

# Principle of Economics

## Costs of taxation

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So in the previous two chapters, we started discussing government intervention in the markets.

And in chapter 7, we introduced the concepts of welfare and the benefits that consumers and producers receive from participating in the market.

Now let's combine these two topics and study what happens to welfare when government intervenes.

We will say that we're studying the costs of taxation in the amount of welfare redistributed between market participants and the amount of welfare lost in the market.

So, to review a little bit from last time, we said that total welfare or total surplus in the market includes the consumer surplus, producer surplus.

And now if we introduce government regulation, if the government collects tax revenues, we should also include the changes in tax revenues.

The basic idea in this chapter is that when the government intervenes in the market and effectively redistributes some welfare from consumers and from producers to itself.

The losses to buyers and sellers exceed the increase in revenues of the government.

That means that intervention by the government in the market introduces some deadweight loss which nobody receives.

We can think that the effort of redistributing welfare between individual market participants creates some inefficiency that no market participant can receive.

So one idea again is that perhaps the government feels that producers receive too much surplus, consumers receive too little surplus.

And the government introduces a tax rate to collect this amount of tax revenues and

perhaps give this lump sum amount of money to consumers to increase their surplus from the existence of this market.

We said that taxes introduce the wedge between market supply and market demand curve.

And the wedge has the height of the amount of the tax.

And the width of this tax revenue depends on the market quantity with the tax in place.

So if we compare market welfare without the tax and with the tax, we can remember from the previous chapter that before the tax was introduced, consumer surplus was a triangle to the left from the equilibrium price quantity pair.

So consumers' surplus was this triangle here, producer surplus was this triangle down here.

There was no government intervention so no tax revenues.

Now with the wedge between the market curves, we can say that the government collects a revenue equal to tax rate times, quantity with the tax rate.

We can see that market quantity with the tax in place would fall to this level.

And with this quantity and with this effective price that consumers have to pay, consumers receive consumer surplus equal to this triangle and producers receive producer surplus equal to this triangle.

So to summarize, the total surplus in the market with the tax is equal to the consumer surplus plus producer surplus plus tax revenue and notably excludes this triangle which was originally included in total surplus as consumer and producer surplus before.

That means that the total surplus with the tax in place is smaller than total surplus originally.

So we can summarize that the introduction of a tax resulted in a deadweight loss because these units of output, which normally would have been efficient to produce, are no longer being produced.

Without the tax in place, we can see that the value to buyers was greater than cost of producers.

And these units should all be produced and the market will get some valuable benefit from these units.

But now the difference between the value to consumers and costs of producers is smaller than the amount of the tax.

So these units will not be produced.

We can say that.

Let's look at the size of the deadweight loss.

We can say that if the supply curve is elastic, so if the supply curve is relatively flat, then if we impose a particular tax rate, so a particular height of a particular wedge between the two market curves, the width of this triangle will be great and the deadweight loss will be great.

On the other hand, if the supply curve was relatively, if the market curves or if the demand curve was relatively inelastic, if we impose this wedge between the market curves, the triangle would be relatively narrow.

And we would say that there is little inefficiency in the market.

So we can summarize that the more elastic the market curves are and it doesn't matter if it's the supply curve or demand curve.

The more elastic the market curves are, the greater the inefficiency of government regulation.

The intuition is that what we care about is the reduction in a market quantity due to tax.

And with elastic market curves, there is a greater reduction in quantity.

And, so the triangle of the deadweight loss will be wider.

Another thing we may wonder about is what happens to the inefficiency as the tax rate increases.

So suppose we impose a relatively small tax rate.

In this case we can see that tax revenue might be relatively big, and the deadweight loss from taxation is relatively small.

As we increase the tax rate, tax revenue might increase or might not increase depending on the width relative to the height of this rectangle.

But clearly, the deadweight loss of taxation will increase.

Because we have, because the triangle becomes wider and its height also increases.

And if we increase tax rate even more, you can see that the deadweight loss clearly increased again it became wider and taller.

And it's unclear what happens to tax revenues.

Now tax revenues become really narrow but really tall.

And it's unclear whether this area is greater than before.

We can summarize these results by saying that as the government increases a tax rate, at first tax revenues are increasing because the higher, the height of the tax revenue is more important than the width of tax revenue rectangle.

But if the government continues increasing tax rate, suddenly the shrinking width of the rectangle becomes more important than the increasing height.

So we get this famous Laffer curve, which tells us that there is a particular tax rate at which tax revenues are maximized.

And intuitively we should think that the government would definitely not want to be on the right of this tax rate, because to the right of this point, the government would be creating distortions in the market without gaining any benefits from it.

On the other hand, as the tax rate increases, the deadweight loss increases at an increasing rate.

So we get a..two results here.

One, as the government was increasing tax rate at first, government revenues were increasing than they were decreasing.

We knew that the government would not want to be too far in right on that graph.

Here, we also see that as the tax rate increases, the distortion increases.

We might looking at this two graphs, so we might ask what is the efficient tax rate.

And it's kind of tricky question.

The efficient tax rate is of course zero.

We should realize that tax revenue is just redistribution from producers and consumers to government coffers, whereas deadweight loss is the absolute size of the pie in the economy.

So this picture shows us how much welfare gets lost in the society because of a tax, whereas previous graphs showed us only the amount of redistribution from the private sector to public sector.

So if we think that the government has no useful reason to collect taxes, we would say that the efficient tax rate is zero.

On the other hand, if we think that the government has some good reason for regulation, such as collecting tax revenues for useful public projects such as hospitals or highways or military, or if the government taxes the market because of uh... market failures such as externalities or market power, we might except some tax rate, because the benefit of tax revenues might offset some of the efficiency losses again, if we care about equity, in addition to efficiency if we think that some redistribution from let's say producers to consumers is beneficial we might except some tax rate and some distortion because the benefits outweighed the inefficiency of uh...taxes.

To summarize the problem that government faces, here you should think that okay, the government faces market-based, the government can choose market-based instruments taxes and subsidies, or the government can choose a command and control policy such as price or quantity regulation, quantity regulation we can refer to that as quote us and we will see the use of quote us in chapter 9, when we deal with international trade.

If the government chooses to impose taxes on the market it can impose taxes on sellers or on buyers we already found out that there is no difference to the market outcome and then the consumers and producers will share same amount of the burden of taxes regardless whether they are set on seller are on buyers.

In the handout that I have prepared for you, I discussed differences between quantity taxes versus value taxes, that just affects the so far, in the chapter I showed the effect of a ....quantity taxes.

With a quantity tax, for every unit of production, there was the same amount of the tax, so the supply curve, so if this tax was on producers, the supply curve shifted uniformly upward by the amount of the tax we can think that with a value tax the amount of the tax depends on the price level.

So if the price level is a small, there is a little bit, there is a small money value of the tax rate.

If the price level is high, the for certain percent, tax rate the amount of the money paid by consumers..by producers to the government will increase.

We can also distinguish progressive proportional or regressive taxes, we would say that progressive taxes increase in the amount as the amount of in the market increases, regressive taxes decrease in the amount as the quantity trade increases, we usually discuss a proportional tax rate when the amount of the tax stays constant regardless what quantities being traded in the market and I've discussed lump sum taxes little bit earlier today.

I said that lump sum taxes do not depend on quantity traded, and do not disrupt market equilibrium, do not disrupt the choices made by market participants.

We may, the government also needs to decide which market to impose tax and in

general it can impose taxes in the labor market or in certain consumption markets and here we should think that depending on the price elasticity of supply and demand in those markets the inefficiencies produced in some markets might be smaller than in other markets.

And finally the government has to decide if it should impose one big tax rate in a single market or a small tax rate across many different markets.

And we saw that this interaction between the Laffer curve, and the size of the deadweight loss should tell us that it's better to introduce a small tax rate across a huge market rather than a big tax in a relatively small market.

So this is the discussion of a...market welfare in the presence of government intervention, in chapter 9, we will look at a particular application of this case we will talk about trade between different countries and the amount of consumer and producer surplus achieved if countries are not allowed to trade with each other, than if the countries are allowed to trade each other without any restriction and finally if the government intervenes and regulates the amount of trade between countries we will see that there are clear effects on consumer and producer surpluses in the exporting and the importing countries.