ARE 120 Spring 2015
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Lecture 10
U.S. AND CALIFORNIA DAIRY POLICY

Housekeeping:

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Useful reading:

Balagtas, J.V. "Milking Consumers and Taxpayers: The Folly of U.S. Dairy Policy." American Enterprise Institute Project, *American Boondoggle: Fixing the 2012 Farm Bill*, 2011. Available at http://www.aei.org/files/2011/07/15/Final-Balagtas.pdf

Balagtas, J.V, D.A. Sumner, and J.Yu. "Changes are Coming to U.S. Dairy Policy." *ARE Update* 16,6 (2013): 4–8. http://giannini.ucop.edu/media/are-update/files/articles/V16N6_2.pdf

Lee, H. and D.A. Sumner. "The 2014 Farm Bill, Commodity Subsidies, and California Update." *ARE Update* 17,4 (2014): 1–4. http://giannini.ucop.edu/media/are-update/files/articles/V17N4_1.pdf

Sumner, D.A. and J.V. Balagtas. "Dairy Policy in the United States: Governments Struggle to Keep up with Markets." Woodrow Wilson Center working paper 2014.

Sumner, Balagtas, and Yu "U.S. Dairy Subsidies Remain Convoluted and Costly," AEI manuscript, Nay 2015.

10.1 Overview of Price Discrimination and Pooling

The idea behind price discrimination is to charge a higher price on a market with relatively inelastic demand in order to raise average revenue.

Revenue pooling is a way of implementing a price discrimination scheme.

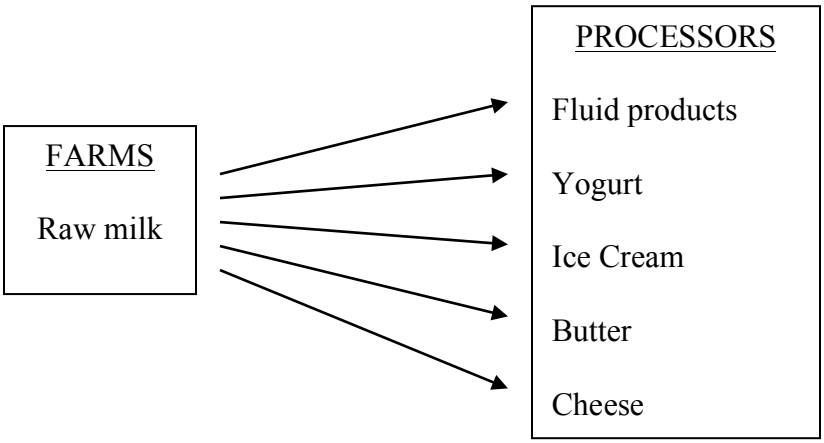
Price discrimination is used in many agricultural markets around the world. Milk pricing regulations in the U.S. and California is an example. Similar policies have been used in Canadian and Australian wheat, and U.S. peanuts.

We illustrate price discrimination using dairy policy in the U.S. and California.

10.2 Dairy Policy Background

Milk marketing

- Raw milk produced on farms is purchased by processors and manufacturers to make various dairy products.

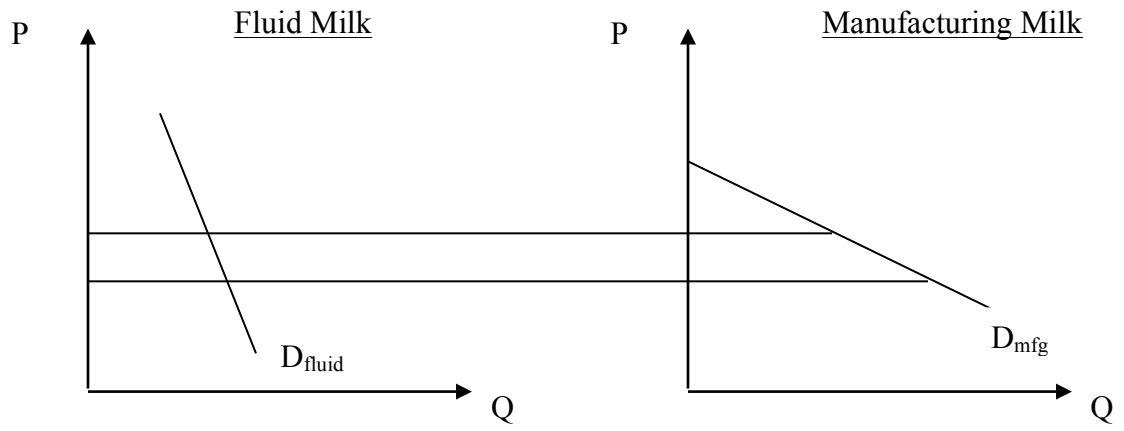


- Processors use a homogeneous commodity, milk, to make several different products, each of which has different demand characteristics.

- Demand for fluid products, and for milk used in these products, is inelastic.

- Demand for manufactured dairy products, and for milk used in these products, is relatively elastic.

A review of demand elasticity



For a given change in price, there is a relatively small change in quantity demanded of the relatively inelastic good, and a relatively large change in the quantity demanded of the relatively elastic good.

History of dairy policy in the U.S.

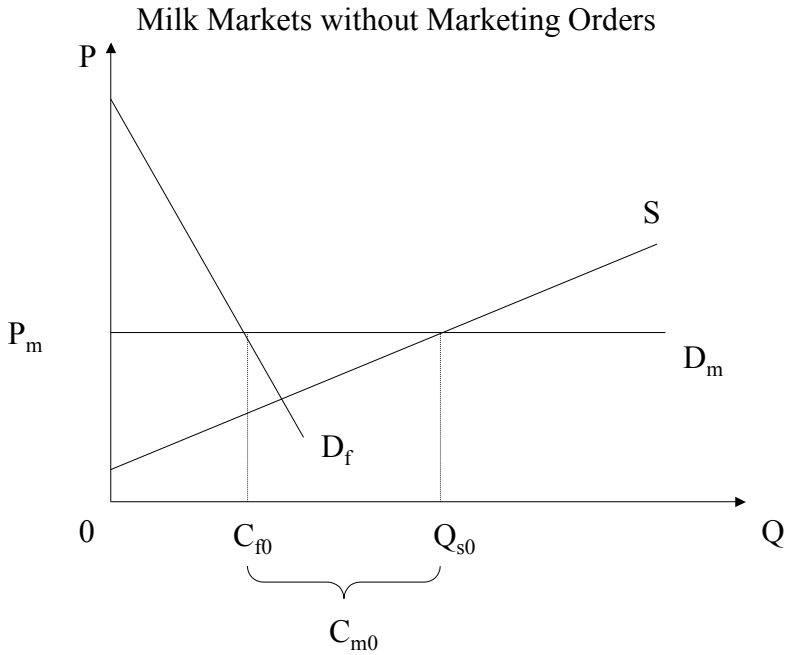
- Little government intervention in the dairy industry through the early 20th Century
- Low farm prices starting in 1929 induced State and federal governments to intervene to help raise farm prices and revenues
- Resulting dairy policy in the U.S. is multi-faceted, the main components being:
    i. farm-level price support (government purchases)
    ii. import tariffs and export subsidies
    iii. milk marketing orders

Milk marketing orders use price discrimination and pooling to raise producer revenues.

10.3 Milk Markets with No Policy

The simplest case has two markets, one of which has a perfectly elastic demand. This could be a homogeneous product with (a) downward-sloping domestic demand, perfectly elastic export demand; or (b) two end-uses (e.g., fluid milk versus manufacturing milk; fresh versus processing uses of fruits), for which one demand is perfectly elastic.

D_f = Demand for milk used in fluid products
D_m = Perfectly elastic demand for milk used in manufactured products
S = Supply of milk



With no policy, there is no distinction between the fluid and manufacturing markets for milk. In the no policy equilibrium, we have a single price, P_m, for all milk.

At this price, quantity C_{f0} is consumed on the fluid market, Q_{s0} is produced, and $C_{m0} = (Q_{s0} - C_{f0})$ is consumed on the manufacturing market.

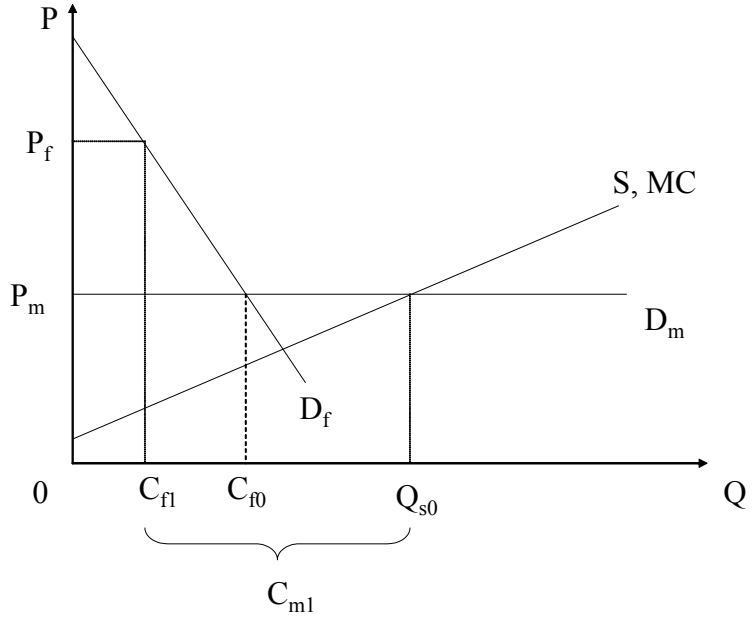
Farm revenue is P_m x Q_{s0}.
Producer surplus is the triangle below P_m and above S (MC).
Consumer surplus is the triangle to the left of D_f and above P_m.

10.4 CA Dairy Policy, 1935–1967

California passes the Young Act (1935), which sets minimum prices that processors can pay for milk. The policy price discriminates against the fluid market: $P_f > P_m$.

This is also called "classified pricing", where different prices are set for different classes (fluid class and manufacturing class) of milk.

Milk Markets with Classified Pricing and No Pooling



By raising the price of fluid milk to P_f , classified pricing lowers consumption on the fluid market to C_{f1}. The marginal producer price is the same at P_m, so total production is still Q_{s0}, and consumption on the manufacturing market increases to C_{m1}.

How can price discrimination be implemented? One possibility is to issue a marketing quota for fluid milk set at Q_{f1}. But California regulators didn't do this, in part because a quota would benefit relatively few producers/quota owners. Instead, they made it law that no fluid processor can pay less than P_f.

Policy-makers hoped to establish equilibrium (P_f, C_{f1}, P_m, Q_{s0}), and create rents ($P_f - P_m$) x C_{f1}. The policy does create these rents, but it does not have a mechanism to assign the rents to anybody. So who benefits from this policy?

- Producers have an incentive to compete for fluid contracts; there's anecdotal evidence that producers paid kickbacks to fluid processors, effectively bidding the price of fluid milk below P_f.

- But if processors are willing to pay P_f, and the price is anything less, then you'd expect competition among processors to bid up the price of milk.

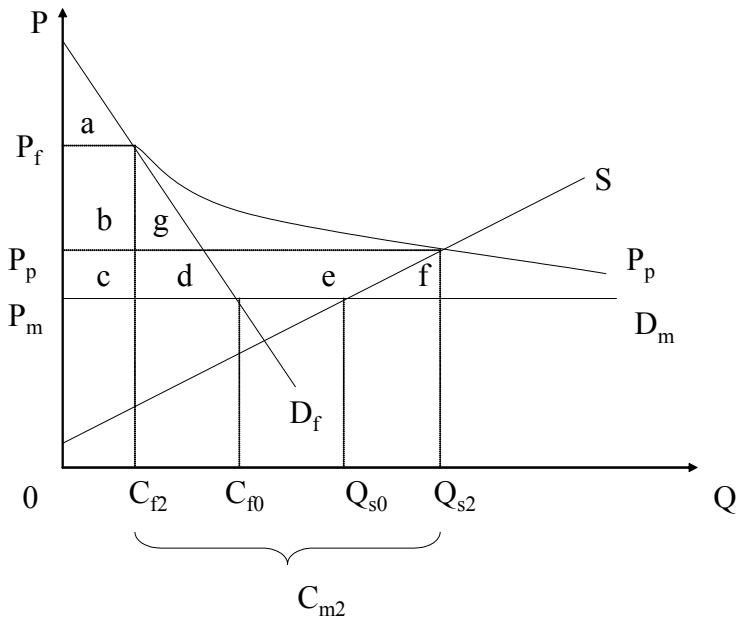
So who benefited from the policy? The answer is not clear. There's room for an interesting research project here.

The next sections discuss how the federal and California marketing orders solve this problem of distributing rents from classified pricing.

10.5 Federal Dairy Policy, 1937–Present (Price Discrimination, Revenue Pooling)

The federal government initiated a similar program with the passing of the Agricultural Marketing Adjustment Act (1937). In addition to the classified pricing mechanism, Federal Milk Marketing Orders employ a producer price equalization scheme, called "pooling", whereby revenue from both markets is pooled, and every producer is given the same price for every unit of output.

Milk Markets with Classified Pricing and Pooling



In this picture P_p is the pooled price line which shows, for any quantity produced (q), the average revenue obtained by selling C_{f2} at price P_f, and the rest $(q - C_{f2})$ at price P_m.

Total revenue: $TR = P_f C_{f2} + P_m(q - C_{f2})$

Producer price (average revenue): $P_p = P_f(C_{f2}/q) + P_m(q - C_{f2})/q.$

$= P_f\theta + P_m(1-\theta)$

$= P_m + (P_f - P_m)\theta > P_m.$

where $\theta = C_{f2}/q$, the share of all milk sold on the fluid market.

Since $P_p > P_m$, the marketing order raises the price received by producers relative to no policy. Equilibrium is found where $P_p = MC$, therefore milk production increases from Q_{s0} to Q_{s1}.

Classified pricing generates additional revenues $C_{f2}(P_f - P_m) = (b + c)$. Under revenue pooling, these revenues are distributed over all production: $(b + c) = (c + d + e + f)$.

Welfare geometry:

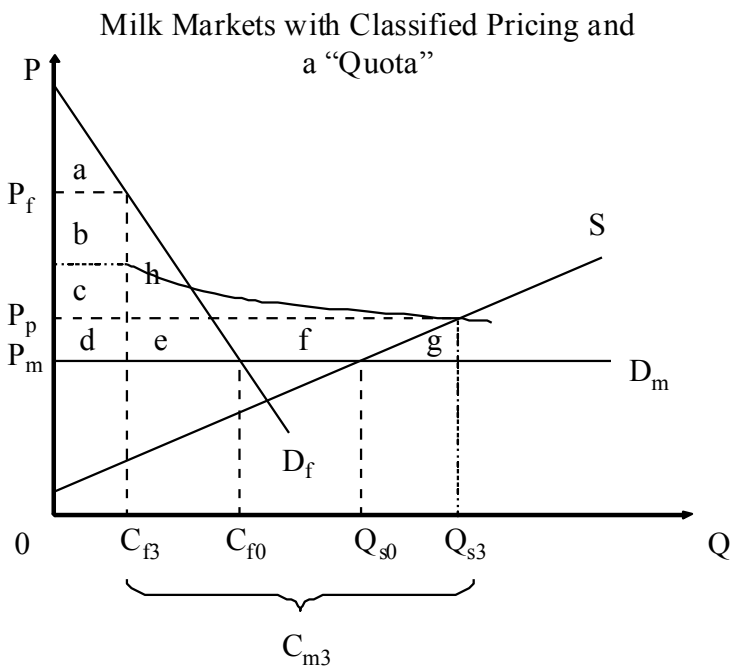
Change in fluid consumer surplus:	– (b + c + d + g)
Change in producer surplus:	(c + d + e)
Net Welfare Effect:	e – (b + g) = – (d + g + f) since b = (d + e + f)

What is the cost to tax-payers? Zero. This policy generates a transfer from fluid market consumers to producers.

Note that classified pricing sets the price in the fluid market at P_f, thus reducing consumption to C_{f1}. We can achieve this same effect by limiting the sale of milk on the fluid market via a marketing quota at C_{f1}, thus raising the price in that market to P_f. In this case, you don't need pooling to distribute the additional revenues to producers. The rents go to owners of the marketing quota, since they have the right to sell on the fluid market.

10.6 CA Dairy Policy, 1967–Present (Price Discrimination plus "Quota")

In 1967, California adopted a different producer price equalization scheme. The State passed out a "quota" to those producers with fluid contracts. Each unit of quota gives its owner a claim to a share of the rents generated by the price discrimination scheme. Note that, unlike the other types of quota covered in this class, this quota does not limit supply, but assigns rights to a portion of the additional revenue created by price discrimination.



Like the federal policy and the pre-1967 quota policy, this policy creates rents on the fluid market with price discrimination. In the above figure, rents are equal to $(P_f - P_m)C_{f3}$, or area (b + c + d).

Quota owners have rights to a portion of these rents. Currently, quota is worth $1.70 per 100 pounds of milk; recently around 4% of total revenue. What's left of the rents are pooled across all milk production. Graphically, area (b) is given to quota owners. Area (c + d) is pooled across all milk production, so (c + d) = (d + e + f + g).

Welfare geometry:

Change in fluid consumer surplus:	– (b + c + d + e + h)
Change in producer surplus:	(d + e + f)
Quota owners	(b)
Net Welfare Effect:	f – (c + h) = – (e + g + h) since c = e + f + g.

Like the federal program, this policy has no cost to taxpayers. The transfer is from fluid market consumers to producers and quota owners. Notice, the transfer to quota owners is a lump-sum payment with no direct supply effect. However, that portion of rents that is pooled raises the producer's price of milk and does induce increased milk supply.

Some current interest in joining the federal milk marketing order

10.7 Main Lessons

We introduced two concepts:

- *Price discrimination (classified pricing)*. Milk marketing orders use classified pricing to raise total producer revenue. They do so by setting a relatively high price on the relatively inelastic market, the fluid market. However, price discrimination only works if it is implemented with a mechanism to allocate the rents. Examples are a marketing quota (which have not been used in dairy), revenue pooling, and the California milk quota.

- *Producer price equalization (pooling)*. Producer price equalization schemes allocate rents generated by classified pricing to producers. Federal milk marketing orders use a simple pooling mechanism, which distributes rents over all production.

(Note, we did not discuss (a) import barriers, (b) price supports, and (c) export subsidies that at times have raised the domestic prices for butter and cheese and skim milk powder, and thus the price of manufacturing milk. Nor AUSFTA.)

10.8 Milk Marketing Orders and Milk Grading

To reduce risk of food-borne illness from dairy products, milk sanitation regulations, or milk grading, enforce standards of cleanliness for dairy producers. The strictest standards are set for milk that can be sold on the fluid market (Grade A milk), while lower standards exist for milk that can be used only in manufactured dairy products (Grade B

milk). As you might expect, the cost of producing Grade A milk is higher than the cost of producing Grade B milk.

So far, we've assumed that all producers potentially gain from marketing orders, either by owning quota in California, or through revenue pooling. In fact, only Grade A producers can own quota or to pool milk on marketing orders. Grade A producers benefit from marketing orders and Grade B producers do not. But, Grade A producers do not need to sell milk on the fluid market to benefit from the marketing order.

As a result, producers selling to the manufacturing market have an incentive to incur the additional cost of meeting Grade A standards in order to participate in the marketing order. Currently, about 97 percent of all U.S. milk is Grade A, but only about one-third of that is used in fluid products. So we produce fluid-grade milk for manufacturing.

Suppose marketing orders raise the price of Grade A milk by 20 cents relative to the price of Grade B milk. How much are producers willing to pay (in the form of additional production costs to meet stricter Grade A standards) to get that extra 20 cents? So the policy creates rents for producers, but those rents – or at least a portion of them – get turned into costs.

10.9 Provisions of the 2002 Farm Bill

The Milk Income Loss Contract (MILC) payment program that was initiated in 2002 pays farmers when the price of milk falls below a trigger level – i.e., a deficiency payments program.

The payment is available to all commercial dairy farmers, but only on the first 3 million pounds of milk production (currently) for any given farm each year (equivalent to production from 150 cows).

The government offsets 45 percent of the shortfall in a specific trigger price. The MILC payment rate per hundredweight in any month is equal to

$$0.45(\$16.94 - \text{Boston Class 1 minimum wholesale fluid milk price}),$$

if the Boston Class minimum wholesale fluid milk price is less than $16.94; otherwise the MILC payment is zero.

MILC payments were triggered in 57 of the 109 months between 12/2001 and 12/2010, with an average payment of $0.51 per cwt.

MILC payments induce production responses that drive down market prices net of MILC payments, disadvantaging larger producers whose payments are capped; disadvantaging California relative to other states.

10.10 Provisions of the 2008 Farm Bill

Essentially continued 2002 legislation, including the MILC program, with some changes in details of support prices and federal milk marketing order operations.

Balagtas (2011) documents these aspects and discusses a range of proposals for policy reform.

He provides the following estimates of various economic impacts:

Table 1: *Costs and Benefits of Key Domestic Dairy Polices in the United States*

	Milk Marketing Orders	Dairy Price Support	Milk Income Loss Contract	Total
		$ million per year		
Dairy Farmers	293	304	595	1,192
Consumers	– 420	– 304	317	407
Taxpayers	~ 0	– 364	– 913	–1,277
Net	– 127	– 364	– 1	– 492

He notes that dairy farm revenue was approximately $20 billion per year, so dairy farmers gained about 6 percent additional income.

Transfer efficiency is not high if the objective is to transfer income to producers:

$100 \times DWL/\Delta PS = 41.3$ percent.

10.11 Provisions of the 2014 Farm Bill

The *Agricultural Act of 2014* made three significant changes to U.S. dairy policy:

- Removed dairy price supports (historically a significant change, but largely symbolic in the current circumstances)
- Eliminated the **Dairy Export Incentive Program**, which had provided targeted export subsidies
- Replaced the **MILC** program with a quasi-insurance program, the **Margin Protection Program** (MPP)

Margin Protection Program (MPP)

The MPP is meant to address two perceived deficiencies of the MILC program:

- Indexing of payment rates was inadequate in the face of high feed prices in 2012
- MILC provided little assistance for large commercial dairies which periodically experienced major losses following the feed price rise beginning in 2007

During the past decade, with volatile commodity markets, wild swings in the margin between the price of milk and the cost of feed to produce milk—

- 2007–2008
    - always above $10/cwt
    - sometimes much greater
- 2009–2012
    - average about $8–9/cwt
    - occasionally below $4/cwt (even efficient farms lose money).

Insurance program pays participants an indemnity based on their choice of quantity covered and the size of the margin to be covered (the margin trigger).

Payments are based on the difference between the covered margin trigger and monthly margin computed as the difference between the "all milk price" per cwt and an index of national corn, soybean and alfalfa hay prices.

New program is voluntary, but free coverage for margins of $4 => almost all famers are expected to participate at least that much.

Farms may insure 25–95 percent of their recent production.

No limit on size of eligible farms but larger farms (with over 4 million cwt ~ 200 cows) pay higher premiums.

Premiums increase up to $0.475/cwt for margins of $8 ($1.360/cwt for farms producing more than 4 million cwt)

Premiums carry substantial subsidy, except for the highest margin coverage for the larger farms—

- more income insurance than under MILC
    - but not foreseen to pay significant indemnities in the coming year
- more subsidy than the old price support program
    - without interfering directly in milk prices
    - likely to encourage production and drive prices down farther

Figure 10-1 *Price Discrimination and Revenue Pooling*

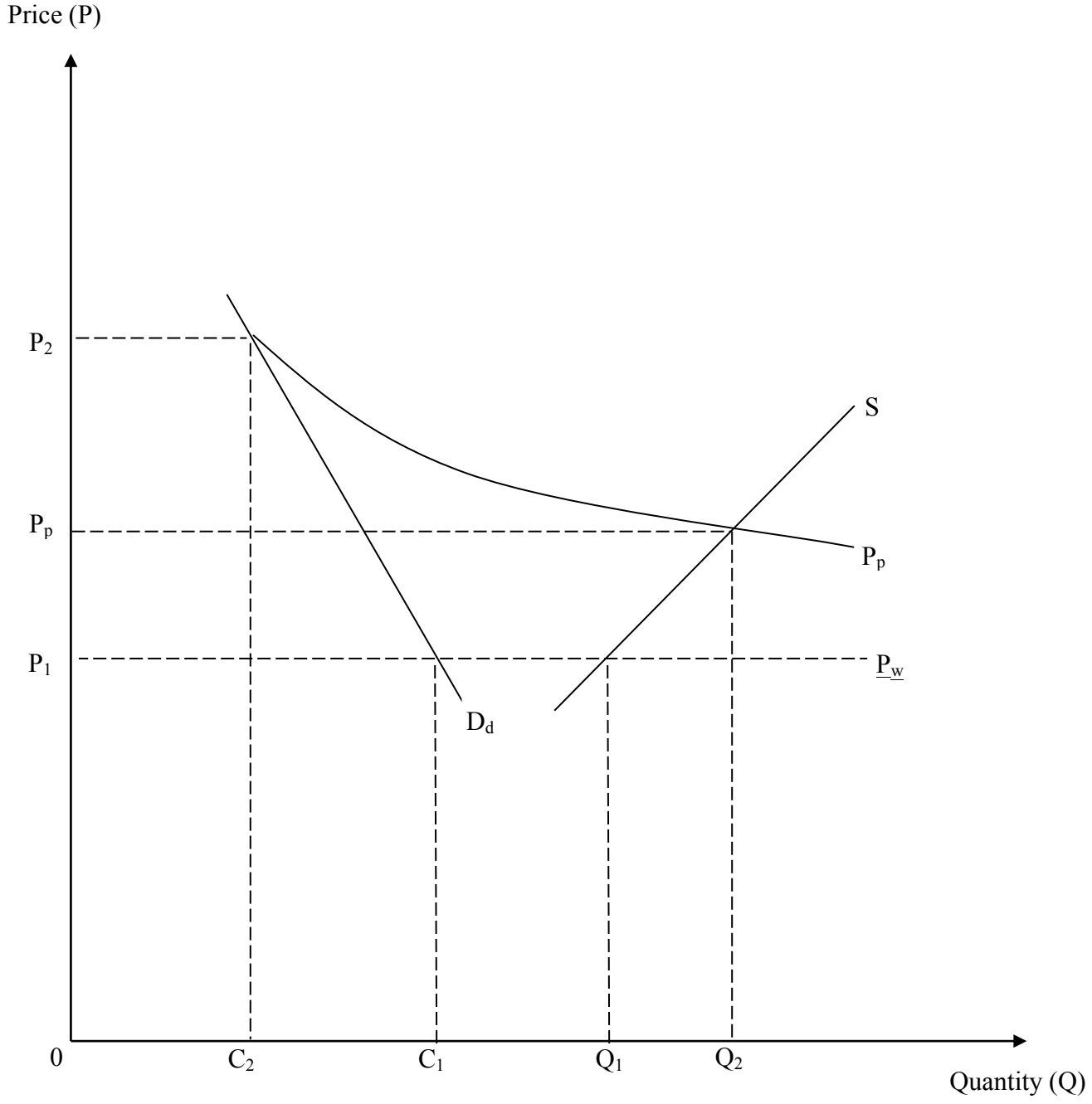


Figure 10-2 *Administered Prices with Three Markets*

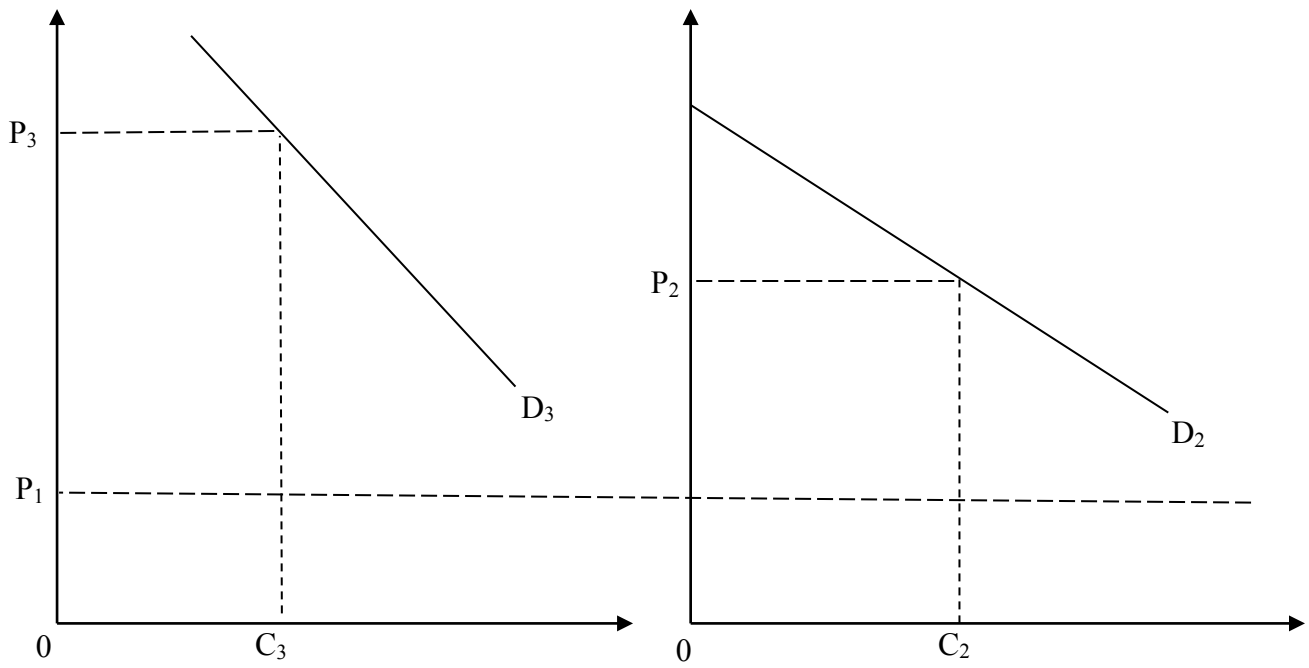
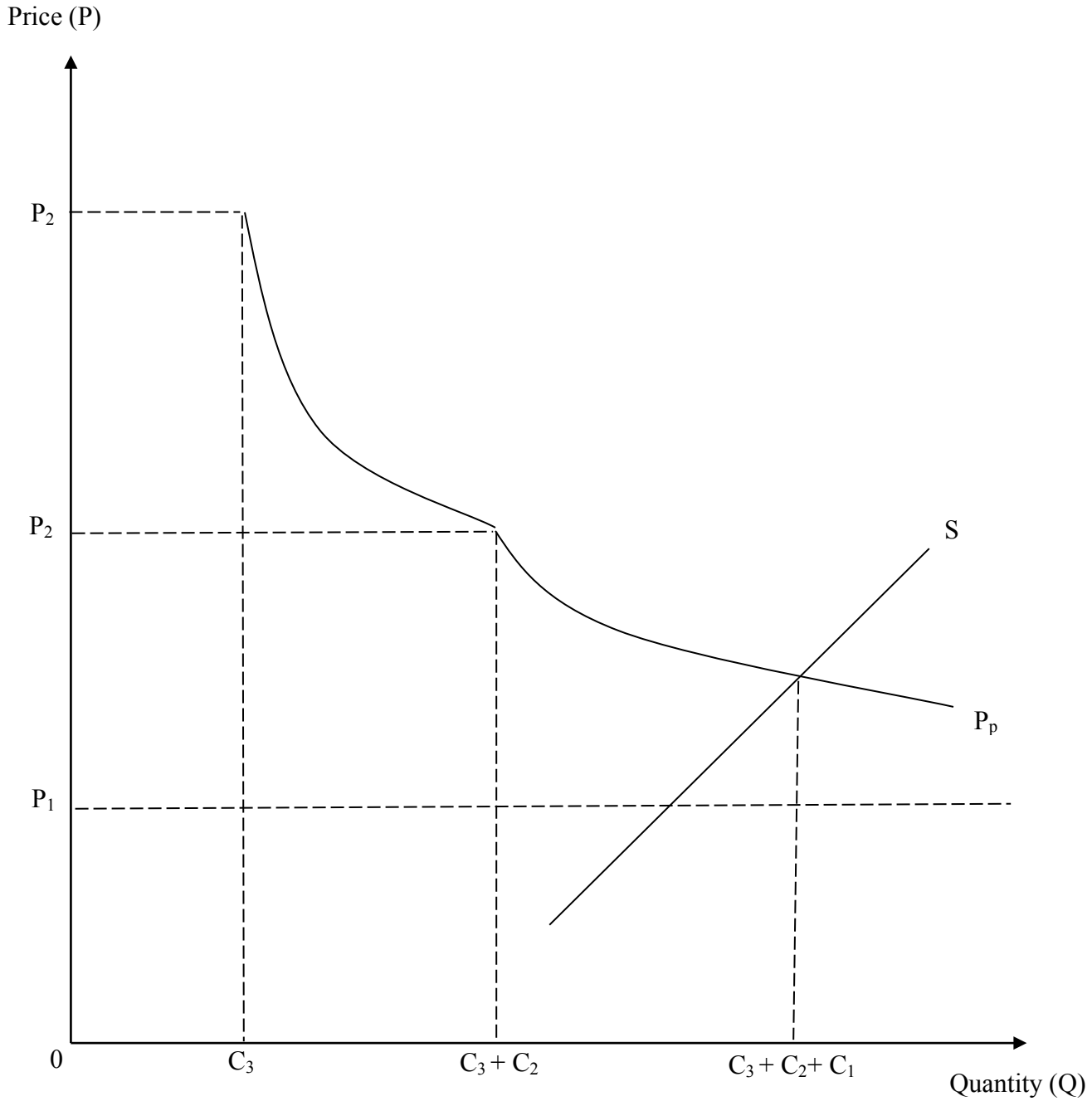



Figure 10-3 *Price Discrimination and Revenue Pooling – Three Markets*