

1 *Toward an Evolutionary Regime for Spectrum Governance*

Supposing that the earth yielded spontaneously all that is now produced by cultivation; still without the institution of property it could not be enjoyed; the fruit would be gathered before it was ripe; animals killed before they came to maturity; for who would protect what is not his own? There would be a strange mixture of plenty, waste, and famine.

In this country, for instance, where the only common property consists in hedge-nuts and blackberries, how seldom are they allowed to ripen?

Jane Marcet, *Conversations in Political Economy*, 1819¹

I think there is a world market for maybe five computers.

Attributed to Thomas Watson, Sr., chairman of IBM, 1943

TODAY, THE RADIO FREQUENCY spectrum is the shared resource that perhaps most strikingly and most pervasively affects the well

1. Marcet (1819, pp. 60–61).

being of society.² Its use is governed by a set of rules and narrow restrictions, designed to limit interference, whose origins go back nearly a century. While in recent years some of those rules have been replaced by more flexible, market-like arrangements, the fundamental approach of this institution remains essentially unchanged.

There is widespread agreement that the current institutional arrangements are a source of major inefficiency and waste, and that the public interest calls urgently for some substantial modifications. So far as we are aware there are no articulate defenders of the current regime, and a number of substantially different substitutes have been proposed as markedly superior in terms of their consequences for the general welfare.

Here it will be agreed that there is substantial room for improvement. However, it is important to emphasize that whatever arrangement is shown to be better today, *it is not because our innate ability to understand the issues is superior* to that of our forebears who designed today's rules. Rather, the primary source of any current shortcomings is that circumstances, notably in the form of the range of products that make use of the spectrum, as well as the associated technology, have changed in ways that were

2. A number of the discussants of this issue have argued that the spectrum is a misleading fiction and that what really is at issue is the set of wireless transmissions, the equipment that generates and receives them, and the possibility that they may interfere with one another. Here there is no need for us to take a position on the existence of an entity that can be labeled "the spectrum." This matter does not affect the substance of the discussion that follows, though it will at times be convenient to refer to the spectrum as though it were a real and well-described entity.

not *and could not have been* foreseen at the time the current procedures were adopted.

We cannot claim to have become better at foretelling the future than our predecessors were. The wisest and best informed of us have repeatedly gone astray when we have attempted fortune telling. Rather, in our view, the only thing we can confidently assert about the future is that it will surprise us.

In our judgment, understanding of this reality is critical for the design of a modified spectrum governance regime that will deserve to endure because of its continued public benefits. We ought to avoid any substitute rules that, like those currently in place, establish a powerful vested interest in prevention of change and thereby make any necessary or desirable change difficult to institute and highly contentious. Such rules are very likely at some point in the future to become as counterproductive as today's arrangements.

The implication is that any good rules will have to be readily changeable as demands, uses, technology, and other critical determinants evolve in unpredictable ways. This is surely one of the most critical criteria for the design of programs for allocation and utilization of the spectrum, and it is an issue that, at best, has not been addressed as more than a peripheral matter in the discussions of proposals for revised spectrum policy.

Rather, redesign of the current spectrum governance regime has been discussed in terms of the choice between two fundamentally different alternatives. One is a market approach that treats licensed access to the spectrum as private property. The other approach would eliminate licensing altogether, at least for a portion of the spectrum. By analogy with medieval practice for a

reserved portion of the available land, the latter proposal would treat parts of the spectrum as common property, essentially open to access by any and all who desire to use it.

As this paper shows, neither the current regime nor the commons approach can serve the public interest well. On the contrary, they both can be expected to result in misuse, inefficiency, and waste. Rather, the welfare of the community will be best promoted by an intermediate arrangement—a variant of the market approach that relies on property rights of unlimited duration, controls spectrum use by way of a market mechanism, materially eases but does not eliminate restrictions upon the uses to which rights can be put by their proprietor, and permits regulatory intervention in a limited number of situations where a pure market approach can damage economic efficiency. Underlying this public interest approach is recognition of the market mechanism's powerful contribution to efficient resource utilization, balanced by the urgency of not overlooking the well-known imperfections to which a market regime is vulnerable. But even that market regime, if its benefits are to long endure, must have built into it effective and workable provisions for easy adaptation to changing circumstances.

In sum, what is emphasized here are the benefits to the public of reliance on the market, provided that appropriate steps are taken to deal with its shortcomings.

It will also be shown that the choice between a market proprietary regime and a commons approach is not irrelevant for the issue of malleability of the rules. If not appropriately constrained, both approaches can easily give rise to those vested interests that are the primary obstacles to evolution and adaptation of rules to

changing circumstances. However, it will be argued that it is the market regime, if properly designed, that is more amenable to adaptability.³

Advocacy of a regime of property rights and markets may well be attributed to a common professional predisposition of economists, including the current authors, to envision the market mechanism as the preferable and effective solution to many problems of the economy. However, that is somewhat of a misunderstanding. The economic literature emphasizes that the market has many imperfections, along with its benefits. As is emphasized below, there is no perfect solution to problems such as those posed by utilization of the spectrum, and rational choice among the available options entails careful weighing and balancing of the differing shortcomings of the available alternatives. That is the objective of this monograph.

3. At this point it may be appropriate to emphasize that the authors can claim no qualifications as engineers or scientists knowledgeable about the complexities of spectrum usage and the associated technology. At least in this arena we do have a good deal to be modest about. Consequently, any statements in this report about such matters should necessarily be interpreted with caution. However, one may hope that, as in the emperor's new clothes, lack of technical sophistication can contribute somewhat to clarity of vision regarding the basic issues and their essence.