Chapter 6

Conclusions

In the Introduction (Chapter 1), we have stressed the necessity of understanding how strategic interactions between market participants in deregulated energy industries shape market outcomes. In this final chapter, we summarize how the research documented in this thesis contributes to this notion. We also provide various policy recommendations and some suggestions for further research.

6.1 Thesis summary

In Chapter 2, we have looked at the extent to which access prices for gas pipelines affect competition on oligopolistic wholesale markets. The framework laid down in this chapter assumes two local markets connected by a pipeline that is owned by a regulated TSO. In each market, a single seller is located. The capacity of the physical network thus shapes the firms’ incentives to deliver the good on each others’ markets. We have shown that when the pipeline size is sufficiently large, neither firm has an incentive to congest the line. Focusing on the case in which the network operator has to recover its cost, the second-best tariffs for flow in both directions are positive and non-discriminatory as long as the two local markets are symmetric. Conversely, a relatively small network capacity creates an incentive for one of the suppliers to deliberately congest the line. In such a situation, transportation tariffs can be used to mitigate the welfare loss arising from congestion. To achieve this, the TSO has to subsidize the seller that is provoking congestion (the ‘small’ firm) in order to entice it to supply more. This alleviates congestion of the pipeline, thereby ensuring that not only the small firm exports more but also that the other firm can ship a higher output level to the distant market.
In contrast to Chapter 2, the focus in Chapter 3, 4 and 5 has been on trading institutions in restructured gas and electricity markets. In Chapter 3, we have developed an empirical strategy to test for the presence of strategic and/or risk-hedging reasons of selling forward. Due to deregulation policies, we have witnessed the emergence of markets for commodities where firms can sell both on a forward and on a spot basis. It is well-known that fixing the price (for part of the output) by trading forward not only allows firms to hedge against price volatility in the spot market, but also creates a competitive advantage over rival firms. The reason for this is that once firms have sold a share of their production against a fixed forward price, they attach a lower value to the spot price and are thus committed to a more aggressive spot strategy. As a result, competitors choose to adopt a compliant strategy in the spot market which has a positive effect on the contracting firm’s profit. However, since all firms have an incentive to affect their rivals’ spot strategies they all end up committing to a more competitive behavior by selling part of their output forward. As we have argued, the existence of this strategic incentive depends critically on whether forward positions become observed. In our theoretical model, we have parametrized the degree of market observability in order to separate the strategic motive from the risk-hedging reason. Our empirical strategy is based on the equilibrium restrictions that follow from the model. Crucial for identification of the two motives of selling forward is the variation in the number of active suppliers in the market.

In Chapter 4, this strategy has been applied to the Dutch wholesale market for natural gas. Using data on forward and spot sales, the number of wholesale suppliers and (variability in) prices at the the Dutch gas hub TTF, we have found that strategic considerations play a considerable role in firms’ forward decisions. We believe this is an important result, given the fact that most of the TTF transactions are conducted over-the-counter. Though OTC markets are often thought to be relatively non-transparent, decentralized trade in the Dutch gas market seem to convey sufficient information content to permit wholesalers to trade forward for strategic reasons. By contrast, gas suppliers do not seem to sell forward to hedge against price risks in the spot market. In the chapter itself, one can read about possible explanations for why there is insufficient evidence that the risk-hedging motive is important when deciding on forward positions.

Finally, Chapter 5 has addressed the question whether OTC marketplaces can compete with organized exchanges, even in case the products transacted on both trading institutions are identical. This is a relevant research problem, since most
of the existing work on this topic (Baye and Morgan, 2001; Galeotti and Moraga-González, 2009) establishes that all trade takes place at a centralized platform. In the chapter, we provide some evidence that this result seems at odds with trading patterns observed in real-world energy markets. We have shown that decentralized trade and B2B e-commerce can exist side by side when buyers differ in their willingness to pay. Purchasers with a high valuation for the good are willing to pay the participation fee charged by the exchange in order to be able to trade on the centralized platform. In this way, they avoid costly bargaining in the OTC market. Low-valuation buyers, on the contrary, bear a lower cost from one-to-one negotiations, which implies they prefer to transact in the decentralized market so as to save on the platform fee.

6.2 Policy implications

As has been recognized by the European Commission, the current state of energy markets is such that consumers still cannot reap the full benefits from the restructuring process. The main reason put forward by the EC is that suppliers on these markets maintain the ability to manipulate market outcomes. This thesis provides market designers with valuable insights about measures that could be implemented to improve the performance in energy industries.

First of all, this thesis delivers new insights about which access pricing scheme could be imposed by the regulator such that the welfare loss from oligopoly on downstream markets is minimized. In order to create a level playing field for entrants, legislators currently strive to ensure that every wholesaler has equal access to transport systems against the same prices. In places where the network owner is not fully unbundled yet, this attempt is praiseworthy as otherwise the non-affiliated suppliers run the risk of being foreclosed. While precluding the possibility to price discriminate on the basis of firm identity most likely benefits welfare, the results of Chapter 2 reveal that discriminatory tariffs based on firms’ incentives can yield more efficient outcomes. For instance, access prices can be utilized to alleviate pipeline congestion, which at the moment is one of the major obstacles in creating well-functioning energy markets. If the regulator forbids the TSO to charge different tariffs for physical and reverse flow, a potential welfare gain is foregone.

Next, our empirical strategy in Chapter 3 provides scholars and policy makers with a way to test whether markets are sufficiently transparent so that forward contracts have commitment value for firms. In many countries, market designers have
endeavored to increase market transparency by facilitating the opening of centralized spot and futures exchanges. However, it may sometimes be impossible to make a profit by operating an exchange, given that the associated cost can be substantial. For example, the Dutch energy futures exchange ENDEX had been confronted with losses in most years of its existence. In case public funds flow to a loss-making exchange in order to avoid bankruptcy, society bears the cost from operating a centralized marketplace at a loss. This can be validated only when the exchange conveys benefits to the public on other grounds. A potential advantage of futures markets is a relatively high level of transparency. The empirical method developed in Chapter 3 can be applied to see whether futures exchanges are indeed transparent enough to let suppliers sell forward for strategic purposes. Alternatively, the method can be used to test whether the information a particular decentralized market conveys to the participants is satisfactory. If this turns out to be true, the need to complement the OTC market with one or more organized exchanges becomes less urgent.

The allocation of public funds to exchanges may thus be a sound policy if the opening of a centralized marketplace leads to a substantial higher transparency in the market. In case exchanges are supported by the government, it is important to understand how these centralized marketplaces can operate at a profit as this could minimize the subsidy flowing to them. If the objective is to increase the exchange’s revenues, legislators should for instance allow organized exchanges to set discriminatory participation fees for buyers and sellers. In particular, the results of Chapter 5 reveal that sellers should be charged a lower fee than buyers. Another way for the centralized marketplace to generate more revenue is to implement sound trading rules. We have established that if suppliers have to make a price offer before observing the entry decision of rival firms, they tend to price more competitively. This in turn attracts a higher share of buyers to the platform, which raises the exchange’s profitability.

6.3 Directions for future research

We hope this thesis has given the reader a good understanding of the various incentives that are at play in energy markets and which type of policy measures could be implemented to bring these incentives more in line with the public interest. Still, by no means we claim that the research documented in this thesis addresses all the relevant issues concerning strategic interactions in the energy industry. In this light, it is useful to briefly discuss how our research could be extended and enriched to
develop a more complete picture of the behavior of market participants.

A first natural extension pertains to Chapter 2, where we have looked at the optimal access pricing scheme in gas markets. Throughout this chapter, we have assumed that there is full information at the regulator’s side about the cost structure of the network operator. In practice, and as we have mentioned in the Introduction, the regulator usually only has imperfect knowledge about the TSO’s cost which further complicates finding the socially optimal transportation tariffs. By applying the incentive regulation theory, we could investigate how the optimal regulatory policy should be altered when there is asymmetric information. In particular, it would be interesting to see how the possibility of congested pipelines interplays with the information advantage of the TSO and whether the optimality of a discriminatory tariff system under congestion survives in this situation. Another intriguing problem to examine using this framework is how the TSO’s incentives change if it is vertically integrated, i.e. if it owns one of the wholesale suppliers that use the network to reach their customers. Research into this avenue will probably lead to valuable insights about how the regulated operator can be enticed to price discriminate on the basis of behavior rather than on firm identity, given the natural incentive of vertically integrated firms to foreclose non-affiliated downstream companies.

Our work on forward contracting also opens several avenues for further study. With respect to the theoretical framework developed in Chapter 3, we note that modelling (forward) market transparency as a single parameter is somewhat restrictive. A more realistic setting would consider a firm-specific probability of observing forward positions, permitting the econometrician to identify the observability parameter per firm. The main reason for why we have assumed that either all or none of the wholesalers become informed about forward sales is that our data set allows us only to estimate the commitment value of forward contracts at an industry level. Indeed, if in the future one is able to collect per-firm data on forward and spot sales for the TTF (or any other energy market that fits our theoretical model) the model has to be modified in order to identify the per-firm observability parameter. In addition, one could examine how the equilibrium results are changed when instead of risk neutrality, one assumes risk aversion at the buyer’s side. In case perfectly competitive, risk-neutral arbitrageurs stand ready to buy and resell all of the forward contracts offered by suppliers, changing the buyers’ risk preferences does not seem to affect the incentives of sellers. This presumably changes when there does not exist a fringe of competitive pure traders who arbitrage away differences between forward prices and (expected) spot prices (see e.g. Bessembinder and Lemmon, 2006).
Regarding our research on the competition between organized exchanges and OTC markets, we feel an interesting extension of the model is to consider a more sophisticated bargaining stage. For example, one could assume that buyers have the option to visit another seller in the decentralized market if they get an unacceptable offer. It is far from easy to envision how this modified assumption will alter the share of trade at each trading institution. On the one hand, the possibility to visit more than one supplier may make the decentralized market more attractive for buyers. On the other hand, sellers might post lower prices on the exchange to avoid ending up negotiating in the OTC market. This could potentially lure more consumers to the centralized marketplace. Another interesting issue to study in relation to the coexistence of the two trading institutions is the role of risk aversion. As we have noted in Chapter 5, the opportunity to transact tailor-made contracts over-the-counter may induce risk-averse traders to shun centralized exchanges where only highly standardized products change hands. An interesting question to address in this context is how a profit-maximizing exchange charges buyers and sellers for platform participation when both sides of the market differ in their degree of risk aversion.