

# Optimal Tariff Pricing: The Mistake of USA Increase Its Tariff Using Reciprocal Tariff Calculation Formula

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**Abstract.** Trump imposed high tariffs which caused substantial losses for almost all countries. He even claimed he made this decision based on Theory of Protecting High-Quality Industries. Furthermore, he uses a formula to improve it. This study uses the value the Office of the United States Trade Representative give and put in Reciprocal Tariff Calculation Formula to prove his formula is a hoax. Also, this study critically examines the U.S. policy of tariff increases, arguing that it represents a strategic misstep when evaluated through the lens of the Reciprocal Tariff Calculation Formula. By applying this formula, which quantifies the impact of tariffs on trade volumes, domestic welfare, and retaliatory responses, the study reveals that the U.S. tariff hikes not only disrupt global supply chains but also generate negative spillover effects on its own economy. The analysis demonstrates that rather than achieving intended goals such as trade balance correction or domestic industry protection, the increased tariffs trigger a cycle of retaliation, leading to reduced trade efficiency, elevated consumer prices, and diminished overall economic welfare. Through theoretical modeling and empirical data, this research highlights the importance of reciprocal tariff calculations in assessing the long - term viability of trade policies. It concludes that the U.S. tariff - raising strategy contradicts the principles of mutually beneficial trade and underscores the need for a more collaborative and data - driven approach to international trade policy - making.

**Keywords:** Reciprocal Tariff Calculation Formula, Tax decision, tariff, Effective Rate of Protection.

## 1. Introduction

### 1.1. Research Background and Research Topic

Since 2018, the Trump administration has imposed large-scale tariff hikes on economies such as China, the EU, and Canada under the pretext of "trade fairness" and "protecting domestic industries," proposing "reciprocal tariffs" policy that requires other countries to levy tariff rates on U.S. goods consistent with those imposed by the U.S. on their goods. This policy deviates from the pricing logic of the traditional international trade theory of "optimal tariff"—which advocates maximizing net benefits by moderately adjusting tariffs to balance import demand and welfare losses while improving terms of trade, with the core being to avoid excessive tariffs triggering trade retaliation. However, driven by unilateralism and political games, Trump's reciprocal tariff policy ignores the long-term negative impacts of tariffs on global supply chains, consumer welfare, and trade partnerships. In recent years, numerous empirical studies have shown that reciprocal tariffs not only failed to narrow the U.S. trade deficit but also pushed up domestic prices and exacerbated global trade tensions, subjecting the multilateral trading system to unprecedented challenges. Therefore, re-examining the contradiction between the reciprocal tariff policy and optimal tariff theory is of critical practical significance for understanding the current transformation of the international trade order and future policy formulation.

### 1.2. Research Purpose and Significance

This study aims to systematically analyze the internal logic of Trump's reciprocal tariff policy from the perspective of optimal tariff theory and reveal the core fallacies of its deviation from traditional trade theories. By quantitatively examining the policy's impacts on the U.S. domestic economy (e.g., industrial competitiveness, consumer welfare, trade balance) and the global trading system (e.g., supply chain restructuring, trade partnerships, stability of multilateral mechanisms), it verifies the

degree to which policy outcomes deviate from intended goals. Furthermore, it proposes theoretically and practically integrated policy optimization paths to provide a theoretical basis and decision-making references for countries to respond to unilateral trade policies and safeguard the multilateral trade order.

### **1.3. Research Methods and Structure**

This paper employs a combination of literature analysis, quantitative data statistics, and case studies to examine the flaws in Trump's reciprocal tariff policy and the broader impacts of tariffs. Through a review of official documents, academic studies, and historical parallels, the research contextualizes the policy's theoretical foundations and political motivations. Quantitative analysis utilizes economic indicators and econometric models to measure the policy's causal effects on industries like agriculture and manufacturing. Case studies of the U.S.-China trade war and aluminum tariff disputes with the EU illustrate how reciprocal tariffs triggered supply chain disruptions, consumer welfare losses, and retaliatory measures, undermining both domestic and global economic stability. The paper is structured to first introduce the policy's theoretical framework, then dissect its flawed economic logic, validate its negative impacts through empirical data and case evidence, and conclude with insights with implications for post-Trump trade policy directions.

## **2. Tariff**

### **2.1. The Definition and Concept of Tariff**

Tariff refers to a type of tax levied by the customs of a country on imported and exported goods passing through its customs territory in accordance with the country's legal provisions. Tariffs are generally collected by the customs and are characterized by enforce ability, non-reimbursability and predetermination. Their objects of collection cover various types of imported and exported goods and articles, with the main purposes including increasing national fiscal revenue, protecting domestic industries, and regulating import and export trade. The domestic government could gain tax revenue, which means the price of the products will be higher for the consumer.

### **2.2. The Impact of Tariff**

#### **2.2.1 The Benefit of Tariff**

Tariff could increase government revenue which means there is more government spending on other products or welfare. Secondly there are more benefits for the domestic producers as the import price increase, more people are likely to choose domestic products which increase the domestic products quantity sale. Also, it could be a way to negotiate, cause other countries do not have a high tariff rate compared to others which will cut down on their quantity exports. In the 18th century, Alexander Hamilton gives up the Infant Industry Argument, which means increasing the tariff to let domestic products increase their sales and to prove it is profitable [1].

#### **2.2.2 The Drawbacks of Tariff**

Tariff will let the cost of the imported product increase, which means the disposable income for the consumer will decrease. This will lead to a decrease in the living standard of the country also decrease in the GDP value. It will cause other countries' attacks as they will also increase their tariff to attack back more wars and attacks more than cooperation. Moreover, tariff will be increasing enterprise costs and affect upstream and downstream industries Enterprises dependent on imported raw materials will see their profits compressed due to increased tariff costs and may even be forced to pass on costs to downstream manufacturers, forming a chain reaction. For example, if tariffs on imported components for the manufacturing industry increase, the price of final products may rise.

### 3. Whether Tariff is Good or Bad

As shown in Figure 1. Although the government could receive the tax revenue, there are also social lost happened which we also called Deadweight Loss, which refers to the reduction in total social welfare when the market deviates from the optimal efficiency state of perfect competition. This loss is not transferred to any party in the market but is a complete net loss of social welfare that disappears entirely, hence the term "deadweight." In essence, it refers to the potential welfare that is permanently lost because socially beneficial transactions, which could have been realized under optimal conditions, fail to occur due to market distortions. It is an important indicator for measuring the degree of market inefficiency, commonly seen in scenarios such as reduced transaction volume caused by taxation, or monopoly enterprises restricting output to raise prices. So, in conclusion tariff will not be good for the whole economy as the Deadweight Loss happened, which some of the profit loose.

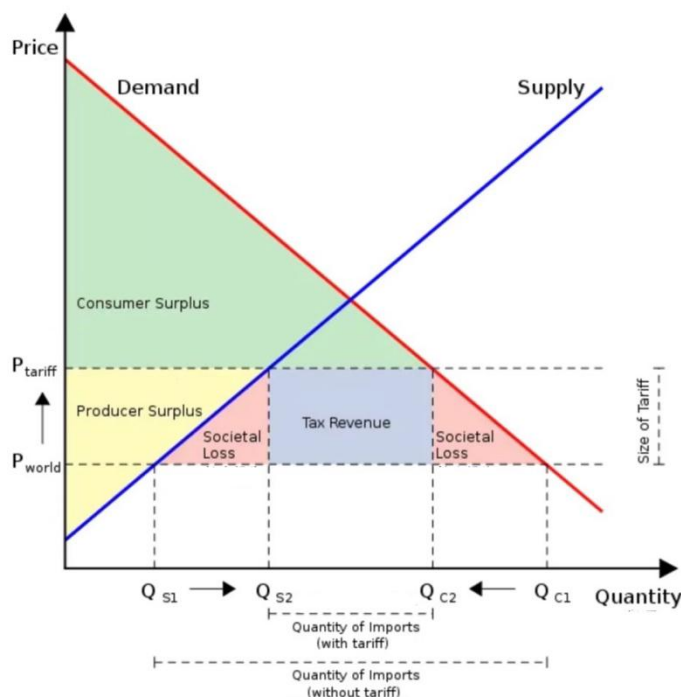


Fig 1. The basic demand and supply modal

### 4. Reciprocal Tariff Calculation Formula

Reciprocal tariffs are calculated as the tariff rate necessary to balance bilateral trade deficits between the U.S. and each of our trading partners. This calculation assumes that persistent trade deficits are due to a combination of tariff and non-tariff factors that prevent trade from balancing. Tariffs work through direct reductions of imports. Reciprocal tariff rates range from 0 percent to 99 percent, with unweighted and import-weighted averages of 20 percent and 41 percent. The function (1) is the formula Office of the United States Trade Representative post. In the formula, the denominator in the formula is  $\epsilon * \phi * m_i$ . Which  $\epsilon$  (epsilon) is import price elasticity, and  $\phi$  (phi) is the pass-through rate of tariffs to import prices. But  $\epsilon$  (epsilon) is a value less than 0 and the value Office of the US Trade Representative use to calculate is -4 but we could ignore the minus as the value of  $\Delta t_i$  is also defined as less than 0 so the minus cancel out. And the value of  $\phi$  given by US Trade is defined as 0.25. This study calculated and could found the product of two numbers is 1. So accurately the formula could be simplified [2].

$$\Delta T_i = \frac{x_i - m_i}{\epsilon * \phi * m_i} \quad (1)$$

This is the formula that has been simplified shown in Figure 2. Since the two cancel out there's only  $m_i$  in the denominator. So, it could simplify as trade deficit divided by imports. And this formula doesn't make sense to draw up the tax rate. Because the trade deficit could be very huge as other countries may not need to import your country's product has, they already have. Which causes high in tariff rate. So, the function has a huge mistake.

$$\Delta \tau_i = \frac{x_i - m_i}{\epsilon \phi \cdot m_i}$$

Fig 2. The Reciprocal Tariff Calculation Formula after simplified

## 5. Effective Rate of Protection

The calculation formula for the Effective Rate of Protection is used to measure the degree of protection that tariffs, or other trade policies exert on the value - added of a certain industry [3]. The formula and the meanings of each variable are as follows:

1)  $e_j$ : The effective rate of protection for industry  $j$ , reflecting the actual protective effect of policies on the value - added of this industry.

2)  $t_i$ : The nominal protection rate of the final product  $i$ , that is, the nominal tax rate levied on the final finished product.

3)  $\Sigma a_{ij}$ : The proportion of the input  $j$  in the cost of the final product when producing the final product  $i$ : the ratio of production factor input to the final cost, reflecting the importance of the input in production.

4)  $\Sigma t_{ij}$ : The nominal tax rate of the input  $j$ , that is, the tax rate levied on intermediate inputs

$$e_j = \frac{t_i - \Sigma a_{ij} * t_{ij}}{1 - \Sigma a_{ij}} \quad (2)$$

Here are some real-world examples of the effective rate of protection (ERP): China's Textile Industry (Pre-WTO) Before joining the WTO, China imposed tariffs on textile imports and raw materials like cotton. Assume a free-trade scenario where a garment cost ¥100, with ¥40 in cotton costs and ¥60 in domestic value added (V). China applied a 15% tariff on garments and a 5% tariff on cotton. After tariffs:

- 1) Garment price rose to ¥115,
- 2) Cotton cost increased to  $¥40 \times (1 + 5\%) = ¥42$ ,
- 3) New value added (V') became  $¥115 - ¥42 = ¥73$ .
- 4)  $ERP = [(73 - 60) / 60] \times 100\% \approx 21.7\%$  [4].

After using the Effective rate of protection, we could use Ad Valorem Tariff [5]. Which the formula is Tariff amount = Dutiable value of imported goods  $\times$  Tariff rate to calculate the tariff amount [6].

## 6. Conclusion

In conclusion, a stable tariff is beneficial to the entire world, which shows the GDP values of the United States and the United Kingdom during the period that has stable tariffs. As both GDP per capita of US and UK increase at this time. Therefore, using an incorrect formula to calculate tariffs

will affect the whole world and cause an economic recession. Which also effect domestic economy and casing a bad effect. Although the effective rate of protection formula is recognized by most countries, it still has some limitations. Price hikes by other countries and the industrial unemployment situation did not be considered in the formula. For example, when the United States using Reciprocal Tariff Calculations, most of the country choose to attack back as to increase their tariff too, which is not just using the effective rate of protection formula. It is foolish not to take measures when others raise tariffs.

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