WHY GAS PRICE CAPS AND CONSUMER SUBSIDIES ARE BOTH EXTREMELY COSTLY AND ULTIMATELY FUTILE

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Why gas price caps and consumer subsidies are both extremely costly and ultimately futile

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Summary

Europe faces a tough winter as gas is indispensable in keeping homes warm. The only alternative to the loss of Russian gas is LNG. But LNG is only available at a higher price because it can only come to Europe if consumers in the rest of world use less gas. The LNG supply is thus very price-inelastic, at least in the short run. This implies that any measure to keep gas or electricity prices low in Europe risks a substantial increase in the LNG import price because lower prices in Europe would result in higher overall domestic consumption.

A simple model shows that any one EU Member State that subsidises domestic gas consumption imposes an external effect on all other Member States by driving up import prices. An EU-wide price cap would be even worse, risking a never-ending spiral of higher import prices and higher subsidies.

Instead, the EU should encourage Member States to make sure that consumers are given the right incentive to reduce their personal gas consumption. This could also be achieved with capped prices if (and only if) consumers receive money back for consuming less. Thus, the key policy aim should not be subsidising gas or power prices but instead to subsidise energy savings.

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Introduction and motivation

The EU is facing an energy crisis. Russia's *de facto* embargo on gas exports to the EU has sent spot prices on Europe's exchanges to unprecedented levels. The prices paid by consumers have also increased, albeit much less so than the spot prices. Prices for households have doubled or tripled, while spot prices on the exchange have increased by a factor of 10 or more.

Consumers are already anxious about the increases that they have been confronted with and politicians are in a state of near panic as they contemplate more massive price increases. Sky-high prices on the spot market are also affecting electricity prices, which are also reaching unprecedented levels on the forward exchanges. This combination has led to mounting pressure to 'do something' to shield consumers from rocketing energy prices.

From an economic perspective, the best approach would be to let consumers pay the market price, while providing poorer households with lump sum income transfers. Another economically sensible approach would be to provide only a limited base amount to needy households at low prices but charge the full market price for the rest.

The slippery slope of subsidies

Unfortunately, several countries have not followed these economic principles and have instead introduced subsidies, which lower the price consumers face without any quantity restrictions and there is increasing pressure to put a lid on prices with the argument that 'markets are no longer functioning rationally'. Households are the policy focus at this point because their need for heating dominates total gas demand during the winter and finding energy substitutions would be most difficult for them in the short run (and of course, households constitute voters). But some countries also provide 'price mitigation' support for industry, especially energy intensive firms and SMEs.

Gas consumers with long-term contracts at low prices present a special case. They have a contractual right to receive gas at a low price, often at a fraction of today's spot market price. For politicians this is convenient because it lowers the pressure for price support. But from an economic perspective, these low prices reduce the incentive to economise on gas use, something that is especially important for the coming heating season.

For industry, having a long-term fixed price presents an opportunity because a firm that receives large quantities at low prices can usually resell the gas if this promises higher profits than using the cheap gas in its own production facilities.

Firms thus face the full market price for gas. This is different for households, who are likely to insist on receiving cheap gas. For these households governments need to create temporary gas savings subsidies, for example by paying households the spot market price for the amount of gas a household does not use this coming winter (relative to the winter of 2021/2).

The German government has recently rescued the (Finnish-controlled) gas distributer UNIPER because it wanted to avoid a massive price increase for its consumers whose fixed price contracts UNIPER cannot fulfill because Gazprom is not delivering contracted volumes (whereas all other suppliers are doing this). At first sight this constitutes a massive gas price subsidy, but the way this rescue is (planned to be) financed changes the picture entirely (see annex for details).

Calculating the fiscal and welfare costs of subsidies

The fiscal cost of providing subsidies is often at the centre of discussions on how governments should react to high gas prices. For economists, the fiscal cost represents only a transfer (from the government to households), not a net loss to society. The net loss to society results from some agents consuming gas with a marginal value below the price society has to pay.

However, it can be shown that the welfare cost to society should be a fraction of the fiscal cost for the government. The value of this fraction depends crucially on two parameters: the elasticity of demand and the size of the subsidy. The lower the elasticity of demand, the smaller the welfare cost for any given fiscal outlay, as one would expect from first principles. The higher the subsidy (as a percentage of the pre-subsidy price), the higher this fraction will be. Again, this should be expected since the traditional 'triangle' welfare cost usually increases with the square of the distortion.

Preliminary rough calculations using conventionally low demand elasticities suggest that the standard 'triangle' welfare losses should be a modest fraction of the fiscal. But this fraction increases with higher subsidisation rates.

The total cost of the various measures adopted by Member States already runs to over EUR 150 billion. A large part of this finances lump sum payments (often not means tested) to households. But a significant part finances overall lower gas costs for households and enterprises. The traditional welfare cost of all these measures could thus still be significant.

There is another side-effect of gas price subsidies which is more important. One side effect is that gas demand will fall less than it otherwise would have done. This means that Europe will have to import more than it would have done should consumers be forced to continue paying the high spot market prices. Higher import demand from Europe is likely put even more pressure on global (LNG) gas prices and thus worsen the term of trade for the entire EU.

The model shows that with an inelastic foreign supply almost of all the expenditure on gas prices will end up in higher import costs. The money given to consumers to enjoy cheaper gas will thus not just represent a transfer from taxpayers to consumers, but a transfer from taxpayers to foreign gas suppliers.

Member States acting under national political priorities do not take this effect into account. Each individual Member State seems to assume that the wider gas market price is not affected by its own actions. This might be true for the smaller Member States, but actions by Germany, which accounts for almost a third of EU gas consumption, could have a measurable impact on global gas prices. The sum of the impact of all national measures will certainly be large enough to impact the global supply/demand balance of gas and thus its price, with a negative effect on the welfare of all Europeans.

The formal framework present below shows that gas price subsidies involve another cost, which could be much higher than the fiscal, namely the higher price all of Europe must pay for imported gas because too little is saved within the EU. The simple model allows for us to relate the importance of this terms of trade effect to observable variables.

One key result is that the terms of trade loss from an EU-wide gas price subsidy could amount to a considerable fraction of the total gas import bill, which this year could end up being as much as EUR 200-250 billion for the EU.

The fact that Europe's supply of gas is highly inelastic implies that the optimal policy would be a tax on gas use to ensure that every user considers the fact that their rate of consumption increases the price for everybody. This is the opposite of what is being done right now.

The analysis presented here is meant to provide a framework for thinking about the present situation in which gas prices are unexpectedly high and there is no spare capacity available because Russia has restricted its supply to Europe and all other producers are already at their production limits. More normal times with spare gas production capacity, and thus and an elastic supply, would require a different framework.

The modelling framework

The modelling framework is kept as simple as possible. It is based on a standard one good model in partial equilibrium. Demand is given by a standard demand function, q=q(p), with q'<0. The elasticity of demand is defined as:

Equation 1

$$\varepsilon \equiv -\frac{dq/q}{dp/p}$$

Any gas price subsidy can be modelled simply as a reduction in the price faced by the consumer. Denoting the subsidy by S, one can thus write: S=-dp. The subsidy will lead to a proportional increase in the quantity demanded equal to:

Equation 2

$$\frac{dq}{q} = -\varepsilon\frac{dp}{p} = \varepsilon\frac{S}{p} = \varepsilon s$$

The increase in demand is thus proportional to the subsidy relative to the (pre-subsidy) price given by S/p, which will henceforth be denoted by s.

The short-term elasticity of demand is widely assumed to be rather low. Some surveys yield 0.1 to 0.2 as a reasonable range, implying that even a large subsidy, say one which cuts the price for the consumer to one half (s=1), would lead to an increase in demand of only 10 %.

The fiscal cost of gas subsidies

The fiscal cost of a per unit subsidy (e.g. lowering price of one kWh of gas) is simply given by the product of the subsidy (S) and the quantity consumed (after subsidy):

Equation 3

$$fiscal\ cost = E = Sq_s = S(q + dq)$$

Where the quantity consumed after the subsidy is evidently endogenous to the subsidy itself.

The standard 'triangle' welfare loss from a subsidy at rate S is given by:

Equation 4

$$Welfare\ loss = \frac{1}{2}Sdq = \frac{1}{2}Sq\frac{dq}{q}$$

The fiscal cost can then be rewritten in terms of both measures of the subsidy, i.e. its absolute amount, S and in proportion to the initial price, s, together with the (absolute value of the) elasticity of demand, ε.

Equation 5

$$fiscal\ cost = E = S\left(q + \varepsilon q\frac{S}{p}\right) = Sq\left(1 + \varepsilon\frac{S}{p}\right)$$

Using the elasticity formula and the expression for total expenditure yields:

Equation 6

$$Welfare\ loss = \frac{1}{2}\varepsilon\frac{Es}{(1+\varepsilon s)} = \frac{1}{2}\frac{E}{((\varepsilon s)^{-1} + 1)}$$

This formula can be used to recover an order of magnitude of the welfare loss from knowledge of the fiscal cost of the subsidy scheme and the size of the subsidy relative to the price, combined with one parameter, namely the elasticity of demand.

In the case of natural gas, both key parameters take close to extreme values. The elasticity of demand, ε, should be rather low (variously estimated around 0.1-0.2) and the subsidy rather high if one considers that at today's market prices for gas the price jump could be as high as 3- to 5-fold. This would yield a value for the critical composite parameter εs of between 0.7/10 and 0.8/5 with a corresponding share of the welfare loss as a fraction of subsidy expenditure of between 1/24th (ε=0.1 and s=0.7) and 1/16th (ε=0.2 and s=0.8). The direct welfare loss is thus likely to be limited.

With low elasticity of demand, a price subsidy has only a modest impact on consumption, it represents mostly a transfer.

The general equilibrium of welfare effects: the terms of trade

The result so far describes the trade-off facing an individual state or region which can take the price of gas as a given. However, if many Member States introduce subsidies the resulting change in European gas consumption will impact overall imports and thus the price at which Europe can import gas (mostly via LNG once Russia is no longer a significant supplier).

The supply of gas to Europe is not totally elastic. Increasing the production of gas takes time. Contrary to oil, there is no spare capacity in gas because it is technically difficult to reduce production from an existing field. However, for Europe, supply is not a given, it depends on the global price which induces consumers elsewhere, especially in Asia, to use less gas.

This implies that while one can take the global supply of gas as a given in the very short run (i.e. the next few months), Europe can increase its imports if it is willing to pay a higher price.

One can thus define a supply curve at EU level by $Q_s=Q_s(p)$, with $Q'>0$. The subscript s will henceforth be dropped since for the EU supply and demand must equal at the aggregate level.

The elasticity of the gas supply at the EU level is defined as:

Equation 7

$$\sigma \equiv \frac{dQ/Q}{dp/p}$$

This elasticity must also be assumed to be low in the short run because it is based on consumers elsewhere reducing their gas use, thus liberating some gas for Europe. One should thus assume that it is of a similar order of magnitude as the elasticity of demand within Europe, ε (but with the opposite sign).

A higher price for imported gas implies a terms of trade loss. There is also a small amount of gas production in the EU but it does not react much to higher prices because of technological constraints. The rigidity of European supply is augmented by environmental concerns (and NIMBYism), as illustrated by the discussion about increasing gas production in the Netherlands.

It is thus assumed here that all of any additional gas for the EU would come from imports. This implies that the terms of trade loss resulting from higher domestic demand is given by the product of the increase in the price times the total quantity imported:

Equation 8

$$Terms\ of\ trade\ loss = dp(Q + dQ)$$

The terms of trade loss can be expressed in terms of the elasticity of supply:

Equation 9

$$Terms\ of\ trade\ loss = \frac{1}{\sigma} p \frac{dQ}{Q}(Q + dQ) = \frac{1}{\sigma} pQ \frac{dQ}{Q}\left(1 + \frac{dQ}{Q}\right)$$

The next step is to link the micro level, at which the price of gas can be assumed to be given, to the macro or EU level, where the price increases with demand.

Different Member States have [different policies](#) in terms of the size and the kind of subsidies provided to consumers. In the aggregate, these national subsidies increase the overall quantity demanded at EU level (or too be more precise, they reduce the savings which would otherwise result from a high price). This higher consumption, denoted here by dQ, then causes a terms of trade loss.

To simplify the analysis, all the different national subsidies are aggregated by assuming that there is one representative Member State with a subsidy s, which leads to an increase in demand equal to dq, as modelled above (and that this subsidy is the only reason demand for gas changes). One can thus write:

Equation 10

$$dQ = dq => \frac{dQ}{Q} = \frac{dq}{q}\frac{q}{Q} = \alpha \frac{dq}{q}$$

The ratio q/Q denotes how the share of total EU gas consumption has affected the subsidy. For example, this could be simply the share of Member States with a gas subsidy in total EU consumption or the share of consumers (e.g. households vs. industry) that receives the subsidy.

This share, q/Q is denoted by α, with 0<α<1. The larger the share of Member States with gas price subsidies, and the more extensive their subsidies, the larger α is.

Using this last relationship, the terms of trade loss can be rewritten as a function of the (representative) national demand increase:

Equation 11

$$Terms\ of\ trade\ loss = \frac{1}{\sigma} pQ \frac{dq}{q}\alpha\left(1 + \frac{dq}{q}\alpha\right)$$

The increase in demand is given by the demand function at national level (see equation (2) above). This yields the following expression for the terms of trade loss:

Equation 12

$$Terms\ of\ trade\ loss = pQ\frac{\varepsilon}{\sigma} s\alpha(1 + \varepsilon s\alpha)$$

The term pQ in this expression means that one can express the welfare loss of a gas subsidy as a fraction of the pre-subsidy overall gas import bill:

Equation 13

$$\frac{Terms\ of\ trade\ loss}{pQ} = \frac{\varepsilon}{\sigma} s\alpha(1 + \varepsilon s\alpha)$$

This is convenient for estimating an approximate size of the welfare loss because the import bill is already known.

The welfare loss relative to the import bill is linear in the size of the relative subsidy, s, the share of countries with subsidies, α, and the ratio of the two elasticities. The last element is crucial.

From the point of view of a single country (i.e. in the perspective of partial equilibrium), the welfare loss from a subsidy is much reduced by the low elasticity of demand. However, this mitigating effect disappears if one considers that the low elasticity of demand also implies that the supply at the aggregate (European) level is also inelastic.

This is a key insight: a low elasticity of demand for gas cuts two ways. Even a substantial price subsidy to EU consumers will not lead to much lower gas savings. But the same applies also to the rest of the world. A high increase in price will be needed to induce consumers elsewhere to reduce their consumption to free up even small additional supplies for Europe.

If one assumes that the global supply for Europe is as inelastic as European demand, i.e. $\sigma=-\varepsilon$ (which would be the case if demand in the rest of the world has the same, low, elasticity), the first term in the expression for the terms of trade loss relative to the overall import bill reduces to:

Equation 14

$$\frac{Terms\ of\ trade\ loss}{pQ} = s\alpha(1 + \varepsilon s\alpha)$$

Given a low value for the elasticity of demand, ε, one can neglect the second term in the brackets. This then implies that the terms of trade loss are simply equal to the product sα, the subsidy rate times the share of countries with a subsidy α (multiplied by the total gas import bill). If one half (by gas consumption) of the EU (i.e. α=0.5) subsidises gas by 50 % (s=0.5) it follows that the loss as a share of the import bill would be 1/4th.

The total cost of importing gas is likely to a surpass EUR 200 billion for the EU this year. Eurostat data shows that the monthly value of gas imports was already running at 16-20 billion per month up to May 2022, i.e. before further price increases following the reduction in Russian deliveries in July (following the maintenance work on Nordstream I). This implies that the welfare loss from subsidising one half of the EU's gas consumption at a rate of 50 % would imply a welfare loss of over EUR 50 billion.

It is also possible to relate the welfare loss from the terms of trade deterioration to the expenditure on the subsidy. Using equations (xx) and (12) yields the following expression for the terms of trade loss:

Equation 15

$$\frac{Terms\ of\ trade\ loss}{Fiscal\ cost} = \frac{pQ\frac{\varepsilon}{\sigma}s\alpha(1+\varepsilon s\alpha)}{Sq(1+\varepsilon s)} = \frac{\varepsilon}{\sigma}\frac{(1+\varepsilon s\alpha)}{(1+\varepsilon s)}$$

Where the simplification uses equation (10), the key result is that the terms of trade loss relative to the fiscal cost of the subsidy is equal to the product of the two terms (also fractions) on the right-hand side of equation (15). One term, the fraction (1+εsα)/ (1+εs) is likely to be close to one since ε is rather small.

The second term, ε/σ, represents the ratio of the two elasticities, which is also likely to be close to one since, as argued above, the elasticity of foreign supply is likely to be equally low as domestic demand in the EU. This implies that ε/σ should be close to one as well.

It follows that the welfare loss from a gas price subsidy via the terms of trade effect could be of the same order of magnitude as the cost of the subsidy itself. In other words, the money which is handed over to consumers to allow them to have cheap gas ultimately flows to foreign suppliers.

Taxing, instead of subsidising, gas consumption – subsidising gas savings

A more general implication of this framework is that, given the inelastic supply of gas to Europe, a negative subsidy, i.e. a tax would be needed. The tax is needed because any individual in Europe who increases her demand for gas imposes an external effect on other Europeans by driving the global price higher. The race to protect consumers has thus mainly had the effect of driving the global price higher.

From equation 13 one can calculate the 'optimal' tax rate, i.e. the rate that minimises the welfare loss from the deterioration of the terms of trade[1]:

Equation 16

$$\frac{\partial \frac{Terms\ of\ trade\ loss}{pQ}}{\partial s} = \alpha + 2\varepsilon s\alpha = 0$$

The optimal tax is thus equal to:

[1] The tax rate on gas which reduces the terms of trade loss to zero can be read directly from equation 13. It is the rate at which the term in brackets is equal to zero, which implies

$$s_{terms\ of\ trade\ loss\ zero} = \frac{-1}{\varepsilon\alpha}$$

Equation 17

$$s_{otimal} = \frac{-1}{2\varepsilon}$$

Substituting this result back into equation 14 allows one to calculate the savings on the import gas bill this optimal policy would generate:

Equation 18

$$\frac{Terms\ of\ trade\ gain\ with\ optimal\ tax}{pQ} = \frac{-\alpha}{2\varepsilon}\left(1 - \frac{\alpha}{2}\right)$$

These results show, as one would expect, that with a negative subsidy in the form of a tax, the EU will obtain a terms of trade gain (relative to the equilibrium without subsidy or tax).

The optimal tax on gas in equation 17 would be a high number in absolute value as it is the inverse of a small fraction, namely the elasticity of gas demand. With low elasticity, say 0.1, the tax should be five times the price (pre-tax). This value might appear excessive, but it illustrates the general principle that what is needed is a tax, not subsidies for gas. Most Member States are thus pursuing a policy which is the opposite from what is required in the present situation – they subsidise instead of taxing gas consumption.

Instead of taxing gas, which would be difficult in the present environment, one could instead provide consumers with subsidies for **gas savings**. This would have the same impact on gas demand as a tax but would leave household incomes higher. For households this can be easily done by paying them the spot price for any reduced gas usage during the coming winter season relative to last year (potentially adjusted for the number of heat degree days).

It was shown above that a price subsidy would mostly be a transfer to foreign suppliers. The equivalence between a tax and a gas savings subsidy then implies that such a subsidy would largely pay for itself, at least indirectly. The government would have the expenditure, but the private sector would gain almost the same amount via lower import prices.

The economic mechanism which suggests that gas should be taxed, rather than subsidised, is fundamentally the same as the argument for imposing a tariff on Russian gas imports when Gazprom had a dominant market position. Measures to make imports more costly increase domestic welfare when the foreign supply curve of an imported product is not perfectly elastic. This is a standard result of trade theory.

Subsidising gas prices at EU level is self-defeating

It has been shown so far that subsidising gas consumption in the EU leads to a term of trade loss. Another, more political, way to look at the same problem is to calculate by how much the price for consumers would fall once one takes the impact on import prices into account.

From equation (13) or the combination of (7) and (10), one can calculate the increase in the import price, dp:

Equation 19

$$Increase\ in\ import\ price = dp = \frac{\varepsilon}{\sigma} S\alpha$$

This result implies that the import price increases linearly with the amount of the subsidy (in absolute amounts). The factor of proportionality, εα/σ, is likely to be smaller than one as long as only a small proportion of the EU uses price subsidies (i.e. α<<1), but it is strictly positive. This means that the import price increases for everybody, even if the only a small number of Member States subsidise gas consumption.

If the entire EU adopts a subsidy, the increase in the import price depends only on the ratio of the two elasticities, and this ratio could be greater than one if the foreign supply elasticity is (in absolute value) smaller than the elasticity of demand in the EU.

The price to consumers is equal to the import price minus the subsidy:

Equation 20

$$Change\ in\ price\ for\ consumers = dp - S = \frac{\varepsilon}{\sigma} S\alpha - S = S\left(\frac{\varepsilon}{\sigma}\alpha - 1\right)$$

This implies that the price for consumers could actually go up if εα/σ > 1, which is possible in the case of an EU-wide subsidy (i.e. with α=1).

As mentioned above, ε=σ is the appropriate assumption if demand in the rest of world is identical to Europe's, and if the rest of world is the same size as Europe. Gros (2022) argues that Asia and Europe constitute one integrated market because most Asian imports are LNG and most of the marginal European imports are also now LNG.

Gros (2022) also shows that the Asian market is somewhat larger than the EU's market, which would imply that *ceteris paribus*, the elasticity of foreign supply, σ, is somewhat larger (in absolute value) than the elasticity of domestic demand in the EU, ε. This would reduce the size of the terms of trade loss. But one must consider that some major Asian countries have kept prices for household energy tightly capped, which reduces the Asian supply elasticity.

For example, Japanese retail energy prices (those that are part of the consumer price index) have increased by 'only' 16 % in the year to August, against over 40 % in the euro area. Chinese retail energy prices have also increase by less than in Europe (by 20 %). In Korea, the government has kept electricity prices constant for years and only allowed small, gradual increases this year.

The combined effect of these measures across Asia is that household energy demand has not been dented by very high LNG prices (Asia depends almost completely on LNG imports). This provides one explanation why LNG prices were so high even before the war started. Asian demand, or at least its residential part, has been insulated from global prices. This is one key reason why it is so costly for Europe to quickly find LNG supplies to make up, at least partially, for the loss of Russian gas.

These large consumer price subsidies in Asia mean that the ratio ε/σ might well be larger than one.

The last equation can also illustrate the external effect a subsidy in any one country can have on the rest of the EU. If only a fraction α of Member States have a subsidy, the price for their consumers is given by equation (20) above. But the price increases **for all other consumers** (those in the $1-\alpha$ Member States without a subsidy). For them the price is given by equation (19).

Trying to protect consumers against high prices can lead to explosive dynamics

Political leaders like to promise 'to protect' consumers against high gas prices (or electricity prices, which are now tightly linked to gas prices). This promise is impossible to maintain at the aggregate level since Europe simply must pay for the imported gas. If it is not the consumer who pays then it must ultimately be the taxpayer.

However, only looking at the situation from the consumer perspective, there is a danger that promises of protection – especially in the form of a guaranteed low price – have a high cost.

A domestic price cap could be modelled in this framework by assuming that policymakers want to achieve a price reduction for consumers equal to a certain amount and thus they impose a subsidy equal to this amount, denoted by S_0.

But once the subsidy has been imposed import prices will increase and policymakers will realise that the price facing consumers has not fallen by the amount anticipated. This will then naturally lead to a further increase in the subsidy.

This idea can be modelled simply by assuming that the subsidy valid at any point in time, t, is increased by a fraction, β, of the difference between the desired fall in the price for consumers, S_0, and the actual price.

The subsidy in time t, S_t, is thus given by:

Equation 21

$$S_t - S_{t-1} = \beta\left[-S_0 - S_{t-1}\left(\frac{\varepsilon}{\sigma}\alpha - 1\right)\right]$$

This implies that the subsidy will keep going up as long as the price for consumers has not reached the target reduction of S_0. The increase stops only when the target is reached. The value at which the subsidy will finally settle, denoted by S_{ss} is given by:

Equation 22

$$0 = \beta\left[-S_0 - S_{ss}\left(\frac{\varepsilon}{\sigma}\alpha - 1\right)\right] => \ S_{ss} = S_0\left(1 - \frac{\varepsilon}{\sigma}\alpha\right)^{-1}$$

This implies that the subsidy will ultimately rise to a multiple of the starting one because a part of the subsidy is offset by higher import prices. The multiplier will increase with the share of the EU which engages in the price cap and the ratio of the domestic to the foreign elasticity of demand, ε/σ.

Even if only a small number of the EU's Member States engage in a price cap, ensuring that the expression $(1- \varepsilon\alpha/\sigma)$ remains positive, this result implies that any initial subsidy will be followed by further ones because part of the initial subsidy would be frustrated by higher import prices.

If the composite parameter $\varepsilon\alpha/\sigma$ is greater than one, there is no equilibrium. The subsidy would explode in the vain attempt to lower the price for consumers, which is not possible in this case because the import price increase, which results from a subsidy, would be larger than the subsidy itself. If policymakers realise this too late, they run the risk of setting off a chain reaction of catastrophic dynamics.

Conclusions

Extreme gas prices are exacting a significant toll on the European economy, reducing households' purchasing power and increasing costs for industry. Member States are reacting to the widespread political pressure for compensation by enacting many support schemes. This is understandable from a political point of view.

But the reality is that high gas prices constitute a tax on Europe given that 90 % has to be imported and this tax has to be borne by somebody. If it is not the consumer, it must be the taxpayer (often the same person). Only a very few leaders have been brave enough to acknowledge this reality.

What no European government has acknowledged is that subsidising gas consumption would only make the problem worse. As consumers face less of an incentive to reduce their own gas consumption, European import demand remains higher than it would have been otherwise. Given the very limited supply from the rest of the world this implies substantial further price increases, thus augmenting even further the burden on Europe (and, in a vicious circle, increasing the demand for additional protective measures).

Unfortunately, European countries are not the only ones trying to protect consumers from high gas prices. Some major Asian importers, such as Japan and South Korea, have also enacted measures to limit the price increases faced by households. This might be one of the reasons why Asian gas demand has so far fallen little and why spot gas prices have continued to increase.

It is understandable that each national government follows national political priorities. But each national measure, for example a price cap on gas, reduces the incentive to save gas. Price caps on electricity have a similar effect since gas still constitutes in many cases the marginal fuel when flexibility is required during peak hours.

Every measure which that reduces the incentives for domestic savings means a higher need for imports, which then puts more pressure on the price Europe faces on the global market.

This constitutes a clear externality which justifies common efforts to reduce gas demand. In this sense the European Commission was justified in proposing common targets for the reduction of gas use throughout the EU. But these targets (for now only voluntary) can only be achieved through higher prices, not with mere political appeals and the 'price mitigation' the Commission recommended earlier this year would make appeals meaningless since households will not dial down their thermostats if the gas price does not increase enough.

What is really needed from an economic point of view would be a tax on gas because that would encourage further savings, thus reducing European demand and lowering the global price. This conclusion is independent of the simple model used here. It derives from first principles that apply in a situation where Europe faces – at least in the short run – a highly inelastic supply of gas.

A price subsidy will lead to higher import prices, but this means that the price paid by the consumer falls less than anticipated than when the subsidy was introduced. The increase in import prices then induces policymakers to increase the subsidy. Any attempt to cap the domestic price could thus set in motion a chain of ever higher spot prices and higher subsidy rates to keep the price for consumers down. EU-wide subsidies could have such a strong impact on import prices that ultimately consumer prices increase anyway because the increase in the import price essentially overwhelms the subsidy.

Sky-high prices on gas have rekindled the usual reaction that policymakers 'must be seen to be doing something'. One expression of this is the call to for an EU emergency energy summit. A key proposal at this summit is likely to be an extension of the Spanish price cap for gas used in power generation to the entire EU. This would be exactly the opposite of what is needed and would drive gas prices even higher.

Instead of subsidising consumption through a price cap, governments should subsidise gas savings, for example by paying households for consuming less this winter than last. This would also involve expenditure, but the model predicts that such subsidies would mostly pay for themselves through lower import prices – but only if implemented at EU level. If any single Member State implements such a scheme, it would bear the full fiscal cost, while the rest of the EU would gain (even if only marginally) from lower import prices.

The broad conclusion is that the Commission should strenuously oppose any gas price cap or subsidy and it should recommend Member States to employ savings subsidies instead.

Every measure that reduces the incentives for domestic savings means a higher need for imports, which then puts more pressure on the price Europe faces on the global market. Unfortunately, supply on the global market is limited by the fact that major Asian gas importing countries have shielded their consumers from price increases, thus keeping Asian consumption high.

Annex

The Gasumlage: a special case study

In Germany, as in many other countries, households usually have longer-term contracts for which the price can be adjusted only gradually. Well run enterprises only offered these contracts if they had themselves longer term contracts at guaranteed prices. However, those companies with contracts with Russia now face a problem because Gazprom is no longer honouring its contractual obligations. This means that these companies must procure the gas promised to households at the spot price. They thus risk bankruptcy, which would force consumers to seek a new supplier at higher prices. This is a particularly acute problem in Germany where the largest gas distribution company, UNIPER, sourced most of its gas from Gazprom. UNIPER was rescued by the government which thus provided an implicit subsidy for UNIPER clients.

One way to look at this is to regard it as Europe's biggest gas subsidy. A closer look yields a more nuanced picture.

The cost of rescuing UNIPER (or rather, allowing its clients to receive gas at low, contractual prices) will be borne by all German gas consumers, through a modest levy, the so-called '*Gasumlage*' set at around 2.4 cents/kWh, or about 25 % of the average price paid by German gas consumers. This Gasumlage will cover (90 % of) the difference between the cost of the contracted deliveries with Gazprom (which are no longer arriving) and the cost of obtaining gas on the spot market.

Another way to look at UNIPER's rescue of (and some other enterprises in a similar situation) is that the Gasumlage represents the gas consumption tax that is suggested by the analysis presented here.

The German government argued that if UNIPER had not been rescued its customers would have faced much higher prices than the customers of other enterprises which had long-term contracts with non-Russian suppliers who are still able to fulfil their contracts. The main difference between the hypothetical situation of not rescuing UNIPER and the package rescue + Gasumlage is that without the rescue there would have been greater price differences paid by German consumers. But there would only be a small difference in the average price since the pricing of the Gasumlage covers 90 % of the cost of substituting contractual Russian gas deliveries.

All this assumes that it is appropriate to protect households' right to receive their gas at contractual prices, prices which increase only with a lag to spot prices. From an economic perspective, this does not make sense in this particular situation. But if prices for many households increase only slowly, one could still provide them with temporary savings subsidies.