European gas regulation: a change of focus

Spanjer, Aldo

Department of Economics, Leiden University

2006

EUROPEAN GAS REGULATION: A CHANGE OF FOCUS*

Aldo Spanjer

a.r.spanjer@law.leidenuniv.nl

Department of Economics, Leiden University
P.O. Box 9520, 2300 RA, The Netherlands
Phone: ++31 71 527 7756 fax: ++31 71 527 7813

Abstract
This paper confronts the current European gas regulation with the emerging new energy paradigm. It argues that due to a lack of policy credibility, the hold-up problem is a serious threat that will undermine the workings of the future EU gas market. This paper explores how one could from a theoretical perspective, given the characteristics of the EU gas markets, try to solve the hold-up problem. Two conclusions are 1) that hold-up will not be solved completely and 2) that in order to solve the hold-up problem as much as possible, the underlying assumption of energy policy should be changed. More specifically, the regulatory focus should no longer emphasize predominantly the consumer interests, but should instead more explicitly recognize producer interests. This implies that the current European gas regulation requires a change of focus.

JEL-classification: L51, L95, and Q48

Keywords: gas regulation, hold-up, regulation theory, new energy paradigm.

* Revised version of paper presented at the European Doctoral Seminar on Natural Gas Research, Oxford, United Kingdom (November 10th, 2006). I thank the participants of my session for useful comments and suggestions on an earlier draft of this paper. The usual disclaimer applies.

1. Introduction

Current European gas regulation is based on the liberal market oriented approach that surfaced at the end of the 1970s. As a consequence, the second Gas Directive[1] mainly focuses on creating an internal energy market via achieving efficiency gains, reducing energy prices, obtaining higher service levels, and increasing competitiveness. The main requirements in the Gas Directives to this end are opening up domestic markets, unbundling of uncompetitive from potentially competitive activities, and introducing third party access to naturally monopolistic infrastructures. Recent developments, however, have triggered concerns on whether this liberal focus is still appropriate. This paper focuses on this question. More specifically, this paper argues that the current regulatory scheme is based on superseded principles which could result in serious problems when confronted with the new energy paradigm that is developing out of the changes that currently are taking place at the international level.

This paper is structured as follows. Section two discusses the new energy paradigm[2] that is upon us. More specifically, previous paradigm changes in energy markets are analyzed in order to identify the drivers of a paradigm change. These drivers are: the specifics of the market at hand, the environment it is operating in, and the economic theory underlying gas policy. This section will show that the combination of changes in market specifics and external environment creates a situation for which the current regulatory regime has not been designed. This legitimizes the question whether the theory underlying current gas regulation should not be changed accordingly. Having asked this question, section three explores, first of all, whether things might go wrong under the current focus. It argues that the specifics of the European natural gas market make it very susceptible to the hold-up problem. Then I try to identify some theoretical recommendations to solve hold-up. Section three concludes that 1) the hold-up problem will not be completely solved; and 2) that any regulatory solution will inherently require a sufficiently pro-industry regulator. Section four argues that in order to lower hold-up as much as possible, the traditional focus of energy policy – i.e., consumer interests explicitly being valued higher than producer interests – should be changed. If not, there is a risk that the efficacy of policy recommendations or institutional innovations will be needlessly diminished. Finally, section five will highlight the future research following from this paper's conclusions.

2. The European gas market: drivers of paradigm changes

The development of Europe's gas markets clearly shows how changing fundamentals and a changing theoretical focus can result in a new institutional approach. When we consider the paradigm changes that have taken place prior to the current one, we can observe which characteristics stand out in determining whether or not pressures for change develop. Roughly three drivers of paradigm changes can be identified: 1) the prevailing focus of economic theory at the time, 2) the environment the market is operating in, and 3) the characteristics of the market. We will see below that these characteristics have profound consequences for the preferred institutional system of the market.

---

1 2003/55EC, OJ L 176, 15.7.2003, p. 57–78.

2 To avoid confusion, note that the definition of paradigm shifts used here differs from the traditional definition of a paradigm shift (or change). Helm (2005, p. 1) argues that "Thomas Kuhn famously described (…) a paradigm shift or 'revolution' as the emergence of an alternative framework of common and shared analysis". According to this definition, paradigm changes indicate "the development of science and of intellectual ideas". I will in this paper refer to paradigm changes in policy which occur because, in Helm's words, "events can conspire to change the historical context to a sufficient degree to make it increasingly hard to reconcile the existing mind set of policy-makers with the evidence, leading eventually to new objectives and new policy instruments".

The traditional structure of the continental gas market, prevailing until the late 1970s, has been based on the neoclassical view on economics. According to this view, the government should intervene in case of a market failure. Probably the most conspicuous example of market failure is the gas infrastructure that was considered to be a natural monopoly. The ensuing fears of anticompetitive behavior were a justification for substantial government involvement into the gas sector. This involvement commonly took the form of a government monopoly. A second prime market failure pertained to the public services, for instance safety or security of supply, which were assumed to possess public good characteristics. Hence, the public monopolies also became the party taking care of securing the public service obligations: the public monopolies received exclusive rights in exchange for the obligation to secure the public service obligations (or services of general economic interest). The external environment contributed to this monopoly structure. This is most visible in case of security of supply. Fears surrounding security of supply – as a consequence of increasing producer-consumer tensions that culminated in the 1973 and 1979 oil crises – were based on the premise that gas was a scarce resource, prone to political producer-country influence, and therefore that government intervention was necessary to guarantee supply security. Besides the theory and the environment, the market characteristics also contributed to the monopoly-oriented view on the market. The immature stage of development of the European gas markets implied a monopoly approach. During the 1960s, after the discovery of the Groningen field in 1959, gas was gaining recognition as a clean alternative to oil and coal. Consequently, an outlet and accompanying gas infrastructure had to be developed in order to allow a widespread use of gas. The gas industry is very capital intensive since large up-front investments are needed along the entire value chain – for example in building production and exploration facilities, pipelines, infrastructure, storage facilities, etc. The old, monopolistic and government-dominated market structure, by spreading price and volume risk along the chain via the use of long-term contracts with take or pay[3] and final destination clauses[4], by balancing market power between producers and consumers, and by linking gas prices to oil prices[5], is well-suited for stimulating the substantial amount of investments required for developing an immature market. After all, any cost incurred could be recouped by the monopolists among the many energy consumers. Not surprisingly, Europe's gas markets managed to develop rapidly.

One could cynically argue that the success of this policy has led to its downfall: after all, the excessive amounts of investments resulting from this market structure – gold plating – is a prime reason for the replacement of this structure, at the end of the 1970s, with a liberal, market oriented one. In addition to the inefficiencies in the old structure, an important impetus for this change in economic focus were the early experiences of liberalization in the United States – in the late 1970s – and the United Kingdom – in the early 1980s. With some delay, Europe followed suit: in the mid-1980s, the theoretical focus moved away from governments controlling the gas markets. Market failure was no longer a justification for allowing government intervention; instead, the focus shifted towards reducing government involvement – 'rolling back the state' – and unleashing competitive forces onto the gas markets. The energy sectors were thought to operate more efficiently when subjected to a market reform that focused on liberalization, privatization and competition. The market environment significantly contributed, once again, to this new paradigm coming into fashion. The excess supply situation – 'the gas bubble' – made gas widely available and cheap, shifting the balance of power towards the buyers. Consequently, no government involvement

[3] In short, a take or pay clause obliges the buyer take always pay, whether he has taken off the gas or not, for the contracted gas. These clauses thus shift the volume risk to the consumers.

[4] Final destination clauses forbid buyers to resell the gas they have acquired outside their own market.

[5] The oil-price linkage shifts the price risk to the producers. This is because the actual gas price does not enter the equation. Therefore, in case of a fall in current gas prices, the oil-linked gas prices will remain unchanged and the lower revenues are passed on to the producers.

to guarantee security of supply was deemed necessary. In addition, the fact that the gas market was considered to be mature is a significant factor. The public monopolies had created a highly reliable, well-interconnected gas infrastructure, requiring an alternative reform policy.[6] The main differences with an immature market that explain this change of heart are that in a mature market, initial investments have long been amortized and, secondly, that gas supply companies face virtually no volume risk. In other words, the economics of the gas markets had changed and so did policy. Instead of stimulating new investments, the emphasis shifted to deploying the existing infrastructure as efficiently as possible – 'sweating the assets' as it is referred to in the literature. All these factors combined resulted in the traditional market organization losing its glitter, making introducing competitive forces through for instance liberalization the new panacea. The European Commission's drive to liberalize European gas markets, stemming from the policy, in 1988[7], to create an internal energy market, reflects this view. The assumption underlying the Directives is, hence, the liberal believe in perfect competition, implying that gas producers should compete for the right to deliver gas to Europe. In addition, the policy of sweating the assets was supposed to increase consumer surplus by driving down network costs as close as possible to marginal operating costs. In the buyer's market that had developed, such a view was quite understandable and liberalizing in order to reach as close as possible the perfect competition outcome of prices at marginal costs would indeed be welfare enhancing. Security of supply was not considered as big a problem as in the old days because 1) the excess supply made anxieties concerning gas imports much less pressing; and 2) obtaining gas reserves from outside of Europe was not considered to be a significant problem, as the producer countries were expected to welcome European foreign direct investment and technological knowledge into their energy sectors in order to develop their reserve potential. In a competitive environment, public monopolies increasingly lose their grip on the national markets, and besides network operations, government-initiated investments are not an option anymore. Competitive forces should induce operators to only undertake efficient investments, doing away with the inefficiencies of gold plating. Once again, theoretical developments combined with changes in market fundamentals and the external environment, have brought about a paradigm change in energy policy.

Lately, however, things have once again changed around considerably. Gas prices have risen explosively on the back of the oil prices and the international context has changed with European demand increasing whereas European supply is steadily decreasing. Europe, as well as other countries in similar circumstances – such as the United States, China and India – will increasingly have to rely on imports. In addition, access to gas reserves in producer countries appears to be much more limited in practice than was assumed previously. The new situation is therefore characterized by record-high prices; low domestic production and rising demand creating supply shortages; and low access to new reserves. These developments shift the balance of power on the international gas market from consumers to producers. In other words, the international gas market is not anymore a buyers' market, but has evolved, or is evolving, into a sellers' market instead. With sellers increasingly gaining in power, a return to a buyers' market is highly unlikely, since this would require excess supply. A rational producer will increase its production capacity only to the extent that it optimizes the production of its fields and maximizes its profits.[8] Oversupplying the market would harm both goals; the current situation can therefore be considered to be a fundamental break with the past. Also, increasing import dependence results in a higher need for investments, because a larger amount of bigger and longer pipelines will have to be built

[6] See for example Ellis et al. (2000) and IEA (2000).
[7] CEC (1988).
[8] Dutch gas policy provides a nice illustration. Two of the most important policy goals underlying Dutch gas policy are to extend the life of the Groningen gas field as much as possible and to maximize state revenues.

from increasingly remote locations. Within Europe investments will be required for maintenance and upgrading of existing pipelines, as well as building new pipelines, among which interconnectors. Besides pipelines, investments will focus on alternative forms of gas delivery, mainly liquefied natural gas (LNG). Investments are needed along the entire LNG chain: in building liquefaction terminals in the producing countries, vessels to ship the LNG, regasification terminals in importing countries, and the necessary infrastructure to transport the gas to the liquefaction terminals and from the regasification terminals (via joint ventures, the prevalent mechanism to conduct large investments, European investors will be confronted with a part of the entire LNG project costs). Moreover, flexibility needs will increase in Europe, since the economics of gas transportation imply that gas flowing from the producers will have a low flexibility. To this end, seasonal gas storages will have to be built, once more increasing investment needs. A projected 45 to 60 billion cubic meter (bcm) of seasonal storage working volume will be needed up to 2025, requiring substantial additional investments.[9] This implies that the current focus on utilizing the existing gas grid as efficiently as possible is no longer appropriate, as massive investments in new infrastructure will be needed.

In addition to changes in the balance of power and the market characteristics, policy objectives have changed also.[10] The main public service obligations currently emphasized are security of supply – as a consequence of the changing balance of power and the increased need for investments, but also for a large part because of market instabilities caused by for instance political turmoil and terrorist threats – and climate change.[11] One should moreover consider that Europe is best characterized as a patchwork of gas markets, each within its own stage of development. Western European gas markets are relatively mature. However, southeastern gas markets, for example, are better described as immature markets in need of further development.[12] As we have seen before, such markets require fundamentally different regulatory policies than do mature markets, making it questionable whether the current EU liberalization movement is the right way to proceed in these countries. Additionally, the maturity of the European gas markets as a whole can be questioned.[13] For one because of the presence of immature member states, but also because of the fact that along the entire European continent substantial new investments are necessary. A third point adding to the questionability of the assumption of a mature European gas market is the observation that the abovementioned need for investments makes volume risk, contrary to what is commonly assumed, important again.[14] Notwithstanding the fact that many of the arguments put forward by producers for security of demand have to a large extent lost their significance, because of the development of gas infrastructure that has taken place during the previous decades, but also as a consequence of the rising market liquidity, there might still be volume risk for certain new infrastructure projects – especially for projects selling high cost gas supplies into a liberalized European gas market.[15] For example, when gas prices continue to rise, there is a risk to a producer that consumers might increasingly switch towards alternative fuels, possibly making investments in production capacity dedicated to Europe worthless. Also, even if security of demand will not be vital in developing a project, the market power at the sellers' side could still result in long-term take or pay contracts. The observation that volume risk might under the new energy paradigm be more than a relic from the past suffices for now.

---

9 CIEP (2005).
10 See Helm (2005).
11 See for example Sioshansi (2005), who argues that climate change has promoted from an academic issue to a major public (energy) policy challenge.
12 See the website of the International Gas Union at: http://www.igu.org/committees/pgc/c.
13 See also van der Linde and Stern (2004, p. 14).
14 See for example Ellis et al. (2000).
15 See Stern (2004). I will in my future research elaborate on the issue of the need for long-term take-or-pay contracts and third party access exemptions under the new paradigm. See also section five.

We can at this point conclude that the market fundamentals and the market environment have changed recently, making it necessary to assess whether Europe's gas market regulation is still up to par with the new energy reality. More specifically, a legitimate question is whether or not the economic focus underlying regulatory policy should be changed accordingly.[16]

3. Regulation theory: hold-up and policy credibility

The preceding sections have shown that a new energy paradigm is upon us and that as a result of this the current regulatory scheme is based on assumptions not anymore reflecting actual market conditions. The main winds of change are an increasing need for investments along the entire value chain and a shift in policy priorities towards security of supply and climate change, which in essence is an investment problem.

We have argued that current gas regulation is typically being employed from a consumer perspective: consumer interest is in most regulatory models being attached a higher weight than rents flowing to the producer. Section two argued that this assumption was valid in the old context of liberalizing a sellers' market in which previously most of the rents were generated upstream. Whether the current regulation scheme is still up to par with reality is a logical question when we consider that of the three main drivers of a paradigm shift have changed recently. Research has tried to answer this question, and two main recommendations are that that regulation should more explicitly consider governance issues as well as recognize the vital role performed by institutions.[17] I will argue in this section that the current gas regulation will not solve the hold-up problem due to a lack of policy credibility. This will seriously undermine the efficacy of policy amendments designed to solve the problem of regulation under the new energy paradigm (see section two). The obvious question is then how the regulatory regime should be amended to solve the hold-up problem. This section will also show that the theory of regulation concludes that a paramount condition for the hold-up problem to be solved is that producer interests are more explicitly recognized. After this, section four will argue that this requires a new focus on gas regulation. Section five, finally, argues that things might in practice be more complicated than suggested so far and hence asks a number of questions that future research should answer.

The hold-up problem and policy credibility

Having observed that adequately securing investments is of paramount importance under the new energy paradigm, the follow-up question is whether, and if so, to what extent things might go wrong on Europe's gas markets. To this end, we should focus our attention on the time inconsistency problem pertaining to a typical regulator which creates the hold-up or underinvestment problem plaguing many network sectors. The hold-up problem is a direct consequence of a lack of policy credibility. The essence is that a typical regulator is not able to credibly commit ex post to a regulatory rule, making the rule incredible ex ante. The regulator's time inconsistency might take one of basically two forms: renegotiation and expropriation. The former entails a regulator using information it has obtained during the regulatory process in order to increase welfare in the subsequent period(s) at the expense of the investor. The latter is relevant in case of sunk investments: once an investor has been tied to the market via sunk investments, the regulator has an

[16] See for instance CIEP (2006) and Dassler (2006) for recent research that tries to answer this question.

[17] A substantial body of research along this line has developed (and is still growing). Important contributors are for instance Williamson (1971, 1975, and 1998) and North (1981, 1990) who extend the ideas of Coase (1937, 1960) on the subject. For an application of these insights to energy regulation, see for instance Groenewegen and Künneke (2005); Midttun (2005); and Correljé (2005).

incentive to expropriate this investment via for instance determining low prices or permitting entry.[18] These risks increase the cost of capital and might even result in investments being cancelled; this is especially harmful considering the massive amount of investments that are required under the new energy paradigm. Before answering the question how to design a regulatory policy that solves the hold-up problem, one should firstly determine how susceptible to the hold-up problem the gas market actually is.

Is hold-up likely on Europe's gas markets?

The likelihood of the hold-up problem occurring in practice is to a large extent determined by the costs of breaking the regulatory contract: the higher these costs are, the less likely it will be for a typical regulator to act opportunistically, and hence, the higher will be policy credibility. A number of variables that create and/or augment the hold-up problem have been identified in the literature. At least seven should be mentioned.[19] The obvious first one is the presence of sunk investments. As mentioned before, sunk investments tie an investor to the market he has invested in, making it easier – and cheaper – for a regulator to expropriate the investment. Second, rapid demand growth increases the benefits in subsequent periods. Hence, the benefits foregone of breaking the regulatory contract will rise at higher demand levels. Third, the rate of capital depreciation is important. High levels of capital depreciation result in a relatively short period over which capital needs to be replaced. The benefits of reneging thus last for a relatively short period of time, making it relatively expensive. Fourth, high technological development makes reneging expensive, too, as the after-reneging benefits will become larger. A fifth factor influencing the likelihood of reneging on a regulatory contract is the regulator's discount factor – that is, the extent to which a regulator values future benefits over present-day benefits. If the discount factor is low, the regulator values present-day pay-offs highly, and hence, will be more likely to renege.[20] A related concept is that of the shortsightedness of a regulator (after all, a regulator that values highly future benefits can by definition not be shortsighted or myopic). The more myopic is a regulator, the more likely this regulator will be to act opportunistically and maximize welfare over a relatively short period of time. This, for instance, might be the case when a regulator is in office for a relatively short period of time.[21] Sixth, the ownership of a regulated firm matters. It has been shown that the incentives of a regulator or government to expropriate sunk investments can be lowered via a privatization policy that distributes a large part of the shares to the general population (as opposed to insider privatization, where the shares are allocated to the workers of the company). This widespread distribution can be achieved by setting low share prices (or even allocating them free of charge), by restricting the number of shares an individual can own and by discouraging people to sell their shares for cash.[22] The intuition is relatively straightforward. Breaking the regulatory contract via expropriation would in this situation harm a large part of the population. This increases the political costs of expropriation. There is, of course, a trade-off because this policy will have its costs. First, the investors themselves will need to receive a sufficient amount of shares to be able to exert some control. Second, the more shares that are being transferred away from the investors, the fewer incentives they will have to invest in the first place. Third and finally, giving away shares for free (or at a discount) will lower government revenues associated with the privatization. The Schmidt model shows that despite these costs, "giving away a substantial part of the shares to the general population may not only reduce expropriation but also increase the restructuring efforts *and* revenues

[18] See Goldberg (1976) and Williamson (1976) for pioneering treatments of this problem. .
[19] See for instance Salant and Woroch (1992); Spiller (1996); Newbery (1999); and Armstrong and Sappington (2005).
[20] See Levine et al. (2005, p. 467, 468).
[21] Lewis and Sappington (1990).
[22] These conclusions follow from Schmidt (2000). See also Vickers (1993) and Biais and Perrotti (2002).

from privatization".[23]

Finally, the weight that is placed on investor profits will influence the credibility of regulation. It is argued that the more weight that is being placed on investor profits, the more credible regulation will be.[24]

With these variables in mind, I determine whether, and if so, to what extent the gas market will be susceptible to opportunistic regulatory behavior. Table 1 summarizes the observations and shows that gas policy credibility will be low. This leads to the conclusion that the specifics of the gas market imply that the hold-up problem will very likely be present on Europe's gas markets.

Table 1: Regulatory policy credibility in the European gas market

Variable	Gas market	Policy credibility
Investments	Sunk and increasing	- +
Demand	Increasing	+
Capital depreciation	Low	-
Technological development	Low	-
Discount factor	Low	-
Private ownership	Predominantly public	-
Investor's profits	Emphasis on consumer interests/surplus	-

Investments in gas markets, in for instance infrastructure, are to a significant extent sunk. Also, even though the gas market is commonly assumed to be mature as a consequence of the controlled manner in which the gas market has been developed up to now, substantial investments will be needed. Regarding policy credibility, this situation creates a trade-off: the increasing need for investments makes reneging more expensive; on the other hand, however, these investments will largely be sunk, increasing opportunities for a regulator to behave opportunistically. This makes a final verdict regarding investments and policy credibility somewhat ambiguous.

Second, gas demand is important. Notwithstanding the significant efforts that, for instance as a consequence of anxieties surrounding increasing import dependence and the resulting emphasis at the Community level on energy efficiency and lowering gas demand, are being taken towards reducing gas demand, gas demand will rise in the coming years. This increases the benefits to be obtained in future periods and therefore lowers the incentive to renege on a regulatory contract. Regulatory credibility increases with rising demand.

Third, at some point in time, investments will be worn out and will need to be replaced by new investments. Gas capital stock generally lasts for many years, resulting in a low level of depreciation. This lengthens the period after which capital will need to be replaced, making the benefits of reneging last for a relatively long period of time.

Fourth, the rate of technological development has the potential to significantly influence the market and its regulation (as has happened in for instance the telecommunications market when mobile telephony

[23] Schmidt (2000, p. 410-413).

[24] See Newbery (1999, p. 41) and Levine et al. (2005, p. 465). Along the same line, Teulings and Bovenberg (2006) show that the potential hold-up problem in investments (in R&D) depends on the share of profits in the consumer surplus; that is, the less surplus a potential investor is able to extract, the lower his incentive to invest. Crew and Kleindorfer (2006, p. 74) argue that the traditional assumption "of economic efficiency maximizing the size of the pie irrespective of the distribution of the resulting benefits" is one of the fundamental shortcomings of traditional regulatory economics.

was introduced). Gas markets generally are characterized by a relatively low level of technological development. The story is analogous to that of depreciation above: the low level of technological development observed in the gas sector results in the benefits from reneging lasting for a relatively long period of time and therefore lowers policy credibility.

Fifth, the discount factor of a typical gas regulator is quite low. One reason for this is electoral pressure to obtain short-term gains. Due to the importance of energy for a national economy, the risen energy prices, and the observation that governments have from the start concerned themselves to a large extent with the gas markets, gas can be regarded as a highly politicized subject. This is in accordance with the observation that regulatory bodies generally have a low degree of political autonomy.[25] This makes the threat of regulation being exposed to political considerations, and hence a low discount factor and myopic behavior, conceivable in the case of gas.

Sixth, the European gas market does not yet score too well on the issue of ownership. Most European energy companies were and still are controlled or influenced by the government – through majority stakes (e.g. in the case of France's Gaz de France prior to its merger with Suez) or golden shares (e.g. in the case of Spain's Endesa, Germany's E.ON, and the Gaz de France/Suez merger company). We have seen above that policy credibility might be higher when these companies would become privatized and their shares spread over a large part of the general population. There are, however, some signs that we are moving in the direction towards lower government involvement – for instance through a European Court of Justice ruling that golden shares are incompatible with the free movement of capital.[26] Whether, and if so, to what extent golden shares will be eliminated form the European gas market remains to be seen, because, as mentioned, a golden share has recently been awarded to the French and Belgian governments following the Gaz de France/Suez merger.[27]

Finally, the picture on investor's profits is not very positive. Both Gas Directives emanate from the view that introducing competition into Europe's gas markets will eventually both improve efficiency as well as secure the relevant public service obligations. As mentioned above, the underlying assumption is that of stimulating the consumer interest/surplus as much as possible. As a consequence, regulatory models typically attach a higher weight to consumer surplus than to producer surplus. This will provide a regulator with clear incentives to act opportunistically, as she will improve welfare when investor's profits are transferred to consumers. Regulatory policy credibility will consequently be low.

We have observed that of the seven main factors identified, five actually point in the direction of a low policy credibility of a typical European gas regulator. Only increasing gas demand – the magnitude of which will depend on the effectiveness of for instance the energy saving efforts from the Commission – will increase policy credibility. The picture on investments in mixed. In other words, we must conclude here that in the case of gas regulatory credibility will be low and consequently that the hold-up problem is likely.

---

[25] See Arentsen (2004, p. 88) who observes that "Only Italy, The Netherlands (to some extent) and the United Kingdom have legally independent and autonomous gas market regulators with autonomous ex ante regulatory mandates. All other countries in one way or another share regulatory mandates with governmental bodies, in almost all cases the ministry of economic affairs or energy."

[26] CoJ EC September 28 2006 C-282/04.

[27] See http://www.eubusiness.com/Competition/060929185152.wh8di53q.

Theoretical solutions to hold-up

Without the intention of being exhaustive, this paragraph discusses a few solutions to hold-up that emanate from the regulation theory.

A lack of regulatory commitment is no problem in case a cooperative equilibrium between the regulator and the regulatee would develop. Theoretically, a cooperative equilibrium between the investor and the regulator could develop – for example, in case of an infinite horizon model where investments last forever, a cooperative solution can be attained if the investor gradually builds up its asset base.[28] A regulator choosing to break the regulatory contract would trigger retaliation from the regulated firm by curtailing or abandoning its investment programme. In this situation, hold-up is non-existent. Recently, however, it has been shown that this cooperative equilibrium is only one of a range of possible equilibria, among which the no-investment/no-cooperation outcome.[29] Given the market characteristics in table one, a cooperative equilibrium is very unlikely.

Other theoretical solutions to the hold-up problem basically follow one of three, interrelated, lines of reasoning: increasing the (political) cost to the regulator of breaking the regulatory contract; limiting the regulator's discretion; or improving the regulator's commitment powers.[30] Most of the variables mentioned in table 1 fall into the category of increasing the costs of reneging. For instance, one way to increase the costs of reneging is by removing the influence of political considerations on regulatory policy. This would, as mentioned above, increase the discount factor, and hence, make reneging more expensive. Privatization has the potential to increase the political costs of opportunistic behavior. Although both of these solutions have the potential to reduce the equilibrium level of expropriation, they both will not, however, completely solve the hold-up problem. Another solution from Table 1 would be stimulating technological development. However, in order for this stimulation to be credible ex post, the regulator's time-inconsistency should first be solved allowing him to credibly commit to a regulatory policy. The remaining three options are more or less exogenous in that they can not (in case of the investments and the depreciation rate) or should not (in case if demand, which should be stimulated in order to increase credibility) be fundamentally altered by a government or regulator. There is thus some scope for reducing hold-up through increasing the cost of reneging, but it will not remove hold-up completely.

The second line of reasoning argues that the regulator's policy discretion should be limited in order to increase policy credibility. This might be done by imposing some requirement, through for instance issuing licenses, on the regulator to allow a regulatee to earn a specified rate of return on investments. The discussion on whether or not to limit regulatory discretion is complicated by a trade-off between regulatory discretion and policy flexibility. At the positive side, limited discretion lowers the opportunity of a regulator to behave opportunistically. However, regulatory flexibility will be limited as well, lowering the scope for regulation to be adapted in a welfare-enhancing manner – for instance because changing market circumstances or advancing knowledge of market parties imply adaptations to the regulatory framework. Limiting regulatory discretion might therefore lower welfare by obstructing welfare-enhancing adaptations to the regulatory scheme. The thin line between increasing welfare and renegotiating on the regulatory contract in this situation should be noted. Besides this trade-off, a vital observation is that lowering a regulator's discretion does not per se solve the hold-up problem. After all, a new government could very well issue new legislation that breaks the regulatory contract. One solution is to separate the administrative and legislative processes.[31] In this way, and by using licenses,[32] regulatory commitment

[28] See Salant and Woroch (1992).
[29] See Levine et al. (2005, p. 461, 462).
[30] See Newbery (1999, p. 72, 73) and Armstrong and Sappington (2005, p. 66-69).
[31] See for instance Levy and Spiller (1994, p. 205-212) and Spiller (1996, p. 444-450).
[32] Licenses are the preferred contractual form in this case, because changing a license will usually require agreement of the regulated company.

might be increased. Matters are more complicated than portrayed here – for instance because the licenses will be inherently incomplete, or because the relation between the regulator, the competition authority, and the government is important. For this paper's exploratory purpose, however, it is sufficient to conclude that also with a restrained regulator and a separation between administrative and judicial institutions, hold-up will not be completely removed.

This thus brings us to the third line of reasoning: increasing the regulator's commitment powers. Related to the issue regulatory discretion is the issue of regulatory commitment: instead of lowering regulatory discretion, one might alternatively choose to increase the regulator's commitment powers. The analysis of regulatory commitment emphasizes the relation between investor profits and consumer benefits. As mentioned above, regulatory commitment will increase, and regulatory policy will become more credible, when producer interests are valued relatively highly, because in this case a regulator will be relatively unlikely to expropriate the investor's (sunk) investments. The advantage of this approach is that it allows a regulator to retain its discretionary powers. He will thus be able to flexibly adapt to changing circumstances in a welfare-enhancing manner by basing policy on the latest forecasts and information available. Of course, this leads us directly to the disadvantages. After all, when a regulator is unable to pursue the welfare-maximizing policy objectives, increasing its commitment powers might actually worsen the situation. This is because of a potential trade-off: increasing commitment powers will make regulatory policy more credible but might, on the other hand, increasingly allow a captured regulator to pursue welfare-decreasing policies. In case of a myopic regulator, the same applies.[33] This trade-off notwithstanding, recent research on the issue of regulatory commitment powers stresses the need for a regulator to be sufficiently pro-industry when trying to solve the hold-up problem.[34] Despite the fact delegating energy policy to an independent energy agency with an explicit emphasis on producer interest will definitely increase policy credibility and hence lower the hold-up problem, this policy also will fail to completely solve the hold-up problem. This is because hold-up will be solved only on the assumption that commitment to the degree of regulatory independence and/or the regulator's focus on producer interests is credible.

In conclusion, this section has shown that in the case of the European gas market 1) the lack of policy credibility makes the hold-up problem very likely to occur; 2) the hold-up problem will not be completely removed; and 3) a policy that lowers hold-up as much as possible will inherently require a sufficiently pro-industry regulator.

4. A change of focus

We have seen in the preceding section that the gas market is very prone to hold-up. The theoretical solutions discussed in the previous section suggest that the presence of hold-up will direct us into a second-best world because none of the proposed solutions will completely remove the hold-up problem. If we acknowledge this, section three provides some very interesting insights for EU gas policy. Most important is the conclusion reached with respect to increasing a regulator's commitment powers, namely, that a vital condition to reach as close as possible the first-best outcome is that an independent regulatory agency places a relatively high weight on investor profits. This is a vital insight because this implies that the current EU view on gas regulation should be amended. After all, section two has argued that one of

[33] See, again, Lewis and Sappington (1990). They argue that a regulator with a relatively short time in office might be primarily concerned with increasing the welfare of its own contemporary consumers. In this case, granting this regulator strong commitment powers might decrease welfare, as he will have the ability to pass on excessive costs to the future regulator and generations.

[34] See, for instance, Levine et al. (2005).

the prime objectives of energy policy in general, and liberalization of the gas market in particular, is serving the consumer interests (via for instance sweating the assets and stimulating as much as possible third party access to the sunk networks). This explains why both Gas Directives have been developed with this focus in mind. This could also explain the observation in section two that despite the fact that both the market characteristics as well as the market environment have changed recently, the theoretical focus has not yet been adapted. In other words, from a theoretical perspective, the new energy paradigm implies a reconsideration of the traditional assumptions regarding consumer and producer interests. Not acknowledging this will result in the hold-up problem remaining present to a larger extent than necessary; this will seriously undermine the efficacy of proposed remedies that retain the current emphasis on consumer interests.

5. Future research

There are two directions on which future research should focus. The first follows from the observation that none of the proposed theoretical remedies actually solves the hold-up problem. It is accepted in recent literature that some temptation to renege always remains. This brings to the fore the question whether this leads to the conclusion that the liberalization should be reconsidered. After all, if there is no change of hold-up being solved completely, then the issue becomes whether or not welfare will be better served by returning to the default option of government dominated energy markets. At least three questions arise. First, will returning to the traditional structure of government-to-government transactions actually do away with policy incredibility, or are the problems analogous as those described above? If the former applies, the implication would be that the observation that currently member state governments increasingly tend to conclude bilateral agreements with gas producers is in fact, contrary to the Commission's opinion, a positive development. Second, will laying down the ground rules for an independent regulatory agency in for instance primary law sufficiently lower the temptation of a regulator to renege on the regulatory contract and hence adequately secure investments? A third question pertains to the likelihood of reconsidering the liberalization. Liberalization has been developing on the European continent for around 20 years now, and it is in my opinion unlikely that this policy will be abandoned – even if it would be the only way to solve the hold-up problem. If this is true, then a more relevant question would be how to structure this imperfect world as good as possible. This brings us to the second research direction, namely, how should the provisions emanating from the current Gas Directives be amended in order to diminish as much as possible the hold-up problem. Or, in other words, how will European gas regulation change when its focus will be changed away from its current consumer-oriented focus?

It should be analyzed first of all how retaining the current, consumer-oriented view will result in problems when confronted with the new energy paradigm. A vital issue in this respect is why current policy proposals to stimulate investments – think of the Article 23 exemptions in the Gas Directive, which allow an investor to be granted an exemption from third party access for a certain period of time when this is required to give the project the go ahead – are not adequate anymore.

A problem relates to the fact that the Commission will not be able to credibly commit to abandoning its current approach. In addition, upholding the current pro-consumer view will under the new energy paradigm increasingly result in conflicts between the Commission and the regulatees, making it harder to reach a consensus and increasing transaction costs. Another potentially significant problem is that a regulator might not deploy its regulatory instruments to the full extent when it does not have adequate incentives to intervene outside the consumers' interest. The touchstone should be whether, and if so, to

what extent the actual reason for liberalization in the first place – the PSOs – will be (better) secured. Note that the PSOs perform a double role: the PSOs – nowadays predominantly security of supply and the environment – are an explicit energy policy goal while they also are the criteria on which the effect of liberalization should be assessed.

After having shown how upholding the current emphasis will worsen the PSOs, the question can be answered how the current provisions should be amended in order to align regulatory policy with the new energy paradigm.

References

Arentsen, M.J. (2004), *Politics and Regulation of Gas in Europe*, in: Finon, D. and A. Midtun (eds.) (2004), "Reshaping European Gas and Electricity Markets. Regulation, Markets and Business Strategies", Elsevier, p. 69-109.

Armstrong, M. and D. Sappington (2005), "Recent Developments in the Theory of Regulation", in: Armstrong. M. and R. Porter (Eds.) (2005), *Handbook of Industrial Organization*, Volume 3, North Holland.

Biais, B. and E. Perotti (2002), "Machiavellian Privatization", *American Economic Review*, 92(1), March, p. 240-258.

Clingendael International Energy Programme (CIEP) (2005), *The European Market for Seasonal Gas Storage*, Discussion Paper, January, The Hague.

Clingendael International Energy Programme (CIEP) (2006), *The paradigm change in international natural gas markets and the impact on regulation*, International Gas Union/ The Clingendael Institute, April, The Hague.

Coase, R. (1937), "The Nature of the Firm", *Economica*, 4(16), November, p. 386-405.

Coase, R. (1960), "The Problem of Social Cost", *Journal of Law and Economics*, 3(1), October, p. 1-44.

Commission of the European Communities (1988), *The Internal Energy Market (Commission Working Document)*, COM(88) 238 final, May, Brussels.

Correljé, A.F. (2005), *Dilemmas in Network Regulation: The Dutch Gas Industry*, in: Künneke, R.W., A.F. Correljé, and J.P.M. Groenewegen (eds.), "Institutional Reform, Regulation and Privatization. Process and Outcomes in Infrastructure Industries", Edward Elgar, p. 115-150.

Crew, M.A. and P.R. Kleindorfer (2006), *Regulation, pricing and social welfare*, in: Crew, M.A. and D. Parker (eds.), "International Handbook on Economic Regulation", Edward Elgar, p. 63-81.

Dassler, T. (2006), "Combining theories of regulation – Proposing a framework for analyzing regulatory systems worldwide", *Utilities Policy*, 14(1), March. P. 31-43.

Ellis, A., E. Bowitz and K. Roland (2000), "Structural Change in Europe's Gas Markets: three scenarios for the development of the European gas market to 2020", *Energy Policy*, 28 (5), May, p. 297-309.

Goldberg, V.P. (1976), "Regulation and Administered Contracts", *Bell Journal of Economics*, 7(2), Autumn, p. 426-448.

Groenewegen, J.P.M. and R.W. Künneke (2005), *Process and Outcomes of the Infrastructure Reform: An Evolutionary Perspective*, in: Künneke, R.W., A.F. Correljé, and J.P.M. Groenewegen (eds.), "Institutional Reform, Regulation and Privatization. Process and Outcomes in Infrastructure Industries", Edward Elgar, p. 1-36.

Helm, D. (2005), "The Assessment: the New Energy Paradigm", *Oxford Review of Economic Policy*, 21(1), February, p. 1-18.

International Energy Agency (IEA) (2000), *Regulatory Reform: European Gas*, IEA, October, Paris.

Levine, P., J. Stern, and F. Trillas (2005), "Utility price regulation and time inconsistency: comparisons with monetary policy", *Oxford Economic Papers*, 57(3), p. 447-478.

Lewis, T.R. and D.E.M. Sappington (1990), "Sequential Regulatory Oversight", *Journal of Regulatory Economics*, 2(4), December, p. 327-348.

Linde, J.G. van der and J. Stern (2004), *The future of gas: Will reality meet expectations?*, Paper prepared for the 9th International Energy Forum 2004, 22-24 May, Amsterdam, the Netherlands.

Midttun, A. (2005), *Deregulation: Design, Learning and Legitimacy*, in: Künneke, R.W., A.F. Correljé, and J.P.M. Groenewegen (eds.), "Institutional Reform, Regulation and Privatization. Process and Outcomes in Infrastructure Industries", Edward Elgar, p. 39-66.

Newbery, D.M. (1999), *Privatisation, Restructuring and Regulation of Network Industries*, MIT Press, Cambridge, Massachusetts.

Newbery, D.M. (2001),"Economic reform in Europe: integrating and liberalizing the market for services", *Utilities Policy*, 10 (2), June, p. 85-97.

North, D.C. (1981), *Structure and change in Economic History*, New York: Norton and co.

North, D.C. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press.

Salant, D.J. and G.A. Woroch (1992), "Trigger Price Regulation", *Rand Journal of Economics*, 23(1), Spring, p. 29-51.

Schmidt, K.M. (2000), "The political economy of mass privatization and the risk of expropriation", *European Economic Review*, 44(2), February, p. 393-421.

Sioshansi, F.P. (2005), "Global climate change: Here to stay", *Utilities Policy*, 13(3), September.

Spiller, P.T. (1996), "Institutions and Commitment", *Industrial and Corporate Change*, 5(2), January, p. 421-453.

Stern, J.P. (2004), *Investments and uncertainty in Liberalised Gas Markets: do projects need Article 22 exemptions?*, presentation at Symposium on the European Natural Gas Market, AER/CPB/ECN, November 5, The Hague.

Teulings, C.N. and A.L. Bovenberg (2006), *Privatization, deregulation and competition: the roles of increasing returns, entrepreneurship and capital-market imperfections*, Paper presented at the 62nd IIPF Congress, August 28th, Paphos, Cyprus.

Williamson, O.E. (1971), "The Vertical Integration of Production: Market Failure Considerations", *American Economic Review*, 61(2), May, p. 112-123.

Williamson, O.E. (1975), *Markets and Hierarchies: Analysis and Antitrust Implications*, Free Press, New York.

Williamson, O.E. (1976), "Franchise Bidding for Natural Monopolies – in General and with Respect to CATV", *Bell Journal of Economics*, 7(1), Spring, p. 73-104.

Williamson, O.E. (1998), "Transaction Cost Economics: How it works; Where it is headed", *De Economist*, 146(1), p. 23-58.

Research Memorandum Department of Economics

Research Memoranda
- are available from Department of Economics homepage at : http://law.leidenuniv.nl/org/fisceco/economie/
- can be ordered at Leiden University, Department of Economics, P.O. Box 9520, 2300 RA Leiden, The Netherlands Phone ++71 527 7756; E-mail: economie@law.leidenuniv.nl

2006.04 Aldo Spanjer
European gas regulation: A change of focus

2006.03 Joop de Kort and Rilka Dragneva
Russia's Role in Fostering the CIS Trade Regime

2006.02 Ben van Velthoven
Incassoproblemen in het licht van de rechtspraak.

2006.01 Jurjen Kamphorst en Ben van Velthoven
De tweede feitelijke instantie in de belastingrechtspraak.

2005.03 Koen Caminada and Kees Goudswaard
Budgetary costs of tax facilities for pension savings: an empirical analysis.

2005.02 Henk Vording en Allard Lubbers
How to limit the budgetary impact of the European Court's tax decisions?

2005.01 Guido Suurmond en Ben van Velthoven
Een beginselplicht tot handhaving: liever regels dan discretionaire vrijheid.

2004.04 Ben van Velthoven en Marijke ter Voert
Paths to Justice in the Netherlands. Looking for signs of social exclusion.

2004.03 Guido Suurmond
Brandveiligheid in de horeca. Een economische analyse van de handhaving in een representatieve gemeente.

2004.02 Kees Goudswaard, Koen Caminada en Henk Vording
Naar een transparanter loonstrookje?

2004.01 Koen Caminada and Kees Goudswaard
Are public and private social expenditures complementary?

2003.01 Joop de Kort
De mythe van de globalisering. Mondialisering, regionalisering of gewoon internationale economie?

2002.04 Koen Caminada en Kees Goudswaard
Inkomensgevolgen van veranderingen in de arbeidsongeschiktheidsregelingen en het nabestaandenpensioen.

2002.03 Kees Goudswaard
Houdbare solidariteit.

2002.02 Ben van Velthoven
Civiele en administratieve rechtspleging in Nederland 1951-2000; deel 1: tijdreeksanalyse.

2002.01 Ben van Velthoven
Civiele en administratieve rechtspleging in Nederland 1951-2000; deel 2: tijdreeksdata.

2001.03 Koen Caminada and Kees Goudswaard
International Trends in Income Inequality and Social Policy.

2001.02 Peter Cornelisse and Kees Goudswaard
On the Convergence of Social Protection Systems in the European Union.

2001.01 Ben van Velthoven
De rechtsbijstandsubsidie onderzocht. En hoe nu verder?

2000.01 Koen Caminada
Pensioenopbouw via de derde pijler. Ontwikkeling, omvang en verdeling van premies lijfrenten volgens de Inkomensstatistiek.

1999.03 Koen Caminada and Kees Goudswaard
Social Policy and Income Distribution. An Empirical Analysis for the Netherlands.

1999.02 Koen Caminada
Aftrekpost eigen woning: wie profiteert in welke mate? Ontwikkeling, omvang en verdeling van de hypotheekrenteaftrek en de bijtelling fiscale huurwaarde.

1999.01 Ben van Velthoven and Peter van Wijck
Legal cost insurance under risk-neutrality.

1998.02 Koen Caminada and Kees Goudswaard
Inkomensherverdeling door sociale zekerheid: de verdeling van uitkeringen en premieheffing in 1990 en 1995.

1998.01 Cees van Beers
Biased Estimates of Economic Integration Effects in the Trade Flow Equation.

1997.04 Koen Caminada and Kees Goudswaard
Distributional effects of a flat tax: an empirical analysis for the Netherlands.

1997.03 Ernst Verwaal
Compliance costs of intra-community business transactions. Magnitude, determinants and policy implications.

1997.02 Julia Lane, Jules Theeuwes and David Stevens
High and low earnings jobs: the fortunes of employers and workers.

1997.01 Marcel Kerkhofs and Maarten Lindeboom
Age related health dynamics and changes in labour and market status.

1996.07 Henk Vording
The case for equivalent taxation of social security benefits in Europe.

1996.06 Kees Goudswaard and Henk Vording
Is harmonisation of income transfer policies in the European Union feasible?

1996.05 Cees van Beers and Jeroen C.J.M. van den Bergh
The impact of environmental policy on trade flows: an empirical analysis.

1996.04 P.W. van Wijck en B.C.J. van Velthoven
Een economische analyse van het Amerikaanse en het continentale systeem van proceskostentoereke-ning.

1996.03 Arjan Heyma
Retirement and choice constraints: a dynamic programming approach.

1996.02 B.C.J. van Velthoven en P.W. van Wijck
De economie van civiele geschillen; rechtsbijstand versus no cure no pay.

1996.01 Jan Kees Winters
Unemployment in many-to-one matching models.

1995.05 Maarten Lindeboom and Marcel Kerkhofs
Time patterns of work and sickness absence. Unobserved effects in a multi-state duration model.

1995.04 Koen Caminada en Kees Goudswaard
De endogene ontwikkeling van de belastingdruk: een macro-analyse voor de periode 1960-1994.

1995.03 Henk Vording and Kees Goudswaard
Legal indexation of social security benefits: an international comparison of systems and their effects.

1995.02 Cees van Beers and Guido Biessen
Trade potential and structure of foreign trade: the case of Hungary and Poland.

1995.01 Isolde Woittiez and Jules Theeuwes
Well-being and labour market status.

1994.10 K.P. Goudswaard
Naar een beheersing van de Antilliaanse overheidsschuld.

1994.09 Kees P. Goudswaard, Philip R. de Jong and Victor Halberstadt
The realpolitik of social assistance: The Dutch experience in international comparison.

1994.08 Ben van Velthoven
De economie van misdaad en straf, een overzicht en evaluatie van de literatuur.

1994.07 Jules Theeuwes en Ben van Velthoven
De ontwikkeling van de criminaliteit in Nederland, 1950-1990: een economische analyse.

1994.06 Gerard J. van den Berg and Maarten Lindeboom
Durations in panel data subject to attrition: a note on estimation in the case of a stock sample.

1994.05 Marcel Kerkhofs and Maarten Lindeboom
Subjective health measures and state dependent reporting errors.

1994.04 Gerard J. van den Berg and Maarten Lindeboom
Attrition in panel data and the estimation of dynamic labor market models.

1994.03 Wim Groot
Wage and productivity effects of enterprise-related training.

1994.02 Wim Groot
Type specific returns to enterprise-related training.

1994.01 Marcel Kerkhofs
A Quadratic model of home production decisions.