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Network unbundling and flawed coordination: Experience from the electricity sector

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ABSTRACT

What is a good balance between competition and coordination? On the upside, unbundling in network industries promotes competition, but this should be balanced against the downside of unbundling, that is, the cost of coordination. Firm-internal coordination falls away and must be replaced by external market mechanisms. This is a non-trivial task. The cost of flawed coordination resulting from fragmentation can be substantial and policy should focus more on market mechanisms and governance structures to secure better coordination. This paper examines the problem of coordination and discusses with real-world examples why the market faces difficulty in providing effective coordination.

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1. Introduction

On the upside, network unbundling improves competition in network industries. On the downside, it becomes increasingly clear that further fragmentation of highly interrelated, technically complex systems imposes a significant cost, that is, the cost of flawed coordination. A prominent example can be found in the analysis of the British Rail system in the McNulty Report (2011) for the British government. The systematic lack of whole-system optimization causes overall-system inefficiency. We have to question whether further steps in unbundling pay off and whether the benefits of additional competition (in addition to the status quo) outweigh the additional cost of flawed coordination. This contribution explores the costs of coordination analytically and looks at experience from the electricity sector.

The European electricity sector is now in the phase of the 3rd Directive of 2009.[1] In the sector inquiry of 2007,[2] the European Commission argued that the development of competition in European energy markets was too slow. As a result, the Commission proposed further network unbundling, especially aiming at mandatory unbundling of ownership. Mandatory ownership unbundling was not politically feasible, yet the resulting political compromise with very restrictive legal unbundling is now far-reaching in practice. Analysis of the accompanying Impact Assessment (IA-Energy, 2007) suggests that the Commission argues strongly towards the benefits of more competition, but largely ignores the downside of unbundling in terms of the cost of coordination.

[1] EU-Commission, 2009, "DIRECTIVE 2009/72/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC", 14.08.2009, Brussels.

[2] EU-Commission, 2007, DG Competition report on energy sector inquiry (SEC (2006)1724, 10 January 2007).

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Lessons from railways are telling. The so-called McNulty Report (2011) for the UK government studies the efficiency of the UK-railway system with two main conclusions. First, the UK railway system is significantly less efficient than comparable peers, and second, the main cause of the inefficiency is far-reaching fragmentation of the system leading to "misaligned incentives". The implications are, first, that there is a limit to unbundling, where the costs start to outweigh the benefits, and second, because firm-internal coordination is falling away, the policy focus should be on the design of charging and contractual mechanisms to secure market coordination. Interestingly, in an October 2014 assessment, on the impact of unbundling in the electricity sector, the European Commission relates precisely to the first point by finding that the so-called ITO-model[3] (a form of legal unbundling) works just fine and no further steps are necessary (CEC, 2014).

In the wake of unbundling, fragmented markets and failed coordination will lead inevitably to misaligned incentives and failed optimization. Moving from the old world of vertically integrated monopolies to a highly decentralized world is easier said than done. This paper explores the impediments that stand in the way of effective coordination and governing mechanisms. In particular, the following issues are considered:

1. Distributional effects
2. Competition policy and price discrimination
3. Regulatory restrictions
4. Transaction and regulatory costs
5. Clarity of price signals
6. Lack of information
7. Incentive incompatibility
8. Strategic behavior and short-termism

Section 2 formulates the main argument of "misaligned incentives". Section 3 discusses the debate around unbundling in the electricity sector. Section 4 discusses the challenge of optimal network charging as a coordination device. Section 5 gives concluding remarks and policy recommendations. The experience in railways gives a good case study of an alternative sector where unbundling is currently at stake. A detailed analysis of the current debate around the 4th Railway Package as presented by the European Commission early 2013 and the experience in the UK as put forth in the McNulty report are provided in the Appendix in Section 6.

2. Coordination and incentives

The cost of unbundling may be substantial and must be balanced against the benefits. Usually, we distinguish two classes of costs associated with unbundling. First are direct synergy losses. In an unbundled world, some services and facilities may be duplicative due to lost economies of scope and internal coordination, leading to higher total costs. Though not the focus of this paper these costs can be significant (eg. De Nooij and Baarsma, 2009; Meyer, 2012a). Second, and the focus of this paper, are the system costs associated with suboptimal coordination. The costs of flawed coordination among different decentralized agents in a fragmented system may not be felt by the individual agents, but are incurred by the system overall. Following the McNulty Report (2011) mentioned above, we associated these costs with the "misalignment of incentives".

The steps in the value chain for a typical network industry are strongly interrelated and actions must be well coordinated to secure optimal investment and operation. In the old world of closed monopolies and vertically integrated utilities, coordination was *internal* within the firm. The incentives of different actors within the company were aligned at management and shareholder level. Liberalization, competition, unbundling, and the emergence of various new players ("third parties") result in fragmentation. In this new context, the actions of a large set of decentralized actors with widely different incentives must be coordinated *externally* by a market mechanism.

As is well known from the seminal work by Williamson (1975), the optimal degree of integration (firm-internal coordination by hierarchy) or separation (external coordination by markets and contracts) depends on a variety of factors; we cannot say that one governance structure is always better than the other. Williamson analyzes the characteristics of transactions, which determine the more suitable governance structure. To be sure, decentralized markets are considered "normal" and transactions within them are guided by Adam Smith's "invisible hand". Looking more closely, the invisible hand is usually visible as a structure of markets and contractual arrangements. With unbundling, we move from an integrated hierarchy to a separated model where transactions must be facilitated by sound market design and effective market mechanisms.

This is the key challenge for the liberalized and fragmented network sectors. In electricity as well as railways, the evolving system of network contracts and charges relied upon for market coordination is at best imperfect. The McNulty Report (2011, p. 9) on the British railway system explicitly stresses that inadequate network charging methods are at the core of misaligned incentives. The incentive problem can be understood in terms of spillover effects and externalities. Incentives are misaligned when one party incurs costs that create benefits for another party, but which cannot be fully recouped. Externalities are essentially spillovers that are not internalized. In our case, the interaction between an unbundled network and commercial businesses can be understood as vertical externalities.

The following two numerical examples using hypothetical units (summarized in Table 1) illustrate how outcomes can be inefficient due to flawed coordination.

Example A presents the following trade-off. The output of solar power installations fluctuates depending on sunshine. Assume that feed-in of a solar power installation at peak capacity requires network expansion at a cost of 200. Suppose that network expansion could be avoided if the solar plant is curtailed when close to peak capacity. For instance, the plant might be operated at 95% but not at 100% because that would congest the network; thus curtailing 5% would avoid the need for network expansion. The solar power plant incurs the cost of foregone revenue for not producing (300). Suppose that the network owner and the solar plant are different parties. Under these circumstances, the network operator will opt for curtailment because it saves 200 on network expansion, even though network expansion would be the optimal social solution (because 200 is less than 300). The network operator will make a suboptimal choice because the spillover cost of curtailment is borne by the solar plant.

Example B is slightly more complicated. Suppose that network congestion can be relieved either by network expansion (which costs 1000) or by a storage facility (which costs 1100). The storage facility is loaded when the network is congested, and returns electric power back into the grid when the network is uncongested. If the storage facility is in place, the owner can arbitrage between different prices at different periods and gain additional trading revenue (300). Assume that unbundling rules are such that the network owner is allowed to build the storage facility (as part of the network) but not allowed to trade power (as this is a commercial

[3] ITO is Independent Transmission Operator; see further below for more details.

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