Chapter 13
Conclusions and discussion

This dissertation reports on a study of Gazprom’s investment strategy regarding Russia’s gas exports and export market behaviour, with a focus on European infrastructure projects, in a geopolitical context. For Russia’s gas sector, gas infrastructures such as pipelines and LNG trains act as options in gaining, maintaining or expanding access to new markets or consolidate positions in existing ones. The planned and proposed export investment strategy of the government-controlled firm Gazprom was assessed by economic-strategic theoretical approaches. As mentioned in Chapter 1, the politico-strategic implications of Gazprom’s investment strategies and decisions are bound to have a long-lasting impact on Europe’s energy balance in general, and its gas balance in particular. Additionally, Russia’s gas export position in Europe has both geo-economic and ultimately geopolitical consequences. In this chapter, Section 13.1 provides a summary and conclusions of the dissertation. Section 13.2 deals with a discussion and with recommendations for further research.

13.1 Summary and conclusions
The research objective of this study has been stated as: “To identify, evaluate and extrapolate Gazprom’s investment strategy regarding Russia’s gas exports and export market behaviour, with a focus on European infrastructure projects and the relevant geopolitical context.” From this research objective, four research questions have been derived. This section is organised into five subsections, aiming to give answers to the four research questions. Firstly, the institutional and theoretical background of this research is discussed. Secondly, the historical-institutional background with respect to Russia’s, and Gazprom’s, investment strategy regarding its export markets is summarised and discussed. Thirdly, Russia’s position in the rapidly evolving interregional gas market will be discussed. Finally, we review how the theoretical framework, combined with the descriptive analysis of Russia’s export strategy, is applied through several case-study analyses in order to provide an answer to the fourth research question. As mentioned in the introduction, this dissertation focuses primarily on gas transport capacity extension in light of quantity competition. In an epilogue at the end of this section (subsection 13.1.5), we will discuss price competition and collusion on project and macro-level.

13.1.1 Theoretical and institutional aspects and valuation tools in relation to gas infrastructure investments
Part I helped us understand the first research question in Chapter 1: “What are the different institutional and theoretical aspects and relevant valuation tools in relation to the gas infrastructure investments in light of business strategies and markets?”
The transmission and supply of natural gas is a complex issue, involving the interplay amongst many actors and involving capital-intensive projects, subject to major risks for both government and private sectors. Moreover, once a gas value chain or any of its components is built, its costs are sunk and can only be recovered by its ‘profitable’ exploitation. Generally therefore, the dominant risk for gas infrastructure investments (e.g., LNG trains and pipelines) is the perceived market (volume and price) risk. Other major risks are of a policy (i.e., regulation), macro-economic, financing, transit and/or geopolitical nature. In order to mitigate these risks, contractual instruments appear to be the most universal ones available given current legislation of unbundling in the US and European markets. The common approach is that potential users of the system commit to capacity contracts for a duration of 10 to 20 years at predetermined tariffs. In addition, the liberalisation process has resulted in the evolution of new business models, including those of flexible supplies, i.e., supplies not committed to any markets for the long-term.

The government plays an important role in shaping the gas sector and its value chains due to the risks and benefits (i.e., economic rents) along the value chain, both in consuming and producing countries. The modern variant of international political economy argues that it is necessary to integrate international relations and (political) economy in order to explain, for example, complex issues in the gas market and the interplay between governments and markets. It states that when a country or nation is blessed naturally with resources, or raw materials, it already holds a major relative advantage. However, it remains an open question whether a country can translate its wealth generated from these resources into other structural powers, such as financial wealth and intellectual capital, given the risks of a resource curse, for example. In most of the gas-producing and exporting countries, national gas or energy firms act as caretakers of the nation’s sovereign gas resources, doing so under the auspices of the government.

Strategies of these national gas firms acting in the export market have to anticipate the dynamics in regional gas markets. Depending on the phase of the market these firms operate in, they are likely to interact in different ways by competing or colluding. Generally speaking, private gas firms have a duty towards their shareholders to maximise the (short-term) value of their gas reserves and their exploitation. In a similar fashion, national gas firms have the task of maximising the present value of long-term revenues from a country’s gas reserves. In addition, most of the government-controlled energy firms have to take into account the government’s wider socio-economic policy goals. However, in the long run it can be argued that a national gas firm aims to maximise the aggregated export value of gas available for its export markets, in particularly when domestic prices are not competitive with export prices. The sequence of investments that have to be made for country’s desirable export position are based on a merit order among all available gas resources and transportation routes, which is constrained by socio-economic issues.
Along the product life cycle, firms compete in the first instance on capacity extension in order to deliver new volumes to the market, and thereby potentially capturing additional market share. In a later stage, price competition becomes more important. In the case of long-distance transport in general, the largest part of the total costs in the value chain is related to the transport component. Therefore, both in relative and absolute terms, the economies of scale in this component, at a project level and in general, help to decrease the average cost of gas vis-à-vis competition. The exclusive ownership of the capacity (i.e., no third-party access) ensures that gas infrastructure investments may be seen as creating an option today in order to expand commodity trade in the future, especially for vertically integrated gas firms.

Because the infrastructural investment opportunities do not exist in a vacuum, they must be considered in their strategic and competitive context. In Chapter 4, we therefore argue that in order to ascertain the overall value of gas transport infrastructure investments, account must be taken of both demand uncertainty and possible competition through a strategic-economic approach. The real-option game model, developed by Smit and Trigeorgis [2001], is a two-stage entry deterrence model that captures, in a duopolistic setting and from the incumbent’s perspective, both the aspects of potential competitor’s entry and the prevailing uncertainty in gas market demand. This model discounts the overall value of gas infrastructure investments to the beginning of the game as a function of market outcomes at the end of the second stage. The framework is based on three levels of planning that have an effect on the overall value of a firm’s project:

- the project appraisal from corporate finance, which aims to determine the effect on the net present value of the projected cash flows resulting from the establishment of a competitive advantage. It assumes that all operating decisions are set in advance and defines an investment decision as a ‘now or never’ choice;
- the strategic planning of growth opportunities, which aims to capture flexibility (option) value, resulting from the firm’s adaptive capabilities through real-option valuation;
- the competitive strategy, which aims to capture the strategic value from establishing, enhancing, or deflecting a strategic position vis-à-vis possible competitor(s) based. This value is derived using game theoretic analysis and industrial organisation economics. This approach captures the notion of an early mover’s advantage.

By integrating real-options valuation with game-theoretic principles, we can make an integrated assessment of strategic growth options value in an interactive, competitive setting.

Given demand uncertainty and possible actions taken by entrants, a firm may thus choose to invest early to pre-empt a potential competitor. However, a fundamental aspect of the real-option game approach is that the combination of interaction between downside demand risk and potential entry may, in various scenarios, warrant a wait-and-see approach, i.e., postponement of investment in gas transport infrastructure. As a result, the corre-
sponding investment decisions involve a trade-off between the values of postponement and pre-commitment. In Chapter 4, we argued that the decision to invest in accordance with the aforementioned three levels of planning is, therefore, based on an overall NPV criterion that integrates the net strategic (game-theoretic) value and the flexibility (option) value. Based on these value components, we can distinguish between the value of having a strategic option to compete (strategic ‘option-game’ value) and foregoing this option to compete now (the value of the option to postpone strategically). These values collectively are an addition to the traditional direct (static) net present value, which is equal to the future expected cash flows from investing immediately.

The trade-off between these two values is a particularly important aspect of the real-option game approach, in light of the costly and capital-intensive nature of gas infrastructures as a strategic option on the growth in gas demand, i.e., the commodity itself. A firm should invest in a strategic project when the total sum of the overall net project value is positive, whereby the net strategic option value is higher than the postponement value of making a strategic investment. In such a case, a strategic option on future gas demand translates into a commitment value.

Yet, the real-option game model is a stylised ‘product’ of industrial organisation theory, economic game theory, and financial theory concerning the valuation of investments. Because of this stylised nature of the model, a conceptual toolbox has also been introduced in Chapter 4, to accompany the model. This toolbox is an effort to explain the myriad of other factors at play outside the stylised model and its application. Other investment determinants which have an impact on investment decisions, and hence also on the merit order, in the gas industry include: (1) the financial and organisational achievability, including types of business models and governmental assistance, of a gas infrastructure project, (2) general investment climate, such as macro-economic developments and fiscal regimes, (3) transit risks, and (4) geopolitical and geo-economic issues.

The model’s added value lies in the quantitative underpinning of a more intuitive understanding of strategic investments. The value lies in its exact application, whereas the toolbox is more conceptual. A joint application of the two broadens our insight into the phenomena under consideration. Moreover, dynamic market theory, the theoretical insights from institutional economics and international political economy, are useful in understanding gas infrastructural investments in light of business and governmental strategies and markets. Such an approach therefore contributes to pursuing the research objective.

13.1.2 Russia’s gas strategy: A historic-institutional background
Part II helped us understand the second research question in Chapter 1: “What is the historical-institutional background with respect to Russia’s, and Gazprom’s, investment strategy regarding its export markets?”
Russia’s current gas export orientation towards Europe by pipeline is the result of more than half a century of gas developments. The first Soviet gas exports materialised just after the Second World War to Poland, followed in 1968 by Austria as the first market-orientated destination in Europe. The Soviet westward gas export campaign saw a substantial increase throughout the 1970s and 1980s, despite US objections against increased European gas imports from Russia during the Cold War period. Large-scale Soviet exports materialised throughout the 1970s and 1980s via so-called ‘gas-for-pipe’ agreements. The West European gas contracts and the accompanying financial and technological know-how, allowed the Soviet Union to free up oil deliveries to the Central and Eastern European countries within the Council for Mutual Economic Assistance (CMEA) for exports to the West, resulting in additional hard currency earnings. At the same time the aim was to achieve gasification in the economies of the CMEA, effectively shoring up that alliance. Until after the energy crises in the 1970s, CMEA countries were subsidised with cheap energy and other raw materials. A lag in the Soviet pricing system further helped artificially subsidise energy, but in the 1980s, the Soviet Union could no longer afford these subsidies. During the second half of the 1980s, the off take of gas fell below expectations because of the economic recession and the rise of a buyer’s market in Western Europe. With the construction of the Brotherhood pipelines through the Ukraine from the late 1960s onwards, Russia’s future export dependence on the Ukraine and Europe was sealed.

The collapse of the Soviet Union and its related institutes has changed the institutional make-up of economic and political relations on the Eurasian continent, as well as the institutionalisation of the gas value chain. As a result of the economic reform process, Russia’s gas sector was partially privatised, though not entirely broken-up. The government-owned firm Gazprom, which had become responsible for Russia’s gas production, distribution and sales from 1989 onwards, suffered from the Russian economic hardship in the form of reduced gas sales and defaulting customers. In addition, Gazprom lost its absolute control over the gas fields and production areas in the Caspian region. During the 1990s, these countries began pursuing alternative export routes for gas to Asia and Europe in order to lessen their dependence on Russia. However, the success of a so-called multi-vector approach for the Central Asian countries was limited at the time and is still limited, with the exception of a pipeline from Turkmenistan to China that was inaugurated in December 2009.

Moreover, Gazprom’s loss of control over Ukrainian transit routes to Europe, which at that moment were responsible for almost all gas transit to Europe, had resulted in major transit problems and risks. The decline in the economy in the wake of the collapse of the Soviet system and a slow and complex transition to a market-economy and increasing gas prices led to payment defaults and debt issues in Ukraine and other CIS countries. Combined with volumes of gas above contractual limits during cold winters, the supply of gas was occasionally shut down (for short periods), or with that possibility was threatened. During the 1990s, intermediaries gradually became responsible for part of the gas exports,
using complex barter agreements. Gazprom’s management allowed these transactions because they had personal interests, which delayed the transition to a normal, commercial relationship between Ukraine and Russia. Gazprom tried to strengthen its control and ownership over existing and new transit routes though Ukraine, without any success due to political obstacles. In Belarus, Gazprom has been more successful in gaining some control, mainly due to indebtedness of Belarus and the relative political isolation of Belarus that exposed its strategic-economic interests to the increasing market leverage of Russia.

Low energy prices during the 1990s, combined with a lack of financial sources, constrained Gazprom’s growth opportunities for its export markets. Ultimately two projects – i.e., the Yamal-Europe and the Blue Stream pipeline – received priority, which aimed to serve the growing Northwest European and Turkish markets, respectively. The Yamal-Europe’s export ambitions were revised downwards, amongst other things due to lack of solid financing. Gazprom’s early investment in the Blue Stream project accessing the Turkish market had reduced the feasibility of competing projects from Iran and other Caspian countries. However, the Blue Stream investment could just as well have been premature, given Turkey’s market uncertainty (see below). Moreover, the Blue Stream and the Yamal-Europe pipeline projects diversify away from the Ukrainian transit route.

Russia’s path-dependency towards Europe as a gas export market determines which investment alternatives are open to Gazprom today, but it also constrains its future choices. The Soviet Union was and today’s Russia is highly dependent on the (West-)European market(s) for its export and hard-currency earnings. These earnings play an important role in subsidising Russia’s domestic market (during the Soviet period also CMEA and other Soviet markets). The Soviet Union’s (and Russia’s) relationship with West-European incumbents (e.g., in Germany, Italy and France), which had a monopoly position in their domestic market before liberalisation, was – and still is – crucial in realising new gas infrastructure and flows. Moreover, the governments assisted their firms in conducting business, even though the US opposed (further) European gas imports first from the Soviet Union and later also from post-Cold War Russia.

Gas trade between Russia and European off-takers has become more complex, due among others to political developments, such as the breaking up of the single integrated Soviet system after the dissolution of the Soviet Union. The liberalisation process in European gas markets rendered this situation more complex. Yet, the realisation of new gas projects still requires strong, government-backed firms; often achieved through vertical asset-swaps (see below).

Although the emphasis of investment incentives within Russia’s gas industry shifted away from maximising output towards maximising profits, the industry’s perspective is still inspired more by long-term visions instead of short-term profit maximisation. The historical-institutional background of Russia’s gas export strategy contributes to pursuing the
research objective by addressing the similarities and differences from the past. Moreover, the success and failures of historical investment cases, such as the Yamal-Europe and the Blue Stream project, offer the benefit of hindsight in order to understand investment programmes currently underway.

13.1.3 Russia’s position in a rapidly evolving interregional gas market

Chapters 8, 9, and 10 in Part III helped us understand the third research question in Chapter 1: “What is Russia’s, and Gazprom’s, position in the rapidly evolving interregional gas market that pertains to Europe?”

In line with gas sector recentralisation in Russia from 2000 onwards, Gazprom was in principle awarded a monopoly over Russian gas exports in 2006. The process of decision-making is centralised, and largely influenced at the government level. Russia’s positioning vis-à-vis the Caspian Sea countries and other gas-exporting countries will determine to a large extent how Russia will fulfil its interregional role as a major pipeline gas exporter. In addition, the geopolitical dimension, as well as (inter)regional market aspects, will have an impact on Russia’s growth strategy.

The expected rise in demand and import-dependencies in the world’s main regional markets will precipitate the need for comparatively greater interregional gas flows in the medium-term and beyond (2015-2030). However, the overall reduction in demand because of the economic downturn of 2008/2009, combined with the development of unconventional gas in the US and (flexible) LNG coming on stream, resulted in an oversupplied market since 2009. This oversupply has led to a reduction in prices and renegotiations in long-term (pipeline) contracts in Europe. It is expected that the situation of plentiful supplies will continue for several years. If demand does not recover soon, competition between gas exporting countries may lead to further price erosion.

Long-term forecasts of gas demand in the world’s most important regions are also prone to great uncertainties, due to various reasons. These uncertainties are related to the level of economic growth, government (climate) policies regarding the use of gas in its energy mix, the relative (oil and) gas price development vis-à-vis its substitutes, CO\textsubscript{2} emission costs and CCS developments, and the development of different (price) regulatory regimes. Due to declining indigenous supplies in Europe, it is expected that European imports will grow. However, there are also scenarios that assume a decrease in European gas imports in the mid term, illustrating the great uncertainty in the market. In the coming decades, though uncertain, largely due to the development of unconventional gas, some additional LNG import may be required in the US. It is expected that gas imports will grow in Asia. However, in absolute terms Asian consumption is expected to remain relative low, when comparing to the other markets. Gas trade in Asia and Europe is largely based on long-term take-or-pay contracts, with indexation to other energy products, with some spot sales based on gas-to-gas competition. The US gas trade is based on short-term and spot sales.
In the meantime Gazprom’s emerging export strategy shows that Russia is also shifting from a captive, regional European setting to a more global one, as it plans to diversify its pipeline gas exports (to Asia and within Europe) and to enter the LNG markets with its own projects. However, for Gazprom, Europe still offers the most of growth opportunities in the long run. In its traditional European market, Gazprom faces competition mainly from other pipeline suppliers: Norway, Algeria, and the Netherlands. These countries, except for the Netherlands, are expected to retain their market share and power. Currently, other small pipeline suppliers, such as Libya and Azerbaijan, and LNG players in the Atlantic basin, such as Nigeria, Egypt and Qatar, play a less important role. In the future, Qatar is set to become an important interregional player, both in the Atlantic and Pacific LNG market. In addition, the landlocked Caspian Sea gas producers, Turkmenistan, Kazakhstan, Uzbekistan and Azerbaijan, continue to seek diversity in their exports to Asian markets as well as Europe. However, they are still strongly tied to Russia and are important in the latter’s gas balance.

In managing value chain related risks and avoiding oversupply, Gazprom appears to take an important position in the advent of greater project-level cooperation between the various gas-exporting countries’ national energy firms. Supply coordination may be further institutionalised through a newly formed international organisation of gas-exporting countries, the GECF, or the Gas Troika, consisting of the three main gas reserve-holders (i.e., Russia, Iran and Qatar), see Section 13.1.5.

Thus, Russia’s, and Gazprom’s, investment policy is a dynamic process, with great uncertainties, stemming from domestic demand, levels of imports from the Caspian region, government policies in export markets and other market uncertainties. The answer to the third research question, that Russia must operate in an uncertain and competitive gas market, supports the theoretical approach described in Section 13.1.1.

13.1.4 Russia’s, and Gazprom’s, appropriate investment strategy towards gas infrastructure into possible growing (sub)regional export markets

Chapters 11 and 12 in Part III helped us understand the second research question in Chapter 1: “How can we identify, evaluate and extrapolate Gazprom’s investment strategy regarding Russia’s gas exports and export market behaviour, based on empirical analysis of a number of case studies?”

Through different case studies in Chapter 11 an analysis has been made of various strategic investment fields available to Gazprom, primarily as an incumbent in sub-regional European markets. The case studies 1-3 include the application of the real-option game model and the conceptual toolbox. One case study was analysed from a historical (ex post) perspective and offers the benefit of hindsight. The other case studies are about strategic behaviour in the current and future markets (i.e., use the model to observe possible ex ante
moves). The case studies started from a country- or project-level, moving on to a sub-regional, and then ultimately in Chapter 12 moving to a European regional level. The applications and Chapter 12 aim to address the fourth research question. Early commitments in the form of early gas infrastructure investments ensure for Gazprom access to its commodity position in its export markets. However, market and other uncertainties may encourage a less pro-active strategy.

Attention has been paid to the SSEE in Case study 2 and NWE markets in Case study 3. These sub-regions are responsible for almost 85 percent of the current European demand. Their expected import requirements are making these regions potential growth markets for Gazprom via the existing Blue Stream and the proposed South Stream, respectively via the existing Yamal-Europe and the Nord Stream pipeline (which is planned and currently under construction, respectively). The SSEE markets are exposed to potential competition from pipeline suppliers in North Africa and the Caspian region (especially Azerbaijan and Iran), and LNG supplies. Yet, Caspian supplies are uncertain due to (geo)political factors and the influences of other geo-strategic competitors. In terms of market power, the future threat to Gazprom’s position in NWE markets will come from LNG supplies (especially Qatar and Nigeria), where it currently competes with indigenous (especially Dutch and British) and Norwegian pipeline supplies. Chapter 12 provides the rationale behind Gazprom’s investments and the impact on market structure in the European gas market as a whole. As a recapitulation, this chapter serves as a backdrop to a conceptual discussion on possible demand and supply scenarios involving extremes of either undersupply or oversupply.

The application of the real-option game has shown that value can be derived from an increase in economies of scale in transport capacity for long-distance gas pipelines, which can act as a deterrent against possible entry. The economies of scale bring average cost per unit of gas output down (i.e., the direct strategic value of the project). Due to the economies of scale of its pipelines and the corresponding value chains, Gazprom is in a strong position to deter a potential entrant’s investment (i.e., the strategic reaction value). In the end, it can capture a relatively high market share and influence the market structure ex-post over a long period of time (i.e., the strategic pre-emption value). Conversely, postponing investment may prove to be just as attractive in the face of downside demand risk(s), for example. These elements together make up the real value of such investments, in addition to the actual static value. Gas pipelines can be employed by Gazprom to protect and/or expand market share by investing strategically early on. Regional gas market structures can thus be influenced by individual projects, which is particularly inherent to an industry characterised by an oligopolistic market structure and a capital-intensive value chain.

As mentioned above, during the late 1990s decisions taken by Gazprom in Turkey as far as Blue Stream pipeline is concerned have had their impact on the structure of the Turkish (and European) market. According to the application of the real-options game model, the
The project was not successful both commercially as well as strategically, due in part to the pipeline's limited economies of scale and the pipeline's utilisation rate after its completion. Additionally, in hindsight, the actual demand growth was far lower than expected as a result of the political and economic instability among other factors. Nevertheless, in practice the pipeline did have some deterrence effect, since it kept Turkmenistan and, to a lesser extent, Iran out of the Turkish market. The pipeline may well have had a greater direct and strategic value if its economies of scale had been higher (and thus its operating costs per unit would have been lower), combined with higher gas demand growth in Turkey.

By using the same real-option game model, one can discern that Gazprom is currently considering a similar move in SSEE markets vis-à-vis the potential threat of other, more recent midstream projects, which could potentially bundle flows from the Caspian and Middle Eastern region. Via the South Stream pipeline, which involves Gazprom's cooperation with the Italian gas firm ENI and other European mid-streamers, it aims to capitalise on an early mover's advantage. Nord Stream pipeline (with a planned capacity of 55 bcm/y), which involves Gazprom's cooperation with, e.g., German companies, also serve as a strategic option for access to future gas demand growth in the NWE market, largely vis-à-vis LNG competitors such as Qatar.

According to the model-application's results, when Gazprom decides to build the South Stream pipeline early on, the overall net project value is positive, owing partially to larger economies of scale and great upward demand potential. Depending on the upward demand potential in NWE, the Nord Stream pipeline may also have a deterrence effect on LNG flows for example. Additionally, the acceptance on the part of the investor of a lower required rate of return vastly aids in facilitating this strategic investment and improves its overall net project value at an almost exponential rate.

Though an important explanatory tool, the stylised model has its limitations. The model can explain some of the strategic aspects of why Gazprom has constructed and may construct various pipelines. The case studies explain the nature and potential results of competition in regional and sub-regional gas markets and help us to better comprehend the dynamics involved. The model assumes the interaction amongst only two suppliers, where the gas industry is characterised by more than two (interregional) suppliers. Moreover, it assumes a two-stage game and a steady state after the end of the game, while in reality strategic interaction and demand uncertainties continue dynamically. Other model assumptions, which remove it further from real world gas industry considerations, include optimisation focussed on quantities, whereas actually pricing plays an equally important role. The model also considers competition at a sub-regional and regional level, whereas an interregional dimension is left out. Other issues such as taxes are also excluded. Notwithstanding the limitations of the stylised model, in reality Gazprom faces various difficulties
in developing a pro-active strategy, for example by investing in gas infrastructure, which is covered by the conceptual toolbox. These difficulties include:

- a proactive investment and export strategy is subject to financing and organisational feasibility issues;
- in light of the competitive nature of potential substitute fuels, policy measures might be put into place to encourage and/or impose the use of such substitutes (e.g., nuclear and solar power);
- in liberalised markets, TPA can undermine the strategic exclusivity of pipeline capacity;
- regulatory on the part of the competition authorities on EU level could backlash, discouraging in the process a proactive investment strategy;
- as a result of geopolitical and geo-economic considerations the call on additional Russian gas could be reduced, and non-Russian gas flows could hence be stimulated.

These difficulties may stall a pro-active strategy on Gazprom’s part. Signing long-term contracts with European buyers, possibly accompanied by vertical asset-swaps, enables Gazprom to ensure its market position in volume terms in the European market. Moreover, vertical gas diplomacy helps Gazprom to ensure, at a government level, market access and reduce the likelihood of downward demand risks. In particular, such a business model is desirable in (near-)mature market. By means of horizontal gas diplomacy, government-level relations with other gas-exporting countries can help to manage supply and to reduce competition.

Besides Gazprom’s market growth opportunities in volume terms, Gazprom may aim for new investments in alternative transport routes (i.e., capacity) to Europe in order to mitigate country and transit risks, especially Ukraine and Belarus. The diversification of pipeline routes for additional supplies and the possibility to reroute existing flows, despite the high costs associated herewith, create additional strategic value, including improving Russia’s security of demand. Furthermore, new business models via Gazprom M&T, involving flexible, intra-regional supplies, could rationalise overcapacity into different entry points for gas into the network for arbitrage possibilities (especially in growth markets). In the midstream, from a practical point of view, the Nord Stream pipeline seems to have relatively more strategic value, because its proprietary status and therefore its strategic value is not undermined by third-party regulation. In addition, Gazprom has already secured a part of the Nord Stream’s capacity through long-term volume contracts.

On the basis of whether Gazprom invests strategically or not, several scenarios can be drawn up of what the market outcome and structure would resemble ex-post, both at the sub-regional and at European levels. These scenarios could also result from a postponement of strategic investment by Gazprom, followed by commercial investments later on. The possible market outcomes include: (1) a (quasi-)monopoly (market share above 70
percent); (2) a dominant, or leader, position (market share between 30 and 70 percent); and (3) a non-dominant or fringe position (below 30 percent).

A real possibility in all three scenarios is oversupply as a market condition, as is expected to be the case in the coming years, for example. The extreme market outcomes and condition, such as a monopoly, a dominant outcome or oversupply, are the least desirable ones from a practical-economic perspective. This is largely a result of coordination problems, financing requirements, regulatory backlash, and possible geopolitical hurdles. While the non-dominant and near-dominant outcomes provide a range of possibilities and are also more realistic, especially at a regional level.

The different possible and feasible market outcomes feed back into Russia’s merit order for its export market. In a situation of a high level of market penetration, Gazprom must start new large greenfield investments, like Yamal and Shtokman, and ensure Caspian imports, which are more expensive than the past and current gas imports and production fields. Energy savings and/or demand reduction in Russia in combination with the boosting of the production of the independents through corresponding incentives, could also free-up substantial volumes. As mentioned above, long-term contracts and vertical asset-swaps, accompanied with government assistance, could help reduce the down-side volume risks. In a broader sense, energy provides Russia with an important role in international affairs, where especially gas may be regarded as a potential tool to resurrect some of its geo-strategic position (i.e., a source of relative advantage). In this respect, in the first instance, Russia is concerned with protecting its territorial integrity and regional economic and political interests within the post-Soviet space.

In a scenario without additional Russian exports, for whichever political and/or economic reasons, Gazprom may be inclined to invest only in some small(er) fields in order to keep-up production and fulfil existing contracts. In addition, Gazprom could also venture into an LNG export programme as well as exporting gas by pipeline to the Asian markets, if such a major export programme were at all feasible from a financing and organisational point of view.

In trying to address to last research question, and therefore to pursue the research objective, we can conclude that Russia’s investment strategy can be rationalised to a largely extent by economic-strategic approaches. However, the theoretical toolbox was not fully sufficient in identifying, evaluating and extrapolating Gazprom’s investment strategy regarding Russia’s gas export strategy, because of the its limitations (see above). Although, the conceptual toolbox tries to fill gap between theories and the practical application, further research is required, such as games involving prices and other dynamics, in order to understand better Gazprom investment behaviour (see also Section 13.1.5 and Section 13.2.2 for further research).
13.1.5 Epilogue: Oversupply and avoiding price competition

Given the discussion above, there is an overall tendency in the gas industry to enhance economies of scale for long-distance pipelines and LNG facilities. Depending on market circumstances, aggressive quantity competition can spill over into price competition. The gas infrastructure investment cases described above can be seen as ‘coordination games’, involving different balances between Gazprom’s pipeline gas flows and those of its would-be gas-exporting rivals. Cooperation begins with coordination games between Gazprom and its potential rivals, which involve different imaginable market structures as outcomes. In each coordination game, trade-offs between commitment and postponement values perpetually determine the tendency towards competing for market share and cooperating to avoid oversupply and thus price.

The interregional gas market is characterised by various regional gas markets that are in some cases mature, while in others much room for expansion still remains. This also holds for various potential gas suppliers. Given the level of development of regional gas markets and the interregional LNG market, a long road of development yet remains for the gas market. With the continuing expansion of capacities witnessed in the interregional gas industry, firms may eventually have to compete through price when the industry matures at an interregional level, which is when collusion is most likely to occur.

The GECF and the Gas Troika (see Section 9.5) appear to be geared towards the regulation and coordination of long-run investments, which may—with the emphasis on ‘long-run’—determine a certain level of gas supply, traded either in long- or short-term contracts. Besides sharing information, the mechanisms for further cooperation in the GECF and/or the Troika can consist of the following: (1) limiting flexible supplies (on a short-term basis); (2) coordinating capacity expansions; (3) coordinating pricing regimes in contracts; (4) sharing the economies of scale by developing their resources together. In this respect, national gas firms can reduce long-run competition in pricing through overcapacity as they jointly sell output in multiple markets; (5) market division of regional and sub-regional markets is a possibility for long-run pipeline and LNG flows. Whether these developments will progress further into institutionalisation depends on a number of factors, including the financial and organisational capabilities of firms involved, the level of cheat behaviour and overall gas market conditions.

On a state-level, Russia may hence opt for collusion in whichever form with fellow gas-exporting countries, such as the GECF and Gas Troika. There are various reasons why Russia may opt for more formal collusion, including avoiding overcapacities and price

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458 For a discussion on Russia’s, and Gazprom’s, desirability of coordination and what types and forms under different circumstances of institutionalisation occur with regard to coordination, see Chapter 10 and 11 in Boon von Ochssee [2010].

459 Algeria’s proposal to attempt a reduction in gas production to limit spot volumes, in light of the oversupplied market from 2009 onward, was rejected by Russia and Qatar on the grounds that it may lead to a loss in market share, amidst Russian calls for the support of long-term contracts [WGI 2010c].
competition. However, as a Russian government-controlled firm, Gazprom is likely to pursue an independent course of action. From a political point of view, Russia is unlikely to make fully binding commitments, given its status as an important stakeholder in global affairs [Finon 2007]. Combined with the inherently unstable nature of collusive agreements, this desire to remain independent may induce Gazprom to prefer ad hoc, tacit collusion. In the end, interregional gas market collusion is likely to be geo-economically driven over the longer run, with political factors possibly influencing the level of formality of cooperation.

13.2 Discussion and future research
This section evaluates and positions the findings, which are yielded from the underlying research objective. The objective also serves as a way to contribute to the decision-making process of policy- and strategy-makers in respect to Gazprom and Europe (in understanding Gazprom’s investment strategies and the role of Russian gas in European energy mix). Therefore, a number of recommendations are made. Moreover, various recommendations for future research are provided, based on the limitations of this study.

13.2.1 Discussion and recommendations
The question whether Gazprom’s investment policy is politically or economically driven remains a vividly debated one. Based on our findings we have concluded that Russia’s investment strategy can be rationalised to a large extent by economic-strategic approaches. Compared to the existing literature, we use an alternative approach, where we integrate a real-option game model alongside qualitative tools in order to evaluate strategic infrastructural investments. The real-option game model is able to provide a quantitative assessment of infrastructural projects of Gazprom regarding market demand uncertainty and potential entry. In addition, the qualitative tools try to get a grip on the institutionalisation of the gas (investment) strategy and on the limitations of the model and variables that are not covered by the model. We find that our approach leads to different outcomes, and may therefore be an important step in improving our understanding of Gazprom’s investment strategies.

In a dominant strand of the literature within the field of political science, gas infrastructural investments are largely rationalised from a political point of view, whereas economic reasons are given less attention. In the dominant strand of the economic literature, stylised models are applied in order to understand investment strategies of Gazprom. However, these models have limitations to analyse real-world cases. Our results tell a different story. The model helps to explain the economic-strategic value, which transcends the commercial value as far as deterring entry and the option value are concerned. In addition, our qualitative tools offer a reality check on the model results. This result explains Gazprom’s investment behaviour in respect to Russia’s export markets. In particular, this study has begun to fill the gap between finance and strategic-economic and (geo)political aspects of Gaz-
prom’s investments regarding Russia’s gas exports. Moreover, institutional aspects in an historical context offer an insight on Russia’s strategy evolution.

The application of the conceptual and real-option game framework have yielded a number of recommendations to Gazprom’s strategy-makers within the decision-making process of evaluating strategic gas infrastructure projects. Moreover, lessons can be learned of this study for European policy- and strategy-makers.

1) Recommendations with regard to the decision-making process of Gazprom.
   • The real-option game model and real-world restrictions. Strategic investments have practical hurdles in realising these investments, e.g., gas has to compete with other substitutes and regulatory bodies force pipeline owners to share their investments via TPA. In addition, political restrictions influence Russia’s, and Gazprom’s, room to manoeuvre (although Russia’s gas diplomacy may also pay out first-mover advantages); see also Section 13.1.4. Hence, if decision-makers within Gazprom consider applying a stylised model for real-world strategic investments, they should embed this model in a conceptual framework, which covers other internal and external investment indicators. For instance in reality, a purely monopolistic position is in practice undesirable from a consumer perspective, but also from Russia’s perspective because of counter measures in off-take markets. Moreover, Russia, and Gazprom, should be aware of the limitations of strategic investments in order to avoid an excessively risky financial exposure and organisational difficulties, both in the midstream and upstream section (especially in the case of a buyer’s market).

   • Russia’s, and Gazprom’s, choice of business models. As described in Section 2.5 and in the application of the conceptual toolbox in Chapter 11 and 12, there are different business models in order to institutionalise new gas supplies alongside its strategic capacity extensions. In practice, Gazprom traditionally applies the business model of long-term supply contracts to ensure gas infrastructure investments. Increasingly, Gazprom explores new forms of flexible supplies in order to balance price and quantity effects on its supply portfolio, which is in line with the strategy of other LNG and pipeline gas-exporting countries. If Russia, and by extension Gazprom, want to focus on a volume-driven strategy in their export markets, Gazprom should sign long-term (oil-linked) contracts with European mid-streamers alongside its capacity extensions. In order to share the burden of investments, Gazprom may form consortia with (foreign) firms along the value chain, accompanied by government support. This business model fits mainly in mature markets in Europe, see also Chapter 12. The business model of flexible supplies has substantial downside risks. Especially in a scenario of a buyer’s market, Gazprom
faces lower margins, lower spot prices, uncertain demand, and stricter financing requirements. Russia and other gas-exporting countries should be aware of the possibilities to coordinate (strategic) capacity extensions in order to protect their investments by not oversizing the market and avoid price erosion, especially in the case of the evolving role of new business models.

2) The role of Russian gas in the European gas portfolio: implications of this research for Europe and policy-makers.

Russian gas to Europe can achieve different positions within the European gas markets, as described in case studies 2 and 3 in Chapter 11 and in Chapter 12. Russia is a potentially important gas supplier in the long run for Europe, where policy-makers take Russia’s share in the total European and sub-regional energy mix into account. If Russia’s market power remains at an acceptable level in the energy mix, cooperation with Russia should be sought by policy-makers and European energy firms. Alternatively, in case Russia’s market power should exceed certain thresholds in the total energy mix (such as 30-40 percent), a tougher line should then be taken, both for economic and political reasons. Either the energy mix can then be changed, so as to enable other fuels to compete more effectively with gas [Van der Linde 2008], or EU energy policies could be created to encourage competition between various gas-exporting countries. Policies are imaginable which could encourage long-term contracts to make coordination between gas-exporting countries for the European gas market less necessary. Energy firms should also diversify their gas supplies when they are economically too dependent on Russian gas.

In a seller’s market scenario, a successful energy policy depends on obtaining competitive supplies from outside Europe, i.e., a focus on external policy of the EU and its member-states. Europe must find a delicate balance between avoiding an overbearing Russian dominance in European gas markets and securing enough gas supply. Encouraging EU-level policies that induce competition could backfire and lead to more coordination between gas-exporting countries (see Chapter 12.2.1 in Boon von Ochssé [2010]).

13.2.2 Future research

Further study of the aspects regarding Russia’s export strategy and its relationship with the international relations is certainly worthwhile, which are not covered in the research questions, mentioned in Chapter 1. It also appeared that some problems, that have emerged when addressing research questions, should require further research. Therefore, we have the following recommendations for future research:

- Volume-based modifications of the real-option game model. As mentioned in Section 11.5 and Section 13.1.4, the application of the real-option game model
to gas infrastructural investments has shown some clear limitations. For example, the model is limited to only two players and the dynamics in the model is restricted to a two-stage game. In addition, both players are fully informed about their dominant strategies and cost information, i.e., there is no asymmetric information involved. The incumbent makes an investment decision on the basis of information it fully possesses. It is a dynamic game with complete information, relatively simple in game-theoretic terms. The basic structure of Smit and Trigeorgis’ [2004] real-option game model, that combines valuation of strategic moves with market structure outcomes, could be expanded to take into account more complexities. Multi-stage games involving more than two players, with incomplete information about each other’s cost functions and strategies, and involving more than two sub-games, could be combined with Smit and Trigeorgis’ [2004] valuation approach.

- **Market dynamics, price competition and shared investments.** Just as in many other industries, gas firms must develop strategies in anticipation of market developments that are dynamic. That firms compete in the first instance on the basis of capacities, or volumes, before way is given to price competition coincides with a widely held view in industrial organisation (see also Chapter 3). Given the research objective, this study focuses primarily on capacity expansions. In light of evolution of the different regional gas markets, a hybrid form of research may offer additional insights, i.e., both price and volume games are considered. In the context of price competition, further quantitative research is desirable on shared investments between gas-exporting countries in order to mitigate price competition. Research on price competition is also interesting in light of the current gas demand crunch as well as uncertainty about the long-term gas market developments.

- **Valuation incentives.** As mentioned in the conclusion in Section 13.1.1, national energy firms and international energy firms have different incentives to invest. Given the research objective, this study presumes primarily rational behaviour of the actors that maximise the value of investments. A further elaboration on the evaluation of investments is desirable in order to get grip on the market behaviour of government-supported energy firms, which may not be maximising the value of their resources *per se*, because of, e.g., socio-economic considerations. In addition to the value-maximisation of shareholders, other rational and bounded-rational behaviour on the part of Gazprom’s decision-makers may be in place. Personal motivations may also play a role. Aspects of behavioural corporate finance, which assumes that markets are imperfect and that actors are bounded rational, could offer additional insights. In particular, relevant aspects in relation to Russia’s decision-making process, besides value-maximisation of shareholders, are: (1) agency costs; (2) asymmetric information; (3) psychologically-induced
motives (due to bounded-rationality and emotions) aspects; and (4) geopolitical aspects. As a result of these aspects, decision-makers may, e.g., suffer from 'over-commitments' towards certain gas export projects involving new gas infrastructure.

- **Gas-importer perspective and behaviour of gas-exporting countries.** In this research we are restricted on the perspective of a gas-exporting country, specifically Russia and Gazprom. However, further research is desirable from the perspective of a gas-importing or consuming country. In particular, it is interesting to analyse which business models and government policies should be considered by European firms and policy-makers, respectively, in their relation with Russia and other gas-exporting countries.