Topic 7: Import quotas and other non-tariff barriers

Introduction and small-country quota analysis

A quota is a limit on trade, usually imports. They remain reasonably common in agricultural goods (for example, the US constrains imports of dairy goods, sugar, meats, and other foods). A quota may be imposed either on quantity (a limit on the number of goods that may be imported) or on value (a limit on the dollar value of imports of a particular good).

Let's first see how a quota works, analyzing a small importing nation, which imports textiles (T). Consider this diagram, where the quota is distance $Q_T^1C_T^1$ = AB.

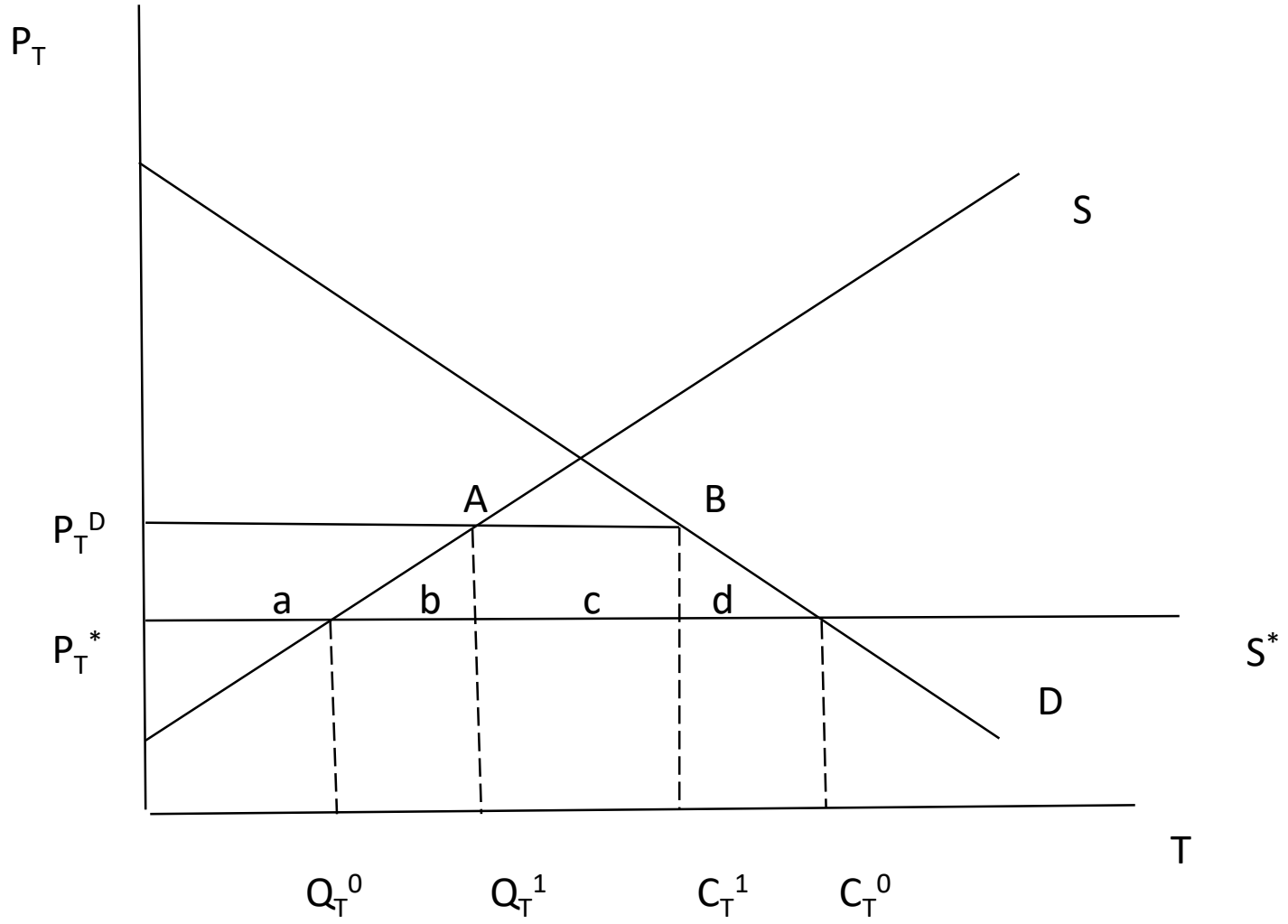
The standard welfare effects are much like a tariff:

Domestic price rises to make the amount of the quota equal to the difference in domestic supply and demand. The quota has engineered a shortage on the market, requiring price to rise.

There is a loss in consumer surplus of –(a + b +c + d).

There is a gain in producer surplus of + a.

The area c is what we call "quota rents". In economics, a "rent" is the payment to owners of a scarce asset in excess of what is required to supply the good. Here, the amount imported under the quota could be imported at the world price p_T^* but those goods command a domestic price p_T^D.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Quota rents

The important question here is how are these quota rents allocated? This will determine the net welfare impacts. Here are the main possibilities.

1. Government could sell the quota rights in an efficient (competitive) auction to anyone willing to bid for them. If it's truly competitive, bidders will bid up the price of the rights to import each unit of the quota to $p_T^* p_T^D$ and the area c becomes quota auction revenues to the government. This situation is fully analogous to tax revenues with a tariff and the net welfare effect is – b – d, as with a tariff.

2. The government could simply give the licenses away to domestic interests, most likely domestic producing or importing firms in the same industry. Then these firms receive the quota rents (they can import the good at p_T^* and sell it at p_T^*). But since these are domestic citizens, we think of the rents (area c) as just a transfer from consumers to these domestic quota rights recipients. Then area c is again a welfare gain and the net welfare effect is – b – d yet again.

Quota rents

3. The problem with case 2 is that because the quota rents are quite valuable we can expect domestic firms to engage in *rent-seeking* to gain the rights to import. ***Rent-seeking may be defined as spending real resources (labor and capital, etc.) to gain ownership of scarce quota rents.*** These resources are wasted because they would not be invested in this way if there were no quota. Here are examples of costly rent-seeking:

- Building a lobbying office and hiring lawyers to convince the government to give the quota rights to particular people.
- Investing in additional (unneeded) production capacity to convince the government that your firm is larger than it really is and therefore should be given a higher share of the quota licenses. This kind of thing is very common since governments find it natural to hand out quotas to firms based on their market shares.

How much rent-seeking might we expect? In principle we might expect enough wasteful rent-seeking to fully account for the quota rents, in which case area c becomes an economic loss. That is, area c is taken away from consumers by the quota but no offsetting income is generated because resources are lost in acquiring rights to area c. In essence, area c is just dumped into inefficient resource waste. In that case the net welfare effect is – b – d – c.

Quota rents

I should note that rent-seeking is not really the same thing as bribery or simply making direct payments to government officials to get the quota rights. Bribery is more like number 2 above, just in a different way. In this sense, bribery is not necessarily inefficient.

But you shouldn't really believe that; in the real world bribery happens behind the scenes and contributes to corruption, which is a major impediment to economic growth.

Is there a lot of wasteful rent-seeking in the world? Yes, estimates in India in 1980s and poor countries more recently claim it may be as much as 30% of GDP in those countries. Not just for import quotas but all kinds of licensing rights, which officials may sell or give to favored individuals.

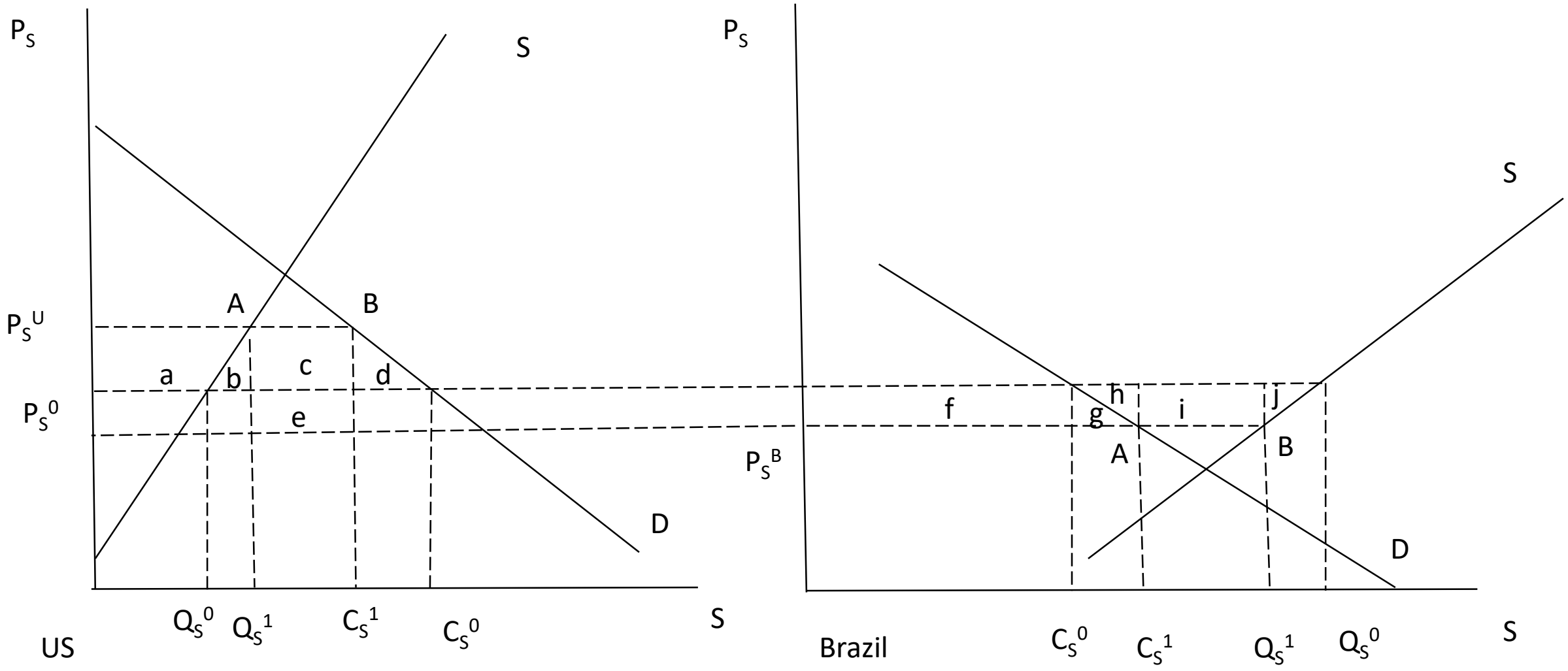
4. The government might prefer to establish a *voluntary export restraint* (VER), in which it tells the exporting country's government to limit exports to the importer's market by distance AB. In that case, the scarcity values (quota rents) go to the foreign country, where they could be auctioned, handed out, or disappear in rent-seeking. The main point for our analysis is that because area c now goes to someone overseas it is no longer a gain in terms of revenues for the home country. The net welfare effect of the VER for the home (importing) country is then – b – d – c.

Large-country quota analysis

On the next chart is the corresponding analysis for a large importer. Suppose the US imports sugar from Brazil and imposes a quota of horizontal distance AB on imports from Brazil.

The US price rises to p_S^U and the Brazilian price falls to p_S^B. The quota rents in the US are areas + c + e. Using the analysis from above (and thinking back to the large-country tariff) we can see the following (you'll need to think through the consumer surplus and producer surplus changes):

- US overall gain or loss = - b – d + e. Here, e is the transfer from Brazil to the US associated with the lower import price (a terms of trade change that favors the US and is bad for Brazil). But this assumes the US government or other domestic quota recipients get the rents efficiently, i.e., no rent-seeking.
- Again we can see the idea of an "optimal quota" based on the possible improvement in the US terms of trade.
- But if there is full rent-seeking, areas c and e disappear into wasted resources. In this case the US welfare effect is – b – d + e – (c + e) = – b - d – c. This is an overall welfare loss because both the terms of trade gain e and the domestic rents c disappear into rent-seeking.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Welfare impacts in Brazil

From Brazil's standpoint the US quota is shown again as horizontal distance AB. Again, you will want to think through the impacts on producers and consumers.

If the US policy is implemented as an import quota then (as before with the tariff) Brazil loses area – h – i – j. Area i (equal to area e) is the transfer from Brazilian exporters to US recipients of quota rents.

But if it's a VER in which the US asks Brazil to limit its exports then Brazilian exporters (or the Brazilian government) would receive the VER rents.

We would then have Brazil gain or loss = - h – i – j + (c + e) = - h – j + c if there is no rent-seeking. In this case area c is ceded to Brazil by the US; in effect the US policy is to "give" the quota rents to Brazil, perhaps in order to make their exporters choose not to lobby against the policy.

Finally, if there is full rent-seeking in Brazil then Brazil's VER rents (+ c + e) disappear into resource wastes. Then the overall Brazil loss = - h – i – j + (c + e) – (c + e) = - h – i – j. Here, - h and – j are deadweight efficiency losses and – i is the loss to Brazilian sugar producers that disappears into rent-seeking in Brazil.

Differences between tariffs and quotas

Where we are at this point:

- In the simplest analysis, import tariffs and import quotas have identical effects on the home country (the case of no rent-seeking for quotas). Both generate deadweight losses offset by either tariff revenues or quota rents.
- But if there is rent-seeking then the scarcity rents of quotas disappear into inefficient resource wastes and/or bribery. We conclude that quotas are worse than tariffs in this case.
- And if the policy is to "ask" foreign exporters to limit their exports in a VER, any revenues or rents go to foreigners, which is clearly worse than a quota for the home country.

So we can "rank" policies in terms of home welfare losses as tariffs are least costly, quotas are more costly and VERs are most costly.

In fact, for these reasons VERs and quotas have been largely eliminated by WTO rules. But there still are quotas and VERS. Why?

Simple answer for VERs: they are a way of "managing trade" and paying off the exporters who lose sales in the home country. Foreign government may choose not to retaliate. The Trump steel tariffs actually are VERs in some cases.

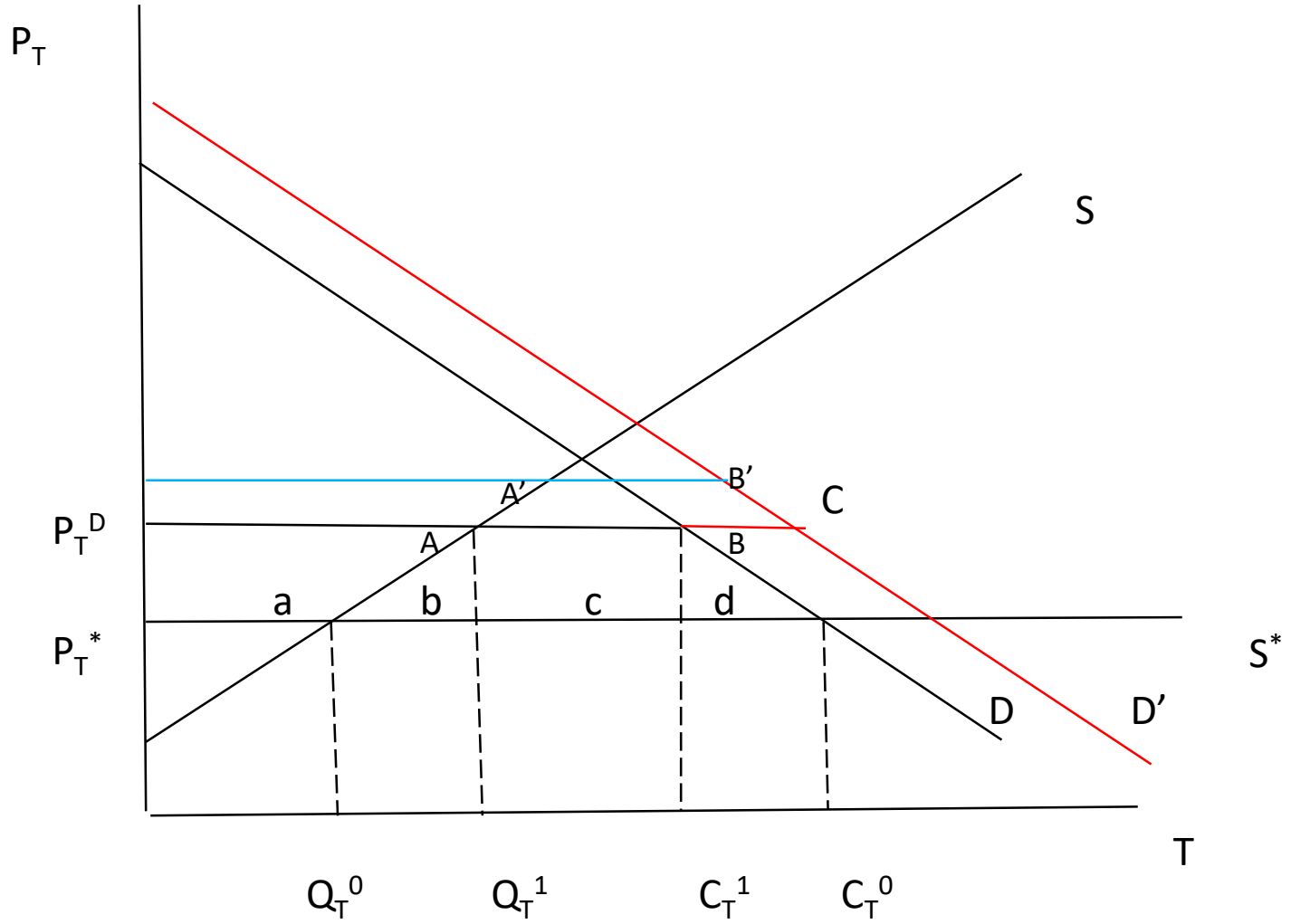
Differences between tariffs and quotas

But there are more differences to highlight between tariffs and quotas.

1. Rent-seeking under quotas. We have already analyzed this case.

2. Domestic responses to shifts in supply and demand vary between tariffs and quotas. Recall the basic diagram for a small importer (next page):

- The higher domestic price arises under either a tariff or an *import-equivalent quota*.
- Tariff: $P^D = P^* + T$. Quota: select quota amount AB that equals lower imports under the tariff. Then we get the same higher domestic price.
- But now imagine there is an increase in domestic demand (D shifts to the right). What happens?
- Under the tariff there is no limit on the quantity of imports, so the adjustment is that imports rise at a constant price (point C). Price remains at P_T^D. Consumption rises and production is unchanged.
- But under the quota the quantity of imports is fixed at AB units. The adjustment comes through a higher domestic price for the given imports, now shown as A'B'. Production is higher and consumption is less than under the tariff when demand shifts upward.
- So which policy would you prefer as a consumer? As a producer?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Differences between tariffs and quotas

3. Impacts when there is a *domestic monopoly*. This means there is just one domestic producer of a good.
   - With a tariff, the monopolist cannot raise domestic price above the domestic price (world price plus tariff) for if she did no one would buy from the monopolist. Thus, the monopolist must actually behave as a perfectly competitive firm protected by a tariff.
   - With a quota, once the amount AB is imported no more can come in from abroad. The monopolist then is the only seller on the domestic sales volume above AB. This permits the firm to cut its output and raise price and profits. We should expect higher domestic price under a quota than a tariff.

So again from a welfare perspective we would have the tariff is better than the quota.

4. The possibility of *quality upgrading* with an import quota (and especially with a VER).
   - If a foreign firm is restricted in terms of the number of units it can sell in the home market but gets to choose which versions of the product (e.g., cars, wines, cheeses, clothing, footwear) it will be more profitable to fill the quota with high-value, high-quality versions. (Or we can think of this as the choice the domestic importer makes: it orders high-quality goods from abroad.)
   - The reason is that the higher-quality goods command a higher price but both versions have about the same transport costs per unit, meaning higher quota rents per unit for high-quality goods.
   - Some examples include (1) the dramatic increase in the quality of Japanese cars in the US market during and after the 1980s VER; (2) imported cheeses in the US are generally higher quality (and more expensive) than similar versions in their home markets; (3) Imported Washington-state apples sold in Japan are gorgeous, tasty and expensive compared to quality and prices here.

Trade policy to address market failures

A final subject to address: are trade taxes (or quotas) effective means of achieving *non-economic goals* or dealing with *market failures*?

A non-economic goal is a policy preference that emphasizes achieving some social or political objective that may not be achievable by relying on private markets alone. Examples: raise domestic production of products or technologies seen as essential for national security, support minimum levels of agricultural output, provide health care to the poor, achieve an equitable income distribution, etc.

Closely related is the idea of a market failure: left alone the market may generate undesirable side effects ("externalities"). Examples: pollution, unwillingness to get vaccinated, failure of the market to protect innovation and knowledge creation, banks and financial institutions taking excessive risks ("moral hazard"), etc.

Countries sometimes use trade policy to try to deal with such problems. This raises the most direct question: does it make sense to use tariffs to deal with market failures?

General answer: no, trade interventions are an indirect approach and achieve these goals (if at all) at higher cost than using a directly aimed policy. The direct policy is called in economics the "first-best" policy. Tariffs are "second-best" policies.

Important qualification: what if the problem is a global or cross-border externality? What are seen as *global public goods?* Climate change mitigation, provision of public health, agricultural biodiversity, many others.

Simplest case: national security goal

Consider the non-economic goal of raising domestic production of a good (aluminum, A) for national security. We'll just use the example of a small importer.

Suppose the goal is to raise domestic output to Q_A^1. If we use a tariff of $T per unit the standard welfare cost is – b – d. (The economy suffers both of the usual DWLs.)

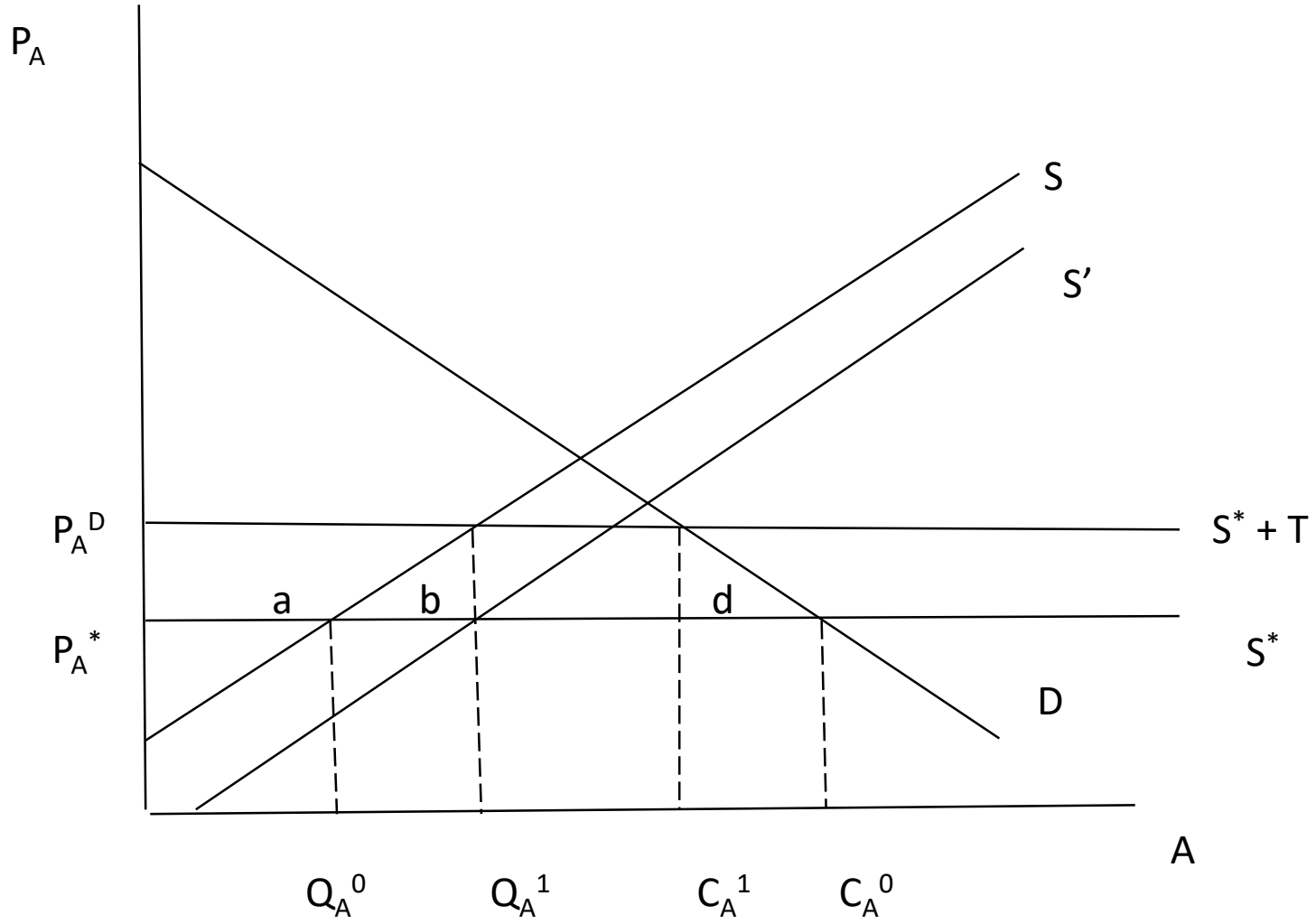
An alternative policy would be to pay a subsidy directly to aluminum producers to expand S to S^1. The subsidy would be $S = $T per unit of output.

What would the equilibrium be? There is no tax on imports so p_A^* still exists for consumers, who remain at C_A^0 . There is no loss in consumer surplus and no consumption DWL.

Producers get p* + S per unit, expanding output to Q_A^1. (How does this work mechanically? To produce at this higher level, producers face a marginal cost of p_A^D along the supply curve but the market price they get remains p_A^*. The subsidy of $S compensates them for the additional cost. Note that imports do fall, to $Q_A^1 C_A^0$.

The private producer surplus gain is + a. But the *subsidy fiscal cost* is – (a + b). (Keep in mind the subsidy is paid to producers on every unit they sell.) *Thus, the overall loss is – b. The economy suffers the production DWL only.*

The output subsidy is the direct policy and is therefore lower cost. There is no secondary distortion on the consumption side.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Some other non-economic goals

We can mention a few types of "non-economic goals" for which trade policy has been used and ask what the direct (and best) policy is.

- Expand or cut production — Output subsidy or tax.
- Expand or cut consumption — Consumption subsidy or tax.
- Redistribute income — Redistribution policies (e.g., progressive income tax, tax credits for low incomes, wage insurance, relocation assistance).
- Smooth farming incomes when prices are volatile — Crop insurance.

When would a tariff be the direct (and first-best) policy?

When the literal goal is to limit imports (e.g., a large country wanting to gain welfare by forcing down world price). But this is policy harms foreign countries ("beggar your neighbor" policy) and they likely will retaliate with tariffs on the original country's exports.

Market failures

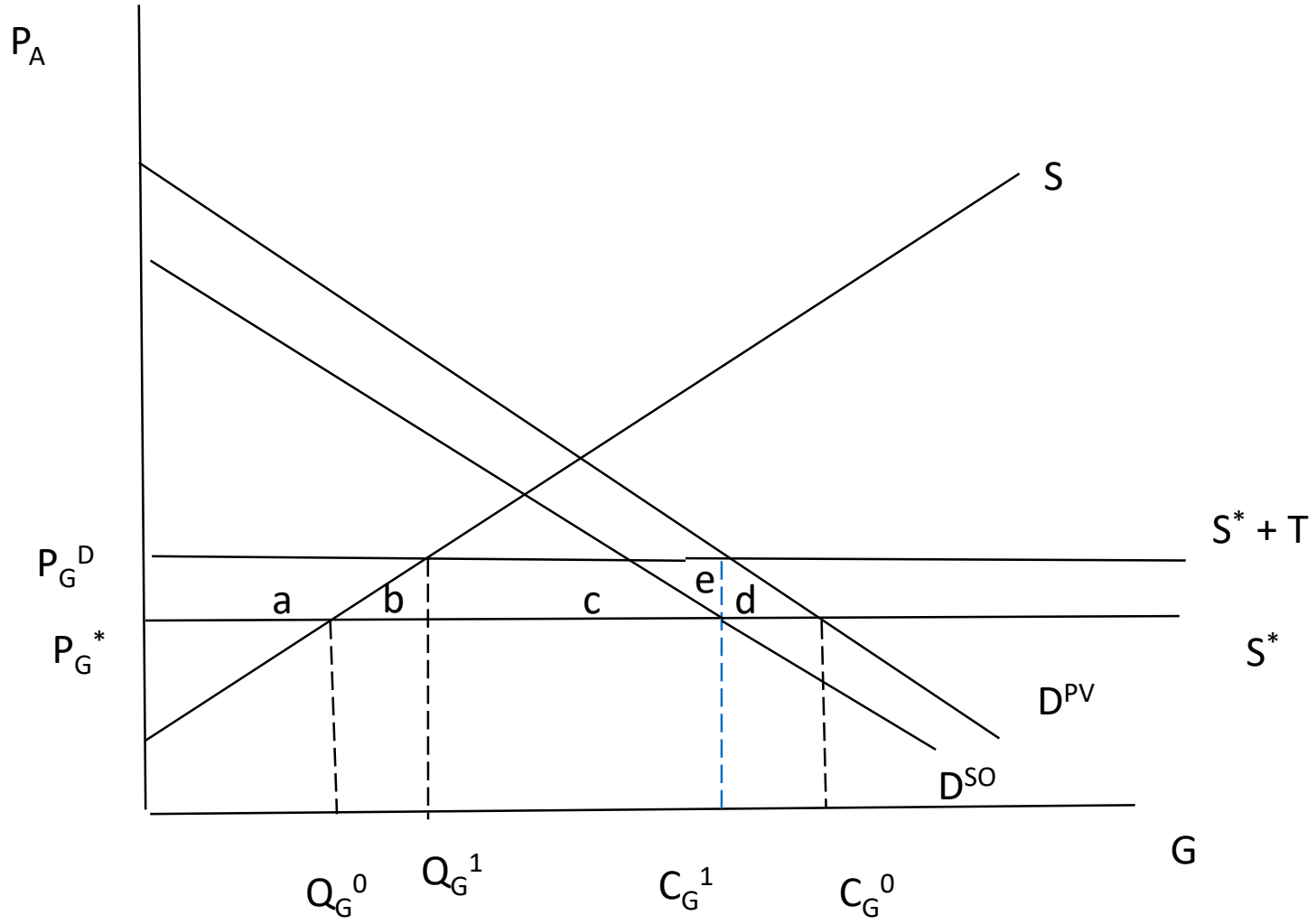
Again, are tariffs (or quotas) the best way to address market externalities? Generally no because they are indirect (second-best) policies. Find the most direct policy that aims at the source of the problem.

Example: suppose domestic consumption of gasoline (G) pollutes the air in an economy that imports gasoline. This pollution causes health problems, raises the costs of cleaning buildings, makes costs of agriculture higher, etc., including contributing to climate change. But these "external costs" are not paid for by drivers in the private market.

We can depict this idea by showing the private demand curve (PV) lying above the "socially optimal" (SO) demand curve. The SO curve embodies the externality costs: if drivers had to pay them they would demand less gasoline.

At the world price, the socially optimal level of consumption is $C_G^1 < C_G^o$.

We want to find the cheapest way to force drivers to consume gasoline along the SO demand curve at level C_G^1.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Market failures

We wish to “internalize” this externality. We might consider an import tax, which would raise domestic price to p_G^D, shifting consumption to C_G^1, as desired. But this higher price raises domestic output to Q_G^1, which is an undesired side effect. Welfare loss = - b – d. Again, the tariff generates the usual DWLs.

The better policy is to tax consumption directly by setting $T_G = T$ (a gasoline tax) but not impose a tariff. Then consumers would pay $P_G^* + T$ as the full price. This would reduce the demand curve effectively to D^{SO}. Consumption falls to C_G^1 as desired but there is no rise in production. Imports fall just to $Q_G^0 C_G^1$.

Loss in consumer surplus = - (a + b + c + d + e).

Gain in tax revenues = + (a + b + c + e).

Net loss = - d. (Just the consumption DWL)

(Actually area d isn’t really a net loss. The tax just pushes consumption to the optimal level by making consumers pay for the externality of consuming gasoline. So consumers are worse off in private terms but society is better off by the same amount due to the reduced pollution.)

Market failures

We can imagine a number of such externalities from domestic market failures and how to address them with a direct policy.

Pollution due to consumption.	Consumption tax
Pollution due to production	Production tax.
Too little domestic R&D	Subsidies or tax credits for R&D spending.
Unsafe products	Safety regulation, taxes, or fines.

Clicker question

The *primary* reason that economists are skeptical about using tariffs or quotas to achieve domestic non-economic goals or fix market externalities is:

A. Tariffs and quotas cannot achieve such goals or fix such problems.

B. Tariffs and quotas may attract retaliation from countries that have seen their exports fall.

C. Tariffs and quotas are not the most direct policy to achieve such goals or fix such problems.

D. Direct interventions such as taxes or subsidies can achieve such goals or fix such problems at lower welfare costs than tariffs and quotas.

E. Both C and D.

International market failures

When might we use trade policy for regulation?

When distortions and externalities cross borders through trade in goods and services. Examples:

- foreign monopoly firms that raise prices in your market (see chapter 7);
- product contamination from abroad;
- health problems that cross borders.
- Transportation of goods across borders generates environmental problems.

But let me give you a sense of how difficult this question is. Consider the problem of child labor use in poor countries. Why does it exist? Desperate poverty, poor schools, costs of going to school, similar issues. None of these issues are related to trade.

But we in the US might not want to consume goods produced this way and we might impose a tariff on such imports. What would this accomplish? (Assuming the US is a large importer so foreign price and output would fall.)

- Significantly reduced demand for these goods in target countries (remember the US is likely a "large" economy), reducing local prices and output and forcing children into (probably) worse kinds of work.

Is this really a cross-border externality? Only through the discomfort we feel in the US. In that context the best policy is to "tax" ourselves and transfer the resources generated to directly targeted programs. How? On way is to create effective labeling and monitoring programs, which is not easy.

Other policies would be foreign aid grants, support for education, direct income support to poor families, and so on.

And the big one: climate change

Suppose one major political impediment in rich countries to enacting stiff domestic carbon pricing (through carbon taxes or limits on production and trading permits to pollute) is that it would raise costs of energy-intensive sectors (coal, oil, construction, housing, metals manufacturing, driving, some agriculture, …) and reduce output and employment as some of those activities move overseas.

Would it make sense to permit countries with carbon pricing to offset this loss with taxes ("border carbon adjustments") on carbon-intensive imports? Economist and engineers would compute the "carbon content" of imported goods. It is a sound argument and many are trying to work it out.

But here are some problems:

- Effect on fossil-fuel prices: if (tax-inclusive) prices are increased in regulating countries and that reduces FF demands, suppliers could shift their sales to non-regulating countries, driving down prices and raising emissions there.
- These tariffs would generate significant terms-of-trade losses for countries against which they are levied.
- They also could reduce GDP growth in those countries and delay the time at which local citizens demand cleaner air.
- So far at least WTO rules forbid trade taxes imposed against how a good is produced.
- What would countries do with the tariff revenues? If they could commit to using them to pay for programs that reduce emissions worldwide, this seems like a promising idea.

A last point: the idea of "effective protection"

We have modeled tariffs and quotas as affecting only the price, output and consumption of a final good.

But 2/3 of global trade in merchandise is in intermediate inputs, which are used to produce other intermediate goods and final goods.

This means that a tariff (or quota or other restriction) on imports of key intermediate inputs (such as steel and aluminum) can raise the costs of downstream using industries and products, causing output and employment to fall there. Thus, while steel is protected directly, steel-using industries (e.g., metal products, construction, machinery, automobiles) have higher costs.

Simple theory: Suppose autos (A) use steel (S) as an input, along with other intermediates. Then the *domestic value added* (DVA) in producing a car is $P_A - \theta_S P_S$ – (cost of other intermediate inputs) where θ is the share of steel in the cost of an automobile. DVA is the amount available to the auto industry to employ and pay domestic workers, capital, and some other costs.

Example: P_A = \$20,000, P_S =\$6,000 (steel needed per car), θ = 0.4, cost of other inputs = \$12,000. Then DVA = \$20,000 - \$2,400 - \$12,000 = \$5,600. Used to pay wages, etc. in domestic automobiles.

Suppose there is a tariff of 25% on imported steel, so $\theta_S P_S$ = (0.4*\$6,000)*(1.25) = \$3,000. Now DVA in autos = \$20,000 - \$3,000 - \$12,000 = \$5,000. DVA per car has fallen from \$5,600 to \$5,000, or by -12%. Autos will employ less labor and capital unless they can pass this higher steel cost onto consumers. But even then the number of domestic cars purchased would go down.

The *effective protection* of a particular good accounts for how tariffs and other trade restrictions on intermediate inputs change value added in that good. It depends on (1) the price of intermediate goods; (2) how high the tariffs on the intermediate goods are; and (3) the importance of each input in the costs of production (θ).

Impacts of steel tariffs

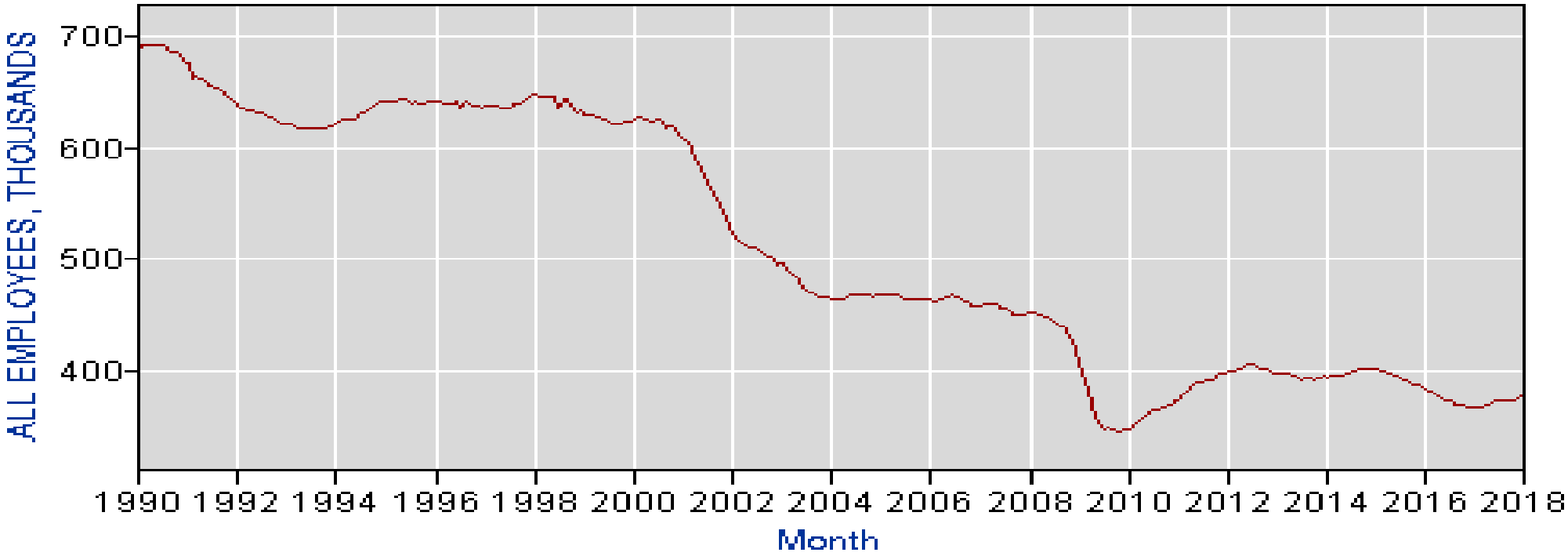
It's this kind of simple analysis that economists use for basic computations of the costs of steel tariffs. Rather than go through the analysis, here are highlights of one such calculation.

Note that steel employment has been falling in the US (primary metals, which is both steel and aluminum and a few others). Next chart.

Some important using industries and their employment levels, 2017, and primary metals θ coefficients:

◦ Fabricated metal products	1,450,000	0.30
◦ Electrical equipment	256,000	0.21
◦ Machinery	700,000	0.15
◦ Motor vehicles & parts	1,140,000	0.11
◦ Furniture	287,000	0.08
◦ Miscellaneous manufacturing	376,000	0.08
◦ Construction	5,300,000	0.05

Annual employment in primary metals, United States, and basic market data



US steel production, 2017		81.6 million MT
US steel imports, 2017		34.9 million MT
Average steel import price		$839.5 per MT
Average steel domestic price		$869.5 per MT

Comparison

Suppose we applied our basic economic theory to predict job impacts in steel versus these using industries. We would need to know:

1. How much does US steel price rise and foreign steel price fall? Estimate, based on “elasticities” of US import demand and foreign export supply: new US price = $981 (up 15.4%), new world price = $785 (down 7.6%).

2. How much would steel imports fall? Estimate: new imports = 24.4 mmt (down 30.4%). (Note: the US Commerce Department predicted a slightly larger fall in its model.)

3. How much would US steel output rise? Estimate (based on an elasticity): new output = 94.2 mmt (up 15.4%). (US DOC predicts new output = 90 mmt.)

4. Jobs “created” in steel? Assume employment rises in proportion with output (very unlikely). Then this model would predict 30,253 more jobs in steel (of those, 23,776 in production-line jobs). Likely an overestimate if steel firms invest some of the higher profits in automation, for example.

5. Use our effective protection concept to compute cost increases in each of the 7 downstream industries and make some assumptions about their ability to pass through those costs to higher prices. Doing this predicts an overall job loss of 66,433 (of which 48,078 would be production-line).

6. It is worth noting that the average production worker wage in steel in 2016 was $62,179. In the downstream industries the weighted-average production worker wage was about $47,000.