



# Principio □□□'

A horizontal row of ten empty rectangular boxes, intended for children to draw or write in.

  **migliori**                    

The image shows two rows of rectangular boxes. The top row contains 10 groups of four small squares arranged in a 2x2 grid. The bottom row contains 10 groups of nine small squares arranged in a 3x3 grid.

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**This only works if producers pay all of the costs associated with production.**

Suppose that is not the case. Suppose, for example, that a steel producer, in addition to using iron ore, coal, etc., **also "uses" clean air.**

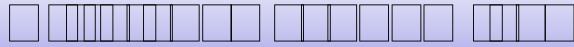
In the process of producing a ton of steel he puts ten pounds of sulfur dioxide into the air, **imposing (say) \$100 worth of bad smells, sore throats, and corrosion on people down wind.**

Since he does not pay for that cost, he does not include it in his profit and loss calculations. As long as the price he sells his steel for at least covers his costs it is worth making steel.

The result is inefficient:

**Some goods may be produced even though their cost, including the resulting pollution, is greater than their value.**

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**Ogni cambiamento, secondo questo principio,  
richiede un consenso unanime.**

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**□ □ □ non si può migliorare la condizione di un soggetto  
senza peggiorare la condizione di un altro**

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## *Principio di Kaldor-Hicks*

una modifica nell'allocazione delle risorse  
è MIGLIORE

se i benefici ottenuti da alcune  
componenti superano le perdite di  
benessere subite da altre componenti,

in modo che, dopo una eventuale  
compensazione delle perdite, risulti  
ancora un incremento di benessere per  
almeno un individuo.

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In an ideal economic system, goods worth more than they cost to produce get produced, goods worth less than they cost to produce do not; this is part of what economists mean by economic efficiency.

In a perfectly competitive private property system, producers pay the value of the inputs they use when they buy them from their owners (wages to workers in exchange for their labor, rent to land owners for the use of their land, etc.) and receive the value of what they produce when they sell it.

**If a good is worth more than it costs to produce, the producer receives more than he pays and makes a profit;**

**if the good is worth less than it costs to produce he takes a loss.**

**So goods that should be produced are and  
goods that should not be produced are not.**

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It is inefficient in another respect as well. The steel producer may be able to reduce the amount of pollution by various control devices--air filters, low sulfur coal, high smokestacks--at a cost.

Calculated in terms of the net effect on everyone concerned, it is worth eliminating pollution as long as the cost is less than the pollution damage prevented--in our example, as long as it costs less than \$10 to prevent a pound of sulfur dioxide emission.

But the steel producer, in figuring out how to maximize his profit, includes in his calculations only the costs he must pay. So long as he does not bear the cost of the pollution, he has no incentive to prevent it.

So the fact that air pollution is an external cost results in both an inefficiently high level of steel production (it may be produced even when it is not worth producing) and an inefficiently low level of pollution control.

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There are two obvious solutions.  
One is **direct regulation**--the government tells the steel company how much it is allowed to pollute.

The other is **emission fees**--referred to by economists as Pigouvian taxes (named after A. C. Pigou)

Under a system of Pigouvian taxes, the government charges the steel company for the damage done by its pollution--\$10 per pound in this example.

By doing so it converts the **external** cost into an internal cost--internalizes the externality.

In deciding how much steel to produce and what price to sell it at, the company will now include the cost of its pollution--paid as an emission fee--along with other costs.

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In deciding how much pollution control equipment to buy, the company balances the cost of control against its benefits, and buys the optimal amount.

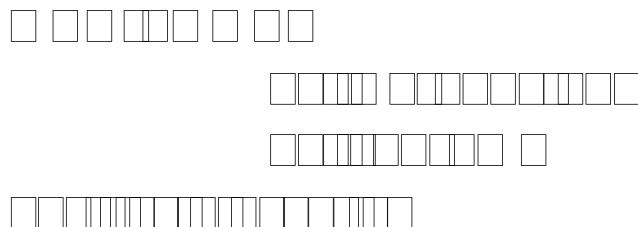
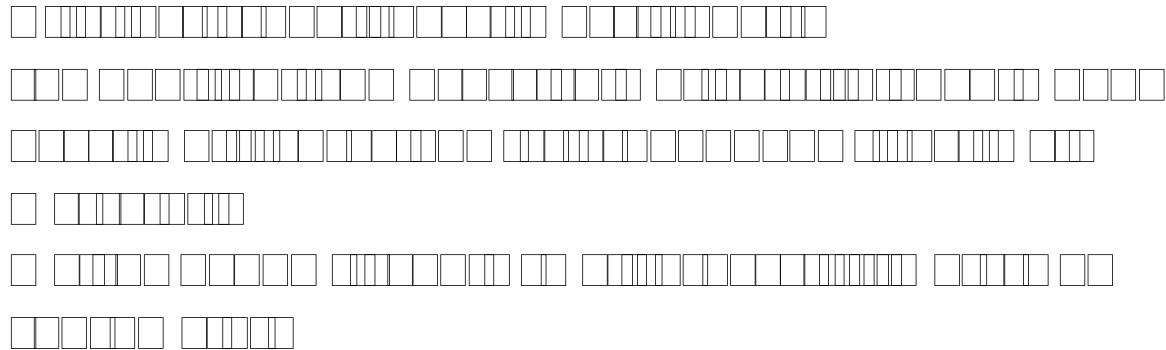
So a system of emission fees can produce both an efficient amount of steel and an efficient amount of pollution control.

In order to achieve that result, the government imposing the fees must be able to measure the cost imposed by pollution.

But, unlike direct regulation, the use of emission fees does not require the government to measure the cost of preventing pollution--whether by installing air filters or by producing less steel. That will be done by the steel company, acting in its own interest.

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# Esternalità



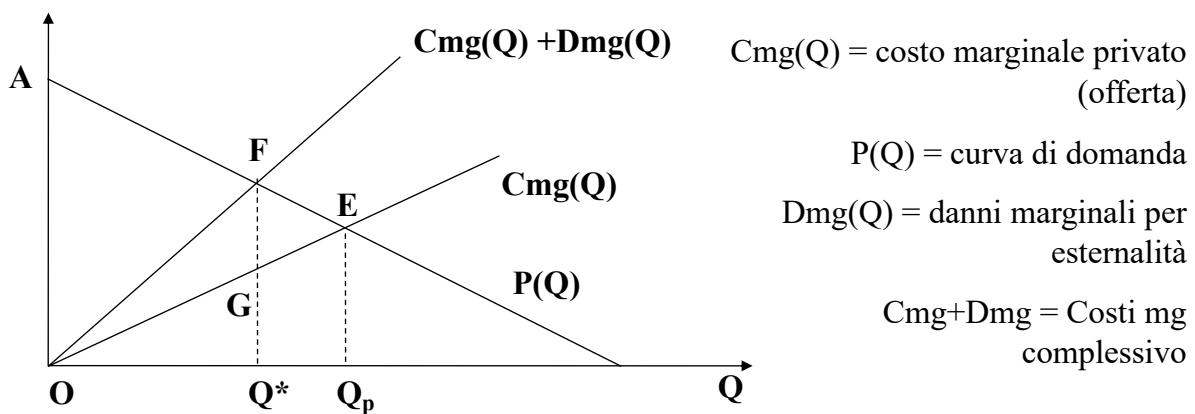
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## Il mercato e il raggiungimento dell'efficienza economica?

Per illustrare il problema consideriamo la produzione di un bene

NB: Equilibrio economico parziale, un solo bene

ricordando che in un economia concorrenziale Prezzo = Costo marginale



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## Perché il mercato “fallisce”?

A horizontal row of ten empty rectangular boxes, intended for children to draw or color in.

A horizontal row of seven empty square boxes, each outlined in blue, intended for children to draw or color.

A horizontal row of ten empty rectangular boxes, each with a thin blue border, intended for drawing or writing practice.

A horizontal row of 20 empty square boxes, each outlined in blue, intended for drawing or writing practice.

A horizontal row of ten empty rectangular boxes, each consisting of a blue outline and a white interior, intended for children to draw or write in.

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## Esempio di esternalità nella produzione

Due imprese, X e Y, (operano in conc perfetta, prezzi dati)

### **Massimizzazione se sono distinte**

$$\pi(x) = p_x x - x^2 \quad \pi(y) = p_y y - y^2 - 30x$$

## *condizioni I ordine*

$$\pi_x = p_x - 2x = 0$$

$$\pi_y = p_y - 2y = 0$$

$$x^* = p_x / 2$$

$$y^* = p_y/2$$

Se AD ES.  $p_x = 80$  e  $p_y = 100$

$$x^*=40 \quad e \quad y^*=50$$

### **Massimizzazione congiunta ( fusione tra le due imprese):**

$$P(x,y) = p_x x - x^2 + p_y y - y^2 - 30x$$

condizioni I ordine

$$\prod_{\alpha} = p_{\alpha} - 2x - 30 = 0$$

$$\prod_{i=1}^n p_i - 2\gamma = 0$$

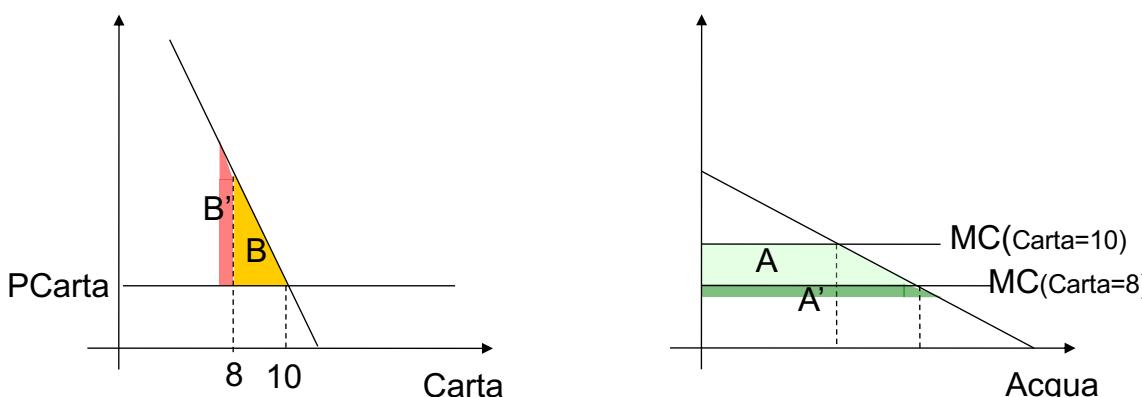
$$\rightarrow x^* = (p_x - 30)/2 \text{ e } y^* = p_y/2$$

ovvero  $x^*=25$  e  $y^*=50$  per i prezzi usati sopra

## Esternalità in un modello di equilibrio economico generale

The image consists of ten numbered boxes arranged horizontally. Box 1 contains a red square. Box 2 contains a blue square. Box 3 contains a green square. Box 4 contains a yellow square. Box 5 contains a red square with a white outline. Box 6 contains a blue square with a white outline. Box 7 contains a green square with a white outline. Box 8 contains a yellow square with a white outline. Box 9 contains a red square with a white outline and a small black dot. Box 10 contains a blue square with a white outline and a small black dot.

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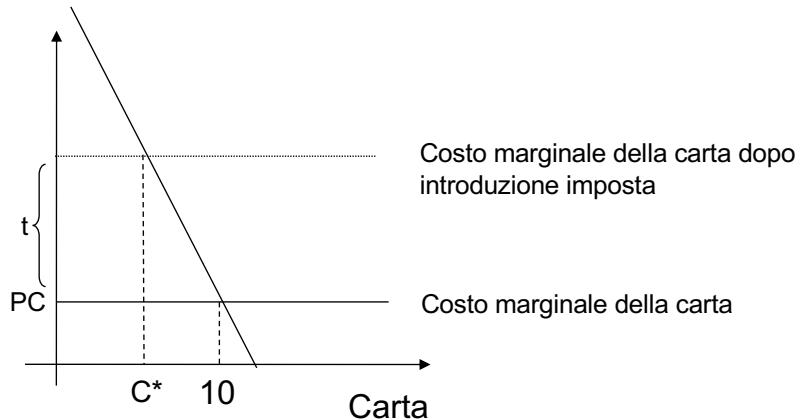
A horizontal sequence of 100 small squares arranged in three rows. The top row has 33 squares, the middle row has 34 squares, and the bottom row has 33 squares. A vertical line is drawn through the 50th square from the left.

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## Come indurre la cartiera a produrre meno?

A horizontal row of 20 empty square boxes for writing responses.

A horizontal sequence of 10 identical rectangular blocks, each divided into 10 smaller squares, representing a 10x10 grid.



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#### Inefficienza mediante confronto tra SMSostituz. e SMTrasform

A diagram consisting of two horizontal rows of rectangles. The top row contains 10 rectangles, and the bottom row contains 11 rectangles. All rectangles are white with black outlines, except for the last rectangle in each row, which is filled with black. The rectangles are arranged side-by-side.

$$\frac{\partial TC^c}{\partial c} = 5 \quad \leftarrow \square \square \square \square \square \quad \square \square \square \square \square \square \square \rightarrow \quad \frac{\partial TC^a}{\partial a} \square \square \square \square \square \quad \square \square \square \square \square$$

$$\frac{\partial TC^a}{\partial c}$$

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A horizontal row of 20 empty rectangular boxes, intended for children to write their names in, likely as part of a classroom activity.

**1 unità di carta con 5 di acqua**

**1 unità di carta con 5 di acqua**

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A horizontal row of ten empty rectangular boxes, each divided into four quadrants by a vertical and a horizontal line. These boxes are intended for students to draw their own geometric shapes.

# Si

$$\frac{\partial TC^a}{\partial a} = \boxed{\text{ }} \rightarrow \boxed{\text{ }} \boxed{\text{ }} \boxed{\text{ }} \boxed{\text{ }}$$

€

The diagram consists of two horizontal rows of 10 empty rectangular boxes each. The second row features five boxes highlighted with a blue border, specifically the 2nd, 4th, 6th, 8th, and 10th boxes from the left.

A horizontal sequence of 20 empty square boxes arranged in two rows of 10. The second row contains 10 boxes, with the last 4 boxes highlighted in red.

A horizontal sequence of 20 empty rectangular boxes, likely for drawing or sketching.

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COSTO TOTALE a livello di intera economia è dato, pari a  $F$ , in quanto i fattori di pz sono dati.

**Cartiera:**  $TC^c = 5c$    **Depuratore:**  $TC^a = 0.5a + 0.05$  a c

$$F = 5c + 0.5a + 0.05a \times c$$

da cui si ricava frontiera di trasformazione →  $a(c) = (F-5c)/(0.5+0.05c)$

Saggio marginale di trasformazione (MRT) da teorema funzioni implicite  
 $MRT = \frac{|da/dc|}{F_c/F_a} = (5+0.05a)/(0.5+0.05c)$

OVVERO:  $(\frac{\partial TC_c}{\partial c} + \frac{\partial TC^a}{\partial c}) / \frac{\partial TCa}{\partial a}$

Quando  $c=10$  e  $a=1005$  quanto vale MRT? MRT =  $55/1 > \text{SMS} = P^c/P^a = 5$

Nel nostro esempio, per raggiungere l'efficienza occorre ridurre  $P^a$  e aumentare  $P^c$ .

In concorrenza perfetta:  $P^{a*} = \frac{\partial TCa}{\partial a}$        $P^{c*} = \frac{\partial TCC}{\partial c} + \frac{\partial TCa}{\partial c}$     *il "vero" costo marginale della carta*  
 cioè  $P^{c*} = 5 + 0.05a$

che si ottiene ad es. fissando  $t = 0.05a$

o anche obbligando le due imprese a fondersi

*N.B.* Nell'esempio  $F=1055$ ,  $F$  sono anche i redditi a disposizione per acquistare i beni. Quando si introduce l'imposta ottimale è quindi necessario redistribuire il gettito ai consumatori affinché abbiano un reddito sufficiente per l'acquisto delle quantità desiderate.

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## Facciamo IPOTESI SULLE FUNZIONI DI DOMANDA

$$c = (205 - P^c) / 20 \quad \text{e} \quad a = 2305 - 1300P^a \quad \text{invertendo si ottiene}$$

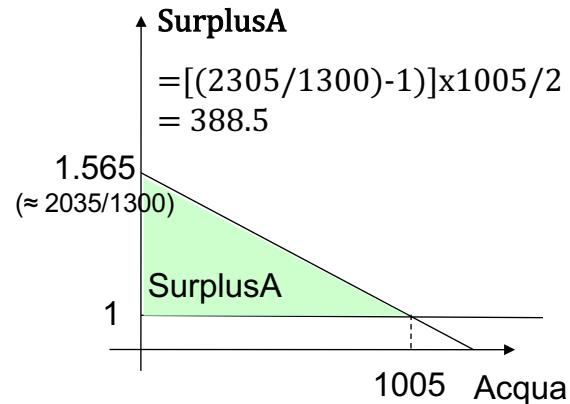
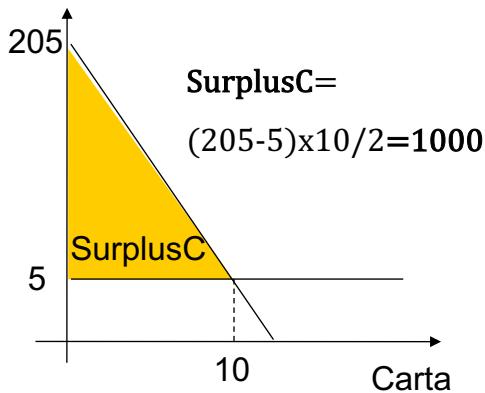
$$P^c = 205 - 20c \quad \text{e} \quad P^a = (2305 - a) / 1300$$

Se la situazione iniziale è  $c=10$  e  $a=1005$  i prezzi sono

$$P^c = 5 \quad \text{e} \quad P^a = 1$$

ricordando che l'ipotesi di costi marginali costanti implica surplus delle imprese nullo, calcoliamo il surplus del consumatore per la carta e per l'acqua

**Surplus Totale = 1 388.5**



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Dalla precedente slide:  $P^c = 205 - 20c$  e  $P^a = (2305 - a) / 1300$

Con l'introduzione di un'imposta

Cartiera con imposta t:  $MC^c = 5 + t \quad P^c = MC^c \Leftrightarrow 205 - 20c = 5 + t$

Fissiamo  $t =$  danno marginale di  $c$  su  $a$ , (avevamo  $TC^a = 0.5a + 0.05ac$ )  $t = 0.05a$

$P^c = MC^c \Leftrightarrow 205 - 20c = 5 + 0.05a \Leftrightarrow 200 - 0.05a = 20c \Leftrightarrow 10 - a/400 = c \quad (1)$

Depuratore:

$MC^a = P^a \Leftrightarrow 0.5 + 0.05c = (2035 - a) / 1300 \Leftrightarrow (1655 - a) / 65 = c \quad (2)$

Mettendo a sistema (1) e (2)  $\rightarrow a^* = 1200$  e  $c^* = 7 \rightarrow P^a = 0,85$  e  $P^c = 65$

Surplus del consumatore nella carta:  $SCC = (205 - 65) \times 7 / 2 = 490$

Surplus del consumatore nell'acqua:  $SCA = ((2305 / 1300) - 0,85) \times 1200 / 2 = 553,8$

Imposta  $t = 0.05 \times 1200 = 60$  Gettito  $60 \times 7 = 420$

**Surplus totale = 1 463,8**

PS verifica che in questo caso il surplus delle imprese è nullo

$$P^c = 65 \quad t = 0.05 \times 1200 = 60 \quad CM^c = 65 \quad , \quad CT^c = 65 \times 7 = Ricavi^c = 65 \times 7$$

$$P^a = 0.85 \quad CM^a = 0.85 (= 34/40), \quad CT^a = 0.5a + 0.05ac = 600 + 420 = R^a = 0.85 \times 1200 = 1020$$

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## ALTRE FUNZIONI DI DOMANDA

**Non è detto che si debba produrre una quantità positiva di carta, dipende dalle funzioni di domanda:**

$$P^c = 10 - c/2 \quad \text{e} \quad P^a = 56 - a(11/200)$$

Cartiera con imposta:  $MC^c = 5 + t$

$$P^c = MC^c \Leftrightarrow 10 - c/2 = 5 + t$$

$t$  = danno marginale di C quindi  $t=0.05xa$  [  $TC^a = 0.5a + 0.05axc$  ]

$$(1) \quad 10 - c/2 = 5 + 0.05a \rightarrow 5 - 0.05a = c/2 \rightarrow 10 - a/10 = c$$

Depuratore:  $P^a = MC^a \Leftrightarrow 0.5 + 0.05c = 56 - a(11/200)$  risolvendo:

$$(2) \quad c = 1110 - a (11/10)$$

Mettendo a sistema (1) e (2)  $\rightarrow a = 1100 \quad c = -100 \rightarrow$

$$c = 0 \quad \text{e} \quad a = 55.5 \times 200 / 11 = 1009$$

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## APPROFONDIMENTO dell'esempio iniziale

La precedente situazione concorrenziale  $c=7$   $a=1200$  è efficiente? Proviamo a modificarla di poco.

Riscriviamo le funzioni di domanda:  $P^c = 205 - 20c$  e  $P^a = (2305 - a)/1300$  e anche  $C^a = 0.5a + 0.05ac$  Ricordiamo che Gettito  $60 \times 7 = 420$

Surplus del consumatore nella carta:  $SCC = (205 - 65) \times 7 / 2 = 490$

Surplus del consumatore nell'acqua:  $SCA = (2305 / 1300 - 34 / 40) \times 1200 / 2 \approx 553.85$   
**Totale surplus  $\rightarrow 1463.85$**

### Aumentiamo di 0.1 la pz di carta, $c=7.1$

1)  $\rightarrow TC_a = 0.855$  quando  $c=7.1$   $a = 1192.4$  (vedi oltre, frontiera possibilità produttive)  
 $P_A = 0.856 \rightarrow \pi_a \square 1.01$

2)  $\rightarrow \downarrow P_C \quad P_C = 63 \rightarrow$  (mantenendo  $t=60$ )  $\pi = 63 \times 7.1 - 65 \times 7.1 = -14.2$  gettito = 426  
 $\rightarrow$  **Gett+  $\pi_c = 411.8$**

$SC_C = (205 - 63) \times 7.1 / 2 = 504.1 \quad SC_A \approx (2305 / 1300 - 0.856) \times 1192.4 / 2 \square 546.85$ ,  
 $Gett + \pi_c + \pi_A + SC_C + SC_A =$  **Tot surplus = 1463.76 < 1463.85**

<sup>^</sup>Non è necessario riaggiustare  $t$  in quanto non cambia la somma di gettito e profitto dato che  $c=7.1$  qui è stato **fissato** per ipotesi

$t$ =danno marginale "sociale":  $1192.4 \times 0.05 \square 59.62$ , gettito  $\square 423.30$  e  
 $\pi = 63 \times 7.1 - (59.62 + 5) \times 7.1 = -11.50$  TOTALE gettito più profitto: 411.8  
Se  $t=58 \rightarrow PC=0$  e gettito =  $58 \times 7.1 = 411.8$

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