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EFFECT OF GOVERNMENT TAXATION ON SUPPLY

By

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World energy demand is expected to increase substantially in the years ahead. Without substantial technological breakthroughs, fossil fuels (oil, gas and coal) must cover most of this growth. European demand for gas alone is expected to increase some 75 per cent over the coming two decades. The sources for gas supply that shall meet this demand are limited to a few large production areas and fields, many of them at locations far from the market. The costs of developing the fields and new and expanded transportation capacity are rather high and need long term investment decisions to be realized.

At the same time, the European gas market is becoming more liberal, with possible more unstable and lower producer prices in the short and medium term as a consequence. The use of energy in general, and gas, in particular, may be taxed higher, as well. The proposal for a directive restructuring the community framework for the taxation of energy products (EU, 1997) was presented approximately at the same time as the TPA-directive was approved (EU, 1998). Although not yet approved, the proposal suggested that minimum charges on all energies should be introduced across the union and raised step-by-step until 2002, when a new escalation plan should be put on the agenda. For natural gas, the minimum rate should be increased as much as 350 per cent, much higher than suggested for oil products, but at the same level as for coal.

The tax proposal «stated» that consumers should be very little hurt by the sharp tax increases. However, it did not tell who eventually is expected to carry the burden. This raises the focus for this presentation: If producers risk carrying the burden of taxation and liberalization through lower and more unstable prices, how will producers' long term production decisions, and,

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hence, the long term supply of gas to the market, be influenced?

Petroleum taxes and gas prices

EU countries have been the forerunners in increasing energy taxes. Until now, this has first of all been a concern for oil products. EU countries have the highest petroleum product prices in the world.[2] As percentage of end-user prices, the typical European tax is some 75-85 % on gasoline, 50-60 % on diesel and 30-70 % on light fuel oils (1999). The recent rise in oil prices has increased the taxes in monetary terms, but modified them in terms of shares of end-user prices. Taxes on a barrel of Brent crude oil reached some 50 USD/bbl in the mid 1990s, while in the early 1980s taxes on an average barrel of oil was in the range of 20-30 USD/bbl. The higher petroleum taxes implies that the price of a weighed barrel of oil to EU *consumers* decreased (only) from 95 to 70 USD/bbl in the period from 1981 to 1994 (Austvik, 1996). In the same period, the price to *producers* declined from some 70 to 15-20 USD/bbl.

Even though oil producers may have lost from the high oil product taxation, European gas producers have benefited. Generally, in today's contracts, gas prices are linked to the price of its alternatives, mostly oil products, such as fuel oils. When fuel oil prices are increased, either it is due to higher crude oil prices or higher taxation, gas prices have followed. Therefore, exporters' gas prices have been much more stable than crude oil prices over the past 15 years. This stability has contributed to securing the investments made in gas production and transportation infrastructure in exporting countries in the period.

However, taxes on the use of gas itself are on their way up. As share of end user prices to household consumers, gas taxes have typically increased from some 15 % in 1984, to slightly more than 20 % in 1994 and to 20-50 per cent in 1999 (including both excise taxes and VAT). The Netherlands, Italy, Finland, Denmark and Austria, have the highest taxes, so far. Taxation on gas to power plants and the industry is lower than taxes on gas to households, in many countries zero. Even though gas taxes are still low compared to taxes on oil products, taxes on polluting coal is even less. In fact coal is subsidized in many countries. This tax-structure confirms the impression that energy taxation in consuming countries has primarily not been set with reference to the environment. Rather it is determined from fiscal needs and set higher the more inelastic demand and / or supply is (according to the so-called "inverse elasticity rule", Ramsey 1927).

Who will carry the burden of higher gas taxes?

Whatever the motive, a tax introduces a difference between the price a consumer pays and the producer receives for a commodity. In autarchy (closed economy), a government can put a tax on consumption and know, depending on the relation between demand and supply elasticities, that a share (between 0 and 100 percent) of this tax will be paid by consumers through higher

[2] The directive for increased CO_2 taxes, mentioned in the EU tax proposal of 1997, was proposed by the EU in 1990, and suggested a 10 USD/bbl increase in the taxation of oil by the year 2000. The directive was not formally implemented, and more or less it was not necessary. Already in 1993, the tax increases suggested were implemented in the major European industrialized countries. In some cases, it was vastly exceeded (Reinsch, Considine & MacKay, 1994).

consumer prices. Producers pay the other share through lower producer prices.

If we do not operate in autarky the results can be quit different. Consumers in a small open economy, trading in international commodity markets, will in most cases pay a consumption tax alone. Price-taking producers selling in this international market will experience lower demand for their products in that country and switch their sales to other countries. But they will get the same price as selling to the other countries (disregarding price discrimination between countries).

However, when "sufficiently" many countries, or big countries, raise consumption taxes, the effects on consumer and producer prices, respectively, is more similar to those in a closed economy. Such orchestrated taxes across consuming nations will, usually, be paid partly by consumers and partly by producers, across borders.[3] As we in the case of European gas are facing a regional market and not a global one, orchestrated consumption taxes on gas across the European market have this potential,

Thus, national European gas taxes may, deliberately or not, serve a similar function as a customs tariff. For a large importing country, or a group of countries, such taxes may pressure exporting countries' prices down. In fact, taxes may be orchestrated across borders in a way that maximizes purchasing countries social surplus, in same way an optimal tariff can do for large importing countries, as we know from international trade theory.

If the proposed EU directive from 1997 should be fully implemented, gas taxes will be increased further, and relatively more than oil product taxes. In the short and medium term the tax may partly be paid by end-users, depending on how (in)elastic demand for gas is, and whether end-user prices matches its alternatives initially. As elasticities for supply and demand may vary depending on price levels and time horizon, the effects of the tax depend on the assumptions made.

In today's market, gas prices are set lower than prices of its alternatives in order to increase the share of gas in overall energy demand. The demand and supply elasticities in the actual range of prices will then determine how the tax burden is shared. In the short and medium term supply of gas is rather inelastic, and demand is not very elastic either, but more elastic than supply. In this situation, producers most likely will pay most of the tax through lower prices both in today's market (in order to maintain demand growth) and in a liberalized market. If producers are earning an economic rent at this level of prices, they will continue to invest even though the economic profit is lowered and be rather insensitive to marginal price changes. On the other hand, if producers are serving at marginal cost, supply will be elastic in the long run. If producers stop increasing supply, consumers will pay the tax. Step by step prices will increase to the level of the price of the alternatives as demand growth become lower and lower. When prices match it's alternatives, tax increases will again be borne by producers.

To the extent gas taxes will be paid by end-users, there may be different limits to taxation across sectors. Industries that use gas are in regional or European competition in using gas as an input factor. In the product markets, however, they are to a larger extent in global competition, in the

[3] This may also be the situation if producers cannot switch between markets when taxes are raised.

same way as industry using oil as an input factor. Private households do not compete in global markets, but choose their energy (mix) according to relative prices (including taxes), technology, cost of switching between energies etc. This uneven competitive position across gas consuming sectors may imply that taxation on gas use in households/business will remain higher than on use in industry and power plants.

If transporters (pipelines and local distribution companies, LDCs) take a higher price for gas than what the initial relationship between gas prices and its alternatives presupposes, the transporters may pay the tax in the short term as well (within today's contractual regime). In this situation, transporters and producers must negotiate over the distribution of the tax burden. In the market, how it has worked until now with repeated sale and resale of gas, these negotiations depend on parties' cost, negotiation strength, market power, jura etc.

Historically, transporters' margins seem rather independent of end-user prices. A liberalized market will also determine transporters' margins independent of end-user prices. As long as transporters can argue that the level of their existing margins are necessary to cover costs, an increase in taxes will not be borne by them. The less dependent margins to pipelines and LDCs are on end-user prices, the more of the tax, if not all, must, eventually, be paid by producers/exporters through lower prices and or by customers at the cost of lower demand growth. To my knowledge, to the (modest) extent such negotiations already has taken place, the result has been that producers pay the tax.

Taxation and liberalization

The development of new market structures, competition rules, regulation and other aspects of the processes towards more a liberal European gas markets may involve redistribution of rent within the gas chain. Increased competition may push gas prices at the customers'[4] level down, especially if there is gas-to-gas competition and an oversupply of gas in the market, and thus, be to the benefit of consumers. At the same time, easier access and lower margins to transmission companies may also be to the benefit of producers, disregarding transitional costs.

In general, companies and countries may lose or gain from liberalization, depending on how the processes proceed in various countries and market segments, and how companies and countries perform, alone and together. If oversupply of gas is avoided, and exporters succeed in an optimal downstream integration, they may not be worse off than in the present market structure. With no tax changes, a TPA regime in the transmission segment on the continent, as suggested, could benefit exporters as well as the customers, at the cost of the transmission segment.

An increase in gas excise taxes may become particularly attractive for consuming countries' governments when rent is made available in the gas chain. This is what happened in the oil market over the past 15 years. When crude oil prices dropped in 1986 and 1991, consumers could have derived the benefit from the loss of rent among producers. However, in Europe and

[4] Customers are here LDCs, gas power plants and large industrial users that buy gas at the end of a pipeline from a transmission company, in today's market, or directly from producers, in a liberalized market. Gas power plants and large industrial users are also consumers of gas, while the LDCs are transporters that sell gas to households and businesses as consumers, at the end of their network.

to some extent in the U.S., consuming countries raised oil product taxation, which stabilized end-user prices and to some extent suppressed demand and (delayed?) a potential later price rise on crude oil.

As downward trends in crude oil prices and cost-savings in oil exploration and production can be used to increase oil product taxation, an upward trend in oil prices can be used to increase natural gas taxes, as was seen in Italy some 10 years ago. Potential lower margins in the transmission segment may also be taken by governments, rather than by producers or customers.

Thus, within certain limitations (and temptations), gas taxes *may* be aimed at becoming revenue generators for consuming countries' governments in the way oil product taxes already are. Because countries with open trade needs rules of minimum levels for taxation and cost-driving regulations, to avoid a "race-to-the-bottom" development, the EU set minimum rules for energy taxation, as well as in a number of other fields. This is an important reason for the pressure towards harmonization of energy taxation. However, because such processes may lead to a pressure on exporting countries' prices and the distribution of rent among countries, gas taxation may become a major political issue for oil and gas producers in their relations to importing countries in the years ahead.

Less new gas to the market?

When market liberalization and/or increased taxation causes lower and less foreseeable gas prices, supply of gas may be affected. The level of and predictability of prices is especially important for the development of huge new and expensive projects. The cost of getting new gas to the market (long term marginal cost of gas production) is particularly high for new gas from Iran, Kazakhstan, mid and northern Norway, the Barents Sea and Siberia. Gas from many of these areas is needed in order to meet the expected demand growth. The higher the ambition of increased gas consumption, the higher and/or more foreseeable prices must be.

On the other hand, from a consuming country's point of view, producer prices need not be higher than what is "necessary" to make producers invest in new capacity. The more cost effectively producers can operate, the lower prices can be. As long as some rent, with "reasonable certainty", is left to a producer making calculations for new field developments, he will invest if he consider himself as a price taker. The only fields making economic rent may then, eventually, be those of the lower cost than the marginal one, as in competitive markets. In this case, the owner of gas as an exhaustible resource will, over time, not necessarily earn resource rent, even if consumer prices are rising, contrary to what economic theory of exhaustible resources usually tells us.

The European gas market may never become "completely and perfectly" liberalized, only more exposed for competition and regulation than it has been. The degree and form of liberalization may differ between sectors and regions, and throughout the gas chain, also on the producers' /exporters' level. A (theoretically) completely liberalized market prerequisite competition between exporting firms, within and between countries. For producing countries, this may be the case only to a limited degree, caused by the characteristics of the European natural gas industry. Because we are facing a non-renewable resource, geographically located in

large amounts in few areas remote to the market, there is a need for a certain level of long-term planning and coordination within each producing area. It is important for all parties that exporting countries exploits the economies of scale and scope in the expensive projects and perform an optimal resource extraction in a way that they are able to supply gas on a stable basis over time. Hence, in all gas exporting countries, centralized bodies orchestrate resource extraction, transportation and sales to the market.

A problem is, of course, that when benefits of scale and scope is exploited and coordination takes place, the firms remaining tend to become large and, thus, may gain some market power. It is the interest of consumers that market inequities caused by extensive concentration in transmission and production are neutralized. From a consuming country's point of view, there is a risk whether there in Europe are enough sellers to create a real market with competition or whether the exporting countries will be able to enforce an anti-competitive situation. Obviously, this concern must be weighed against the economic characteristics of European gas and it's non-renewable and long-term nature. There are no easy once-and-for-all solutions when the European gas market shall be liberalized and/or taxed.

In this situation, producers can play an important role in achieving the joint interest in remaining stable and foreseeable suppliers to the European gas market. In order to do this, producers need stable and foreseeable prices as well as the instruments and ability to optimize gas extraction over time. For producers, it is a genuine risk connected to the increased uncertainty and price volatility a more liberal market creates, in general, and of the possibility of increased gas taxation, in particular. It is difficult to see that the EU *simultaneously* can achieve lower gas prices, high tax revenues from gas usage, and a growth in both demand and supplies as expected.

One of the biggest problems for producers is that purchasing countries through energy taxes have a political tool that, ex post, can derive (much of) their expected rent. Worst case scenario for exporters occur when fields and pipelines are "fully" developed. At this stage, most producers' costs are sunk, and producers have no alternative but to continue supplying gas through existing facilities and grids even though prices are well below what was expected. In the very extreme, if no new capacity can be developed, taxes could be raised to the point where producers' prices just cover a little more than variable costs. With all cost sunken producers would benefit from continuing producing even if prices do not even cover fixed costs.

Therefore, future contracts should include rules over how a tax burden shall be shared within the industry in order to reduce the political price risk producers otherwise face. It is, of course, difficult to limit future parliaments' ability to put new taxes on the use of gas. On the other hand, if gas taxes are further increased, across EU countries, producers are not anymore facing market prices only, nor in today's or in a liberalized market. Prices will be heavily influenced by political decision making, as well. If this situation cannot be solved, producers may not be able to take the commercial and political price and tax risk involved, and, consequently, delays huge new investment projects.

Lower prices in the short and medium term that is to the benefit of importing countries may then turn into higher prices in the long run due to lower long term investments in production. We can see some degree of a parallel in the U.S. In the U.S., natural gas prices are now on the way up

again (before oil prices started to rise) partly due to lower investments in production after prices were dropping as a result of the deregulation of the market in the mid 1980s.

If the long term stability and growth of the European gas market is to be secured, energy taxes should to a larger extent than today be set to reflect each carrier's environmental benefits and costs. Taxes on gas should be lower than on other fossil fuels and liberalization should take a form that increases gas consumption. Among fossil fuels, natural gas is the environment's best friend. Low gas taxes would benefit producers through more stable and foreseeable prices, consuming countries through stable and continued increases in supplies as well as it would give us all a better environment.

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