

ELECTRICITY MARKET REFORMS: INSTITUTIONAL DEVELOPMENTS, INVESTMENT DYNAMICS AND GAME MODELING

Abstract

We offer an analysis of deregulated electricity markets and studies the oligopolistic market dynamics that could prevail in the new structure. Two complementary approaches are used for these purposes. The first is institutional and presents a thorough illustration of the economic arguments advanced to support market reforms and an industry view of the actual strategic actions undertaken by important utilities. Legislative changes will be reviewed for different countries with a discussion on the assessment procedures for these reforms. A detailed example of the reform process in the Finnish electricity market is presented. The investment issue will emerge as an interesting challenge to focus on, due to its importance for the market. The second approach is more analytical and develops on the market equilibria that could result from the new structure. A dynamic model of investment for the electricity market is built and applied to the Finnish market. The first contribution of this thesis is therefore to establish more clearly on what principles all electricity reforms rely. As will be shown in chapters 1 and 2, this matter is not self-evident and these principles, when explicitly identified, are at least open to debate. A thorough review is made in these two first chapters of the economics of this sector, the policy changes and the industry adjustments. The second main contribution, stemming from the second approach, is to use game-theory to study the dynamic investment problem in electricity markets. Chapter 3 presents the investment problem in economic terms in a simple static context. Game theoretical elements needed to move forward to a dynamic analysis are presented in chapter 4, with an important discussion on the relevance of three different information structures. One of these, the S-adapted information structure, will be used to show some interesting features, motivating its application to the case of Finland, one of the most advanced deregulated electricity market. Chapter 5 develops a 10-year, 5-period oligopolistic electricity market with many players, where production and investment choices have to be made under stochastic demand growth scenarios. This model offers a new contribution to the analysis of investment in deregulated electricity markets, where dynamic effects are seldom taken into account in game models.