OPTIMAL TARIFF VERSUS OPTIMAL SANCTION

The case of European gas imports from Russia

Daniel Gros

CEPS Policy Insights
No 2022-12 / March 2022

Optimal tariff versus optimal sanction:

The case of European gas imports from Russia

Daniel Gros

Abstract

Europe has set itself the aim of reducing its dependency on Russian gas imports. This paper provides an economic analysis of a tariff on imports of natural gas into the EU which would help achieve this goal. The starting point is Gazprom's monopoly on exports of gas from Russia and pricing power on the European market. But Gazprom has also few alternative outlets for its gas. Europe thus has buying or monopsony power. Standard trade theory implies that a tariff on Russian gas imports would be beneficial for Europe even on purely economic grounds because it would exploit Europe's buying power and induce Gazprom to lower prices.

The standard linear model used here takes into account the availability of alternative supplies in the form of Liquified Natural Gas (LNG). It yields the following numerical results:

- Only one half of the tariff would result in higher prices for European consumers and the tariff revenue would be more than sufficient to compensate them for this loss.
- The tariff, which maximises Europe's welfare, would be between one third and one half of the free market price. This would cut Gazprom's net revenues by more than a half.
- If the tariff is used as a sanctions weapon to reduce revenues for Russia, the tariff should be higher (around 75 %) and would cut Gazprom's revenues to close to zero (less than one sixteenth of the free trade level).

The overall conclusion is thus that an EU import tariff on Russian gas would have a major impact on Russia's earnings from gas exports and would certainly improve the European terms of trade.

Note: This is a second, slightly modified version. Many thanks to Werner Roeger who pointed out a conceptual mistake and one semantical inaccuracy in the original version of this Policy Insights paper.

Daniel Gros is a Member of the Board and Distinguished Fellow at CEPS. Special thanks are due to Alessandro Liscai for excellent research assistance.

CEPS ▪ Place du Congrès 1 ▪ B-1000 Brussels ▪ Tel: (32.2) 229.39.11 ▪ www.ceps.eu

Contents

Introduction

The ongoing suffering of the civilian population in Ukraine has led to calls for the EU, or individual Member States, to ban imports of Russian gas. The economic consequences of such a step would be very severe in the short run. But there is another more gradual way to minimise economic disruption for Europe and still have a strong impact on the revenues flowing to Russia. The EU should simply impose a special import tariff on Russian gas.

Such a move would, of course, be against current World Trade Organization (WTO) rules. But under special circumstances it can be justified with the exemption under article XXI for national security. Moreover, Russia has imposed for a long time an export tax of 30 % on gas. The EU can claim that its import tariff simply compensates for this distortion[1].

A tariff could be implemented almost overnight; and given that it would be done at the EU level it would provide a tangible sign that Member countries can act together.

The political advantage of a tax on imports of gas from Russia are also clear.

First of all, it would counter, at least partly, the argument that by importing gas from Russia we are financing Russia's war of aggression in Ukraine. Those continuing to buy Russian gas would then also contribute to public finances and the tariff would provide them with a strong price signal to diversify over time. Those who have alternatives to Russian gas will take these up immediately. The demand for Russian gas in Europe will fall, slowly at first, but at an accelerating rate.

Secondly, it would yield substantial revenues. At present, high global natural gas prices and a 30 % tariff on the value of Russian gas could easily reach 30-50 billion EUR (on an annual basis) at the EU level. This would allow the EU to provide assistance for vulnerable groups being hit by higher gas prices, further assistance to the Ukrainian government and help Member States to defray the costs of caring for the millions of refugees we must expect. If, as now unfortunately seems likely, 3-5 million Ukrainian have to seek shelter in the EU, the overall refugee costs could be in the order of dozens of billions of euros (counting over 10 thousand euro per refugee for housing and living expenses).

A further advantage of this approach would be that it would provide a very strong long-term incentive for the private sector to seek other supplies. And these supplies would be forthcoming. If the EU makes it clear that the tariff is going to stay as long as Russia's aggression against Ukraine continues, other potential suppliers of gas around the world will take notice and start investing in finding new sources or further exploiting existing ones. Gros argues that in Asia there is considerable potential for energy savings and switching from gas to coal, thus liberating important quantities of LNG supplies for Europe.

[1] Tarr, D.G. and Thomson, P.D. (2004), 'The merits of dual pricing of Russian natural gas', *World Economy*, Vol. 27, No 8, pp. 1173-1194.

There is little Russia can do to avoid this tax because it cannot simply sell its gas somewhere else. With 140 bcm, the EU accounts for about 70 % of overall Russian pipeline gas exports. The other 30 % is unlikely to be able to compensate fully for the EU market. China already takes substantial amounts of gas from Russia and will not want to become more dependent on Russia for its energy. As the biggest buyer, the EU has considerable 'monopsony power', which should be used to counteract the monopoly position of Gazprom[2].

The purpose of this paper is to apply a standard partial equilibrium trade model to the specific situation of European gas dependency on a monopolistic supplier, i.e. Gazprom. The case at hand is thus different from the usual models which assume that foreign supply is provided by competitive firms (see Sturm (2022)). Taking into account the fact that Gazprom has market power implies that even on strictly economic grounds a tariff on Russian gas would increase EU welfare. Gazprom does not have a monopoly on supplies of natural gas to Europe. It is thus not a monopolist, but its decisions can influence the price.[3] This implies that the standard two country models must be modified.

Moreover, Gazprom cannot be considered as a private sector supplier. It represents the interests of the Russian government, and its revenues finance the Russian war effort. This is why this contribution also looks at a non-standard policy goal, namely to reduce Gazprom's profits.

One might of course object that Russia could react to the European import tariff by increasing its own export tariff. This might very well be the case. But Russia's export tariff is of little importance. It determines only the domestic price level for gas. The lower that level the more gas will be wasted inside Russia. The domestic price level for gas inside Russia is anyway fixed in roubles and has thus gone down relative to the world market price level. The Russian export tariff has thus de facto already increased.

The following section sets out the essential elements of a standard model, the cost structure of the foreign supplier, the demand curve for Russian gas in Europe, potential other supply and the resulting pricing power (and thus profits) of the foreign supplier. This is then followed by the determination of the tariff yielding the highest welfare for Europe (optimal tariff) and the tariff which would additionally reduce Gazprom revenues at an acceptable cost for Europe (optimal sanction).

[2] Johnson, H.G. (1968), 'The Gain from Exploiting Monopoly or Monopsony Power in International Trade,' *Economica*, Vol. 35, No 138, pp. 151-156.Russia has some LNG export facilities, but they are close to fully used and can thus not constitute a safety valve.

[3] Many thanks to Werner Roeger for pointing this out.

A standard model

Here we present a standard partial equilibrium model of a country which imports a good from a foreign supplier with some pricing power. This foreign monopolist cannot sell the same good in third countries, at least not at the price charged to European customers[4][5]. This assumption that markets are segmented gives the home country monopsony power, which is not used under free trade. This assumption seems warranted since most of Russia's gas exports go via pipeline to Western Europe. It would take years to build new pipelines to other markets or build up the needed LNG facilities.

In the following it is assumed that the marginal cost of supplying this good is constant, given by:

Equation 1 $$Marginal\ cost = c$$

One could argue that in the short run the cost of pumping gas to Europe is zero as the pipelines are readily available and the fields have been developed with the aim to export to Europe. Moreover, Gazprom does not immediately have enough other customers to export the gas coming out of existing fields. However it has always the option of pumping less gas and retaining it for future sales. The assumption of a zero marginal cost thus does not seem wholly appropriate; but is not central to the results presented here, as all the results would still hold if marginal costs were in fact zero.

The following presents the simplest case of linear demand and supply curves. The annex briefly analyses the more general case of any downwards sloping demand curve and provides in Figure A1 the standard diagrammatical exposition of the case for a tariff when the home country faces a foreign monopolistic supplier. The figure cannot show what the magnitude of the optimal tariff would be and how it would affect the revenues of the foreign supplier. This is why it is necessary to derive analytical solutions starting from the core element, namely the demand function for gas.

Deriving the European demand for Russian gas

The starting point is that the overall quantity of gas demanded in Europe is a declining function of the price:

Equation 2 $$Demand\ in\ EU = Q = D - d_e p\ or\ p = \frac{D-Q}{d_e}$$

Where p represents the price paid by European consumers. There is one integrated European market in this model. The price is the same for all countries, independently of whether they

[4] Jones, R.W. and Takemori, S. (1989), 'Foreign monopoly and optimal tariffs for the small open economy,' *European Economic Review*, Vol. 33, No 9, pp. 1691-1707. They discuss in detail what constellation of market segmentation would be required.

[5] Sturm and Menzel (2022) discuss the general case when Russia has other export markets, but dismiss it as irrelevant for the case of gas.

import their gas from Russia or alternative sources (piped from Norway or Algeria, LNG from the Middle East). The impact of changing gas prices or a tariff thus does not depend on the amount of gas imported from Russia, but only on the overall imports of gas.

A key feature of the global market for natural gas is that Europe is the marginal or balancing market where both piped gas and LNG are available. This means that that LNG can constitute an alternative source of supply for Europe.

Asia (rather the big Asian importers of gas like China, Japan, and South Korea) depend almost entirely on LNG supplies, which arrive there via tankers from major exporters like Australia and the Middle East (Qatar, for example). This representation of the supply from Asia implicitly considers only the net balance between the producers and consumers, where additional net supply can result in the short run only by energy savings by Asian consumers (Gros (2022a)).

It is assumed here that LNG supplies are subject to increasing marginal cost because transport is more costly and because the substitution of gas by oil or coal in power generation in Asia would liberate supplies for Europe. Inter-fuel substitution elasticity is rather high[6]but it becomes increasingly difficult as more and more power stations switch to alternative fuels. What one can consider as supply of LNG for Europe thus does not come from additional production, but rather lower demand in Asia, which liberates potentially large quantities of LNG for Europe.

Equation 3 $$Supply\ from\ Asia = -S_a + s_a p$$

Where the term $-S_a$ indicates that, at very low prices in Europe, gas would flow from Europe to Asia. The parameter S_a thus indicates the overall strength of Asian demand whereas the parameter S indicate the strength of the reaction of Asian demand to higher prices (thus liberating supplies for Europe). Given that more gas is being used for power generation in Asia than in Europe one could argue that $s_a > d_e$, but this is not essential as will become clearer below. Asia stands here for any additional supplies which would be forthcoming at a higher price. This could also be supplies from other source countries like Norway, Algeria or Qatar. However, increasing the production of natural gas takes time as there is little spare capacity. In the short run (next 9-12 months) energy savings in Asia constitute thus the main source for additional supplies to Europe.

The availability of LNG supplies means that European demand for Russian gas is given by:

Equation 4 $$Demand\ for\ Russian\ gas = Overall\ demand\ in\ EU - supply\ from\ Asia$$

$$= D + S_a - d_e p - s_a p$$

The slope of the European demand curve for gas from Russia is thus determined by the sum of the reactivity of demand for gas inside the EU plus the potential supply from Asia. For the

[6] Stern, D.I. (2012), 'Interfuel substitution: a meta-analysis', *Journal of Economic Surveys*, Vol. 26, No 2, pp. 307-331.

subsequent analysis it will be more convenient to express the (European) demand curve for Russian gas in terms of the price European customers are willing to pay. Inverting equation 4 and denoting the quantity imported by Europe by q, this can be written as:

Equation 5 $$p = \frac{D+S_a}{d_e+s_a} - \frac{q}{d_e+s_a} = R - rq$$

Where r and R are defined as

Equation 6 $r \equiv 1/(d_e + s_a)$, and $R \equiv \frac{D+S_a}{d_e+s_a}$.

The composite parameter R has a decisive influence on the results presented below. R will be higher the higher the intercepts (D and S_a) and will be lower the stronger both price effects on quantities demand (s_a and d_e). The parameter R can also be considered as an indicator for the pricing power of Gazprom on the European market. This pricing power will be lower the stronger the price effect on European demand or the larger the demand from Asia (S_a).

Monopolistic pricing

If Russian gas were supplied competitively to Europe the European price would be fixed at the Russian marginal cost (so long as Europe imports gas from Russia). Indicating this price with p_{com} one can write:

Equation 7 $$p_{com} = c$$

However, Russian gas is supplied by one firm only; Gazprom. One must thus assume that Gazprom does not act as a price taker. It is not a monopolist[7] because there are other suppliers. But Gazprom is the only supplier with some pricing power. It will then set the marginal revenue equal to marginal cost.

Total revenue is given by:

Equation 8 $$TR = pq = Rq - rq^2$$

It follows that setting marginal revenue equal to marginal cost plus a potential tariff, denoted by t, yields:

Equation 9 $$MR = (R - 2rp\,) = c + t$$

For ease of computation we concentrate on the case of a specific tariff of rate t (meaning t euro per cubic meter). Russia imposes an export tariff on gas (until recently of 30 %). However, the size of the Russian export tariff is irrelevant here since the aim of Gazprom is simply to maximise its revenues from gas exports. The domestic Russian price, which is much lower, is only a residual quantity.

[7] It is possible that Gazprom doesn't only act according to commercial interests as it is state owned, but this issue is not pursued here.

The quantity which Gazprom will offer (denoted by q_t), is thus linearly related to the tariff:

Equation 10 $$q_t = \frac{R-c-t}{2r}$$

The price which Gazprom will charge European consumers can be obtained by substituting this relationship back into the demand curve, which yields:

Equation 11 $$p_t = R - r\frac{R-c-t}{2r} = \frac{1}{2}(R+c+t) = c + \frac{1}{2}(R-c+t) > c$$

Equation 9 implies, as one would expect, that Gazprom will charge a positive price even if its marginal cost were zero. The price it charges will depend on the parameter R, which incorporates the availability of supplies from Asia. The higher the reactiveness of Asian supply to higher prices (the higher s_{aa}), the lower will be the price Gazprom charges in Europe.

The price which the monopolist charges is higher than the competitive price as long as R>c, i.e. the marginal value of a small amount of Russian imports is higher than the marginal cost for Gazprom (plus the tariff). In the following it will be assumed that this is the case.

The formula for the price level replicates the well-known result that with a linear demand curve, the monopolist lowers the net tariff price by one half of the tariff so that the price for consumers increases only by one half of the tariff. The tariff revenue would be more than enough to compensate consumers since the net price for the economy falls, i.e. the terms of trade improve. The net tariff price is given by:

Equation 12 $$p_t - t = \frac{1}{2}(R+c-t)$$

It can now be shown that the total profits of Gazprom are a declining function of the tariff.

Gazprom's profits

The revenues accruing to Russia due to continuing European gas imports have come into focus. Here we calculate how they are affected by the tariff.

The net profits of Gazprom are given by the difference between its total revenues, minus the costs and the tariff paid:

Equation 13 $$Net\ profits\ Gazprom = Rq - rq^2 - tq - cq$$

Where the subscript t for the quantity demanded (indicating that it depends on the tariff rate) has been suppressed for notational convenience. The expression for net profits can be written more compactly as a function of the parameters of the demand curve by using the relationship between the quantity demanded and the tariff.

Equation 14 $$Net\ profits\ Gazprom = q(R-t-c) - rq\left[\frac{R-c-t}{2r}\right]$$

Which can be simplified to:

Equation 15 $$Net\ profits\ Gazprom\ = q\left(R - t - c - \frac{R-c-t}{2}\right) = \frac{(R-c-t)^2}{2}$$

Gazprom's net profits decline as the tariff increases; they are also an increasing function of R. In both cases the relationship is quadratic, i.e. convex. The marginal impact of increasing the tariff is higher when starting from a high level of the tariff than when starting at zero. The same applies to the intercept parameters (the strength of European and Asian demand for gas).

The expression for the net profits of Gazprom (15) implies immediately that a tariff equal to (R-c) would lead to zero revenues and thus zero imports of Russian gas. At a tariff above this level, it would pay for European importers to rely entire on alternative sources of gas. The term (R-c) thus represents the tariff rate implicit in a total embargo.

If one parameterises the tariff in terms of a fraction of (R-c), e.g. by t=α(R-c) (it will be shown below that this is an optimal policy, of course with α<1) one can rewrite the expression for Gazprom's net profits as:

Equation 16 $$Net\ profits\ Gazprom = \frac{\left((R-c)(1-\alpha)\right)^2}{2r}$$

As Gazprom acts as a monopolist, free trade is not appropriate for Europe. But this raises the question how high the tariff should be. Here we consider two cases:

1. The 'Optimum tariff'. The home country (Europe) should increase the tariff up to the point where the loss of consumer surplus from the tariff equals the gain through better terms of trade. This case is standard in the literature.
2. The 'Optimum sanction'. Here the objective function is different, given the present case of a conflict, where the revenues accruing to Gazprom have a negative utility for Europe because they help to finance a war of aggression. This provides an additional argument for a tariff.

Case 1: standard optimum tariff

In the 'standard' optimum tariff case the home country cares only about its own welfare. The size of the optimum tariff can be calculated by maximising European welfare, which is given by the integral under the demand curve of European consumers, minus the net of tariff revenues paid to Gazprom.

Equation 17 $$Home\ country\ welfare = W_{OT} = \int_0^{Q_t}\left(\frac{D-Q}{d_e}\right)dQ - pQ + tq = \frac{Q^2}{2d_e} + tq$$

$$= \frac{Q^2}{2d_e} + \frac{1}{2r}\left[(R-c)t - t^2\right]$$

Where the second equality sign uses equation (9).

The optimum tariff rate maximises this welfare, subject to the reaction function of the foreign monopolist. The marginal impact of a tariff on home welfare is given by:

Equation 18 $$\frac{\partial W_{OT}}{\partial t} = \frac{Q}{d_e}\frac{dQ}{dp}\frac{dp}{dt} + \frac{1}{2r}[R - c - 2t] = -\frac{Q}{2} + \frac{1}{2r}[R - c - 2t]$$

The 'standard' optimum tariff is attained when $\frac{\partial W_{OT}}{\partial t} = 0$, which implies:

Equation 19 $$Q = D - d_e p = D - d_e \frac{1}{2}(R + c + t) = \frac{1}{r}[R - c - 2t]$$

Which can be simplified to:

Equation 20 $$t\left(2 - \frac{rd_e}{2}\right) = [R - c - rD] + \frac{rd_e}{2}(R + c)$$

Equation 21 $$t_{OT}(4 - rd_e) = 2[R - c - rD] + rd_e(R + c) = [2R - 2rD + rd_e] + c(rd_e - 2)$$

where the term t_{OT} denotes the tariff rate which maximizes European welfare.

Recall that equation (6) implies that the composite parameter R contains D and the composite parameter r contains d_e.

The relationship between R and D, as well as r and de can be simplified if one assumes that the structure of demand in Asia is the same as in Europe, i.e. if $S_a = \mu D$ and $s_a = \mu d_a$, with μ>0. This would imply that $rd_e = 1/(1+\mu)$ and $rD = R/(1+\mu)$. If Asia were a big as Europe μ would be equal to one.

Equation 22 $$t_{OT}\left(4 - \frac{1}{1+\mu}\right) = \left[2R - 2\frac{1}{1+\mu} + \frac{1}{1+\mu}\right] + c\left(\frac{1}{1+\mu} - 2\right)$$

Which can be solved to yield:

Equation 23 $$t_{OT} = \frac{2 - \frac{1}{1+\mu}}{4 - \frac{1}{1+\mu}}(R - c) = \frac{1+2\mu}{3+4\mu}(R - c)$$

This result has a straightforward interpretation if one recalls that (R-c) is equal to the tariff which would bring Russian exports to Europe to zero.

The leads to some simple implications:

The optimal tariff increases in the size of the parameter μ, which indicates the size of alternative suppliers (alternative to Gazprom). With high value of μ, say around 3 (which corresponds to a situation in which Gazprom supplies one third of the market (before the tariff), i.e. the Asian market (or more in general alternative supplier) are three times larger, the optimal tariff would be 7/15 times (R-c), or closer to one half of the tariff which would bring European imports of gas to zero. In other word, in this case the tariff would be approximately one half of the tariff implicit in an embargo.

In the extreme case of μ=0 i.e. if Gazprom was Europe's only supplier, the optimum tariff would be equal to one third of the 'embargo tariff' equivalent.

The optimal tariff can also be related to the (pre-tariff or free trade) price by using equation (10).

Equation 24 $$\frac{t_{OT}}{p_{FT}} = \frac{1+2\mu}{3+4\mu}\frac{2(R-c)}{(R+c)} = \frac{1+2\mu}{3+4\mu}\frac{2\left(\frac{R}{c}-1\right)}{\left(\frac{R}{c}+1\right)}$$

The optimal tariff as a fraction of the free trade price (p_{FT}) thus depends both on the relative size of the Gazprom supplies to that from Asia and the ratio between the parameter R and its marginal cost of production. For a ratio of R/c equal to 3 (marginal cost one third of the price) the second ratio simplifies to one. The ultimate result would then be that the optimal tariff as a fraction would be between one third for the case of μ=0 (Gazprom monopolist) and about one half for the case of μ=3 (Gazprom supplies one third of the market). In this, more realistic, case the optimal tariff would be equal to 7/15th , or slightly less than one half of the no-tariff price.

It is more difficult to judge whether present prices reflect free market price of the model. Present spot prices might well reflect the fear of a complete import ban and an implicit moral price on Russian gas. If this were the case the optimum tariff could be lower than the 7/15 conjecture above, maybe close to about one third of today's spot price.

Equation 24 implies that the optimum tariff is an increasing function of the parameter R (defined in equation 5, above). The value of R is decreasing in the sum of the slope coefficients of the European and Asian demand schedules. The more reactive demand is, the lower will be the optimum tariff. The intercepts of European and Asian demand, which denote their strength have the opposite effect. Strong demand in either or both regions justifies a higher tariff.[8]

Imposing the optimum tariff would have a strong impact on Gazprom's net profits. Using equation 16 above, with α= 7/15, implies that Gazprom's profits would fall by the factor of close to 3^2:

Equation 25 $$\frac{Net\ profits\ Gazprom\ optimum\ tariff}{Net\ profits\ Gazprom\ no\ tariff} = (1-\alpha)^2 = \left(\frac{8}{15}\right)^2 = \frac{64}{225}$$

Simply imposing the 'standard' optimum tariff would thus already deprive Gazprom of up to two thirds quarters of its profits.

[8] The annex shows that with a more general demand function one obtains the standard result that the tariff should be equal to the absolute value of the elasticity of demand. Estimates of the elasticity of demand for gas vary and are usually higher in the longer run. Auffhamer and Rubin (2018) report estimates between 0.2 to 0.3, which would be similar to the result found here.

Case 2: optimum sanction

The optimum tariff argument assumes that the home country is indifferent about the size of the (remaining) profits of the foreign producer. However, this is not the case at present because the profits of Gazprom support a war of aggression in Ukraine. The purpose of a sanction is to impose a cost on the adversary, not (as the case above) to increase home welfare.

To capture the idea that the purpose of a sanction is to reduce the income of the adversary, it is assumed here that the net profits of Gazprom enter the utility function of Europe negatively with a weight denoted by λ[9].

In this case foreign profits lower home country welfare, which is now given by.

Equation 26 $$Home\ country\ welfare = W_{OT} = \int_0^{Q_t} \left(\frac{D-Q}{d_e}\right) dQ - pQ + tq - \lambda q(p-t-c)$$

$$= \frac{Q^2}{2d_e} + \frac{1}{2r}[(R-c)t - t^2] - \lambda \frac{(R-c-t)^2}{2}$$

Where the second transformation uses the expression for the profits of Gazprom, equation (15).

The maximisation of the expression with respect to the choice of t following the same procedure as above (setting the derivative with respect to t equal to zero) yields:

Equation 27 $$\frac{\partial W_{OS}}{\partial t} = -\frac{Q}{2} + \frac{1}{2r}[(R-c) - 2t] + \lambda(R-c-t)$$

This implies that the optimum 'sanctioning' tariff is given by:

Equation 28 $$t_{OT} = \frac{2(1+2\lambda) - \frac{1}{1+\mu}}{4(1+\lambda) - \frac{1}{1+\mu}}(R-c)$$

The tariff optimised to yield the biggest sanctions effect (while minimising the cost for the EU) is thus higher than the optimum tariff whenever Europe puts some weight of reducing Russian gas revenues, i.e. as long as λ is positive (compare to equation (23)). For the simplest case of λ=1, i.e. Europe is willing to forego one euro if this ensures that Russia loses one euro, this would yield an optimum sanction of :

[9] More precisely, each euro of net profits for Gazprom is equivalent to one euro lost for Europe. The implicit reasoning could be that the resources flowing to Gazprom support the war effort, requiring an equivalent effort on the European side.

Equation 29 $$t_{OT} = \frac{2(1+2)-\frac{1}{1+\mu}}{4(1+1)-\frac{1}{1+\mu}}(R-c) = \frac{5+6\mu}{7+8\mu}$$

For the case of the relative size of Russia equal to one third (i.e. μ=3), this would yield an optimum sanctioning tariff of 23/32 or close to three fourth of the embargo equivalent. Which is considerably higher than the standard optimum tariff, but not quite as punitive as the 90 % proposed by Hausmann (2022). A tariff equivalent to 75 % of the cut-off price would anyway reduce the net profits of Gazprom drastically. Using again equation 15 with α=3/4 it follows that Gazprom's profits would fall to about one sixteenths of the free-trade (status quo) level:

Equation 30 $$\frac{Net\ profits\ Gazprom\ optimum\ sanction}{Net\ profits\ Gazprom\ no\ tariff} = (1-\alpha)^2 = \left(\frac{1}{4}\right)^2 = \frac{1}{16}$$

Notice that λ=1 implies that Europe would be willing to accept a fall in income of about one tenth of a proportional loss to Russia since the EU's absolute GDP is almost 10 times larger than Russia's. Using the limited willingness of Europe to incur pain would still lead to a tariff which would reduce Gazprom's profits to close to zero.

Welfare comparison

It is difficult to compare welfare under the two different cases considered above. Normally one compares free trade (FT) to the optimum tariff (OT). However, one cannot compare these two to the optimum sanction (OS) case because the latter contains a different argument (namely the desire to reduce revenues for the foreign country).

It follows that if the home country (Europe) does not care about the net revenues of Gazprom, the optimum tariff is better than free trade.

However, if the revenues of Gazprom affect Europe's welfare negatively, welfare is higher with the optimum sanction tariff than either free trade or the tariff set at the optimum tariff.

If only domestic variables count one thus has, a usual:

Equation 31 $$W_{OT} > W_{FT}$$

In a sanctions environment one has:

Equation 32 $$W_{OS} > W_{tariff\ at\ OT\ level} > W_{no\ tariff}$$

The simple conclusion is that the tariff rate should be increased beyond the standard optimum tariff level if reducing the flow of resources becomes an additional aim of policy.

Conclusion

The starting point of the simple model used here is that Gazprom has a monopoly position as the only Russian exporter of gas to Europe and has pricing power on the European gas market. Its pricing power is constrained in the medium run by the potential for energy savings in Europe and potential gas supplies from Asia. However, it is strong in the short run.

European private sector entities are presently competing for Russian gas. The import tax would put a price on two external effects these importers have thus far ignored. Namely, the (pecuniary) externality that each individual importer drives up the price, thus increasing our terms of trade loss. Secondly, that each individual importer increases our collective dependency on Russian gas and provides more revenues for the Russian war effort.

The model confirms two standard results:

1. Free trade is not the optimum in this case.
2. The foreign monopolist will increase its price only by a fraction (one half) of the tariff and the government would have more than enough revenues to compensate all consumers for the higher price.

The linear demand function used here to calculate orders of magnitude for further aspects:

1. The tariff which maximises Europe's welfare would be close to one third of the price at which Europe would stop importing from Russia (or to be more precise one third of the difference between that price and the marginal cost of Russian gas).
2. A tariff of this size (approximately 30 %) would cut Gazprom's net revenues approximately by half. But this would be just a side effect, not the main aim of the tariff.
3. If the tariff is used as a sanctions weapon to reduce revenues of Gazprom, the tariff should be higher and would cut Gazprom's revenues to one fourth of the free trade level.

The overall conclusion is thus that an EU import tariff on Russian gas would have a major impact on Russia's earning from gas exports and would certainly improve the European terms of trade.

The main political objection against a tariff is that it would further increase gas prices. However, any quantitative restriction on Russian gas imports into the EU would have the same effect (unless gas is rationed). A complete embargo on gas imports would drive prices even higher. A tariff remains the most efficient means to reach the goal of reducing Russia's revenues from gas.

One has to ask how Europe would achieve the aim of reducing gas imports from Russia without resorting to a tariff. The only alternative would be quantitative restrictions or outright orders to energy distribution companies not to buy Russian gas. The latter would be difficult to sustain from a legal point of view and the former would be equivalent to a tariff if the rights to imports Russian gas are auctioned. If they are just distributed on political grounds this would result in a massive distribution of rents. The European Commission has recently presented ideas on how the EU could substitute about two thirds of today's Russian gas imports 'well before 2030'. But the Commission document (European Commission (2022)) describes only what sources could substitute Russian gas, but not how or why private sector gas users should reduce their purchases of Russian gas.

At any rate one has to keep in mind that any reduction in Russian gas imports, whether achieved through quantitative restrictions, licensing, or a tariff, leads to the same increase in gas prices. The main difference a tariff makes is that the link between the reduction of gas imports and higher prices becomes more transparent.

Annex. General demand curve

Here we consider the more general case of a demand given by p=f(q).

Total revenue is then given by TR=qf(q).

The condition that marginal revenue equals marginal cost for the foreign monopolist can then be written as:

$$c + t = f(q) + qf'(q)$$

This implies that the quantity sold by the monopolist is related to (changes in) the tariff by:

$$dq\big(f'(q) + f'(q) + qf''(q)\big) = dt$$

Which implies that:

$$\frac{dq}{dt} = \frac{1}{\big(2f'(q) + qf''(q)\big)}$$

This can also be used to calculate the impact of the tariff on prices, which is given by:

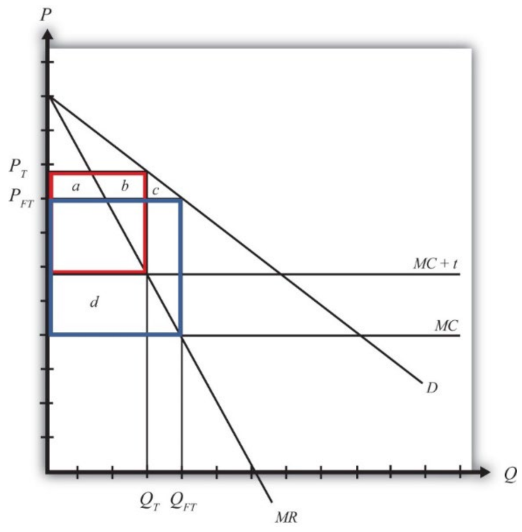
$$\frac{dp}{dt} = \frac{f'}{\big(2f'(q) + qf''(q)\big)} = \frac{1}{2} + \frac{f'}{qf''(q)}$$

The price paid by consumers increases thus by one half if f" is small (the linear case considered in the text). The demand for imports from Russia depends on both the European demand and potential Asian supply, the magnitude (and sign) f''(q) thus depends on these two key parameters.

Diagrammatical textbook exposition

The figure below illustrates the linear case used in the text. MC denotes the marginal cost, D demand, and MR is marginal revenue. QFT denotes the quantity imported under free trade, and QT the quantity imported with a tariff (or rate t).

Figure A1.



Source: https://saylordotorg.github.io/text_international-trade-theory-and-policy/s12-06-the-case-of-a-foreign-monopoly.html#:~:text=Thus%20a%20tariff%20can%20raise,monopolist%20to%20the%20domestic%20government.

Effect on Importing Country	
Consumer Surplus	$-(a+b+c)$
Producer Surplus	0
Govt. Revenue	$+d$
National Welfare	$d-(a+b+c)$

The importing country gains if d > a+b+c, which will always be the case for a small tariff.