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# On Some Reflections of Profit and Loss Functions

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**ABSTRACT:** This article is about the symmetrical reflections of profit and loss functions and the functions obtained from them, which are widely used in applications economicy, business applications and other financial applications of mathematics. The study is seen that the applications in the literature are calculated according to the profit and loss accounts alone. Since the occurrence of loss in an economicy activity negatively affects the result of the profit, as a result of the loss, economicy activity bankruptcy, decisions are finalized. This has irreversible consequences. The controllability of these two interactive events poses reassuring risks. In short, This situation enables the manageability of the activity. Applications in life take place on a more real axis. Ensuring the control of the event and seeing the whole event gives the opportunity to intervene in the activity in a short time. Therefore, the activity started with linear functions in the plane. Evaluations are made on the graphics here. The system concepts existing in Mathematical Science, their results in applications, especially in economic activities in the market are examined and their symmetrical reflections with respect to each other are examined. Starting from the reflections of the known profit and loss functions, their interactions with each other are investigated. How the break-even point is reflected according to these reflections, and therefore what they did is examined. The reflection of profit and loss functions according to another function is discussed. This makes it necessary for the control, planning and implementation of the situations observed in an economic activity, which are known in market economies. Therefore, the change in price is important in an economic activity. To determine the timing of the advertisements and to know their reflection is important for the plan of decreasing or increasing the price. The loss curve is negatively sloping due to price, reflecting new information on the condition of its slope. The reflections of the determining factors is emphasized very vary in marketing. Differences according to variables affect the management of this activity. Reflections determine results. The prices of the products directly concern both the producer and the consumer in an economic activity.

**Keywords:** business, applications economicy, financial applications, loss, profit

## 1. INTRODUCTION

Finding the inverse of a function in mathematics is a reflection with respect to x. The one-to-one and surjective conditions are necessary to find the inverse of the function [1-4]. These conditions is not necessary in a reflection in the plane. Units or functions that affect the activity reveal the result. The effect of the results shows the positive or negative state of the activity. We take precautions by having knowledge in advance by reflection without waiting for the result of an activity [5-8].

Let $P(x)$ be the profit function and let $L(x)$be the loss function for all $x \in \mathbb{R}^+$.

Let be any two a function demand $f_D(x)$ and supply function $f_S(x)$. A revenue and an expense function

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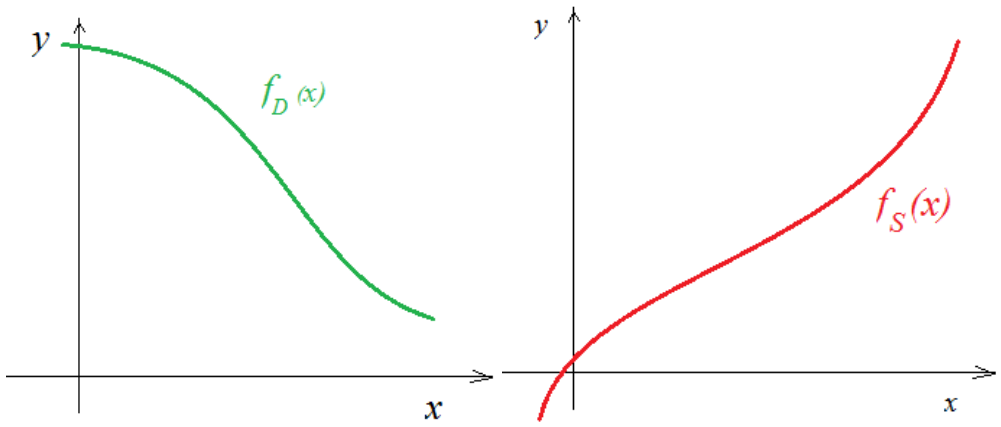


Figure 1.

$R(x) = xf_D(x)$,
$E(x) = xf_S(x)$.

If $R(x) > E(x)$ then,

$$P(x) = R(x) - E(x), L(x) = E(x) - R(x).$$

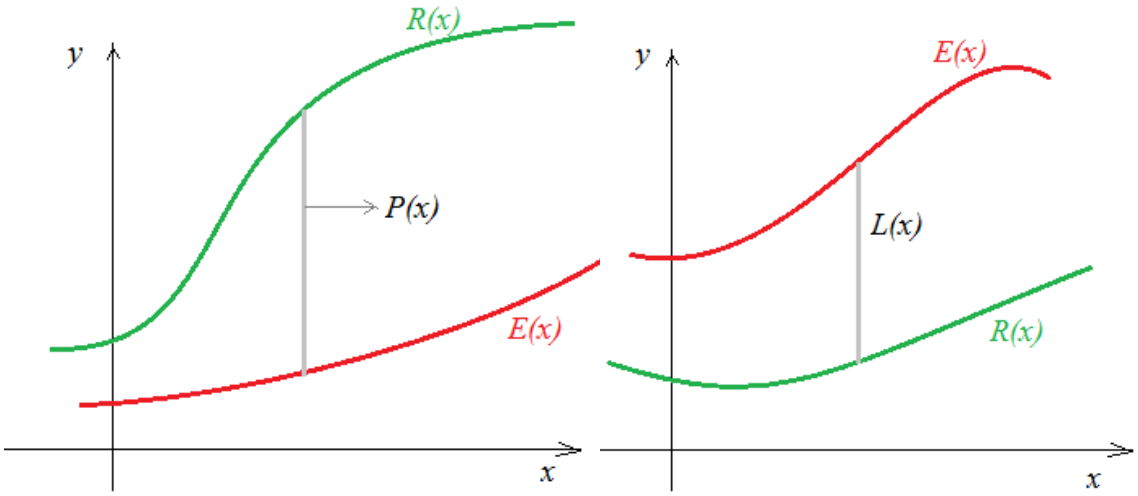


Figure 2.

This discussion is for functions with one variable on the plane. Responded to new discussions when practices are not equal.

$P(x) = x(f_D(x) - f_S(x))$, where $f_D(x) > f_S(x)$
$L(x) = x(f_S(x) - f_D(x))$, where $f_S(x) > f_D(x)$.

This study emphasizes the importance of comparing inequality according to the causes that reveal it.

## 2. MATHEMATICS AND APPLICATIONS FINANSIAL

**Definition 1.** Let $y = f(x)$, be any two real-valued functions $y = g(x)$ is called the reflecting axis, function $y = f(x)$ is called reflected and the function $y = h(x)$ is called the projected function if $x$ is calculated in the function $y = g(x)$, $y$ is obtained by substituting the calculated $x$ and function $y = g(x)$ in the function $y = f(x)$.

$$y = g(x) \Leftrightarrow x = k(y)$$

$x$is replaced by $k(y)$and $y$ is replaced by $g(x)$ in the function $y = f(x)$.

$$y = f(x)$$

The reflected function $h(x)$ is obtained by the equation $g(x) = f(k(y))$.

$$g(x) = f(k(y)) \Leftrightarrow y = h(x)$$ [8].

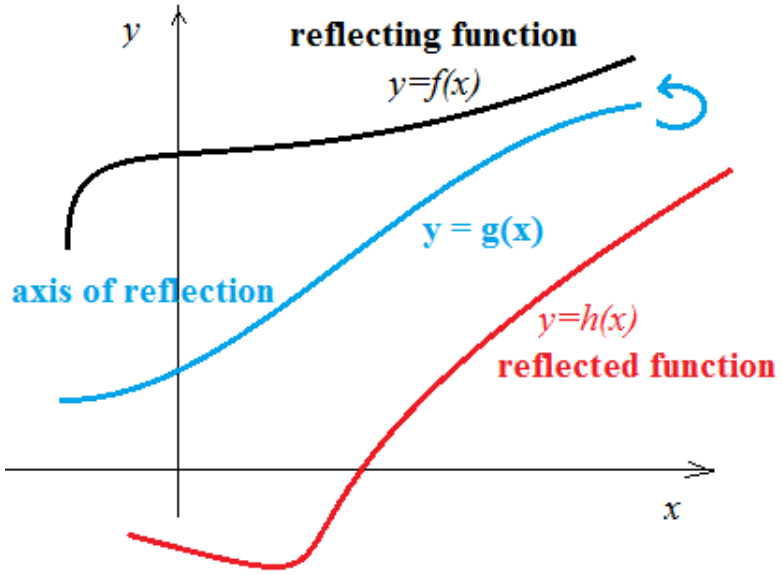


Figure 1.

If $f_D(x) = ax + b$ and $f_S(x) = cx + d$, for all $a, b, c, d \in \mathbb{R}^+$ then

$$L(x) = (a - c)x^2 + (d - b)x$$

The situation in increasing the amount is given below. In short, the reflection is the inverse of function.

$$L^{-1}(x) = \begin{cases} \pm\dfrac{d - b\sqrt{4(a-c)x + b + d - 2bd}}{2(a-c)}, & a - c \neq 0 \\ \dfrac{x}{d-b}, & d - b \neq 0, c - a = 0 \\ \emptyset, & d - b = 0, c - a = 0, x \neq 0 \\ \mathbb{C}, & d - b = 0, c - a = 0 \wedge x = 0 \end{cases}$$

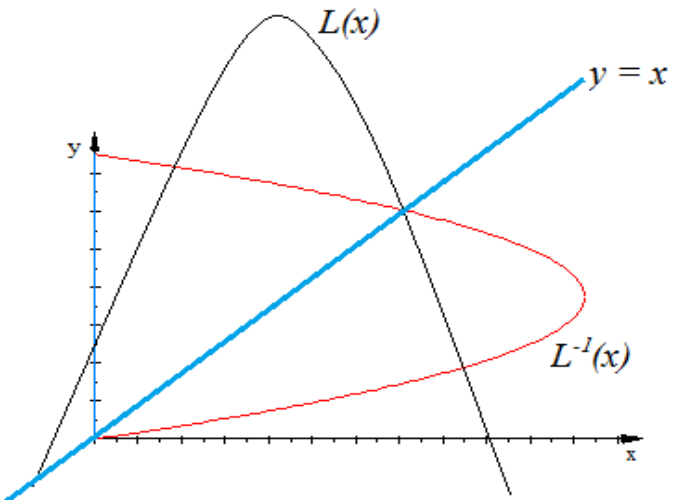


Figure 2.

The amount values on hand turn into reverse when the loss is maximum.
A similar situation is discussed for the profit function.

$$P(x) = (c-a)x^2 + (d-b)x.$$

If the profit function is reflected in decreasing units $y = -x$; then,

$$P^{-1}(x) = \begin{cases} \pm\frac{b-d\sqrt{4(c-a)x+b+d-2bd}}{2(c-a)}, & a-c \neq 0 \\ \frac{x}{d-b}, & b-d \neq 0, c-a = 0 \\ \emptyset, & b-d = 0, c-a = 0, x \neq 0 \\ \mathbb{C}, & b-d = 0, c-a = 0, x = 0 \end{cases}$$

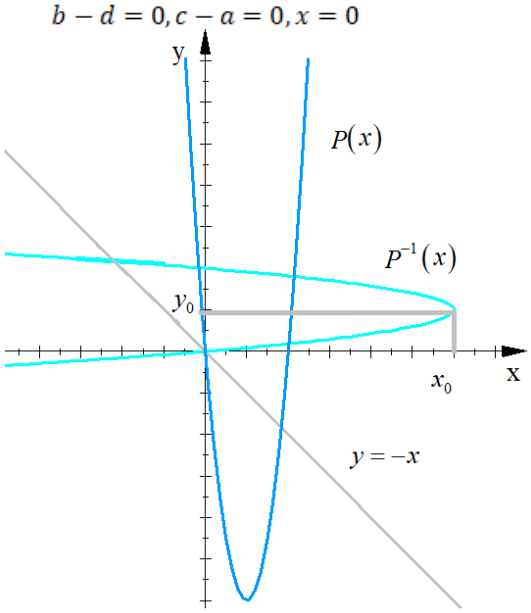


Figure 3.

The expression of reflection is $y$ while the unit is $-x$.

**Lemma 2.** Let $L(x) = (a-c)x^2 + (b-d)x$ be any functions loss and let $P(x) = (c-a)x^2 + (d-b)x$ be any function profit. The reflection of one of the functions relative to the other is given below.

i. If $L_P(x)$ is the reflected functions $P(x)$ then,

$$L_P(x) = \begin{cases} \dfrac{b^2 + d^2 - 2bd - \left(\pm(b-d) + \left(x(b-d) - x^2(a-c)\right)^2(a-c)^2\right)}{4a - 4c}, & a-c \neq 0 \\ \emptyset, \mathbb{C}, & otherwise \end{cases}$$

ii. If $P_L(x)$ is the reflected functions $L(x)$ then,

$$P_L(x) = \begin{cases} \dfrac{b^2 + d^2 - 2bd - \left(\pm(d-b) + \left(x(d-b) - x^2(c-a)\right)^2(c-a)^2\right)}{4(c-a)}, & a-c \neq 0 \\ \emptyset, \mathbb{C}, & otherwise \end{cases}$$

**Proof.** It is clearly.

**Example 3.** Let $L(x) = 3000x - 2x^2$,$P(x) = -3000x + 2x^2$ be the loss and profit functions, respectively.

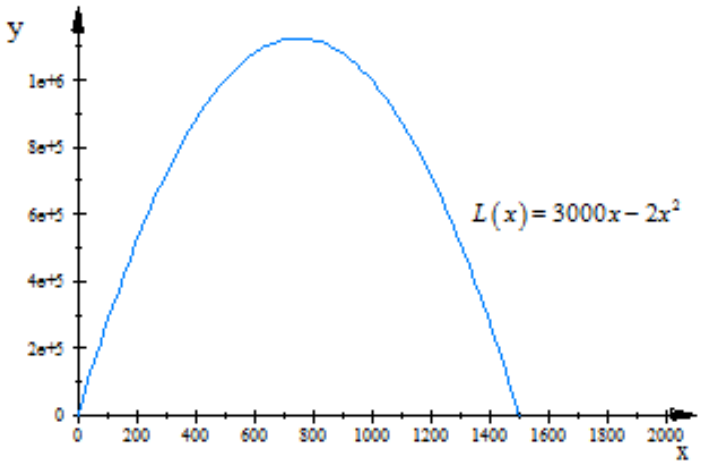


Figure 4.

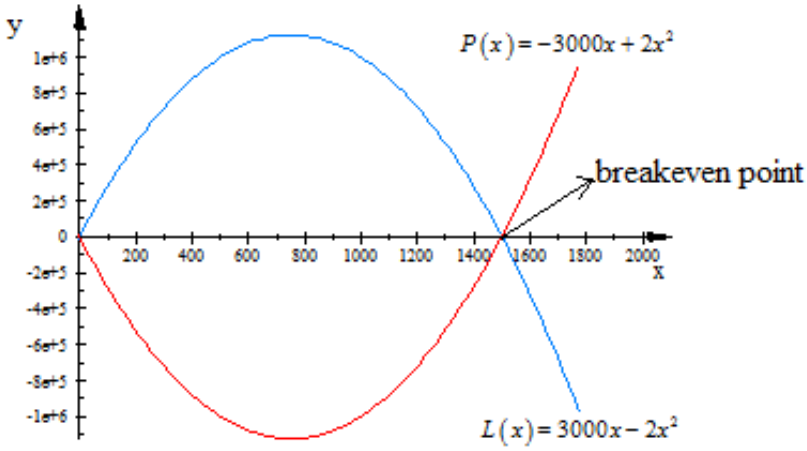


Figure 5.

The dependence of the equilibrium point on the quantity is inevitable in case the loss function is reflected according to the profit function.

Reflection of loss function according to demand function;

$$L_D(x) = 1500 \pm 2\sqrt{x + 561000}.$$

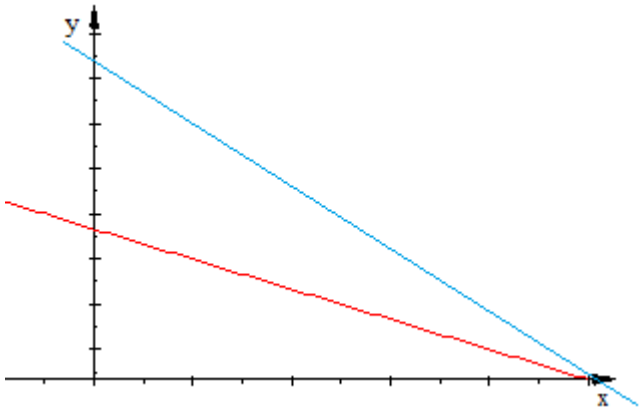


Figure 6.

The reflection of the profit function according to the demand function is given below.

$$P_D(x) = 4500 \pm 2\sqrt{x + 561000}$$

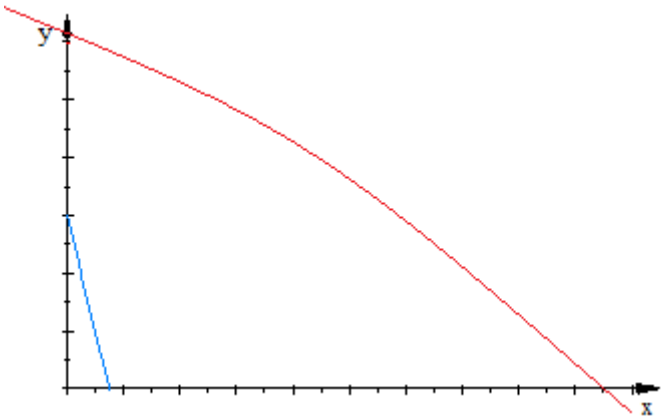


Figure 7.

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## 3. RESULTS AND DISCUSSION

These reflections explain that the science of mathematics is closely related to the science of economics. The situation brings different discussions with the comparison of different economic functions.At the same time, if the reflecting function changes, the breakeven point will also change. Also study; Examining how the profit or loss concerns will be in private enterprise market economies, which is the main concern of investors as a result of the reflections, thus guides the most basic micro-economic instruments on the plane.

The study is noteworthy that only the discussions made on the functions produced by the demand and supply functions, which were studied before, can be discussed according to different functions. The change in the marginal profit and loss functions has brought the discussion that the repercussions are different.

Although the results of economic activity can be followed with technological tools, it makes it necessary for the event to occur. The result, that is, the course of profit and loss functions, can be observed even before the economic activity takes place. This means that the economic risk factor can be monitored with confidence. This allows investors and consumers to operate with more confident steps. Although this study is on economics and cost, similar studies can be done in other systems.

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## CONFLICTS OF INTEREST

The authors declare no conflict of interest

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