Do Article 22 exemptions adequately stimulate investments in European gas markets?*

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Abstract
Stimulating investments whilst introducing competition is a major policy issue in European gas markets. The current Article 22 exemptions regime, which is an application to the gas market of the access holiday theory, is designed to address this issue. Though useful, the access holiday theory provides an incomplete picture. In order to adequately analyze the exemptions regime, this paper incorporates the real options theory of investments into the analysis. Combining both theories provides the properties of an exemptions regime that better stimulates investments in gas. The current exemptions regime has some shortcomings, in particular regarding its risk criterion. A better exemptions regime would grant less exemptions, but if it does, allows higher profits during the exemption.

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European gas markets, investments, access holidays, real options

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1. Introduction

Verschillende oplossingen hold-up: AHs in Australië; Hackberry decision (removing economic and regulatory barriers) in VS; exemties in EU?

Stimulating investments → facilitating investments

The time of overdimensioned (goldplated) networks inherited from the monopolistic era has past. Currently we face a substantial need for new investments along the entire gas value chain. Total EU-27 gas investment needs up to 2030 exceed 200 billion Euro. At the early stages of liberalization, costs could quite easily be decreased by more efficiently deploying the existing infrastructure (sweating the assets). Goldplating disguised the inherent tension between stimulating investments and promoting competitive forces. However, reduced spare capacity following liberalization more visibly brings this tension to the fore. Nowadays, asset sweating is likely to result in underinvestment and consequent disruptions. Hence, the emphasis has shifted from sweating existing assets to stimulating investments in new assets. European policy makers are not deaf to these concerns. Both Gas Directives try to overcome the above tension by granting certain investments derogations or exemptions from the third party access regime.

This contribution deals with the issue whether the current exemptions regime as laid out in Article 22 of the second Gas Directive adequately stimulates investments in the European gas market, i.e., the required amount of investments at the right time. The first issue is why investments may get into scrapes in the first place. This is discussed in section 2. It points out the rationale for granting exemptions as a solution to the tension between liberalization and investments. Section 3 discusses the access holiday literature which provides some clues for granting exemptions. This section submits that using only the access holiday literature as the theoretical underpinning of an exemptions regime is inappropriate, predominantly due to its flawed treatment of investment timing. Section 4 discusses the real options theory and points out that it more comprehensively analyzes investment timing decisions. Both theories are discussed intuitively. Section 5 combines both theories to arrive at the conditions on which exemptions should be granted. It shows that the current exemptions regime has some shortcomings. Section 6 concludes.

2. Investments in European gas: the hold-up problem

Investments in gas markets are predominantly irreversible (sunk). Examples are costs for project identification, investment planning, and construction. In addition, once laid, a gas pipeline has very limited, if any, alternative use. This creates a quasi-rent which is the difference between an investment’s pay-off in its current use and its highest alternative use. Furthermore, the decision to build a pipeline is usually based on negotiations between a specific consumer and a specific producer. This locks both into a bilateral dependency which changes through time and which impacts the appropriation of the quasi-rent. Prior to the investment, the principal – the producer/investor – has a relatively strong bargaining position, as the agent – the consumer or its regulator – depends on him for undertaking the

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1 CEC (2007, S. 17).
investment. Ex post, however, the limited alternative use of its sunk investment ties the investor to the market for the foreseeable future, which shifts the bargaining power to the regulator. This provides him with the incentives to adapt his policy in order to increase his own or society’s rents at the expense of the investor’s through arrogating the quasi-rent. This can be achieved by renegotiation or expropriation. The former entails a regulator using information it has obtained during the regulatory process to increase welfare in the subsequent period(s) at the expense of the investor. Expropriation means that a regulator creams-off the investor’s profits via for instance determining low prices or by cheaply or freely permitting entry. Both may obstruct or hold-up investments.

The essence of hold-up is that investments may be obstructed if an investor doubts the credibility of a regulatory policy. Policy becomes incredible when a regulator’s actions are time inconsistent, i.e., when a regulator is unable to keep the promises it has made earlier. In regulatory terminology: when a regulator can not credibly commit ex post to a regulatory rule, this rule becomes incredible ex ante.

Hold-up results in inefficient investments. Efficiently stimulating investments therefore comes down to solving the hold-up problem which in turn is determined by the credibility of regulatory policy. It has been argued elsewhere that the structural characteristics of the European gas market create a low policy credibility, which makes the gas market vulnerable to hold-up. Traditional solutions to hold-up include long-term take-or-pay contracts, vertical integration, regulating the pipeline as a monopoly, or to have the government build and operate pipelines. Liberalization puts pressure on the viability of each of these and therefore potentially aggravates hold-up and obstructs investments.

The issue at stake is how to solve this problem. The second Gas Directive attempts to do this by allowing certain investments an exemption from the third party access provisions stipulated in Article 22. Third party access (TPA) to infrastructure is one of the key provisions that emanate from the Gas Directives. It determines that every infrastructure owner must grant third parties fair and non-discriminatory access to its infrastructure. The TPA exemptions regime allows an investor freedom from this regime if certain conditions are met (see section 5). With an exemption, an investor is allowed to deny access to an entrant. He may conclude long-term contracts based on negotiated TPA, rather than regulated TPA without an exemption, in order to obtain the required financing for a project. This is equivalent to granting an access holiday (AH), and therefore we start out with discussing the implications of the AH theory for granting a TPA exemption.

3. Access holidays and exemptions

This section discusses the main recommendations that emanate from the AH models for granting exemptions.

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4 We refer to investor and regulator throughout this paper.
5 Society’s rents increase because most regulatory models specify a social welfare function that attaches a higher weight to consumer benefits than to producer benefits. See Baron/Myerson (1982); Laffont/Tirole (1986).
6 Klein et al. (1978); Williamson (1985); Grout (1984).
7 We have so far assumed that hold-up results on underinvestments. However, hold-up may also result in overinvestments, as shown by Hubert (2007).
8 Spanjer (2006, S. 9).
10 See Spanjer (2007) for a more elaborate analysis.
The AH theory is built on the observation that access regulation creates a regulatory truncation of profits. That is, in case of profits accruing to an investor, access regulation will lower these while for losses no compensation is provided. This may lower an investment’s return to the extent that the investment is delayed or abandoned.\textsuperscript{12} Setting appropriate access charges may remove truncation. If a regulator is able to ex post set access charges that guarantee returns to an investor that also cover all ex ante risk, then regulatory truncation is non-existent. However, following Gans and King (2003), such regulatory commitment is unlikely in practice due to legal, political, and practical constraints.\textsuperscript{13} This lack of regulatory commitment powers creates scope for introducing access holidays to remove regulatory truncation. Access holidays remove truncation by allowing an investor to be completely free from access regulation for a specified period of time. An AH is relatively simple to implement because a regulator only needs to determine holiday length and allow the investor to act in his own interest. During the holiday, an investor is free to do as he wishes within the restrictions of competition policy. He may grant access if he considers this in his own interest, but he may also deny access to a potential entrant. This allows him to retain all profits accruing to him during the holiday. These should compensate him for the loss of profits after the AH has expired and when access regulation will be implemented. An AH improves commitment by removing ex-post regulation. An AH is granted before the investment is undertaken, so an investor is certain of the holiday length in advance of his investment. The investor also knows for sure that afterwards he will be confronted with access regulation. Hence, the ex-ante uncertainty about a regulator’s actions has been removed.

The remainder of this section considers the implications of AH theory for an exemptions regime that removes the truncation problem. According to AH theory, an AH serves two purposes: 1) making a privately unprofitable but socially desirable investment profitable; and 2) aligning an investor’s investment timing with the socially optimal timing. The former is straightforward because the profits generated under an AH increase overall profitability which may render a previously unprofitable investment project profitable. The AH models distinguish a situation in which a single group of investors make an investment from one with multiple potential investors. A single investor will be unable to reap all social benefits of his investment as there will always be some consumer surplus.\textsuperscript{14} Hence, when considering to wait or not to make an investment, the investor reaps the full benefits of waiting (i.e., reduced investment costs) but will not face the full social costs of waiting (i.e., reduced surplus for entrants). Consequently, he will typically wait too long from a societal perspective to make an investment. In this setting, an access holiday which is longer than required for just cost remuneration may speed up investments by allowing the investor to reap a larger share of its investment’s social surplus. With multiple potential investors, on the other hand, investments might be undertaken too soon.\textsuperscript{15} This is because an investment race might develop, in which each investor tries to invest as soon as possible

\textsuperscript{12} The emphasis on stimulating investments implies that these investments are socially desirable. This is an important assumption in the AH models, which we follow in this paper. We drop the prefix socially to emphasize that an investment can also be considered desirable from another, broader, perspective.

\textsuperscript{13} Note the similarity with the hold-up problem discussed in section 2. Regulatory truncation due to access regulation can be regarded as expropriation.

\textsuperscript{14} See Gans/King (2003). The tacit and realistic assumption is that the monopolist will be unable to perfectly price discriminate between consumers.

\textsuperscript{15} Gans (2001).
in order to preclude others from doing so.\textsuperscript{16} This induces investors to invest earlier than socially optimal.\textsuperscript{17} This makes an exemption, which speeds up investments, unnecessary.

In conclusion, AH theory argues that an exemption is necessary to guarantee socially desirable but privately unprofitable investments. Secondly, exemptions may also be granted to improve investment timing. An investor’s timing improves when he receives a larger share of his investment’s profits, which can be achieved by granting exemptions which are longer than necessary to recover investment costs.

Although AH theory provides useful guidance, it is nevertheless inappropriate to base an exemptions regime on just the AH theory’s recommendations, because the practical applicability of its assumptions is rather limited. The main problem resides in its treatment of investment timing. Confusion may arise because we have noted that the AH theory allows an investor to determine investment timing based on holiday or exemption length. However, rather than arising as a consequence of regulatory truncation, investment timing can also be a deliberate strategy of an investor to lower uncertainty. The real options theory of investments more comprehensively analyzes these incentives and has rather significant consequences for devising an exemptions regime.

4. Real options theory

This section sets out the basic premises of the real options theory and infers its implications for devising an exemptions regime.

Real options theory, instigated by Dixit and Pindyck (1994), has developed out of discontentment with the traditional neoclassical approach towards investments, and emphasizes its empirical failure and the unrealistic nature of its assumptions. The neoclassical models propose a net present value (NPV) rule: invest whenever an investment’s NPV is positive. This predominantly relies on two assumptions: 1) invested capital can be sold easily to other users, i.e., capital is completely reversible; and 2) an investment opportunity is a once-only occasion, i.e., if the firm declines to invest now it will never again get the chance to.\textsuperscript{18}

Many real-world investments do not exhibit these characteristics, however. The real options approach jettisons both assumptions and analyzes investment decisions based on 1) partly or completely irreversible (sunk) investments; 2) the ability of investors to time their investments; and 3) uncertainty about future rewards of an investment. The option to delay a sunk investment is critical. The choice of a typical investor is between investing now and incurring a sunk cost with uncertain future returns or to wait until more information arrives. Waiting therefore has value because it enables the investor to undertake his investment in a situation with more information and less uncertainty. This value is referred to as the (call) option value of waiting. When undertaking an investment, the investor gives up this option value. Consequently, the investment should be undertaken only when the benefits of investing exceed the sum of costs plus the loss of the option value of delay. The difference with the NPV rule is obvious: there is a range of positive NPV values where no investment takes place (because the net-benefits are not high enough to compensate for the loss of the

\textsuperscript{16} Such a strategy is likely for gas (especially LNG), because the essential facility character of most gas investments renders duplication prohibitively expensive. Hence, the first one to invest will be the infrastructure owner, while the others will become access seekers.
\textsuperscript{17} Reinganum (1989).
\textsuperscript{18} Hubbard (1994, S. 1819).
option value). There is a higher than previously assumed hurdle rate for an investment to become profitable.

Uncertainty is a key parameter in real options theory. Uncertainty impacts investments through the option value of waiting. Most empirical studies on the impact of uncertainty on investments take a short-run perspective and find a negative impact. The long-run impact of uncertainty on investments is more ambiguous. Hartman (1972) and Abel (1983) argue that the long-run capital stock may increase under uncertainty because uncertainty increases the future marginal revenue product of capital. Abel and Eberly (1999) show that the long-run capital stock depends on the interplay between the user cost of capital and the hangover effect. The user cost of capital is an indication of the unit cost for the use of a capital asset, which increases with uncertainty, and consequently lowers the capital stock. The hangover effect works in the opposite direction: the irreversibility of investments makes it impossible for a firm to sell its capital in a low demand state, which increases the capital stock compared to the reversible case. Abel and Eberly argue that neither effect dominates globally, hence that irreversibility may both decrease and increase the capital stock. This ambiguity has invited a substantial body of empirical research which is surveyed by Carruth et al. (2000). They conclude that, despite some fundamental difficulties in empirically testing the effects, the irreversibility effect lowering investments nevertheless tends to dominate the investment increasing effects of uncertainty, also in the long-run.

This paper focuses on regulatory uncertainty which arises if policy is imperfectly credible. Regulatory uncertainty contrasts with economic or financial uncertainty which both can be hedged. If investors doubt the credibility or sustainability of a policy, they may choose to wait and see how the policy materializes. This increases the value of waiting and postpones investment until the return on capital rises sufficiently to compensate for the losses to the investor should a policy reversal take place (of course, when the required hurdle rate is never reached, this investment delay is perpetual and no investment is undertaken).

The final issue of interest is the bad news principle (BNP). Bernanke shows that the willingness to invest in irreversible projects in the current period depends on the expected severity of bad news that may arrive in subsequent periods. Bernanke defines a bad news state as a state in which project profitability has decreased to the extent that an investor would have regretted undertaking the investment had he known this beforehand. Good news is defined as a situation in which project profitability rises. Its main conclusion is that uncertainty asymmetrically impacts investment timing. Bad news affects investment timing while good news does not.

This can be explained intuitively as follows. Suppose an investor has to decide whether to invest today or at a later point in time. Given the inherent presence of uncertainty, the investor calculates the expected discounted value of profit when investing immediately and compares this with the expected profit of delaying and undertaking the investment if good news has arrived. If the former outweighs the latter, investing immediately is the optimal strategy. If not, then the investment will be postponed.

This postponement is created by the option value of delay. Bernanke shows that only bad news creates an option value. Recall that an investor has the possibility to give up some short-term rents by delaying his investment in order to wait for more certainty to arrive. With the chance of bad news occurring, waiting has value because it may be beneficial to wait and see how serious the bad news is. Hence, investment delay becomes more likely as

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19 See Serven (1997); Altug et al. (2000) for overviews.
the expected bad news becomes worse. Potential good news, on the other hand, has no
timing impact, because good news that may arrive in the next period is reaped by the
investor in any case (since investing immediately is the optimal strategy when one expects
good news to arrive in the next period). Hence, the option value of waiting is zero,
regardless the size of the good news. Therefore, waiting to invest only has value when there
is a chance of bad news occurring, which adds perspective to the relationship between
uncertainty and investment. Increased uncertainty impedes the timing of irreversible
investments by raising the option value, but only through its impact on the bad state. An
investor’s intertemporal assessment is influenced by making the bad state less severe, rather
than increasing profits in a good state.21

5. How and when to grant exemptions

The repercussions of the above results are huge, because according to the BNP there is
relatively little scope for access regulation to negatively impact investments. AH theory is
based on the assumption that access regulation truncates profits which impedes investments.
The BNP implies that while access regulation may well lower profits, it not necessarily
affects investment timing, because access regulation only occurs in case of good news.

This can be seen intuitively by recalling that an investor’s timing decision is determined
by a comparison of the expected discounted value of the profit when investing immediately
versus the expected net present value of the investment when investing later. Access
regulation truncates good state profits which lowers the net value of the investment when
investing immediately compared to the situation without access regulation. However,
access regulation lowers the expected value of the investment when waiting by the same
amount.22 Hence, the difference between both is unaffected by introducing access
regulation, and in turn so is the investment timing decision. Therefore, access regulation
may truncate profits, but it does not impact investment timing. The truncation problem does
not appear. Then neither does hold-up and no exemption is required.

This statement must be qualified somewhat because the BNP applies to the investment
timing decision, but does not explicitly consider the long-run capital stock. Too stringent
regulation may of course lower investments by making an investment delay perpetual. This
happens when good states are relegated into bad states. In this setting, access regulation
indeed influences investment timing (to the extent that the investment will not be
undertaken at all), and the truncation problem resurfaces. This situation of excessive
regulation is usually ignored in the real options models. AH theory applies to situations of
excessive access regulation, while the remaining situations are better analyzed through a
real options lens. All in all, exemptions should be granted less often than access holidays
prescribe.

Table 1 lists the main differences between the AH and the real options case for granting
exemptions. As indicated, a distinction must be made between the decision to undertake an
investment and the decision when to start investing, which is reflected by the second and

21 The empirical literature on the BNP is scarce. The few available results point in the direction of investors
behaving in line with the BNP. See Svensson (2000); Haigh/List (2005) who explore the BNP for industrial
firms in Uganda and professional traders from the Chicago Board of Trade, respectively.
22 Panteghini/Scarpa (2003a, b) show this result for profit sharing mechanisms. They furthermore show that
investment timing incentives are equal under price cap regulation with and without a profit sharing
mechanism, provided that profit sharing occurs in the good state.
third column, respectively. Also, as indicated in the fourth column, the level of allowed profits under an exemption differs between both approaches.

Table 1: Access holidays versus real options

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<thead>
<tr>
<th></th>
<th>Investment</th>
<th>Timing incentives</th>
<th>Profits</th>
</tr>
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<tbody>
<tr>
<td>AH theory</td>
<td>Exemption might stimulate desirable but unprofitable investments.</td>
<td>Access regulation impacts timing incentives. Exemptions are required to overcome investment delay.</td>
<td>No remuneration of option value (NPV criterion).</td>
</tr>
<tr>
<td>Real options theory</td>
<td>Exemption might stimulate desirable but unprofitable investments.</td>
<td>Access regulation does not impact timing incentives unless it is excessive. Timing incentives are influenced by lowering bad state losses.</td>
<td>Option value and general (regulatory) uncertainty must be reflected in tariffs.</td>
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We can derive a number of properties which an exemptions regime better capable of solving the hold-up problem and stimulating investments should possess. Incorporating the possibility of investment delay into the analysis lowers the scope for granting exemptions compared to the traditional AH analysis. Therefore, exemptions must be granted restrictively. Specifically, the properties of an exemptions regime that better stimulates investment are that an exemption must: 1) diminish political or regulatory uncertainty; 2) make a previously unprofitable but desirable project profitable; or 3) allow an investor to avoid losses in a bad state.

As indicated, the TPA exemptions regime emanates from Article 22 of the second Gas Directive, which states that investments in new infrastructures as well as in significant increases in capacity of existing infrastructures and to modifications of such infrastructures which enable the development of new sources of gas supply can be dispensed from TPA requirements if the following six conditions are met:

1) It must concern a major new infrastructure – interconnectors, LNG and storage facilities;
2) The new infrastructure must enhance competition in gas supply and security of supply;
3) The level of risk attached to the investment must be such that the investment would not commence without an exemption;
4) The infrastructure must be legally separate from the system operator;
5) Charges must be levied on users; and
6) The exemption must not be detrimental to the efficient functioning of the internal gas market.

The three identified properties enable us to answer the question whether the current exemptions regime will be adequate in lowering hold-up as much as possible. All three properties relate to risk and uncertainty, which makes the risk condition particularly interesting to us. A DG TREN Interpretation Note provides examples of what determines an investment’s riskiness:

1) the extent to which an investment is sunk;
2) the presence of uncertainty due to events that might occur after the investment has occurred, for instance concerning consumption projections;

3) other competing investments;
4) changes in world market conditions; or
5) an above average amortization period.

The first property we identified relates to diminishing regulatory uncertainty. The second example allows uncertainty to have an impact on profits, which is positive. However, it appears to emphasize economic uncertainty without explicit reference to regulatory uncertainty. Therefore, the current regime does not score well on the first property. On the second property, making previously unprofitable but desirable projects profitable, the score is better, as the level of risk must be such that the project will not go ahead without an exemption. However, both the costs of regulatory uncertainty and the option value are once again not explicitly recognized. Therefore, this paper submits that under the current exemptions regime, allowed profits will be too low. The third property, avoiding losses in the bad state, may be safeguarded through an exemption. However, granting exemptions may also increase good state profits, in which case the exemption would be useless for investment timing.

6. Conclusions

This paper has examined whether the exemptions regime as put forward in the second Gas Directive adequately stimulates desirable investments in European gas markets, i.e., the required investments undertaken at the right time. This question is occasioned by the inherent tension between undertaking sunken gas investments and market liberalization. The TPA exemptions regime has been developed to overcome this tension, which requires solving the hold-up problem to which the European gas market is vulnerable and which may be aggravated by liberalization.

The TPA exemptions regime builds on the access holiday (AH) theory which provides useful guidance for designing an exemptions regime. However, it is not sufficient because AH theory fails to adequately recognize an investor’s timing incentives. In order to more comprehensively analyze investment timing issues, this paper incorporates the real options theory of investments into the analysis. According to this theory, access regulation impacts investment timing much less often than assumed by AH theory. AH theory builds on the assumption that access regulation creates a regulatory truncation of profits. That is, a lack of credibility to leave access regulation unaltered after a sunk investment has been made, negatively impacts irreversible investments. The implication of real options theory is that this credibility problem does exist but is likely less severe than AH theory assumes, because regulatory profit truncation impacts investment incentives only in case of excessive access regulation. If access regulation is not excessive, i.e., if it does not relegate good states into bad states, then investment timing is unaffected and no exemption is required. Hence, real options theory results in a regime that grants exemptions more restrictively than if it were solely determined by the AH recommendations.

Combining AH theory with real options theory provides insights into how and when to grant exemptions. Exemptions should be used only to 1) diminish political or regulatory uncertainty; 2) make a previously unprofitable but desirable project profitable; or 3) allow an investor to avoid losses in a bad state. These properties expose a number of flaws of the current exemptions regime. First, as indicated, exemptions should be granted more restrictively than AH theory prescribes. Second, neither the option value of delay nor the presence of regulatory uncertainty are currently considered in the assessment of an
investment’s riskiness. Allowed profits will consequently be too low. Furthermore, there is the risk of an exemption increasing profits in an already profitable situation, which would render the exemption useless from a timing perspective. If a regulator wants to improve the timing of a delayed investment, he should focus on the bad state via lowering bad state losses.

The current exemptions regime does not solve the hold-up problem – and by extension does guarantee sufficient and timely investments – as much as it could, predominantly due to its inappropriate risk criterion. Incorporating the real options recommendations into the analysis has two main consequences for the existing exemptions regime: 1) there is less scope for granting exemptions, because access regulation only impacts investment timing when it is excessive; and 2) when an exemption is granted, higher profits should be allowed, because the option value of delay and the presence of regulatory uncertainty both increase the hurdle rate.

References


