

EVALUATING MARKET POWER USING COMPETITIVE BENCHMARK PRICES INSTEAD OF THE HERFINDAHL-HIRSCHMAN INDEX

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I. INTRODUCTION

Market power is commonly defined as the ability to profitably charge prices above the competitive level for a significant period of time.¹ This economic definition is equivalent to the European concept of significant market power (SMP), which a firm is deemed to possess “if, either individually or jointly with others, it enjoys a position equivalent to dominance, that is to say a position of economic strength affording it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers.”² Evaluation of the presence or absence of market power is a key element of most antitrust and competition analysis. Government regulators in the United States, the European Union, Australia, New Zealand, and many other countries have issued guidelines on the evaluation of market power in the merger context and other areas.³ These guidelines typically follow the framework of market definition followed by calculation of market shares along with a summary measure of market concentration—typically the Herfindahl-

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¹ See U.S. Dep’t of Justice & Federal Trade Comm’n, Horizontal Merger Guidelines 0.1 (1992, revised 1997) [hereinafter Merger Guidelines].

² See Commission Regulation, Guidelines on Market Analysis and the Assessment of Significant Market Power, 2002 O.J. (C 165) 6, 14–15 ¶ 70 [hereinafter SMP Guidelines].

³ The guidelines provide the analytical framework used by the agencies and provide guidance in shaping enforcement policy. For example, the Merger Guidelines state the goal is “to reduce the uncertainty associated with enforcement of the antitrust laws in this area.” See Merger Guidelines, *supra* note 1, at 0.

Hirschman Index (HHI), which sums the squared market shares of firms in the relevant market. In performing market power analysis, other structural features of the market are also considered. We will call this approach the “HHI approach.” Its results are often not straightforward to interpret. Competition authorities recognize that high concentration measures are generally not a sufficient condition to infer market power. Use of other structural factors in a market often does not lead to a clear conclusion.

The New European Framework has aligned the definition of SMP with the European Court of Justice’s definition of dominance within the meaning of Article 82 of the EC Treaty. Consequently, in determining whether an undertaking has SMP in a specific market, either individually or jointly with others, the national regulatory authorities (NRAs) must act in accordance with the Commission’s practice and the relevant case law of the European Court of Justice and the European Court of First Instance on dominance.⁴ Essentially, a finding of collective dominance must be based on a number of criteria, such as the existence of a mature market, stagnant or moderate growth on the demand side, low elasticity of demand, homogeneous products, similar cost structures, similar market shares, lack of technological innovation, mature technology, absence of excess capacity, high barriers to entry, lack of countervailing buying power, lack of potential competition, various kinds of informal or other links between the undertakings concerned, and retaliatory mechanisms.⁵ In large part, these factors are all structural characteristics of a market.

We argue that market power determinations should be made on the basis of competitive benchmark prices where available, and this approach is superior to structural analysis (the HHI approach), such as that currently followed under Article 82. This measurement approach uses prices that consumers pay for the good or service in question. Consumers pay for goods and services at market-determined prices. If SMP exists, they will pay supracompetitive prices. Thus, a competitive benchmark will allow a determination of whether prices are supracompetitive.⁶ Since prices form the basis for the evaluation of consumer welfare (consumer

⁴ See Council Directive 2002/21, On a Common Regulatory Framework for Electronic Communications Networks and Services, 2002 O.J. (L 108) 33, 36 ¶ 28, 44 art. 14(2) (EC) [hereinafter Common Regulatory Framework]; Ministry of Communications, Marine and Natural Resources, S.I. No. 307, European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2003.

⁵ See SMP Guidelines, *supra* note 2, at 19 ¶¶ 97–98; Common Regulatory Framework, *supra* note 4, Annex II.

⁶ These competitive benchmark prices may require econometric adjustment to account for differences in quality, cost, and currency.

surplus), they also provide important information for competition authorities, whose goal is typically the protection of consumer welfare.⁷

Our purpose in this article is not to provide an exhaustive framework for choosing the correct benchmark. The suitability of a given benchmark will depend on individual circumstances. In some industries, such as regulated industries, however, the suitability of a particular benchmark may be considerably clearer. To demonstrate the practical differences between the two approaches, we examine a decision by the Irish telecommunications regulator, ComReg, which used the EU competition guidelines to determine that the two largest mobile providers in Ireland, Vodafone and O2, had joint dominance and were exercising significant market power.⁸ In September 2004, Vodafone and O2 had a combined share of approximately 94 percent of the Irish mobile market. A third mobile network operator (MNO), Meteor, had 6 percent. Thus, the HHI was 4682 and indicated a “highly concentrated” market, which ComReg made the foundation of its competitive analysis. The structural analysis of economic characteristics undertaken by ComReg did not consider the outcome in the market in terms of prices, which one would expect to be the primary focus of an evaluation of SMP. Either single-firm dominance or joint dominance will lead to an exercise of SMP by increasing prices above competitive levels because firms maximize their profits. Thus, the primary focus of an economic analysis of the Irish mobile market should be on price.⁹

In contrast to the HHI approach, our approach compares prices for mobile service in Ireland to those in the United Kingdom, where regulators had found the market to be “effectively competitive,” which usually connotes an absence of SMP. Mobile prices in the United Kingdom provide a reasonable benchmark because, among things, the same technology was being employed in both countries to produce the same service; the economic issues were thoroughly litigated in the United Kingdom; the regulators there had greater experience and more substantial resources at their disposal than the regulators in Ireland; and there is no reason to believe that the U.K. regulators were biased in favor of mobile carriers. Prices in Ireland were *lower* than prices in the United

⁷ For an explanation of how market demand allows for evaluation of consumer welfare, see Jerry A. Hausman, *Exact Consumer Surplus and Deadweight Loss*, 71 AM. ECON. REV. 662 (1981).

⁸ ComReg, Market Analysis—Wholesale Mobile Access and Call Origination, Document 04/118, Dec. 9, 2004, available at http://www.comreg.ie/_fileupload/publications/ComReg04118.pdf [hereinafter ComReg Market Analysis].

⁹ We use ComReg’s market definitions for the purposes of this economic analysis. Consistent with the requirements of the New Regulatory Framework, we also consider the other economic factors discussed above.

Kingdom. Moreover, in investigating prices, we found no correlation existed between prices and the HHIs in a group of EU countries. That is, an increase in concentration was not associated with higher mobile price nor did countries with very high concentrations have higher than average mobile prices. In December 2005, the Irish Appeals Panel annulled ComReg's decision regarding joint dominance and SMP.¹⁰

II. COMPARING PRICES TO A COMPETITIVE BENCHMARK

To analyze potential dominance and SMP, a regulator or competitive authority should, where possible, compare prices to a competitive benchmark, by which we mean the market outcome of a competitive process where no single dominant firm is exercising unilateral market power and no group of firms is exercising joint dominance.

A. AMBIGUOUS INFERENCES FROM STRUCTURAL CHARACTERISTICS

Instead of using a benchmark approach that considers real-world market prices, ComReg made four claims that were based on inferences about structural characteristics of a market in which Vodafone and O2 had a combined market share exceeding 90 percent. First, ComReg claimed that it found a "high degree of parallel behavior" on the part of O2 and Vodafone in terms of price movements.¹¹ However, the expected outcome in a highly competitive market with homogeneous products is for prices to move together, as competitors must respond to competition. Such price movements demonstrate a high own-price elasticity of demand for each firm in the Irish mobile market, which suggests a high degree of competition. Indeed, this high own-price elasticity is also consistent with a high churn rate in Ireland. Merrill Lynch reported the churn rate in Ireland to be 2.6 percent per month, which was higher than the United Kingdom's, 2.1 percent per month, and was second highest among the 16 European countries.¹²

¹⁰ Decision No: 08/05 of the Electronic Communications Appeals Panel in respect of Appeal Numbers ECAP6/2005/03, 04, 05, 06, 07, 08, December 14, 2005, *available at* <http://www.ecap.ie/NR/rdonlyres/D7CB11CD-5C97-40B8-BE4C-B0E3CE90552F/0/ECAPDecisionNo0805.pdf>.

¹¹ ComReg Market Analysis, *supra* note 8, ¶ 4.133, at 62.

¹² See MERRILL LYNCH, GLOBAL WIRELESS MATRIX 2Q04, 3, tbl. 1 (Sept. 2004), *available at* <http://www.comcom.govt.nz/IndustryRegulation/Telecommunications/Investigations/MobileTerminationRates/ContentFiles/Documents/Global%20Wireless%20Matrix%202Q04%20Sept%202004.pdf>. Only Denmark had a higher churn rate. The Irish churn rate also exceeded the U.S. churn rate of 2.2 percent per month. *Id.* The Federal Communications Commission (FCC) finds the U.S. mobile market to be effectively competitive. See, e.g., FCC, ANNUAL REPORT AND ANALYSIS OF COMPETITIVE MARKET CONDITIONS WITH RESPECT TO COMMERCIAL MOBILE SERVICES 94 (2006), *available at*

Second, ComReg claimed that there has been “little significant downward movement” in the monthly minimum bills.¹³ Of course, if prices have already reached competitive levels, there is no reason for them to continue decreasing. Consider the mobile market in the United States, which is widely considered by economists and government regulators to be highly competitive.¹⁴ Price movements in the United States have been similar to Ireland, but the United States mobile market is effectively competitive. The United States has among the lowest mobile prices of any major developed economy. Yet, as the following figure shows, prices did not decrease significantly over the three-year period from 2001 to 2004, according to the Bureau of Labor Statistics price series for mobile telephony.

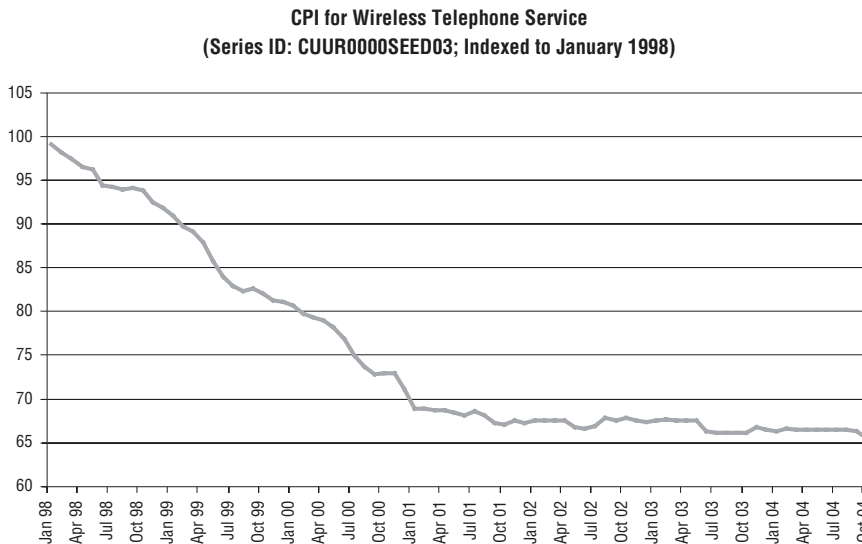


Figure 1.

http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-06-142A1.pdf [hereinafter *FCC Report*].

¹³ ComReg Market Analysis, *supra* note 8, ¶ 4.133, at 62. These prices were hypothetical rather than actual market prices, which excluded handset costs and subsidies—an important competitive factor in mobile competition for postpaid customers. See Jerry A. Hausman, *Mobile Telephone*, in *HANDBOOK OF TELECOMMUNICATIONS ECONOMICS* 564 (M. Cave et al. eds., 2002).

¹⁴ See, e.g., *FCC Report*, *supra* note 12. For example, the DOJ permitted the merger of Cingular and AT&T Wireless, the second and third largest mobile providers. It is not plausible that the DOJ would allow a merger if it thought that the market was not effectively competitive. See *Merger Guidelines*, *supra* note 1, at 0.1–0.2.

Third, ComReg claimed that for low-intensity users there was little variation in the O2 and Vodafone tariffs.¹⁵ Again this outcome is to be expected in a competitive market. Further, the most recent data from the OECD demonstrated that Ireland had a lower price for low-intensity users than did the United Kingdom.¹⁶ According to the OECD calculations, Ireland had the least-expensive, low-user mobile charges of any EU country in Western Europe except Denmark.

Fourth, ComReg claimed that there has not been sufficient downward price movement among high-user segments.¹⁷ Contracts for corporate customers, however, are individually negotiated, so tariff comparisons are not practical and do not indicate actual prices paid in the market. Consequently, this structural factor—like the preceding three—is, at best, ambiguous evidence of whether Vodafone and O2 were jointly dominant and had SMP.

B. ECONOMIC INCENTIVES FOR MNOS TO CONTRACT WITH MVNOS

ComReg also focused on the absence of mobile virtual network operators (MVNOs) in Ireland.¹⁸ MVNOs use a facilities-based network (that of a mobile network operator, or MNO) to offer mobile services. ComReg did not demonstrate, however, that mobile prices were higher in Ireland than a competitive benchmark.¹⁹ Indeed, mobile prices were lower in Ireland than in the United Kingdom, which ComReg stated had been found to be effectively competitive. This market outcome in terms of prices should have been the determinative factor in assessing possible joint dominance and SMP. Instead, emphasizing the emergence of MVNOs in the United Kingdom, ComReg concluded that “[t]he absence of MVNOs and other independent service providers in Ireland . . . suggests a market that is not effectively competitive.”²⁰ That conclusion, how-

¹⁵ ComReg Market Analysis, *supra* note 8, ¶ 4.134, at 62.

¹⁶ See ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, COMMUNICATIONS OUTLOOK 2005, 172 Fig. 6.8 (2005), available at http://www.thepublicvoice.org/events/tunis05/oecd_outlook.pdf.

¹⁷ ComReg Market Analysis, *supra* note 8, ¶ 4.137, at 63.

¹⁸ *Id.* ¶ 4.153, at 66. In Ireland in 2004, three MNOs—Vodafone, O2, and Meteor—had facilities-based mobile networks. Another MNO, H3G, entered the market in 2005.

¹⁹ ComReg did attempt to demonstrate that return on capital employed was high among mobile providers in Ireland. Although we do not review that claim here, economists have known since the early 1980s that one cannot use accounting rates of return to demonstrate the presence of SMP. The problems with using accounting rates of return are especially severe in an industry like mobile telephony, which has had a very high rate of technical change requiring new investment in technology.

²⁰ ComReg Market Analysis, *supra* note 8, ¶ 4.69, at 48.

ever, suggests that ComReg conflated protecting competition—the purpose of competition laws—and protecting individual competitors, which evidently complained to ComReg about their inability to gain MVNO access on the economic terms they desired.²¹

Can the absence of MVNOs be sufficient to demonstrate joint dominance in the mobile market in Ireland? First, one must consider the basic economic incentives of O2 and Vodafone. Each operator would find it in its best unilateral economic interests to provide access to MVNOs if doing so would expand the market, so that the MNO could sell additional mobile services. This pattern of MVNO entry to expand the market has been the experience among MVNOs in the United Kingdom and Australia, and among resellers in the United States after the FCC no longer mandated resale in October 2002. In the United Kingdom, O2 has a joint-venture service provider arrangement with Tesco. Similar resale arrangements exist with 7-Eleven convenience stores in the United States, with Ztar Mobile providing the network capacity, which it purchases from the largest U.S. network operator, AT&T (formerly Cingular). To date, these outlets sell only prepaid mobile services. Supermarkets and convenience stores, which generate high levels of consumer traffic, offer an additional means of distribution and thus are likely to expand the market.

ComReg said “pent-up” demand among potential MVNO providers was a signal of “tacit collusion” among MNOs.²² ComReg cited economies of scope from companies offering services in fixed markets. To the extent that these potential MVNOs believed that they could profitably enter the Irish mobile market, it is worth noting that there was an unused mobile license available²³ and no significant barriers to entry existed because each of the existing carriers—O2, Vodafone, and H3G—had to construct a 3G network.²⁴

C. BARRIERS TO ENTRY

ComReg claimed the existence of barriers to entry but never gave an economic justification for the claim.²⁵ Some regulators have concluded

²¹ *Id.* ¶ 4.68, at 48.

²² *Id.* ¶¶ 4.125–4.132, at 61–62.

²³ *Id.* ¶ 4.117, at 59.

²⁴ 3G is third-generation digital technology, which replaces the older second-generation (2G) technology. 3G technology allows for significantly faster data transmission speeds and also higher voice transmission capacity. See Hausman, *Mobile Telephone*, *supra* note 13, at 564.

²⁵ ComReg Market Analysis, *supra* note 8, ¶ 4.119, at 59.

incorrectly that the sunk costs involved in constructing a 3G network constitute a barrier to entry. Again, because *all* existing carriers in EU countries will be required to construct 3G networks, no significant barriers to entry exist from the requirement that a new entrant construct a sunk cost 3G network. Barriers to entry arising from sunk costs do not apply here because barriers to entry arise from *asymmetries* in required sunk investment costs, which do not exist here.²⁶ Given the availability of spectrum in Ireland and the relatively high churn rates, no significant barriers to entry existed. ComReg cited a “late mover” disadvantage, yet the “late mover” in the United Kingdom (T-Mobile) is now the country’s largest mobile provider, having passed the initial entrants, Vodafone and O2 (formerly BT Cellnet). Given the over 30 percent annual churn in Ireland, the “late mover” claim is not correct, especially given the cost advantage that 3G offers voice traffic compared to the cost of 2G.

There is a postscript to this analysis of barriers to entry. In 2005, ComReg announced that it would grant an additional 3G license in the near future. Three firms expressed an interest in the license: eircom, Meteor, and Smart Telecom. Neither eircom nor Smart Telecom had mobile operations at the time of the award. The additional license was eventually awarded to Smart Telecom in November 2005.²⁷ Thus, market evidence demonstrated an absence of barriers to entry in Ireland with the entry of H3G and a new entrant using the available 3G license. Once again, economic analysis of structural factors proved ambiguous, at best—and actually incorrect, as market outcomes demonstrated in a very brief period of time.

ComReg never investigated the question of potential profitability of MVNOs in Ireland. Instead, ComReg concluded that “it is rational [for MNOs] to allow access and therefore denial of access in this instance sustains the case for tacit collusion.”²⁸ Thus, ComReg essentially “worked backwards” from the finding of no MVNOs to “tacit collusion” to “joint dominance.” This approach to a determination of SMP has been rejected by many competition authorities where SMP must be demonstrated apart

²⁶ Stigler’s and von Weizsäcker’s definitions of barriers to entry focus on the effect of cost asymmetries. See GEORGE J. STIGLER, *THE ORGANIZATION OF INDUSTRY* 67–70 (1968); C. Christian von Weizsäcker, *A Welfare Analysis of Barriers to Entry*, 11 *BELL J. ECON.* 399 (1980). Their definitions are more restrictive than Bain’s. See JOE S. BAIN, *BARRIERS TO NEW COMPETITION: THEIR CHARACTER AND CONSEQUENCES IN MANUFACTURING INDUSTRIES* (1956). For an analysis of the differences, see DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* 76–80 (4th ed. 2005).

²⁷ See Press Release, ComReg, Smart Offered 3G License, (Nov. 16, 2005), available at <http://www.comreg.ie/publications/default.asp?ctype=5&nid=102203>.

²⁸ ComReg Market Analysis, *supra* note 8, ¶ 4.130, at 61–62.

from a given market action—for example, the decision not to supply MVNOs.

D. ANALYSIS OF JOINT DOMINANCE AND COORDINATED EFFECTS

We next consider ComReg's analysis of "no deal to date" for MVNOs, and its finding of joint dominance. ComReg found "coordinated effects" between O2 and Vodafone.²⁹ Economists typically find three necessary elements for coordinated interaction: agreement on terms profitable to the firms involved, the ability to detect deviations, and a credible retaliation mechanism to punish deviations. These conditions are necessary, but not sufficient, for successful coordination to occur. (Other economic factors, such as entry, must also be considered.) The decision of the European Court of First Instance in *Airtours* broadly adopted this economic approach as the basic legal rule for determining joint dominance.³⁰ *Airtours* requires that (1) given the characteristics of the relevant market, each member of the oligopoly must know how the other members are behaving to be able to adopt the same policy, (2) members of the oligopoly must be deterred over time from departing from the policy thus adopted, and (3) that common policy must be able to withstand challenge by other competitors, potential competitors, or customers.

ComReg's first finding was that the market was oligopolistic because four firms had entered the market.³¹ However, as we show below in Part III, a graph of price versus market concentration demonstrates no relationship. Regression analysis also demonstrates that concentration does not affect average revenue per user (ARPU), leading to the conclusion that concentration does not have a significant effect on outcomes in mobile markets. Thus, ComReg's conclusion that the degree of market concentration may be important was refuted by actual market data.³²

1. *Incentive to Coordinate Among MNOs*

ComReg considered the "incentive to coordinate" and keep prices above competitive levels.³³ Prices in Ireland, however, were below prices in the United Kingdom, which ComReg agreed was effectively competi-

²⁹ *Id.* ¶ 4.22, at 37–38.

³⁰ Case T-342/99, *Airtours plc v. Commission*, [2002] S.C.M.L.R. 317, available at http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapicalexplus!prod!CELEXnumdoc&lg=en&numdock=61999A034 [hereinafter *Airtours*].

³¹ ComReg Market Analysis, *supra* note 8, ¶ 4.24, at 38.

³² *Id.* ¶¶ 4.27A, 4.31, at 39–40.

³³ *Id.* ¶ 4.27B, at 39.

tive. ComReg also cited “considerable costs associated with entry,” but as noted above regarding the change from 2G to 3G, barriers to entry did not exist. To the contrary, the market fact of entry by H3G demonstrated the absence of significant barriers to entry (as did the subsequent entry of Smart Telecom).

ComReg claimed two main reasons for finding an “incentive to coordinate.” First, there were only a few firms. Yet Ireland has four network mobile operators, a number which has been sufficient to achieve high levels of competition in the United Kingdom and other countries. Second, ComReg claimed that the “firms are relatively symmetric.” However, ComReg’s main finding that a share of 40 percent for O2 and 54 percent for Vodafone were close enough to be “relatively symmetric” was contradicted by ComReg’s own findings on price. ComReg agreed that prepaid prices are quite low in Ireland. Since 74 percent of customers in Ireland were prepaid, the finding of “relatively close” market shares leading to coordination and elevated prices was contradicted by actual market outcomes for prepaid prices in Ireland. ComReg did not consider the “relative symmetry” of market shares in the United Kingdom, a market found to be effectively competitive. Using the latest statistics from Ofcom at the time, the shares of the four operators in the United Kingdom were 23.6 percent, 24.6 percent, 26.9 percent, and 25.0 percent—which are much more symmetric than the 54 percent and 40 percent shares in Ireland in 2004.³⁴ Indeed, the coefficient of variation of shares in Ireland was 3.83 times as large as in the United Kingdom. Thus, the “relative symmetry” of shares in Ireland was quite small compared to the “effectively competitive” U.K. market.

2. Ability to Coordinate Among MNOs

When ComReg examined the ability to coordinate, it focused on two factors: price and denial of wholesale access.³⁵ We analyze ComReg’s approach using the framework provided by *Airtours*. ComReg’s discussion of price coordination was incorrect for the reasons discussed above. ComReg attempted to use a minimum monthly bills (MMB) comparison that was based on hypothetical transactions as opposed to real-world outcomes.³⁶ Our analysis of real-world prices in Ireland compared them to

³⁴ See OFCOM, THE COMMUNICATIONS MARKET—TELECOMMUNICATIONS APPENDICES (Aug. & Oct. 2004), available at http://www.ofcom.org.uk/research/cm/qu_10_2004/194541 (Oct.) and http://www.ofcom.org.uk/research/cm/cmpdf/telecom_apndx.pdf (Aug.).

³⁵ ComReg Market Analysis, *supra* note 8, ¶¶ 4.54–4.56, at 45.

³⁶ *Id.* ¶ 4.59, at 46.

the United Kingdom and found a high degree of price competition in Ireland. Thus, ComReg's evidence of the MNOs' ability to coordinate actions rested largely on the alleged denial of access to wholesale access seekers.

ComReg recognized that the terms offered by a new retail entrant are "crucially dependent on the terms of the wholesale access."³⁷ Yet these terms are totally lacking in transparency, for the simple reason that the MVNO and the MNO negotiate them confidentially. The agreements with which we are familiar contain complex terms with highly nonlinear prices. Thus, ComReg did not establish the necessary condition of the ability to coordinate if either Vodafone or O2 found it *individually* profitable to sign an MVNO agreement. The ability of the MNOs to observe pricing behavior—as *Airtours* requires to establish the transparency necessary to support a finding of collective dominance—is completely lacking with respect to MVNO agreements. Neither member of the "dominant oligopoly" has the ability to know how the other members are behaving in terms of actual MVNO terms and conditions. Instead, ComReg assumed its answer. According to ComReg, the absence of MVNOs from the market sufficed to establish the MNOs' ability to coordinate.

3. *Detection of Cheating*

The next necessary element of coordinated interaction is the ability to detect cheating. ComReg first considered price deviations and found that transparency is sufficient to permit coordination or "tacit collusion."³⁸ As we discussed above, however, MVNO agreements are non-transparent. ComReg did not explain why prices were lower in Ireland than in the United Kingdom.

Just as important, ComReg did not explain why churn was higher in Ireland than the United Kingdom. Subscriber acquisition costs are very significant in mobile telephony, and churn is among the most important factors affecting profitability. For example, in the United States the average customer acquisition cost is about \$300. The average revenue per customer per year is about \$550. Indeed, the leading reason for AT&T Wireless's demise in the United States, despite its familiar brand name, was its persistently high customer churn. In contrast, Verizon Wireless and Nextel have succeeded because of their ability to keep customer churn to low levels. ComReg did not recognize the significance of the

³⁷ *Id.* ¶ 4.65, at 47.

³⁸ *Id.* ¶ 4.76, at 49.

fact that monthly churn in Ireland was 2.6 percent, compared to 2.1 percent in the United Kingdom. If Irish MNOs could coordinate their actions and detect price deviations, one would expect a significantly *lower* level of churn in Ireland than in the United Kingdom, an “effectively competitive” market.

ComReg’s other example of deviation was granting wholesale access. ComReg found that high churn in the Irish market could lead to significant profitability if wholesale access were provided to an independent service provider.³⁹ However, ComReg never considered why churn was so high if the carriers were coordinating their actions, since churn is very expensive.

ComReg also never considered whether an MVNO agreement would be *unilaterally* profitable to either O2 or Vodafone. ComReg speculated that “a deviation might therefore take the form of offering wholesale access to an independent service provider on terms that would enable the service provider to acquire significant numbers of customers.”⁴⁰ ComReg was correct that there exists a low enough price to cause this outcome, but ComReg failed to ask the basic economic question of unilateral profitability of the network operators: Do a given firm’s actions arise from a unilateral decision or from coordinated actions with its competitors?

4. *Credible Retaliation Mechanism*

We now consider the last necessary condition for coordination, a credible retaliation mechanism. Although ComReg need not necessarily prove that there is a specific retaliation mechanism involving a degree of severity, it must nonetheless establish, in the language of *Airtours*, that deterrents exist “which are such that it is not worth the while of any member of the dominant oligopoly to depart from the common course of conduct to the detriment of the other oligopolists.”⁴¹ Economists recognize that a credible punishment mechanism is crucial to successful coordination because incentives to cheat always exist. ComReg quoted Patrick Rey regarding reversion to “normal” competition (a notion long known to economists).⁴² Yet prices in Ireland were already at “normal lev-

³⁹ *Id.* ¶¶ 4.85–4.87, at 52.

⁴⁰ *Id.* ¶ 4.85, at 52

⁴¹ *Airtours*, *supra* note 30, ¶ 195.

⁴² ComReg Market Analysis, *supra* note 8, ¶ 4.91, at 53 (quoting Patrick Rey, *Collective Dominance and the Telecommunications Industry* (mimeo, University of Toulouse, Sept. 7, 2002)).

els” compared to the United Kingdom and the rest of Europe—so reversion to “normal” prices could not be a credible retaliation mechanism.

Thus, ComReg’s reasoning again reduced to an absence of MVNO agreements. Here ComReg never advanced a credible retaliation mechanism. ComReg claimed that either a reversion to normal competition (which already existed) would occur or the non-deviating firm could respond by “granting access to upstream wholesale elements.”⁴³ ComReg believed that “the most effective retaliatory mechanism is price.”⁴⁴ However, this retaliatory mechanism did not exist because prices were already at a competitive level. Granting access to upstream wholesale elements was not a credible retaliatory mechanism. For example, if O2 were to grant access, ComReg assumed that Vodafone’s threatened retaliation would be to also grant access. This approach assumes that Vodafone would act in an economically irrational manner because that response would not be in its best economic interests—that is, making its “best response” to entry. When consideration is also given to Meteor and H3G, both potential (and, in H3G’s case, mandated) providers of wholesale access, ComReg’s simple two-player scenario is further undermined.

The correct approach to the decision for O2 is to ask: After O2 grants wholesale access, is it in Vodafone’s best economic interests, acting unilaterally, to grant wholesale access as well? If it is not, then Vodafone will not “retaliate,” because that action will harm its economic interests. O2 will take this outcome—Vodafone making its “best response”—into account in its original decision whether to grant wholesale access. ComReg failed to conduct this analysis and so did not demonstrate that tacit coordination is sustainable. Both O2 and Vodafone could have an economic incentive to depart from a “no MVNO” policy. Neither carrier has a credible retaliation threat to deviations from the assumed “no MVNO” policy. Therefore, an essential condition of *Airtours* is unfulfilled.

Economists have long understood this problem—called a “sub-game perfect Nash equilibrium”—in terms of analysis of new entry. When deciding whether to enter a market, a potential entrant will know that the incumbent(s) will act in its own best economic interests. If the new entry involves sunk capital investment, the incumbent will know that the new entrant will not exit and the incumbent should behave in the manner that maximizes its profits given the new entry. The potential new entrant will take this behavior into account when making its decision.

⁴³ ComReg Market Analysis, *supra* note 8, ¶ 4.95, at 54.

⁴⁴ *Id.* ¶ 4.97, at 55.

The method to deter entry is for the incumbent also to make sunk cost investments that will credibly pre-commit it to behave in such a manner after new entry as to make the new entry unprofitable.⁴⁵ ComReg did not identify any action on Vodafone's part that would cause it credibly to pre-commit to make O2's grant of wholesale access unprofitable. Thus, if O2 found granting wholesale access unilaterally profitable, it would do so.

As we discussed above, if one were to focus upon price as a retaliation mechanism, MVNOs would most likely compete by vying for pre-paid customers and by expanding distribution. ComReg found that pre-paid prices in Ireland for the 74 percent of overall customers were highly competitive compared to other European countries. Thus, potential price retaliation was contradicted by current market outcomes. Indeed, the only category of customers for which ComReg believed prices were above competitive levels was for high usage postpaid consumers, which comprised approximately 3.5 percent of the overall market. A credible retaliation mechanism for 3.5 percent of total customers is highly unlikely.⁴⁶ The *Airtours* requirement of a credible retaliation mechanism was not satisfied. Thus, ComReg did not advance a credible retaliation mechanism to support its primary reason for inferring coordinated interaction: the absence of MVNO agreements in Ireland.

III. COMPETITIVE ANALYSIS BASED ON MARKET OUTCOMES

The structural, or "HHI-based," approach to the question of joint dominance and SMP is ambiguous, at best. Similar prices can be the outcome of joint dominance, or they can be the outcome of a highly competitive market when the products are close to homogeneous, as is the case with 2G voice and message services. In mobile telephony, the absence of MVNOs can arise from joint dominance or from the unilateral decisions of the MNOs. Indeed, typically, economists employing structural analysis have difficulty distinguishing coordinated-effects behavior from competitive behavior. However, the outcome of the competitive process—here, mobile prices—can often provide a more clear-cut analysis. If competitive benchmark prices exist, they can provide important, and even conclusive, evidence of whether SMP is being exercised.

⁴⁵ This strategy is sometime called "taking a hostage." Other strategies of credible pre-commitment also exist in certain situations.

⁴⁶ The Horizontal Merger Guidelines recognize that a firm's incentive to deviate is greater when "the smaller is the base of sales on which it enjoys elevated profits prior to the price cutting deviation." Merger Guidelines, *supra* note 1, at 2.12.

A. MOBILE SERVICE PRICES IN IRELAND

The Irish mobile market has performed well in terms of low prices. Among the sixteen western European countries (the fourteen EU countries plus Norway and Switzerland), Ireland had among the lowest average price in the second quarter of 2004 at US\$0.21 per minute.⁴⁷ Indeed, the average price in Ireland was lower than the average price in the United Kingdom, which was US\$0.22 per minute. Yet ComReg quoted with approval the finding by Ofcom, the U.K. regulatory authority, that it “has not found any mobile network operator to have SMP in the mobile access and call origination market.”⁴⁸ In 2004, the United Kingdom had four 2G mobile providers, each with a share between 20 and 25 percent, as well as a new entrant (H3G) using 3G.

As with individual dominance, joint dominance is absent in the United Kingdom, where the market is deemed effectively competitive. Because prices are the same or lower in Ireland, most economists would conclude that neither single nor joint dominance is present in Ireland to the extent that the United Kingdom provides a relevant benchmark. Since the same technology is used in both countries and cost conditions would be at least as favorable in the United Kingdom because of scale economies, the United Kingdom provides a relevant economic benchmark. However, ComReg never compared actual average prices in Ireland to any competitive benchmark. Instead, ComReg calculated the minimum monthly bill as the monthly cost to a subscriber with a given user profile.⁴⁹ Thus, ComReg used only *hypothetical* prices, not actual prices. Given that 74 percent of Irish mobile customers were prepaid, where quantity demanded is closely related to price, and that ComReg neglected to include handset costs and subsidies, which are an important competitive aspect of postpaid, ComReg’s approach did not reflect real-world economic conditions.

As further evidence of the price performance of the Irish mobile market, data gathered by O2 on its Irish and U.K. operations showed that average revenue per voice minutes in Ireland was 13.2 percent less than its voice revenue in the United Kingdom. Thus, O2’s own data were consistent with the Merrill Lynch data that demonstrated that prices in Ireland were lower than in the United Kingdom.

⁴⁷ MERRILL LYNCH, *supra* note 12. No average price was reported for Belgium. Merrill Lynch reported the amounts in U.S. dollars.

⁴⁸ ComReg Market Analysis, *supra* note 8, ¶ 4.69, at 48.

⁴⁹ *Id.*, App. B. For an explanation of the importance of handset subsidies in mobile competition, see Hausman, *Mobile Telephone*, *supra* note 13.

B. THE RELATIONSHIP BETWEEN HHI AND MOBILE PRICES

ComReg inferred a “lack of effective competition in the retail market” based on “lack of downward movement in high user segments, little or no leap-frogging, and a high degree of parallel behaviour.”⁵⁰ However, none of these criteria ever actually involved comparing prices in Ireland to a competitive benchmark, nor did they demonstrate SMP. ComReg stated that “structural factors in the market” influenced its determination.⁵¹ ComReg emphasized that Vodafone’s and O2’s combined market share was 94 percent, which in this case equates to an HHI of roughly 4600.⁵² To investigate whether a relationship existed between high concentration and competitive outcomes in mobile markets in Europe, we graph the price of the fifteen European countries against the HHI. We observe no relationship.⁵³ This finding is a general one among European mobile markets.

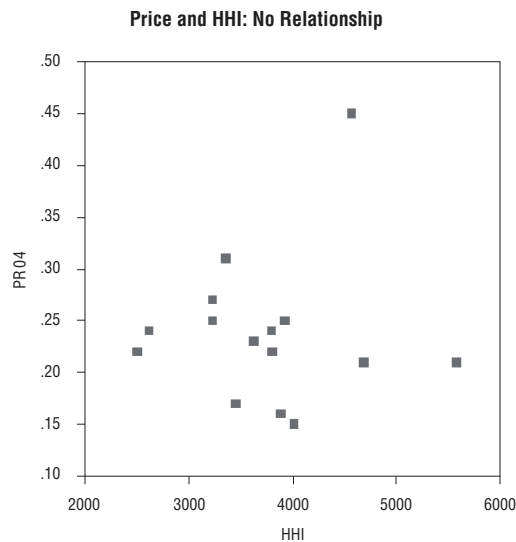


Figure 2.

⁵⁰ ComReg Market Analysis, *supra* note 8, ¶ 4.138, at 63.

⁵¹ *Id.* ¶ 4.139.

⁵² *Id.* ¶¶ 4.6, at 32; 4.17, at 36; 4.33, at 41; 6.15, at 74.

⁵³ The R2 of a regression of price on HHI is .005, far below levels of statistical significance. If one omits Switzerland, which has the high price observation of US\$0.45, the coefficient of HHI in the regression becomes negative, although it remains insignificant.

Ireland's HHI was 4682 and its average price was US\$0.21, which placed it among the lower price countries notwithstanding the fact that it had the second largest HHI. Further, none of the three European markets with HHIs exceeding 4500 has especially high mobile prices. Thus, no economic inference can be made on a relationship between market concentration and competitive outcomes. The European Commission's SMP guidelines similarly observe that "a mere finding that a market is concentrated does not necessarily warrant a finding that its structure is conducive to collective dominance in the form of tacit coordination."⁵⁴

In a network industry with high fixed costs, such as mobile, only a small percentage of customers (here on the order of about 10 percent) need to shift to constrain prices to competitive levels. With 74 percent of customers using prepaid plans in Ireland, far more than a sufficient number of customers choose prepaid to constrain the postpaid price, which is the one market segment where ComReg claimed to find a higher than competitive price.⁵⁵ ComReg's own statistics found that the vast majority of mobile customers in Ireland had among the lowest prices in Europe. Thus, in our view the overall average price in the market is the correct statistic to consider, and Ireland had quite a low average price compared to other European countries, including the effectively competitive United Kingdom.

IV. CONFUSING PRICE WITH REVENUE

When ComReg examined "absolute price levels,"⁵⁶ it erroneously compared revenues, not prices, across countries by using average revenue per user (ARPU) as its basis of comparison. If one were to use ComReg's ARPU comparison, an incorrect inference of a lack of effective competition would arise in the United States, when high usage largely explains the high level of ARPU. Similarly, when one compares Irish ARPU to the United Kingdom's ARPU of US\$39, as reported by Merrill Lynch, one finds that Ireland's ARPU was significantly higher. However, we find, according to the Merrill Lynch Report, that Irish usage is 38 percent higher than the United Kingdom's. The correct finding, as we explained above, is that the Irish price was lower than the U.K. price.

⁵⁴ See SMP Guidelines, *supra* note 2, at 19, ¶ 100.

⁵⁵ Indeed, because 74 percent of subscribers were prepaid, using the OECD definition of high-user (for consistency with ComReg's analysis), one can estimate that only about 3.5 percent of O2's mobile users were high-use, postpaid consumers. Thus, among the four categories of users that ComReg considered, Ireland was less expensive for 96.5 percent of all customers compared to the United Kingdom, which, again, had been found to be effectively competitive.

⁵⁶ ComReg Market Analysis, *supra* note 8, ¶ 4.140, at 63.

ComReg's approach produced an incorrect conclusion concerning consumer welfare. One can estimate consumer welfare from the introduction of mobile telephony. Consumer welfare is approximately proportional to revenue divided by a function of the market price elasticity.⁵⁷ To the extent that high usage leads to high ARPU, consumers are demonstrating that they value the product more and are achieving higher consumer welfare. Thus, to the extent that prices were lower in Ireland than in the United Kingdom but ARPU was higher, Irish consumers were achieving greater consumer welfare from mobile telephony in Ireland than in the United Kingdom.⁵⁸ Although ComReg inferred from high ARPU that a "problem" existed, the opposite conclusion was correct. Consumers in Ireland value the usage of mobile, and their high usage leads to high consumer welfare.

ComReg did not explain what causes ARPU to be higher in Ireland than in, say, the United Kingdom. Revenue is price multiplied by quantity. We have demonstrated that prices are approximately the same in Ireland and the United Kingdom; consequently, the quantity consumed—that is, mobile usage—in Ireland must be higher on average than in the United Kingdom. Does some identifiable economic or demographic factor in Ireland cause these higher quantities, or do they depend on some unobserved factor?⁵⁹ One can use econometric analysis to determine the source of Ireland's high usage and ARPU. An econometric analysis (regression) typically attempts to explain the determination of a given variable, here ARPU, in terms of "explanatory" variables such as price, income, and other characteristics. For our econometric analysis, we performed a log linear regression of the log of ARPU on the log of price, log of GDP, an indicator variable for Ireland, and the log of the proportion of the population between the ages of 15 and 24.⁶⁰

⁵⁷ See, e.g., Hausman, *Mobile Telephone*, *supra* note 13; Hausman, *Exact Consumer Surplus and Deadweight Loss*, *supra* note 7; Jerry A. Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications*, BROOKINGS PAPERS ON ECON. ACTIVITY: MICROECONOMICS 1 (1997).

⁵⁸ This conclusion depends on approximately equal market own-price elasticities in both countries, which the econometric analysis reported here indicates holds true.

⁵⁹ This latter question is not definitive in terms of competitive analysis because the existence of higher-quantity consumers may depend on unobserved preference factors. For example, wine consumption per capita is higher in France than in Norway. However, an econometric explanation gives greater assurance that the differences observed in Ireland do not depend on some unexplained competitive distortion.

⁶⁰ A revenue equation or quantity equation will typically have price and income included. Given the small sample size and the lack of instruments, we use least squares rather than instrumental variables. The equation does not fail a Hausman specification test. A log linear specification uses the variables measured in logarithms, which has been found to be useful in many situations, especially where heteroscedasticity is present.

Table 1

Dependent Variable: LARPU

Method: Least Squares

Sample: 1 16

Included observations: 15

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>
C	-4.069285	2.449321	-1.661393
LPR04	0.165283	0.156170	1.058354
LGDP	0.430104	0.119792	3.590420
IE	-0.046273	0.231623	-0.199777
LYOUNG	1.148956	0.567720	2.023808
R-squared	0.650514		
Adjusted R-squared	0.510720		
S.E. of regression	0.154253		

The econometric results find a price elasticity of -0.84 and find that income and the proportion of young people are both statistically significant.⁶¹ The indicator variable for Ireland is not significant and is negative, which demonstrates that controlling for these factors, Ireland has a slightly lower (but not significant) difference in ARPU. When we include market concentration in terms of the HHI, we find that HHI is not economically or statistically significant.

⁶¹ The elasticity is 1.0 minus the coefficient of the price variable, LPR04, since the left hand side variable is revenue. The elasticity estimate is consistent with the finding of lower price and higher ARPU in Ireland than in the United Kingdom.

Table 2

Dependent Variable: LARPU

Method: Least Squares

Sample: 1 16

Included observations: 15

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>
C	-3.682942	2.347988	-1.568552
LPR04	0.163153	0.148715	1.097086
LGDP	0.367759	0.122177	3.010065
IE	-0.116380	0.225979	-0.515002
LYOUNG	1.128594	0.540778	2.086983
HHI	8.11E-05	5.69E-05	1.424409
R-squared	0.714807		
Adjusted R-squared	0.556367		
S.E. of regression	0.146881		

The indicator variable for Ireland is now even more negative, although it is still not statistically significant. Thus, the econometric results do not find that ARPU is abnormally high once economic and demographic factors are taken into account. Thus, we find price and GDP to be important variables in explaining market demand. The log of the proportion of young people is again found significant, although no special effect is found for Ireland. We find that high ARPU in Ireland arises from low prices, relatively high GDP, and a higher proportion of young people creating a higher quantity of minutes of use demand than in other European countries. Accordingly, ComReg's reliance on Irish ARPU as indicating a competitive problem was mistaken. In particular, the regression results found nothing economically or statistically significant about ARPU.

V. CONCLUSION

Determinations regarding joint dominance and SMP that are based on "HHI factors" are rarely clear cut. Further, certain market outcomes, such as an absence of MVNOs, can arise from unilateral actions of firms without SMP or from coordinated interaction. Economists have long realized, and courts also have increasingly agreed, that differentiating between the two sources of actions is often extremely difficult. In highly competitive markets with non-differentiated products, economists expect similar prices, and often similar business strategies, among competitors.

Whether these prices and business strategies arise from unilateral profit maximization or coordinated interaction is often not clear. However, a price-based economic analysis, which should be the central focus of any SMP analysis because consumers pay these prices, often resolves much of the ambiguity.

ComReg's investigation of O2's and Vodafone's alleged joint dominance in Irish mobile telephony illustrates the point. In finding joint dominance, ComReg relied on a number of structural facts that it recognized were not individually determinative in demonstrating joint dominance. Many—for example, the existence of a four-firm “oligopoly”—demonstrate little or nothing of importance in terms of likely economic outcomes. Other measures that ComReg used, such as ARPU, are incorrect. Finally, ComReg was unable to specify a credible retaliatory mechanism for joint dominance and assumed that Vodafone would act in an economically irrational manner if O2 signed an MVNO agreement.

ComReg failed to apply the most direct test of SMP, which is a comparison of price to a competitive benchmark. SMP is exercised when prices are above the competitive level. A competitive benchmark often allows straightforward comparisons of whether SMP exists. Here, benchmarks refuted the existence of SMP and, thus, joint dominance. The HHI approach to analyzing SMP, which we have shown often results in ambiguous findings, does not correspond to a correct economic analysis of market power.