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SHOULD WE TAX TRADE? A PIGOUVIAN PERSPECTIVE

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ABSTRACT

We develop a simple and intuitive Pigouvian perspective on optimal trade policy. Our approach unifies a wide range of rationales for taxing trade, from the classical optimal tariff argument to contemporary debates about global carbon emissions and geopolitics. We also clarify when trade policy intervention is warranted and when alternative domestic instruments should be used instead.

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Introduction

The scene happens at Rochester, New York, in the 1970s. A soon-to-be-famous trade economist in his early 30s meets an already famous macroeconomist in his late 60s. The trade economist is visiting for the semester, teaching a new undergraduate class. The macroeconomist is there for the day and asks what the class is about. "It is about trade policy," the trade economist replies. "What is there to teach?" the macroeconomist quips. "Don't we all know free trade is optimal?"[1]

The goal of this article is to discuss why free trade may not always be optimal and, in such circumstances, what the optimal trade policy may be. We approach the problem of optimal trade policy as one of optimal technology regulation, with international trade as the technology of interest. Our focus is primarily normative,

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[1]The two participants in the Rochester scene are Elhanan Helpman and Milton Friedman. We thank Elhanan Helpman for sharing this anecdote.

without apology. We will not try to explain why politicians set tariffs the way they do. Instead we will illustrate through a series of examples how theory and data can be combined in order to make progress on what trade policy ought to be.

To set the stage for our main analysis, we first offer a brief reminder of mercantilist ideas and the classical case for free trade. We then turn to the Theory of the Second Best, as a rationale for trade policy intervention, and the Targeting Principle, as an alternative defense of free trade. We conclude by discussing the limits of this defense and what optimal trade policy might entail in practice. Some of these themes are as old as the field of international economics itself. The novel and unifying perspective put forward in this article is a Pigouvian one.

The Pigouvian logic is familiar in environmental economics. If firms or consumers do not internalize the marginal impact of an economic decision on social welfare, such as pollution, then a Pigouvian tax should make them pay for it. As we will see, the same logic, broadly interpreted, is equally useful in international economics. Applied to the decision to trade with the rest of the world, it provides an intuitive way to characterize the structure of optimal trade policy, regardless of whether departures from free trade reflect concerns for efficiency or redistribution.

The core of this article is a series of formulas for optimal trade taxes and subsidies, as the case may be. Each formula highlights relevant sufficient statistics. For given values of these statistics a formula provides conditions that trade taxes must satisfy in order to be optimal. If the import tariff currently imposed on a given good is lower than the one implied by the formula, then a tax reform that reduces imports of this good must be welfare-improving. If the observed tariff is higher instead, then raising imports from their current levels must raise social welfare, at least locally.

A key strength of our Pigouvian perspective, beyond its ability to accommodate various normative considerations, is its robustness to positive considerations. The specifics of the economic environment may affect how changes in trade policy map into changes in imports via income effects, economy-wide changes in factor prices, or input-output linkages. These general-equilibrium complications, how-

ever, have no bearing on the set of sufficient statistics that enter these formulas.

Another strength of our Pigouvian perspective is that it applies both when tariffs are the only policy instrument available and when they are not. Pigou's logic shifts the discussion over tariff policy away from absolutist claims that free trade is always optimal and also away from indiscriminate uses of tariff policy to address a wide variety of policy goals. Tariffs can be a targeted way to influence a foreign country for geopolitical or environmental reasons, provided that they affect international prices. Tariffs may also complement other imperfect domestic redistributive instruments, though existing empirical evidence suggests that the resulting optimal tariffs may be quantitatively small in this case.[2]

For expositional purposes, we often refer to import tariffs rather than trade taxes more broadly. The formulas below, however, apply without further qualifications to the case of import subsidies, export subsidies, and export taxes. All trade taxes are wedges between domestic and international prices, which the formulas below characterize. Import tariffs and export subsidies are positive wedges, whereas import subsidies and export taxes are negative wedges.

Act I: The Mercantilist Fallacy

Mercantilists view international trade as a zero-sum game in which exports are good and imports are bad. Accordingly, a trade surplus reveals a country's success on the world markets, whereas a trade deficit indicates its failure. The mercantilist view has a long history. Irwin (1996) offers this classical statement from Mun (1664): "The ordinary means therefore to increase our wealth and treasure

[2]Our analysis builds on classical discussions of the rationale for trade policy in Meade (1955), Johnson (1965), Bhagwati (1971), and Corden (1974). Related discussions of the Targeting Principle and the Theory of the Second Best, applied to other policy instruments, can be found in Tinbergen (1952) and Lipsey and Lancaster (1956-1957). Irwin (1996) provides an intellectual history of the case for free trade, which we have used to organize our theoretical analysis. Modern treatments of these ideas are developed in Dixit (1985) and Helpman and Krugman (1989). Some of the general themes developed in this article are also discussed in Costinot and Rodríguez-Clare (2025), but without the Pigouvian emphasis. Detailed derivations of the tariff formulas presented here can be found in Costinot and Werning (2023), Adão et al. (2025), and Adão et al. (2026).

is by foreign trade, wherein we must observe this rule; to sell more to strangers yearly than we consume theirs in value." The same way firms ought to maximize their sales net of their expenditures, countries ought to maximize the value of their exports net of their imports.

In such a world, it might seem optimal for countries to impose import tariffs as a way to reduce their trade deficits. In practice, a desire to correct trade imbalances was one of the main drivers of the rise in protectionism during the 1930s, what Irwin (2012) refers to as the great trade policy disaster. Almost 100 years later, trade deficits remain salient in today's discussions about trade policy. The formula used to generate the "Liberation Day" tariffs announced by President Trump on April 2, 2025 is a recent manifestation of these ideas.

On the positive side, there is a question about whether tariffs can actually affect trade deficits. There is no doubt that tariffs can lower imports. But it is far from clear why the same import restrictions would leave exports unchanged. In fact, one of the most robust insights about trade policy is the equivalence between import tariffs and export tariffs due to Lerner (1936). From a macroeconomic perspective, it is not immediately obvious how tariffs would change a country's incentives to save and invest. But if tariffs do not affect national saving and domestic investment, how can they affect trade deficits?

In Costinot and Werning (2025), we have highlighted systematic reasons why permanently raising tariffs can lower trade deficits. Intuitively, even if a tariff is permanent, its incidence may vary over time. In periods of trade deficits, consumption and, in turn, imports tend to be higher. As a result, a permanent tariff has a disproportionate impact on the cost of living in these periods. All else equal, this provides incentives for consumers to spend less in periods of deficits, thereby reducing global imbalances.[3] Liberation Day tariffs have generated a new round of predictions about the quantitative impact of tariffs on deficits (for example, Auclert et al., 2025 and Caliendo et al., 2025), but it is fair to say that despite recent

[3]This insight relates to Obstfeld and Rogoff's (2000) influential observation that trade costs between countries may limit the magnitude of global imbalances, as subsequently investigated by Eaton et al. (2016) and Reyes-Heroles (2016).

empirical work, there remains considerable uncertainty about the impact of tariffs on trade deficits.

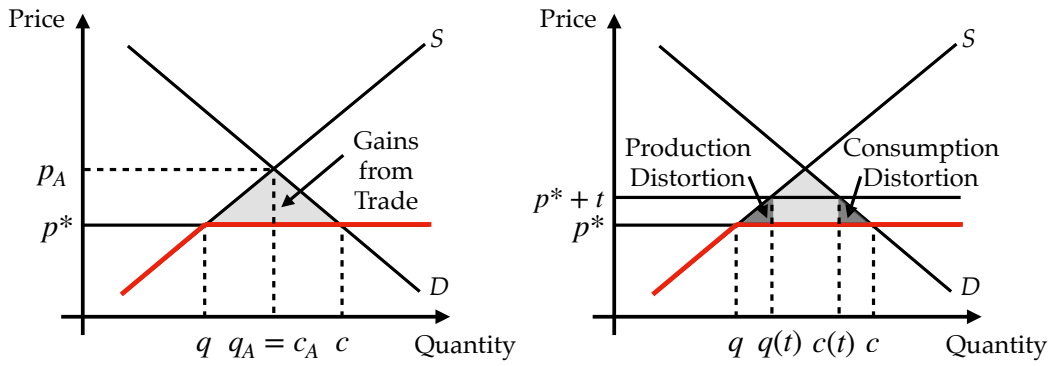
The fundamental issue with the mercantilist's perspective, however, is not positive, but normative. That is, why would the maximization of trade surpluses ever emerge as the relevant social welfare objective of a country? Imagine a radical government that chooses to prohibit the consumption of all goods in its economy. By doing so, it succeeds in turning a trade deficit into a trade surplus. Would anyone argue that social welfare must have increased as a result? Trade imbalances simply cannot be taken as a starting point for the welfare evaluation of trade policy. As repeatedly argued by trade economists, from Ricardo (1817) to Krugman (1996), countries are not like firms, and international trade is not a zero-sum game.

Act II: The Classical Case for Free Trade

The classical case for free trade turns the mercantilistic logic on its head. It puts people rather than firms at the center of the analysis, with imports the ultimate benefit from international trade and exports its unfortunate cost. At its core, the classical case for free trade can be broken down into two parts. First, opening up to international trade is a form of technological progress. Second, technological progress is welfare-improving and should not be restricted.

That the ability to trade with the rest of the world is, ultimately, a form of technological progress is one of the most fundamental observations in international economics. Figure 1 offers a simple graphical representation of this idea. Consider a good, say electric vehicles, that can be either produced domestically or imported from abroad at some fixed price p^*. Another so-called outside good is used as numeraire and implicitly exported in the background. The supply curve S represents the marginal cost of producing electric vehicles domestically. The demand curve D represents the marginal benefit of consuming electric vehicles.

Under autarky, a country must produce what it consumes, $q_A = c_A$, leading to an autarky price p_A. Under free trade, it also has the option of importing from



(a) Welfare Gains from Trade **(b)** Welfare Cost from Trade Protection

Figure 1: The Classical Case for Free Trade

abroad. Hence the relevant "technology" is the lower envelope of the domestic supply curve S and the horizontal line going through p^*, which is the foreign export supply curve. Going from S to the lower envelope of S and p^* is technological progress.

One may be tempted to view the fact that imports are equal to domestic consumption minus domestic production, $m = c - q$, as an accounting identity that defines imports. Figure 1 suggests instead to interpret $c = q + m$ as a structural relationship that reflects a choice over two distinct technologies, domestic production (q) and imports (m), that can both be used to deliver consumption (c). If the new technology "imports" is deployed efficiently, as described in Figure 1a, with domestic production occurring up to the point at which the domestic marginal cost is equal to p^* and domestic consumption occurring up to the point at which the domestic marginal benefit is equal to p^*, then opening up to trade must raise welfare.

By how much? The total gains from trade can be measured by the area of the gray triangle. They reflect the fact that in the absence of international trade, some electric vehicles would still be consumed, but produced at an unnecessarily high cost—the area of the triangle with base $q_A - q$. Furthermore, some electric vehicles

would no longer be consumed, despite the fact that its marginal benefit is greater than its marginal cost p^*—the area of the triangle with base $c - c_A$. The sum of the two is the area under the import demand curve.[4]

A tariff is not quite as bad as shutting down all trade, but it lowers welfare by distorting the way the new technology "imports" is being deployed. If a specific tariff t is imposed on imports of electric vehicles, it creates a wedge between the international price p^* received by foreign exporters and the domestic price p paid by domestic consumers and, in turn, received by domestic firms, with $p = p^* + t$.[5] This leads domestic firms to produce electric vehicles that should have been imported instead—a production distortion, corresponding to the area of the dark gray triangle with base $q(t) - q$—and consumers not to consume electric vehicles that should have been imported as well—a consumption distortion, corresponding to the area of the dark gray triangle with base $c - c(t)$. The welfare cost of trade protection is given by the sum of the two dark gray triangles in Figure 1b.

Act III: The Limits of the Classical Case

If trade is a form of technological progress, it may be tempting to conclude that tariffs and other trade restrictions are necessarily a bad idea. There is no reason to throw rocks in your harbor, even if other countries previously did so, as Beveridge (1931) observed in response to the rise of protectionism in the 1930s. Notwithstanding the rhetorical appeal of the rocks-in-the-harbor metaphor, the classical case for free trade is only a profound insight, not a universal truth about the world. Indeed, there are potential reasons why one may want, under certain

[4]The fact that the welfare gains from trade are equal to the area under the import demand curve, properly defined, does not depend on the partial equilibrium nature of the economy depicted in Figure 1, as further discussed in this journal in Costinot and Rodríguez-Clare (2018).

[5]For expositional purposes, we describe all trade taxes in this article in specific rather than ad-valorem terms. A specific tariff is the dollar amount that an importer must pay in order to import one unit, whereas an ad-valorem tariff is charged as a percentage of the import price. It is important to note, however, that if t is the optimal specific tariff, then the optimal ad-valorem tariff is simply $t^{av} = (t/p^*)$ and vice versa. The equivalence between the two instruments reflects the fact that what matters is the wedge between p and p^*, not how it is implemented.

circumstances, to limit technological progress, from the development of robots to artificial intelligence. The same general reasons apply to international trade: namely, efficiency and redistribution.

For now, we assume that trade taxes are the only policy instruments, besides a uniform lump-sum transfer used to rebate tax revenue. To streamline our optimal tariff formulas, we consider separately the cases for trade policy as a tool for efficiency, domestic redistribution, and international redistribution. Combining these three cases is straightforward. The optimal trade tax when all three motives are present is simply the sum of the three terms appearing on the right-hand side of each formula below.

Trade Policy as a Tool for Efficiency

Key to the classical case—in favor of free trade and against trade protection—is the idea that the invisible hand of the markets always leads the economy towards efficiency. In such circumstances, expanding technological possibilities, be it via new scientific discoveries or simply cheaper imports, must raise welfare. More options cannot make you worse off if you always pick the best one.

There are well-known reasons, however, why market forces may fail to deliver efficiency. Textbook examples include externalities, imperfect competition, and nominal rigidities. Might some degree of trade policy intervention be optimal in this case? The Theory of the Second Best answers in the affirmative. If there are pre-existing distortions, then using even an imperfect policy instrument that creates its own distortions can lead to efficiency gains.

For concreteness, let us start with an economy subject to an externality e. Firms are perfectly competitive and there is a representative agent, so that redistribution is not relevant in the model and correcting the externality is the only motive for trade policy. The externality e may be domestic in nature, like air pollution or local knowledge spillovers, or international, like global carbon emissions or some geopolitical action. What matters for our purposes is that the externality creates a wedge between the (net) social and private marginal costs of e, which we will

simply refer to as social harm.

Next, consider the following hypothetical scenario. Starting from observed trade policy levels, the government engineers a small policy change designed to lower the imports of a given good g by $\Delta m_g < 0$. In the absence of general-equilibrium effects, the required policy change would be a small increase $\Delta t_g > 0$ in the tariff imposed on that good. In the presence of general-equilibrium effects, this may require adjusting other tariff lines to make sure that, out of all the goods subject to trade policy, only the imports of good g vary. General-equilibrium considerations would also affect how changes in trade policy map into changes in the externality e. Fortunately, none of these complicated considerations affect the basic structure of what the optimal trade tax on good g ought to be. A necessary condition for the observed tax t_g to be optimal is simply

$$t_g = \text{Social Harm(e)} \times \frac{\Delta e}{\Delta m_g}, \qquad \text{(Externality)}$$

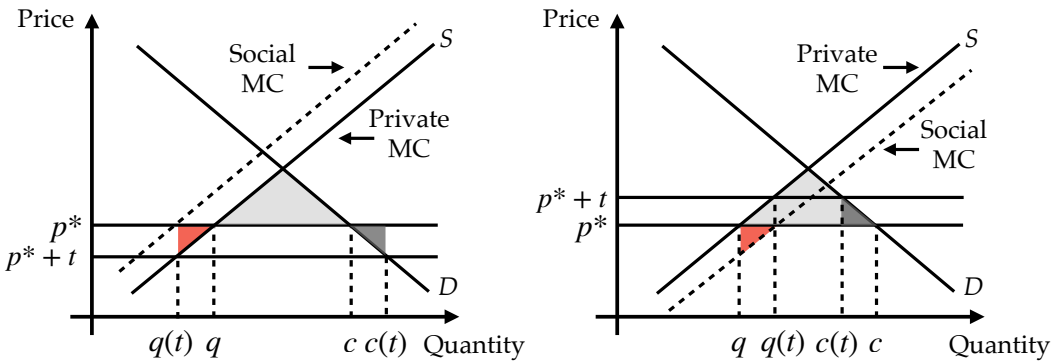
with the social harm of raising the externality e equal to

$$\text{Social Harm}(e) = \text{Social Marginal Cost}(e) - \text{Private Marginal Cost } (e),$$

which could be positive or negative depending on the sign of the externality.

The tariff in the externality formula equates the marginal benefit of the policy reform in terms of fiscal revenue, $t_g \Delta m_g$, with its marginal cost in terms of efficiency, Social Harm$(e) \times \Delta e$. Figure 2 illustrates the situation where the externality is caused by domestic production, so that $e = q$. If the externality is negative (Social Harm$(e) > 0$) and imports of good g reduce externalities ($\Delta e / \Delta m_g < 0$), then the optimal tariff is a subsidy, $t_g < 0$, as described in Figure 2a. The converse is true if the externality is positive, as described in Figure 2b. In each case, the gains from correcting the externality are given by the area of the red triangles.

The standard Pigouvian logic is that if consumers or firms do not internalize the social harm of their own actions, then a tax should make them pay for it. When the action of interest is directly generating the externality e, such as "emitting car-



(a) Negative Externality

(b) Positive Externality

Figure 2: Trade Policy as a Tool for Efficiency

bon," the policy recommendation is to set a carbon tax equal to its social harm. When the action of interest m_g is "importing Brazilian beef" or "importing Indonesian palm oil," the logic is the same, but it requires adjusting the social harm of carbon by the impact of import restrictions on global carbon emissions, as summarized by the term $\Delta e/\Delta m_g$ in the externality formula. This term captures all the general-equilibrium considerations that affect the relationship between trade policy and emissions, including the possibility of carbon leakage across countries. Existing work on trade policy and climate change (for example, Kortum and Weisbach, 2021, Hsiao, 2026, Farrokhi and Lashkaripour, 2025, and Garci-Lembergman et al., 2025) can be viewed as attempts to combine theory and data in order to provide empirically credible estimates of $\Delta e/\Delta m_g$. With these estimates at hand, along with an estimate of the social harm of carbon, commonly referred to as the "social cost of carbon," one can then use the externality formula to evaluate the optimality of current trade policy for any given good.

The same logic applies to any externality, not just environmental ones. Historically, the infant industry argument for (temporary) tariffs is a classical departure from free trade that arises from such considerations, as discussed in Bardhan (1970). If there are positive externalities due to learning-by-doing in some indus-

try—Irwin and Klenow (1994), Goldberg et al. (2024), and Barwick et al. (2025) provide estimates of such learning effects for the semiconductor and electric vehicle industries—then the above formula suggests subsidizing imports of goods g that raise output in this industry, like intermediate inputs used in the industry, and taxing import of goods that reduce it. The same logic also applies in the case of geopolitical considerations. For instance, a country may care about national security and the military action e taken by another, as emphasized in recent work by Becko and O'Connor (2025), Becko et al. (2025), and Clayton et al. (2026). If changes in imports can influence that decision, then Pigou's logic suggests restricting the imports of goods in proportion to their ability to influence this action, as again reflected in $\Delta e / \Delta m_g$.[6]

It should also be clear that there is nothing specific about externalities in the previous discussion. The same formula holds independently of why social and private incentives diverge. Suppose that because of imperfect competition, firms charge different markups on the goods that they sell, leading to misallocation in the economy, a classical theme in Helpman and Krugman (1989). As a result, the value of the marginal product of the factors that firms employ, say labor, is not equalized across these: employment in high-markup firms, whose goods are undersupplied, has higher marginal value than in low-markup firms, whose goods are oversupplied. Let e_n denote employment in a given firm n. In this situation, the wedge between the (net) social and private marginal costs of e_n is the opposite of firm n's markup τ_n. Pigou's logic then implies setting a tariff on the imports of good g equal to its damage on misallocation in the economy,

$$t_g = -\sum_n \tau_n \times \frac{\Delta e_n}{\Delta m_g}. \qquad \text{(Misallocation)}$$

This misallocation formula holds true regardless of whether firms are monopolistically competitive or whether they are strategic and compete à la Bertrand, Cournot, or some variation. This is also true when the difference between pri-

[6]Compared to Becko and O'Connor (2025), Becko et al. (2025), and Clayton et al. (2026), we abstract from the issue of how trade policy may also be used as a threat off-the-equilibrium path.

vate and social marginal cost τ_n arises from taxes faced by firms, in which case $\sum_n \tau_n(\Delta e_n/\Delta m_g)$ is equal to the so-called fiscal externality associated with these taxes.[7] We will return to this important observation when discussing environments in which governments may use other taxes to achieve their objectives, and show that the same Pigouvian logic continues to apply.

Atkin and Donaldson (2022) provide estimates of these misallocation terms for various countries around the world, which one could use again to conduct optimal trade policy. If import-competing sectors tend to have lower markups, then the optimal trade policy may be import subsidies that relocate workers towards sectors with higher markups. The same logic also applies when the "labor wedge" between the social and private marginal costs of employment arises from nominal wage rigidities, as emphasized by Johnson (1965).

Trade Policy as a Tool for Domestic Redistribution

Traditionally, Pigou's ideas have been associated with non-pecuniary considerations. An inefficient level of economic activities, perhaps pollution or employment, is what creates a rationale for taxation. Interpreted more broadly, the same ideas, however, are equally useful to shed light on pecuniary considerations. We start by discussing domestic redistribution here.

Suppose now that the allocation of resources in the economy is efficient and that international prices are fixed, so that the only relevant consideration for evaluating the effects of trade policy is how it affects domestic prices $(p_1, ..., p_N)$. This long vector includes the prices of all tradable goods that may directly be affected by trade policy, as well as the prices of non-tradable goods, wages, and any other primary factor of production that may also be indirectly affected by trade policy. In this case, going through the same hypothetical scenario where the government lowers the imports of good g, the necessary condition for the observed tariff on

[7] Harberger (1964) offers an early discussion of the equivalence between taxes and various distortions or wedges. More recently, this equivalence plays a central role in the misallocation literature, from Hsieh and Klenow (2009) to Baqaee and Farhi (2020).

good g to be optimal is

$$t_g = \sum_n \text{Social Harm}(p_n) \times \frac{\Delta p_n}{\Delta m_g}, \qquad \text{(Domestic Redistribution)}$$

with the social harm of raising p_n now a combination of the social marginal cost for the buyers of good n and the social marginal benefit for their sellers,

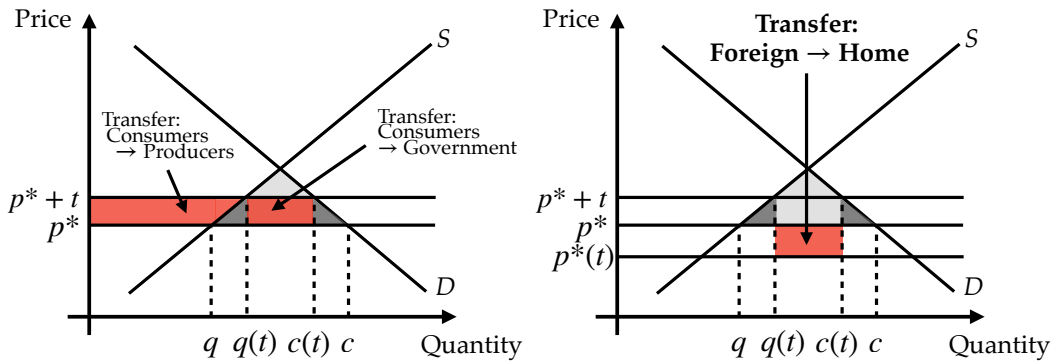
$$\text{Social Harm}(p_n) = \sum_h \text{Social Return of Fiscal Transfer to } h \times m_n(h),$$

where $m_n(h)$ denotes net trade of a good or factor n by a household h. Net trade $m_n(h)$ is positive if h is a net buyer of n (for example, of electric vehicles or tee-shirts) and negative if h is a net seller (for example, of blue- or white-collar labor services).

If the value of a marginal dollar in the hands of the government is the same as the marginal value of a dollar in the hand of household h, then the social return of a fiscal transfer to h is zero. And if this is true for all households, then the redistributive tariff should be set equal to zero. This assumption was implicit in the classical case for free trade described in Figure 1. But in general, one may value using trade policy to affect domestic prices and, in turn, the real income of different households. The domestic redistribution formula plays a central role in the political-economy of trade literature, with Grossman and Helpman (1994) offering the most influential micro-foundations for differences in the social return of fiscal transfers to different households in a model of lobbying.

Figure 3a offers a graphical representation where we have highlighted (in red) the transfers from consumers to producers and from consumers to the governments.[8] For a given social welfare criterion, one can view the fact that the social marginal value of income is not equalized across households as another source of

[8]To make the redistributive effects stark, we treat consumers and producers as distinct groups of households in this example. Consumers own the outside good, which they sell to purchase the good whose demand and supply are displayed in Figure 3a. Producers own the output of this good, which they sell to purchase the outside good.



(a) Domestic **(b)** International

Figure 3: Trade Policy as a Tool for Redistribution

distortion. In the same way that policy intervention could improve welfare by reallocating resources to the "right" activities—that is, those deemed to have higher marginal values—policy intervention may now improve welfare by reallocating income to the "right" households, even if production were to remain unchanged.

Using tariffs to finance an exogenous stream of government revenues can be viewed as a special case of domestic redistribution, from the private sector to the government. In this case, the magnitude of government expenditure determines the (negative) social return of transfers to a representative domestic household. The domestic redistribution formula for an optimal tariff then reduces to Ramsey's tax formula, which calls for minimizing the real income cost to the domestic household, subject to satisfying the budgetary needs of the government.

Like in the case of trade policy as a tool for efficiency, whether or not there are general equilibrium effects does not affect the previous Pigouvian logic. It only affects how a government would go about restricting imports to achieve its redistribution objective. For instance, if there are no general-equilibrium effects, a government that wants to redistribute income towards textile workers may only want to restrict textile imports. If there are general-equilibrium effects, a government should also take into account how input-output linkages and factor mobility

across sectors would also affect the return to these workers. In this case, import restrictions on one good may have implications for the prices of other goods and factors. Quantitative trade models and computers may again be required, as in Adão et al. (2025), to solve for these complicated effects and derive estimates of $\Delta p_n / \Delta m_g$ for the domestic redistribution formula. But the Pigouvian logic remains straightforward: if $\Delta p_n / \Delta m_g > 0$ and the social harm of raising p_n is positive, because it lowers the real income of households with higher social marginal value of income, then the optimal tariff on good g should be set equal to the social harm that it generates. When poor households have higher social marginal value of income than rich households, trade policy can raise social welfare by engineering, through changes in domestic prices, a progressive redistribution of income.

Trade Policy as a Tool for International Redistribution

We can apply the Pigouvian logic in the exact same manner when the motive for trade policy intervention is international redistribution. Suppose again that the domestic allocation of resources is efficient, but now assume that by restricting imports, a country may affect the international prices $(p_1^*, ..., p_N^*)$ paid and received by foreigners. Again, this long vector may include the prices of tradable goods, but also the prices of non-tradable goods and wages.[9] Finally, in order to isolate the international redistribution motive, suppose that the social return of a fiscal transfer to any domestic household is zero.

Let us return to a hypothetical policy reform that reduces imports of good g and, in turn, triggers an adjustment in the vector of international prices Except for the fact that international rather than domestic prices are now the variable of interest, there is no difference compared to the case that we have just studied. For

[9] In theory, this long vector could also include the prices of goods in different periods or states of the world. In Costinot et al. (2014), we use this broader interpretation to tackle the question of optimal capital controls as a special case of optimal trade policy. Davila et al. (2025) use a similar approach to study optimal tariffs in dynamic heterogeneous agent economies.

the observed tariff on good g to be optimal, the following condition must hold

$$t_g = \sum_n \text{Social Harm}(p_n^*) \times \frac{\Delta p_n^*}{\Delta m_g}, \qquad \text{(International Redistribution)}$$

with the social harm of raising a given price p_n^* a function of whether foreigners are net buyers or sellers of good n,

$$\text{Social Harm}(p_n^*) = \text{ Social Return of Fiscal Transfer to Foreigners} \times m_n^*,$$

where $m_n^* = -m_n$ are net foreign imports of good n, in line with our previous notation for domestic households.

The social return of a fiscal transfer to foreigners depends on the social marginal value of foreigners' income. The classical optimal tariff argument, discussed in the early work of Mill (1844), Torrens (1844), and later Edgeworth (1894), assumes that the social marginal value of foreigners' income is exactly zero. Under this assumption, the social return of a fiscal transfer to them is equal to -1. In this case, the international redistribution tariff formula simplifies into

$$t_g = \sum_n m_n \times \frac{\Delta p_n^*}{\Delta m_g}. \qquad \text{(Terms-of-Trade Manipulation)}$$

It captures the idea that a country with the ability to manipulate its terms of trade may exercise its monopsony power to reduce the price of its imports and its monopoly power to raise the price of its exports, thereby transferring income from foreigners to itself. The terms-of-trade manipulation formula therefore mimics the optimal pricing rule of a multi-good firm that acts both as a monopsonist and as a monopolist. In the special case with only two goods, with good g the one subject to an import tariff and the other good the numeraire, the previous formula implies that the optimal import tariff, expressed in ad-valorem terms, should be equal to the inverse of the elasticity of the foreign export supply curve, $t_g/p_g^* = \Delta \ln p_g^* / \Delta \ln m_g$, as in Johnson (1951-1952).

Figure 3b offers a graphical representation. The upside of distorting imports

of good g is to lower its international price and create a transfer from foreigners (in red). If a country cannot affect international prices, then the terms-of-trade manipulation formula implies free trade. But if it can, and domestic consumers and firms do not internalize the impact of their behavior on international prices, Pigou's logic calls for an optimal tax on each good g that is equal to the marginal effect of its imports m_g on the country's terms of trade, $\sum_n m_n \times \Delta p_n^*$.[10]

More generally, the social marginal value of foreigners' income could be either positive—perhaps because of international cooperation along other dimensions, as in Adão et al. (2026)—or negative—perhaps because of the desire to impose economic sanctions, as in Becko (2024). A lower value implies a lower social fiscal return of transfer to foreigners and, in turn, a uniform shift in the optimal trade policy t_g, but it does not affect how trade taxes should vary across goods, as emphasized by Becko (2024). General-equilibrium considerations, as complex as they might be, are again encapsulated in the marginal effect of import restrictions on the distorted economic variables, now in the form of the vector of international prices. The emergence of global value chains, a much discussed phenomenon, matters if it affects these marginal effects.[11]

We have abstracted so far from the issue of foreign retaliation. Would retaliation invalidate the argument? As a theoretical matter, the answer is no. These considerations would affect the value of world price changes $\Delta p_n^* / \Delta m_g$ entering the international redistribution formula, but not the structure of the formula it-

[10] We have highlighted the parallel between the domestic and international redistribution formulas. A similar connection holds between the misallocation and international redistribution formulas. When international prices are endogenous, domestic consumers and firms do not use the trade technology efficiently because they fail to recognize that the social marginal cost of their imports m_g includes the price effects on infra-marginal units of all other goods. The optimal Pigouvian tax asks them to pay for Social Harm$(m_g) = \sum_n m_n \times \frac{\Delta p_n^*}{\Delta m_g}$, consistent with the misallocation formula.

[11] An interesting, but distinct issue related to global value chains is whether they lead to cross-country ownership of assets. Implicit in our discussion is the assumption that foreigners face international prices p^* and not domestic prices p. If foreigners own domestic assets because of foreign direct investment, then changes in p would also affect the magnitude of income transfers to the rest of the world. Blanchard (2009) offers an example. In such situations, a country may have incentives to lower domestic prices uniformly as a way to expropriate foreigners, leading to departures of Lerner Symmetry, as we discuss in Costinot and Werning (2019).

self. Suppose that changes in trade policy at home cause changes in trade policy in the rest of the world. In this case, foreign retaliation, whether conducted by one or many trading partners, becomes one more determinant of the response of international prices to imports, alongside the other economic considerations that shape those price adjustments. Likewise, a country could anticipate that under World Trade Organization rules, any change in tariffs would be reciprocated by a change in foreign tariffs that keeps its terms of trade fixed, as in Bagwell and Staiger (1999). As a practical matter, of course, retaliation is a potentially important argument against attempts at terms-of-trade manipulation, as the foreign policy change could even turn what would have been a positive transfer from abroad into a negative one.

How large are the tariffs called for by the terms-of-trade manipulation formula? Quantitative trade models can provide values under assumptions about the structure of preferences, technology, and market structure. In Ossa (2014), abstracting from foreign retaliation, the median values are around 60 percent. In Broda et al. (2008), using a simpler partial equilibrium analysis, they are around 160 percent! None of these estimates, however, use actual changes in trade policy to estimate its incidence on international prices directly. Instead incidence is inferred indirectly, through the lens of a structural model, via the response of import prices and quantities to other shocks. The question of whether countries can manipulate their terms of trade—and in turn let foreign exporters pay for tariffs via a decrease in the prices they receive—is far from settled empirically. Recent evidence collected during the US-China trade war points to perhaps surprisingly small responses of international prices to US tariffs. Both Fajgelbaum et al. (2020) and Amiti et al. (2019) cannot reject a zero effect of US tariffs on the international prices of US imports that were targeted by tariffs, relative to US imports that were not. Put differently, there was almost complete pass-through of US tariffs into domestic prices. This is interesting, but it should be clear that the results from these difference-in-difference regressions do not imply that the optimal tariff is zero. The terms-of-trade manipulation formula includes all goods, including those that the US exports. The United States could improve its terms of trade if it could raise

the price of its exports relative to its imports, but recent empirical evidence simply does not shed light on the size of this effect.

Act IV: The Targeting Principle

Compared to the classical case for free trade, which assumes that laissez-faire is optimal, the Targeting Principle offers a more subtle and robust defense The economy may be distorted and government intervention may be warranted. Yet one cannot conclude that a tariff is optimal without making it compete with other available instruments. The Targeting Principle suggests that trade policy is acupuncture with a fork, and calls for using needles instead.

A Better Way to Improve Efficiency

To put a little more meat on the distinction between forks and needles, let us return first to the case of a domestic externality e, such as air pollution or local knowledge spillovers. Suppose that the government, in addition to trade policy, has access to another policy instrument t^e, which it can use to tax or subsidize e. This will be the needle in this example.

A simple way to understand how the Targeting Principle operates is to note that with access to another policy instrument, it is optimal for the government to set $t^e = \text{Social Harm}(e)$, which is the textbook Pigouvian tax that restores the first-best allocation. Now returning to the externality formula, and taking into account the fiscal externality associated with the corrective tax $t^e \Delta e$, this implies

$$t_g = [\text{Social Harm}(e) - t^e] \times \frac{\Delta e}{\Delta m_g} = 0.$$

When the other policy is in place, there is no longer a wedge between private and social marginal costs and the rationale for using non-zero trade taxes evaporates.

Intuitively, when trade policy is used to correct a distortion, it is at the cost of potentially creating another. In Figure 2, for instance, the problem is the level

of domestic output ($e = q$). A small tariff helps to bring q closer to the social optimum, but at the cost of pushing domestic consumption c away from its optimal level. In this example, if a production subsidy is available, it ought to be used to target the underlying distortion. This is why trade policy intervention is acupuncture with a fork.

The same logic applies if there are multiple domestic externalities, if some of these externalities are dynamic, as in the case of the infant industry argument, or if there is domestic misallocation due to imperfect competition, nominal rigidities, or financial constraints. If the government has access to additional policy instruments to target domestic distortions directly, then it should take advantage of these and let trade be free.

A Better Way to Redistribute

The Targeting Principle can also be applied to adjudicate the role that trade policy should play, or not, as an instrument for domestic redistribution, either across different households or as a way to collect revenues for government spending.

As a first benchmark, suppose that the government has access to unrestricted lump-sum transfers, an admittedly extreme assumption. In this environment, lump-sum transfers should be engineered up to the point at which the social marginal utility of income of every household is equal to the social marginal value of public funds and the marginal return of a fiscal transfer is zero. Since lump-sum transfers are non-distortionary, our domestic redistribution formula continues to apply. But once the social return of fiscal transfers is zero, the formula implies zero trade taxes. The alternative policy tool means that seeking to use trade for redistribution is superfluous, as lump-sum transfers alone restore the first-best allocation.

Of course, unrestricted lump-sum transfers are not available in practice, and it is hard to imagine that they ever will be. As a first step towards greater realism, Diamond and Mirrlees (1971) and Dixit and Norman (1986) turn to an environment in which the government instead has access to a complete set of linear

commodity taxes t^c, which it could use to pursue its redistribution objective. The set of commodity taxes include both taxes on goods and factors, which can create a wedge between the prices faced by domestic households and domestic firms. Would the government also want to use trade policy in this case? A corollary of Diamond and Mirrlees' (1971) production efficiency result is that trade, viewed as another technology to deliver domestic consumption, should not be taxed.

To understand how this celebrated result relates to the Targeting Principle and the Pigouvian logic developed earlier, consider again a hypothetical policy reform that reduces imports of good g by some small amount, but now accompanied by a change in commodity taxes that keeps fixed the prices p faced by domestic households. A complete set of commodity taxes t^c makes such a combined policy reform feasible. Since domestic prices are fixed, there are no income transfers across households and the optimal tariff implied by the domestic redistribution formula would again be zero. The remaining issue is whether commodity taxation creates additional distortions. The answer is no, since households have no reason to alter their behavior. It follows again that the optimal policy must be free trade.[12]

Even when optimal commodity taxes are in place, the economy considered by Diamond and Mirrlees (1971) and Dixit and Norman (1986) does not replicate the first-best allocation. When the government's goal is to redistribute, rather than improve efficiency, it must introduce distortions that would have been absent under laissez-faire. The more robust insight here is that if needles exist to achieve a given policy goal—in this case, in the form of commodity taxes that can directly target the prices faced by domestic households—then they should be preferred to coarser trade policy instruments.

[12]For the curious and mathematically inclined readers, the complete argument is as follows. Recall that if there are multiple rationales for trade policy intervention, then one should take the sum of our Pigouvian formulas. In the presence of distortionary commodity taxation, this implies

$$t_g = -\sum_n t_n^c \times \frac{\Delta c_n}{\Delta m_g} + \sum_n \text{Social Harm}(p_n) \times \frac{\Delta p_n}{\Delta m_g},$$

where the fiscal externality $-\sum_n t_n^c \times (\Delta c_n / \Delta m_g)$ reflects the efficiency motive in the misallocation formula. The policy reform is constructed so that $\Delta p_n = \Delta c_n = 0$ for all n. This generalized formula therefore implies $t_g = 0$.

Act V: Two Limits to the Targeting Principle?

As a defense of free trade, the Targeting Principle has two limits. First, it only renders trade policy intervention superfluous when the relevant targets are domestic rather than international. Second, even when the policy target is domestic, the needles that it calls for may be much finer than those available to governments in practice, in which case tariff policy may re-appear on the policy menu as a flawed but practical real-world alternative.

When Targets Are International

The classical optimal tariff argument, which emphasizes a country's ability to manipulate its terms of trade, is often presented as the key theoretical exception to the optimality of free trade. Irwin (1996) describes it as "the hardest to refute on theoretical grounds and [...] the most important exception to free trade ever conceived." One reason is that trade policy intervention in this case is fully consistent with the Targeting Principle.

From an empirical standpoint, one may question the magnitude of terms-of-trade movements that an individual country is able to engineer, especially in the presence of foreign retaliation. From a moral standpoint, one may also object to a government assigning zero marginal value to income in the rest of the world and, in turn, benefiting from making foreigners poorer. Irwin (1991) reminds us of the memorable words of Edgeworth (1908), who helped lay the theoretical foundations of the terms-of-trade argument. Referring to the subsequent work of Bickerdike (1906), he notes: "The direct use of the theory is likely to be small. But it is to be feared that its abuse will be considerable . . . Let us admire the skill of the analyst, but label the subject of his investigation POISON."

However, if a government's objective is international redistribution, it should be clear that trade policy is a targeted way to achieve it. As previously discussed, the classical tariff argument, formalized in the terms-of-trade manipulation formula, corresponds to the special case where the targets of interest are interna-

tional prices. There are no domestic policy instruments that can give a country direct control over those prices, above and beyond what trade policy can achieve.

This observation applies more broadly to any international target, not just international prices. We have already mentioned the case of global carbon emissions and geopolitical actions. What these two examples have in common is that the externality derives, at least partly, from actions taken in the rest of the world, which domestic policy instruments do not directly control. Hence, a country that decides to fight climate change unilaterally should tax its own carbon emissions. But because a country cannot directly tax foreign carbon emissions, trade policy is, from its perspective, the optimal way to tackle emissions in the rest of the world. Compared to the earlier externality formula, the only difference is that the relevant changes in carbon emissions are foreign rather than global ones. If foreign emissions arise solely from domestic consumption, the optimal tariff on good g reduces to the social cost of carbon multiplied by the carbon content of good g's imports, consistent with a carbon border adjustment mechanism. If foreign emissions partly derive from foreign consumption, then optimal trade policy ought to seek to affect these emissions indirectly as well.

Compared to the classical tariff argument, terms-of-trade manipulation is no longer an end in itself, but it remains critical. If countries cannot affect international prices, then they are unlikely to affect carbon emissions in the rest of the world either, since it is changes in international prices that incentivize beef producers in the Amazon or palm oil producers in Indonesia to alter their behavior.[13] The same logic applies to tariffs used as sanctions for geopolitical purposes.

[13] A small caveat is that our observation presumes a unique mapping from international prices to foreign exports and imports. In theory, foreign firms may be indifferent between selling domestically or exporting, in which case trade policy in one country may affect quantities in the rest of the world, even without changes in international prices. Such a situation arises in Kortum and Weisbach's (2021) Ricardian model. We thank Sam Kortum for pointing this out.

When Domestic Instruments Are Coarse

Let us return once more to the case where domestic redistribution is the only motive for trade policy intervention. On the one hand, it is unrealistic to assume that no other policy instruments are available to achieve this goal. As Rodrik (1995) puts it, "Saying that trade policy exists because it serves to transfer income to favored groups is a bit like saying Sir Edmund Hillary climbed Mt. Everest because he wanted to get some mountain air. There was surely an easier way of accomplishing that objective." On the other hand, it is equally unrealistic to assume the availability of lump-sum transfers to achieve redistribution at no efficiency cost.

The production efficiency result of Diamond and Mirrlees (1971) discussed earlier relies on assumptions that are less extreme than the availability of unrestricted lump-sum transfers, but still demanding. For their result to hold, the government needs access to a complete set of commodity taxes—not just different taxes on different goods, such as electric vehicles and tee-shirts, but also on different factors, such as tech and textile workers. In principle, workers with distinct skill sets may be taxed differently, even if they earn the same income.

In Costinot and Werning (2023), we explore a more realistic environment in which the government can use domestic taxes for redistribution, but these are limited to nonlinear income taxes, as in Naito (1999). The only restriction that we impose on social preferences is that the government cares about the distribution of real income, not the identity of who is rich or poor.[14] In this setting, we show that trade policy can be used as a form of predistribution that complements redistribution through income taxation.

To see how departures from free trade may arise, consider again a reduction in imports of good g, now accompanied by an adjustment in the income tax schedule designed to hold fixed the distribution of real income. By construction, there is no

[14]This anonymity criterion is attractive from a normative standpoint, our primary focus in this paper. In practice, however, governments may place greater weight on individuals associated with certain sectors or states, perhaps because of differences in their ability to lobby or to be pivotal in elections. If so, their choice of trade taxes would also reflect these political-economy considerations, in line with the domestic redistribution formula. Adão et al. (2025) conclude that such considerations account for about one-third of US tariff variation.

direct benefit to this policy reform in terms of redistribution. But unlike in the case of commodity taxation discussed above, there is now potentially a nonzero fiscal externality arising from changes in labor supply. By the same Pigouvian logic as in the misallocation formula, the optimal trade tax on good g must be equal to

$$t_g = -\sum_n \tau_n \times (w_n \ell_n) \times \frac{\Delta \ln \ell_n}{\Delta m_g},$$

where τ_n is the marginal income tax rate faced by households at the n-th quantile of the wage distribution, $w_n \ell_n$ is their earnings, and $\Delta \ln \ell_n$ is the resulting change in labor supply. In addition, in order to keep real income fixed, changes in labor supply must offset changes in relative wages, implying

$$\frac{\Delta \ln \ell_n}{\Delta m_g} \propto -\frac{\Delta \ln \omega_n}{\Delta m_g},$$

where $\omega_n = (w_{n+1} - w_n)/w_n$ measures wage growth across quantiles, i.e., inequality, and the coefficient of proportionality is pinned down by labor supply elasticities.

When relative wages are fixed, so that $\Delta \ln \omega_n / \Delta m_g = 0$, this new formula implies free trade. But when imports are associated with a steepening of the wage schedule, so that $\Delta \ln \omega_n / \Delta m_g > 0$, the same formula calls for trade policy to be used as a form of predistribution. Unlike in the domestic redistribution formula, knowledge of the social marginal value of transfers to different households is not required. This opens up the possibility of a purely empirical evaluation of whether observed trade policy is optimal.

As an illustration of how to combine theory and data to shed light on optimal trade policy, Costinot and Werning (2023) use existing empirical work on the China shock as inputs into the above formula. A large literature has documented the effects of the rise of China on US labor markets, most notably Autor et al. (2013), Autor et al. (2014), and Acemoglu et al. (2016). This important body of work, however, leaves open the question of what these effects imply for US policy. Using estimates of the effect of Chinese import competition on US wages at

different quantiles of the wage distribution from Chetverikov et al. (2016), along with measures of marginal US income tax rates and estimates of labor supply elasticities, this formula implies an import tariff on Chinese goods of 0.07 percent.

In a nutshell, the available evidence suggests that large changes in imports induce modest changes in relative wages, in the sense that $\Delta \ln \omega_n / \Delta m_g$ is small. As a result, the fiscal cost of distorting imports in order to achieve predistribution is high and the optimal tariff is low. Although free trade need not be optimal in this context, it remains an excellent approximation.

Concluding Remarks

There is more to optimal trade policy than free trade. Mercantilist fallacies aside, we have shown that the same Pigouvian perspective can be used as a unifying framework to understand when trade policy intervention is warranted and when it is not. From the classical optimal tariff argument of Mill (1844) and Torrens (1844) to contemporary debates about global carbon emissions and geopolitics, all the formulas presented in this article derive from the same basic principle: if domestic firms and consumers do not internalize the marginal impact of their imports on social welfare, they should be asked to pay for it. Despite the complexity of general-equilibrium interactions, optimal trade policy can be expressed as a function of a few sufficient statistics that do not depend on the details of such interactions.

We recognize that many of these statistics may be hard to measure in practice and unlikely to be pinned down by empirical work alone. For instance, if the European Union were to reduce its imports of Brazilian beef, by how much would carbon emissions abroad decline? Current answers to such questions depend not only on data, but also on the specific structure of the quantitative trade models used to harness them.

Yet such limitations do not lessen the importance of clarifying when and why a government may wish to tax or subsidize trade. The Pigouvian formulas pre-

sented in this article highlight what matters and what ideally needs to be known. To go from data to policy recommendation, one needs a theoretical compass. We hope this article helps orient ongoing and future debates in the right direction.

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