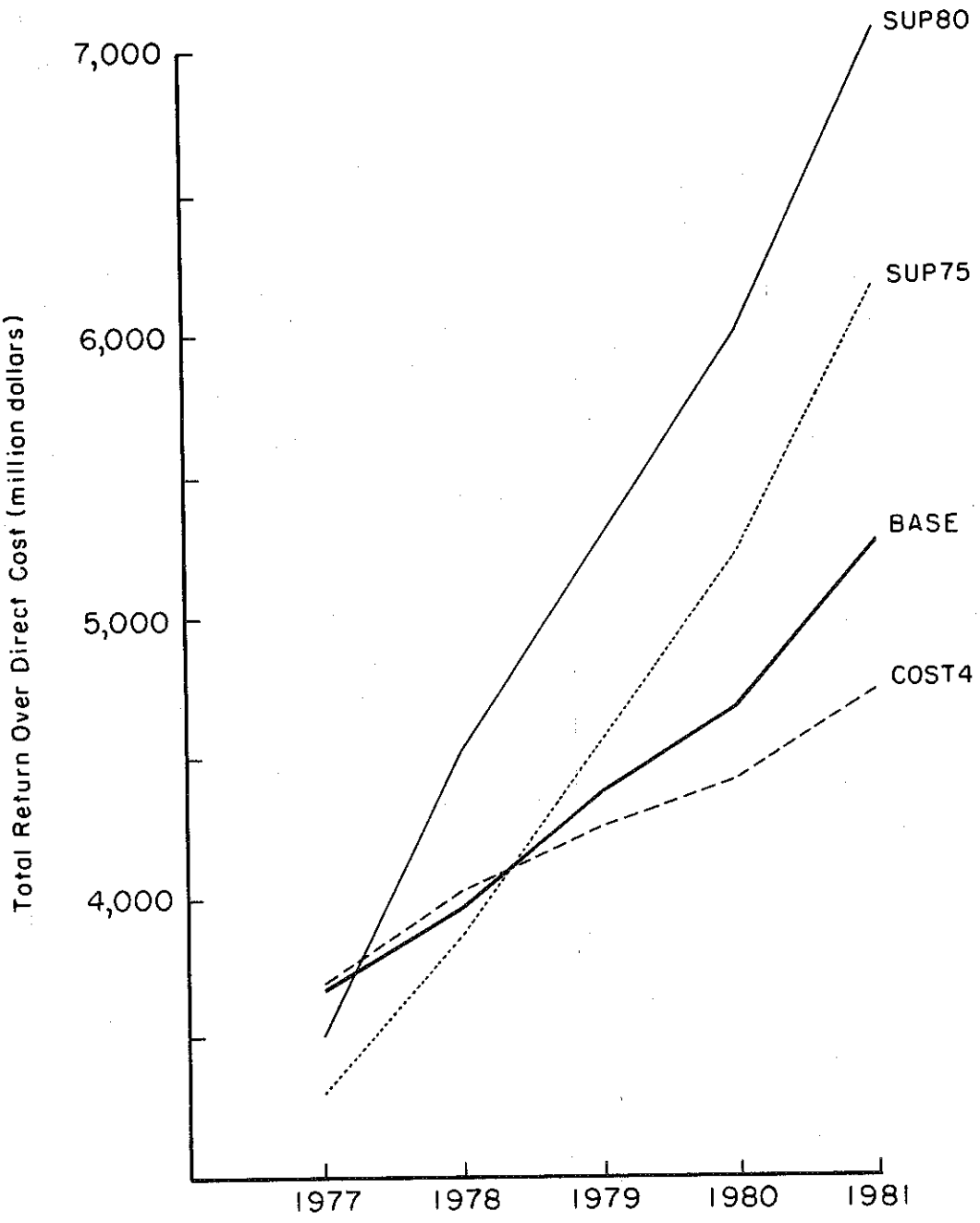


FIGURE 3. TOTAL RETURNS OVER DIRECT COST UNDER ALTERNATE PRICE SUPPORT POLICIES, IN MILLION DOLLARS

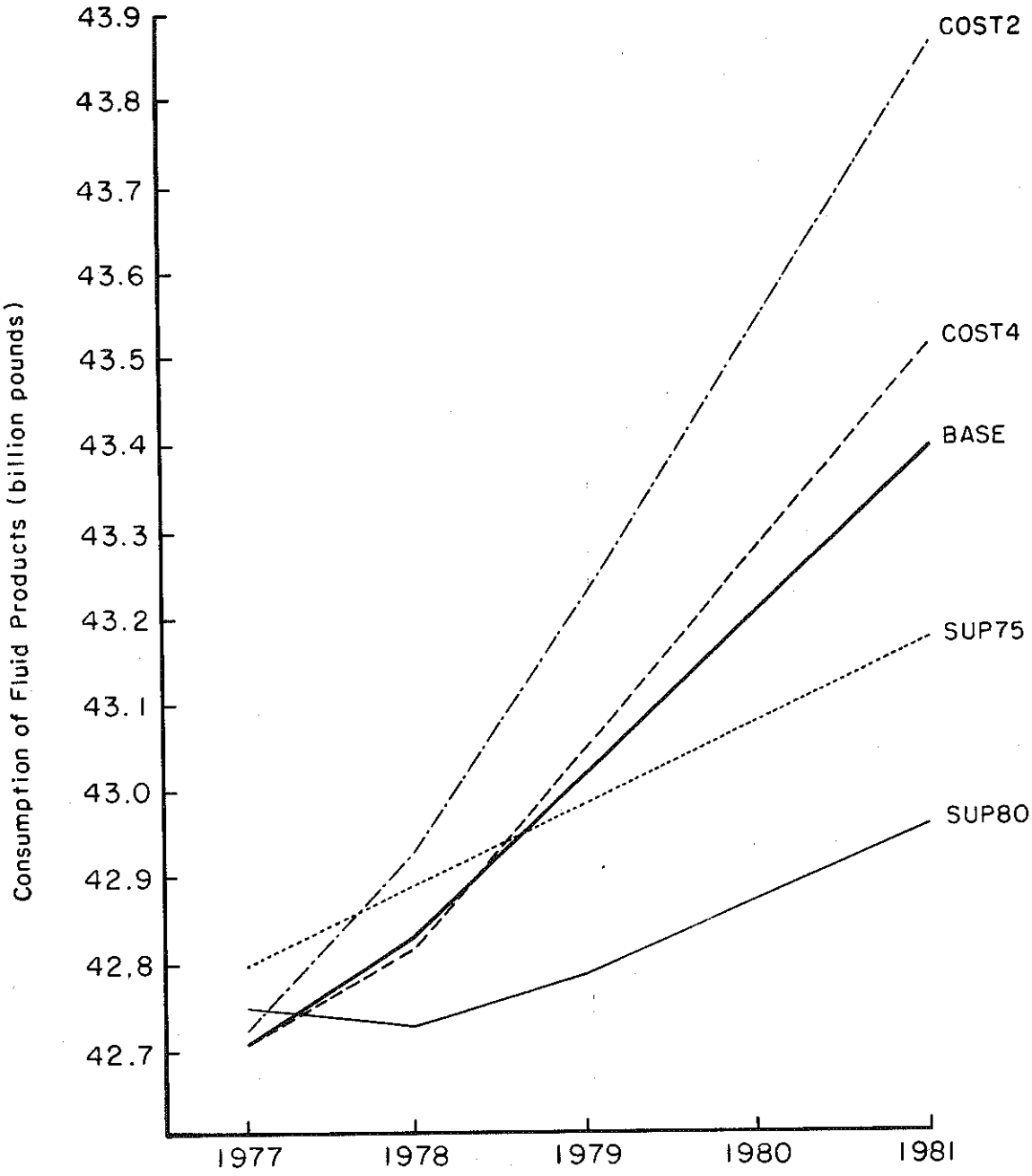


FIGURE 4. CONSUMPTION OF FLUID PRODUCTS UNDER ALTERNATE PRICE SUPPORT POLICIES, IN BILLION POUNDS

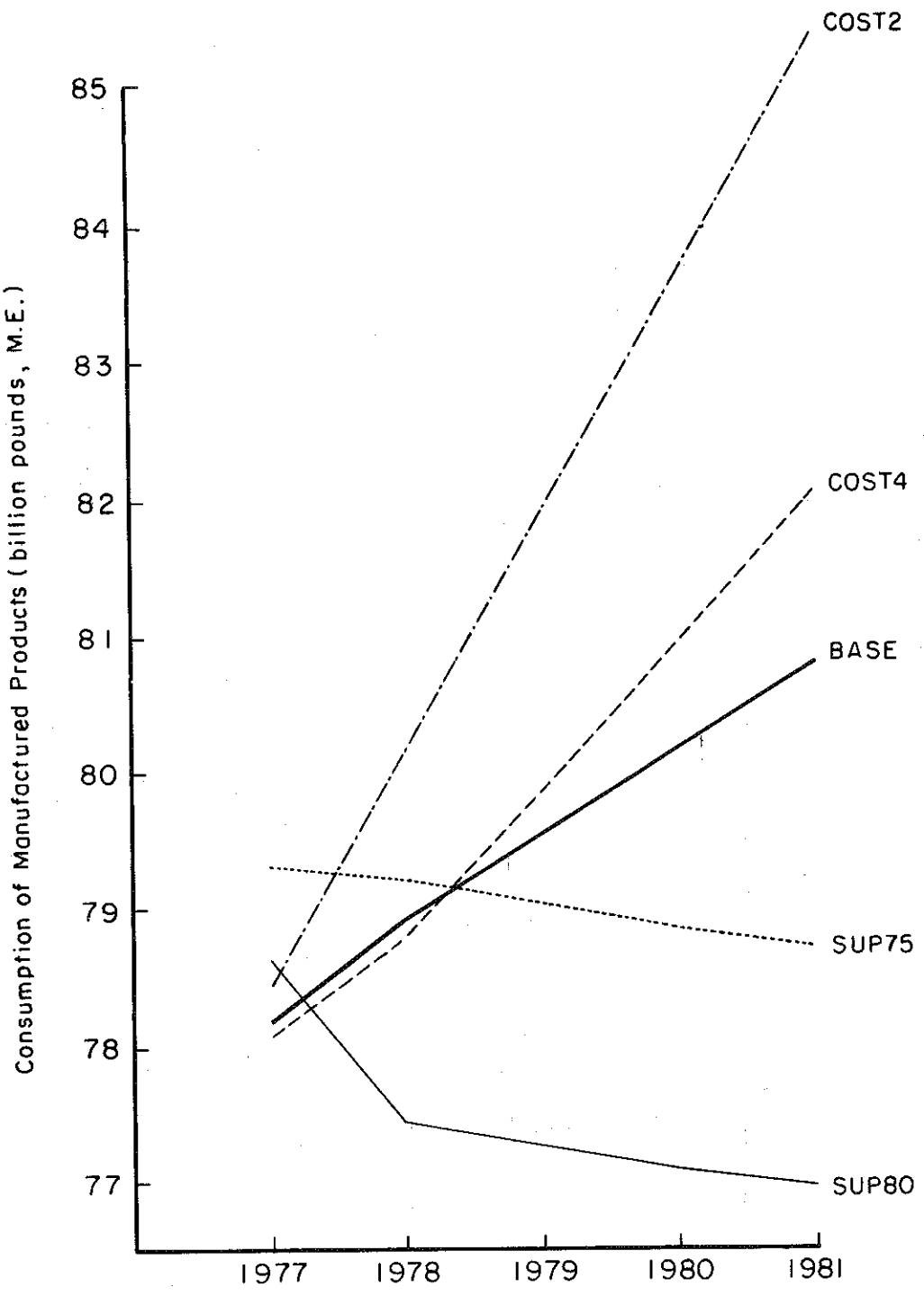


FIGURE 5. CONSUMPTION OF MANUFACTURED PRODUCTS UNDER ALTERNATE PRICE SUPPORT POLICIES, IN BILLION POUNDS

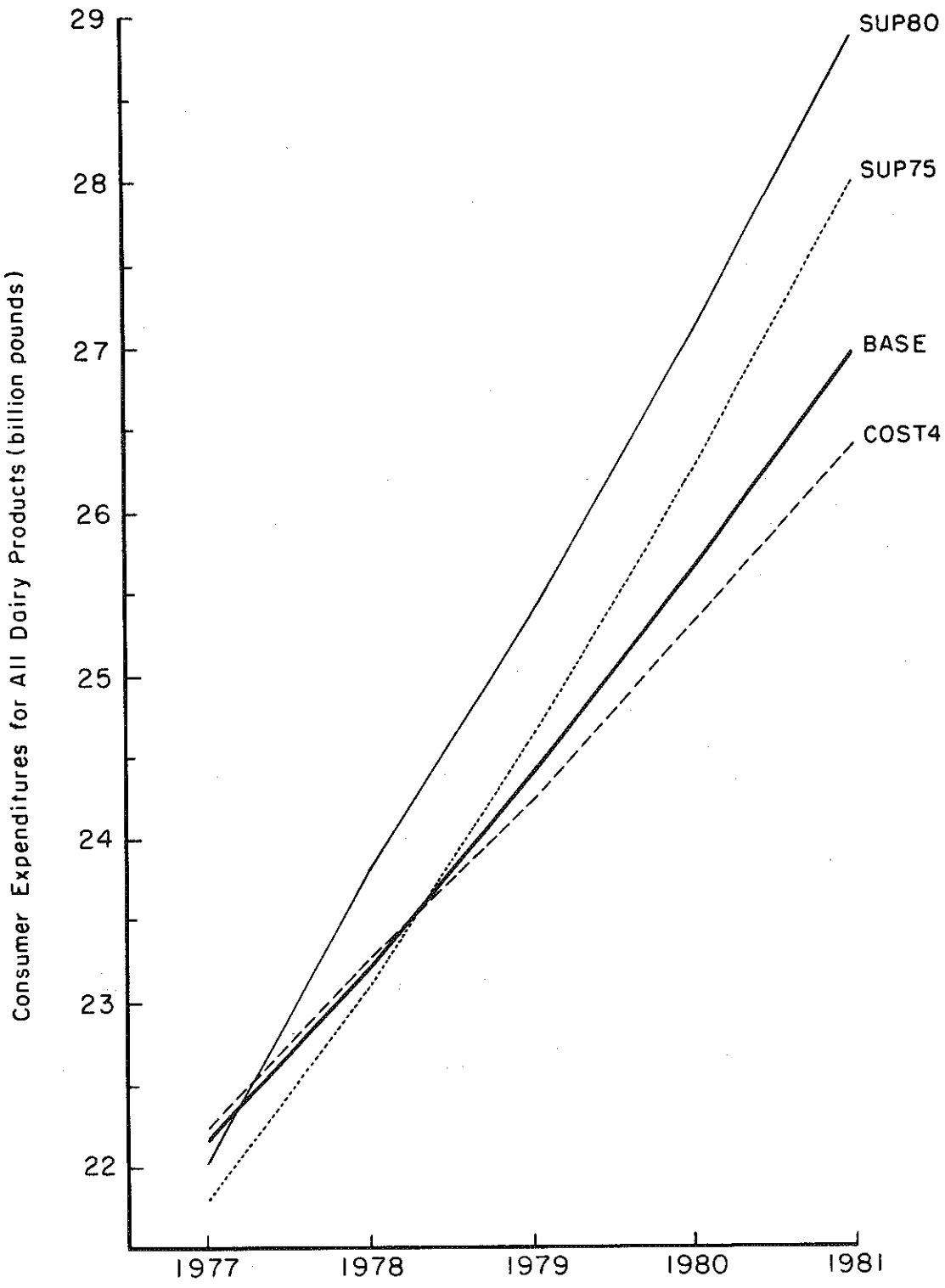


FIGURE 6. CONSUMER EXPENDITURES ON ALL DAIRY PRODUCTS UNDER ALTERNATE PRICE SUPPORT POLICIES, IN BILLION DOLLARS

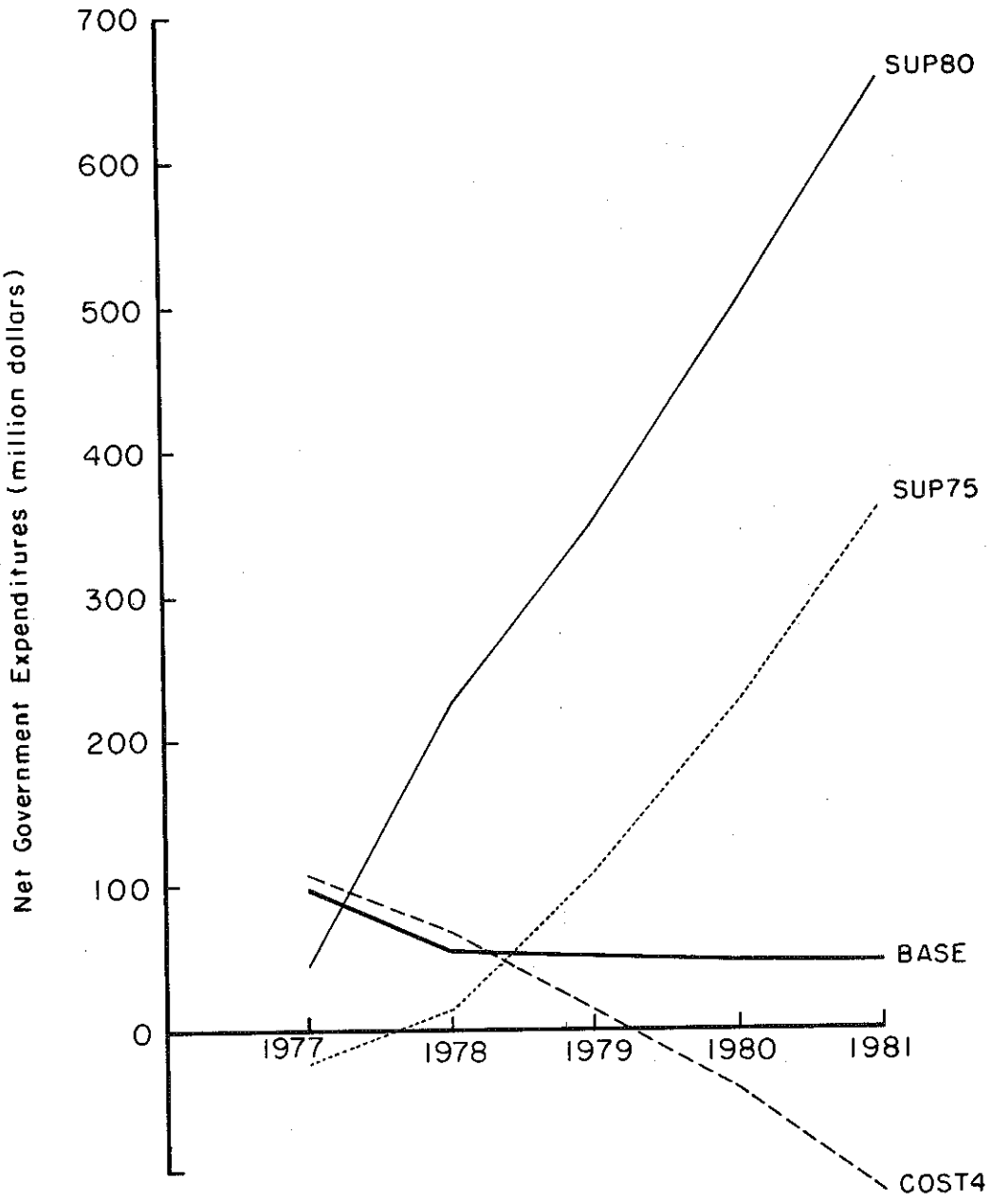


FIGURE 7. NET GOVERNMENT EXPENDITURES UNDER ALTERNATE PRICE SUPPORT POLICIES, IN MILLION DOLLARS

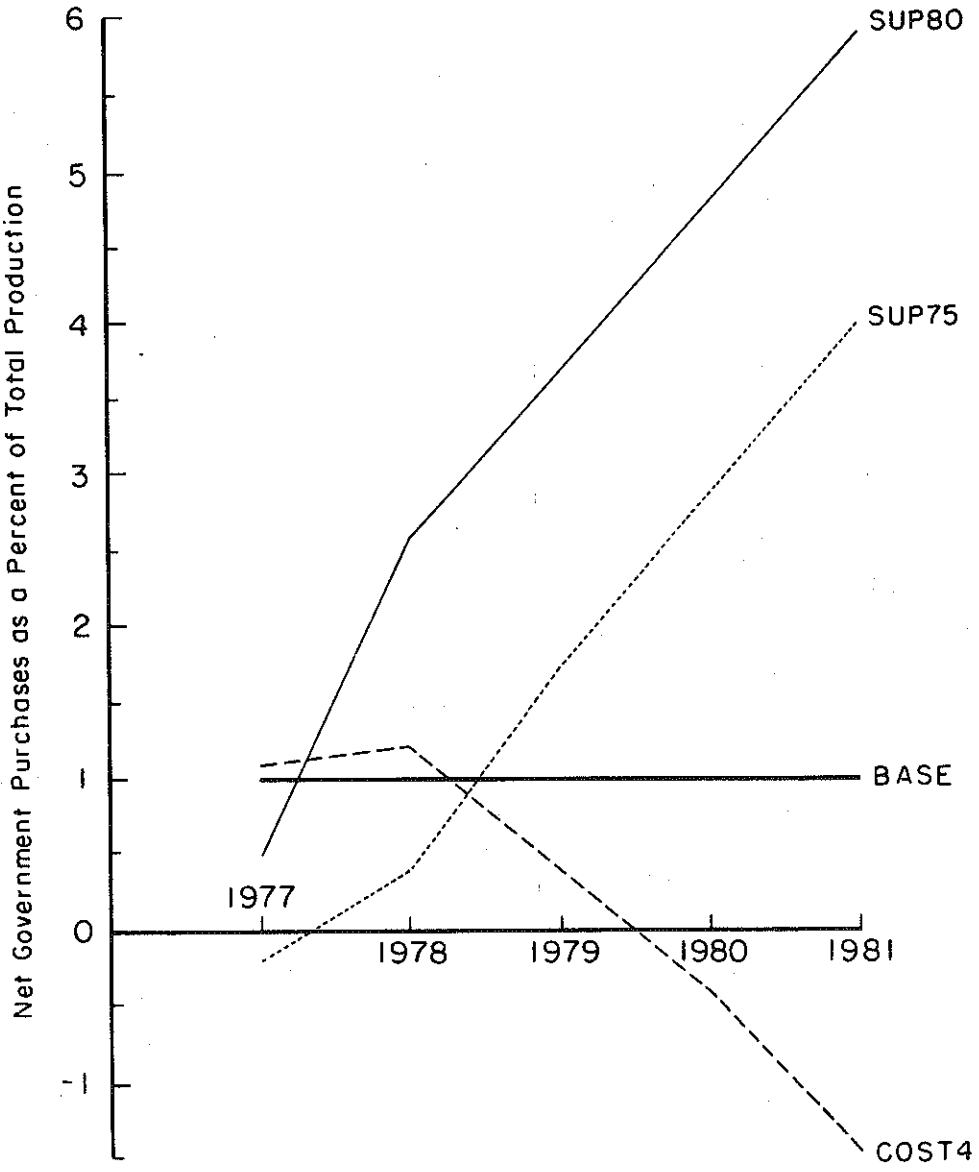


FIGURE 8. NET GOVERNMENT PURCHASES AS A PERCENT OF TOTAL PRODUCTION UNDER ALTERNATE PRICE SUPPORT POLICIES

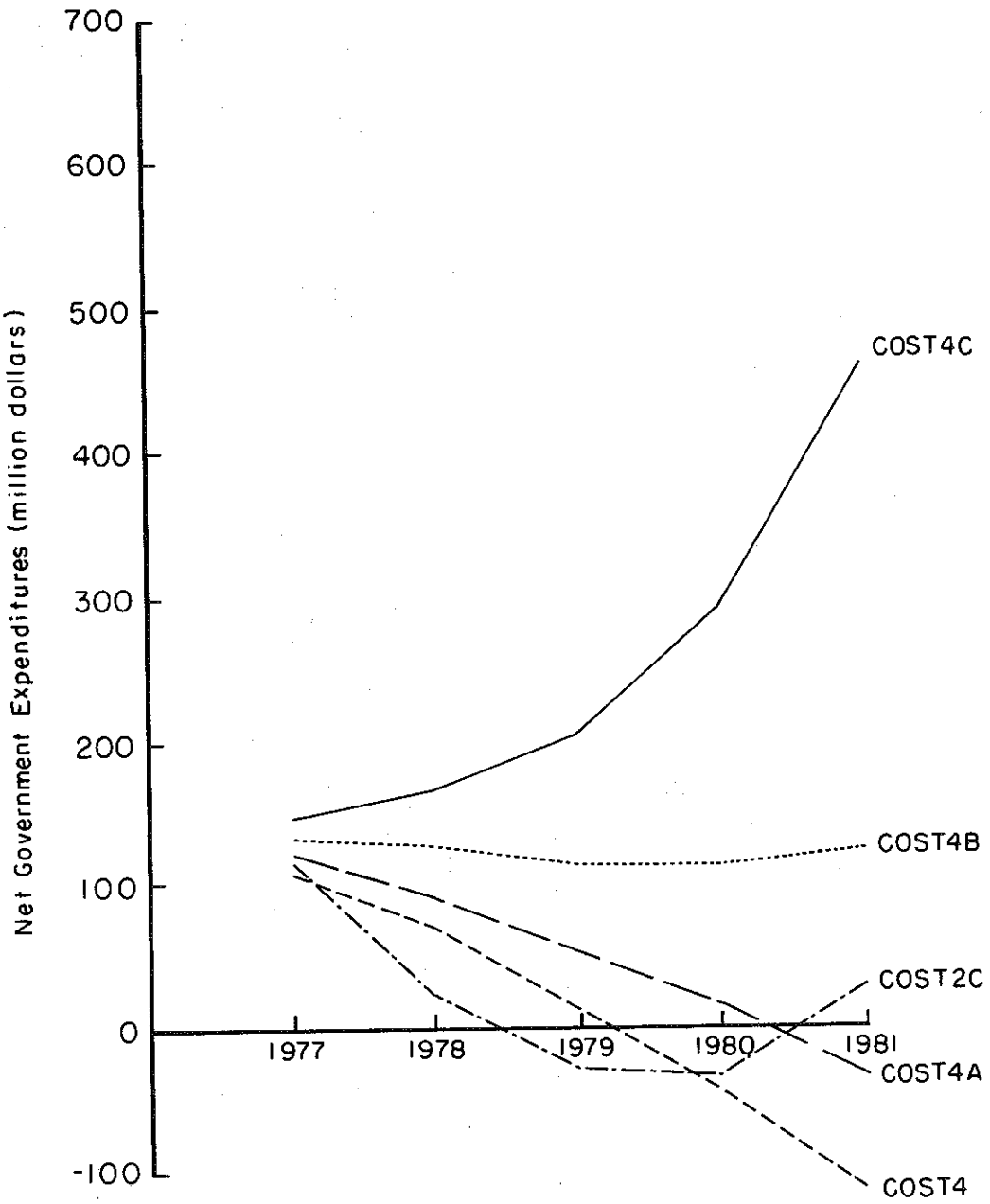


FIGURE 9. NET GOVERNMENT EXPENDITURES WITH SUPPORT PRICES BASED ON COST OF PRODUCTION AND INCREASING IMPORTS, IN MILLION DOLLARS

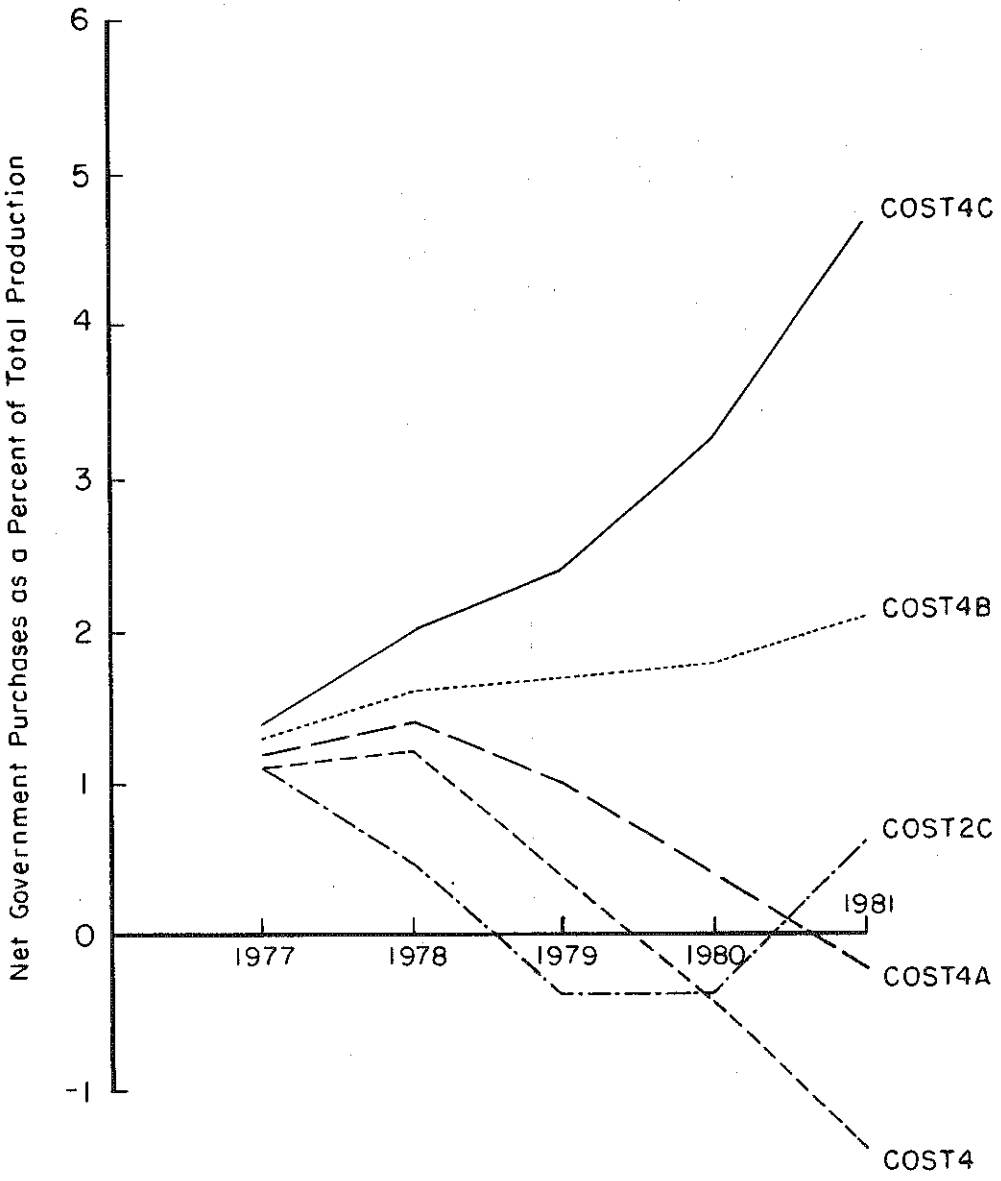


FIGURE 10. NET GOVERNMENT PURCHASES AS A PERCENT OF TOTAL MILK PRODUCTION WITH SUPPORT PRICES BASED ON COST OF PRODUCTION AND INCREASING IMPORTS

## References

1. E. M. Babb, D. E. Banker, O. Goldman, D. R. Martella, and J. E. Pratt, Economic Model of Federal Milk Marketing Policy Simulator - Model A, Station Bulletin No. 158, Agricultural Experiment Station, Purdue University, April 1977.

2. David E. Banker, A Model for the Analysis of Alternative Pricing Policies in Federal Milk Marketing Orders, unpublished Ph.D. thesis, Purdue University, August, 1977.

3. Andrew M. Novakovic, An Economic Analysis of the U. S. Dairy Price Support Program and Alternate Policies, unpublished Ph.D. thesis, Purdue University, May, 1979.