

The Trend of Competitive Structure in Telecommunications Industry : The Case of Voice Fixed and Mobile Service

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ABSTRACT

The remarkable growth of Korean telecommunication market has based on the introduction of competition as well as mobile technology like CDMA. It was well known that such a conspicuous growth has been towed by mobile service rather than fixed telephone service. In telecommunications service the number of subscribers to mobile was over 40 millions in 2006 and also, while the traffic amount of fixed telephone has been more decreased, that of mobile, which already outnumbers the fixed, has been constantly increased and will be much more in future. It will accelerate the substitution of access and call demand of fixed service by mobile. This change of technology and demand does affect directly the market performance of telecommunications. And regulation has also an effect on market structure, which finally affects on market performance. In this paper we suppose the fixed and mobile telecommunications services are in a same industry. After reviewing the relations among the demand, cost, charge structure and revenue structure in the one fixed and mobile telecommunications market using the framework of an industrial structure analysis, we discuss the current issues of telecommunications regulation and implications for the future regulation.

Key Words : fixed and mobile service, market performance, demand, cost, charge, industrial structure analysis, regulation

I. Introduction

The telecom industry had long been a sector subject to extensive government regulation until as recently as the 1990s. This decade, when telecom markets in many countries worldwide opened up to competition, saw a significant easing of government regulations. Yet, the telecom industry is far from completely free of regulatory constraints. Various regulations are still in place, and their impact on the telecom industry remains tremendous. Meanwhile, with the roll-out of PCS service in the 1997, mobile telephony, thus far a complement to fixed-line telephony, started to play the role of a substitute, as the growing appetite for mobility made an increasing number of telecom users abandon fixed-line telephones altogether. Further, the

improvement in mobile network infrastructure, successively enabling 2-G and 3G services, and the progress in device technology turned mobile phones into much more than a simple communications device. As mobile handsets of the latest generations send and receive data and multimedia content as well as play back music and take pictures and video, mobile telephony is today perceived as no less a necessity, if not more so, than fixed-line telephony. At a regulatory level, however, the fixed-line and mobile communications markets remain completely distinct and are subject to different sets of rules. Asymmetric regulation, therefore, is still in practice today. More restrictive regulations apply to the fixed-line segment of the telecom market, for instance, concerning the obligation to provide essential facilities, rates, bundled

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sales, interconnection rates and market entry (KT, 2002; Choi, 2004).

Assessing structural changes affecting the telecom market and understanding their implications are especially important at a time when technological progress is rapidly transforming the industry's landscape. In this paper, we consider the fixed-line and mobile telephone service markets as one single integrated voice market, and analyze the conduct of carriers liable to affect performance (revenue) within this integrated market, to draw implications for regulatory policy in the fixed and mobile convergence era.

The rest of this paper is organized as follows: in Section II on theoretical background and methodology, we review industrial organization theories and industrial structure models, and current theoretical discussions on the validity of an integrated fixed-mobile telecom market, followed by a description of the data and analytical methods used in this study. In Section III, structural changes in the telecom market are analyzed with regard to a number of key market factors as well as the relationship between structural changes in the performance of individual carriers and market factors is examined using the methods described earlier. Finally, in Section IV, implications for telecom regulatory policy, drawn from the results of the analysis, are presented.

II. Theoretical Background and Methodology

2.1 Theoretical Background

The analysis of market performance was first performed in a field of economics known as industrial organization (IO). According to the framework for market analysis, known as "structure-conduct-performance paradigm," whose main proponents are J.S. Bain (1956, 1959) and E. Mason (1939), the structure of a market (number of companies within a market, degree of integration with suppliers, etc.) influences the conduct of market participants (price, investment, production, R&D, etc.), which, in turn, is a factor influencing market performance (profit, innovation and product diversity, etc.) (Tirole, 1988). Most

empirical studies using the framework of industrial organization theories, however, focus on differences in performance between industry sectors, rather than differences between companies (Robinson et al., 1998). They rest on the implicit assumption that firms within an industry, aside their difference in size, are entities that are homogenous at most levels, at least from an economic perspective (Porter, 1981). Meanwhile, industrial organization models most often integrate widely-varying factors, both internal and external to the market. Factors related to policy, customs, culture, regulatory systems and institutions, technology, demand and other environmental factors all come into play, forming a complex web of relationships. Hence, industrial organization models require a vast variety of actual data to yield meaningful results. For this reason, the structure-conduct-performance paradigm analysis is more often used as a conceptual model for discerning factors influencing market performance and understanding their characteristics, than as a deterministic model (Yu et al., 2004).

In the meantime, in policy-oriented studies, theories of industrial organization are used in the context of either structural approaches emphasizing the causal relationship between market structure and market performance, or behavioral approaches stressing the causal relationship between market conduct and market performance. There are several reasons cited in favor of a structural approach: one is that market performance can be predicted using market structure variables alone as independent variables. Secondly, as market conduct may vary wildly even when the structure of the market is identical, and similar conducts do not necessarily result in similar levels of market performance, a causal understanding of the relationship between structure, conduct and performance can result in an ambiguous prediction. Thirdly and finally, it is quite difficult to gather actual conduct-related data. Those who favor behavioral approaches defend them saying that it is neither wise or justified to overlook market conduct-related variables, when the accuracy of analysis depends so crucially on the quantity of data, and that for a thorough and in-depth analysis of the

relationship between structure, conduct and performance, the research must consider a broad set of independent variables including market conduct variables. In recent times, however, the two types of approach have been often combined, to consider both structure and conduct. Despite this trend toward a combined approach, in policy guidelines, especially those dealing with the status of competition in national or international markets, structural indicators are still largely favored over conduct-related indicators (Kang et al., 2005). Structural indicators alone are often an insufficient basis for policy-making. The conduct of individual companies and indicators of performance, and any performance disparities existing among the companies, should also be considered for more effective policy-making.

In the above, we briefly discussed the characteristics of industrial organization models and their advantages and disadvantages and described the current trends in policy-oriented research. The industrial organization model proposed by M. Porter (1980) is one that applies approaches of industrial organization theory to company business strategies, allowing the assessment of performance differences among individual firms and the relationship between company-level performance and the performance of an overall industry. The profitability of an industry, in Porter's model, is determined by five factors: intensity of competition within an industry, its potential entrants, substitute goods, supplier and buyers. Porter's model, although a static model which fails to provide a concrete description of competition strategies, based on interaction between firms, is considered a useful analytical framework, enabling an accurate understanding of industrial structures and effective explanation of reasons why certain industries do better or worse than others, in overall industry-level performance (Chang, 1996). The model is widely used for designing competition strategies of individual firms, as a basic analytic tool. In industrial policy support research, the model is used modified to suit various analytical purposes.

The industry with which this study is concerned is the voice communications service industry, inclusive of both mobile and fixed-line segments. For

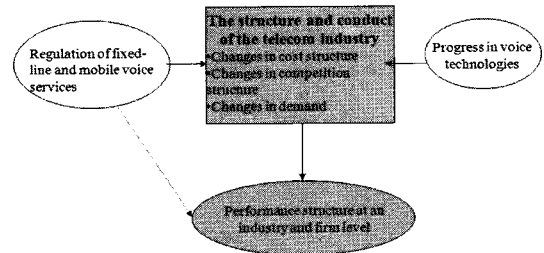


Fig. 1. Framework for Structural Analysis of the Telecom Industry

regulatory purposes, fixed-line and mobile services are considered distinct categories of telecom service. An example of vertical regulation, this distinction allowing a target-specific regulation is based on the technological environment, as the two types of voice service are provided over two different types of network. More recently, however, the progress made in both mobile and fixed-line communications technologies (network and service integration technologies, etc.) and the situation in the telecom market, now fast approaching the saturation stage, are making the competition between these two voice segments fiercer, driven among others by the phenomenon of mobile telephony substituting fixed-line telephony. This situation has raised the need for reviewing the current classification of voice services into two distinct categories (Park et al., 2007). In late 2006, the Korean Ministry of Information and Communication issued a new telecom regulation road map, anticipating an eventual merging of these two voice services. Meanwhile, from the point of view of economics, for two similar products (or services) to be included within a single industry or market, there should be a sufficiently strong level of substitutability between them. Telecom services are generally distinguished into two sub-segments: access service and call service. The process of substitution between fixed-line and mobile telephone is already in full swing, as has been confirmed by many studies (Byeon et al., 2003; Sung et al., 2002; Ahn et al., 2004; Sung & Lee, 2002; Ward & Woroch, 2004, etc.). Whilst there are fewer studies confirming the acceleration of the process of fixed-line/mobile substitution at the level of access service (Rodini et al., 2002 Sung et al., 2002, etc.) than those dealing with call substitution, the possibility is nevertheless

real that the phenomenon is affecting also access services. Given these various developments, the exploration of future directions in telecom regulation by looking at the fixed-line and mobile telephonies as one single integrated voice market is an extremely timely topic with important implications for both policy makers and the industry.

2.2 Analysis Framework and Methodology

The conceptual framework for analyzing the relationship between the demand, cost, price and revenue structures of the voice communications industry consists, on the one hand, of the structure-conduct-performance model drawn from the theory of industrial organization and, on the other, of the model of industrial profitability proposed by M. Porter (1980). The performance of an industry, i.e., its profitability depends on several factors such as cost structure, structure of competition, demand, and the capability to negotiate with suppliers. In addition to those factors internal to an industry, there are also external environmental factors with known influence on the structural characteristics of a given business and ultimately on the revenue structure of the industry as a whole, such as regulatory policies and the level of technological progress. Those interactions among the various factors are described in <Fig. 1>.

In the telecom industry under heavy regulation, the revenue structure of both the industry as a whole and of individual firms is extensively influenced by technological policies and service regulations put in place by authorities. Regulatory decisions have a direct influence on the structure of the overall industry as well as a secondary impact on the revenue structure of individual firms, as the industry-level impact spills over to firms. In some cases, the influence on the revenue structure of individual firms may be direct, depending on the nature of the regulatory decision. Regulatory changes affecting inter-carrier interconnection fees or network access fees could be an example.

The most crucial factors influencing the profitability of individual firms, however, as pointed out by many researchers of industrial organization remain the structure of competition and cost structure

within an industry, and most importantly, changes in demand. The survival of a company vitally depends on these determinants, and only those companies capable of successfully positioning themselves in relation to them can have the competitiveness needed to attain or maintain a viable level of performance and grow. This mechanism of selection, reserving survival to only the fittest, is an essential dynamic which ensures a sound development of industries, and also one of the fundamental goals pursued by industrial policy makers. Thus our analysis in the fig. 1 focuses on two gray parts, i.e., changes in cost, demand, price structure and changes of performance structure.

In what follows, using the above research model, we analyze the structures of demand, cost and competition within the voice communications industry, considered as an integrated market including the fixed-line and mobile industries, and attempt to determine the relationship between these structures and the performance of the industry as a whole and the revenue structure of individual carriers. Three mobile operators, SK Telecom, KTF and LG Telecom, and two fixed-line local call service providers, KT and Hanaro Telecom were selected for the analysis of changes in intra-industry conduct and revenue structure. The analysis, which is an experimental study, used the IR (Invest Relations)¹⁾ data of the carriers studied, from the period 1996-2006. Based on the results of analysis, we identify issues in the current regulatory system, related to the relationship between the structure of industry and the revenue structure, and propose future directions for telecom regulation.

III. Characteristics of Competitive Structure in Voice Communications Service

3.1 Access and Call Demand

The commercial launch of PCS service in 1997

1) The IR data were gathered from the official websites of the operators and were organized by company and year for comparative analysis. Data of some operators or certain years were excluded, either because they are irrelevant to the goal of analysis or were unavailable.

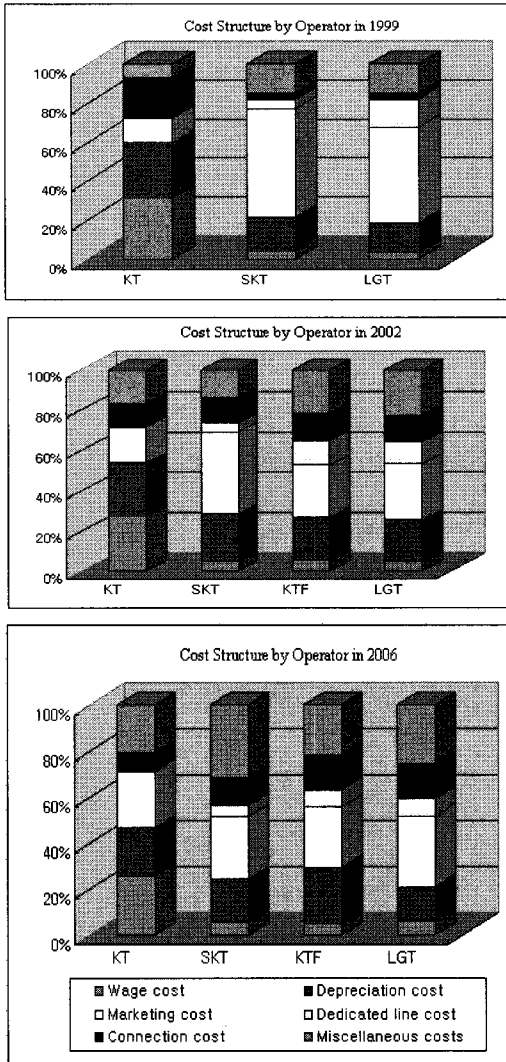


Fig. 2. Changes in the Cost Structures of Fixed-line and Mobile Operators

triggered a sharp surge in demand for mobile telephony, which eventually surpassed the demand for fixed-line telephony, starting from 1999. There is a clear trend begun in 2002 where by the cumulative number of fixed-line subscribers either shrank or stood still. This change in subscription demand resulted in an explosive growth of demand for mobile telephony, raising its share of the voice market to 64% in 2006, leaving only 36% to fixed-line telephone. A similarly dramatic surge is observed also in actual call demand. The share of calls originating from mobile networks already surpassed that of fixed-line networks in 2004 and furthermore the gap has continued to

widen since then.

The shift in voice demand has been also accompanied by the phenomenon of demand substitution between fixed-line and mobile telephony, as has been demonstrated by many empirical studies (Byeon et al., 2003; Sung & Kim, 2002; Ahn & Lee, 2004; Sung & Lee, 2002; Ward & Woroch, 2004, etc.). Further, these changes in subscription and call demands are clearly reflected in the distribution of revenue-basis market shares of fixed-line and mobile carriers. For example, in 2006, the ratio of revenue shares between the fixed line and the mobile segment was 7:3.

3.2 Cost

The telecom industry is a facility-intensive industry appreciating a significant degree of economy of scale. Although the initial investment requirement is huge, the unit cost of service provision quickly declines when the call traffic increases. However, the cost structures of two operators providing similar services can nevertheless be substantially different, depending on technologies used to provide the services and the structural characteristics of networks involved.

<Fig. 2> below offers a comparative view of cost structures among Korean fixed-line and mobile telecom operators in the years 1999, 2002 and 2006. The cost structure of KT, dominant fixed-line operator in Korea, is characterized by a rather high share of wage cost and an especially important share of depreciation cost, resulting ostensibly from new investment projects. However, the cost of marketing represents a relative minor share of KT's overall cost when compared to mobile operators. Mobile operators, on the other hands, have cost structures in which wages claim only a moderate share of the overall cost, a fact having to do with the special characteristics of mobile communication (much fewer switching centers are required for providing mobile services than fixed-line services). Meanwhile, the cost of marketing (cost of attracting subscribers, handset subsidies, etc.) represents an inordinately high share of the overall cost. This difference in cost structure fixed-line and mobile operators appears to have a sizeable impact on their strategic behavior. Whilst

fixed-line operator has a rather rigid cost structure due to the high wage and facility costs, the cost structure among mobile operators involves much less wage and facility costs. As mobile operators can flexibly adjust the cost of marketing, they are able to spend more money on creating new demand and broadening their subscriber base; in other words, they have leeway to invest in expanding their revenue base as needed. One interesting fact is that the share of marketing spending in overall cost is the highest among all mobile operators studied at SKT, the incumbent of the Korean mobile market. This may be interpreted as a strategic behavior on the part of an incumbent supplier, aimed at solidifying its position of dominance and maintaining and increasing its market share.

There have been, however, significant changes in the cost characteristics of Korean telecom operators between 1999 when corresponding to an early growth stage for the mobile market and 2006 when the mobile market phased into a stage of maturity. Initially, the cost of marketing for attracting or retaining customers accounted only for a small share of KT's overall cost, whose biggest portions were claimed by wage, depreciation and connection costs. Such cost structure may be explained by the fact that the marketing need is rather minimal for a company like KT, which not long ago was the monopoly supplier of the Korean fixed-line market. Yet, this pattern soon gave way to a new one in which the share of marketing cost is far more significant. KT's marketing spending grew, in proportion to the overall cost, starting from 2002 and rose to a substantially higher level in 2006. This shift in KT's cost structure may indicate the increased effort on the part of a fixed-line operator to retain and win new customers, in the face of intensifying competition.

The cost-structure trend among mobile operators is diametrically opposite. In 1999, the year when expanding the market for mobile services was still the key priority for the market participants, marketing accounted for a high share of their overall cost. Once the mobile market reached the stage of stabilization, the cost of marketing gradually declined with a proportionate increase seen in other expenditures. As the cost of marketing increased among fixed-line

operators and decreased among mobile operators, their cost structures, by 2006, had become quite similar²⁾. This congruence in cost structure between fixed-line services and mobile services may mean that the two voice segments are now exhibiting similar industry or market characteristics.

Furthermore, as shown in the graphs in <Fig. 3>, indicating changes in the per-subscriber cost of key carriers per cost item, the pattern is becoming very similar over time between fixed-line and mobile services. In concrete terms, prior to 1998, the cost of service provision was much higher in the mobile segment than in the fixed-line segment. However, starting from 1998 and thereafter, the trend is inverted. This phenomenon is due foremost to the increased cost of depreciation as a result of massive network investment undertaken by mobile operators in the mid-1990s. Handset subsidy programs launched by mobile operators during the same period in a bid to expand the subscription demand also contributed to the phenomenon. The initially high cost gradually dropped, falling below the cost of fixed-line services starting from 1998-1999. This trend appears to be mainly the result of higher network efficiency, coming with the stabilization of network infrastructure, and an explosive subscription growth seen around this time. Moreover, the cost of marketing, significantly higher up until 2002, among mobile operators, became higher among fixed-line operators starting from 2003. This change may be explained by the increased facility investment and marketing activities among fixed-line operators, even as the number of subscribers remained at a standstill. In a sharp contrast to fixed-line services, the per-subscriber cost of mobile services drastically fell over the same period caused by an exponential growth of subscription.

To sum up, first, the overall cost structures of

2) The coefficient of correlation between the cost structures of KT, the dominant fixed-line service provider, and the three mobile operators was -.18 in 1999, .24 in 2002 and .49 in 2006, suggesting structural changes toward a greater level of similarity. Per-operator data analyzed below were taken from annual IR data of individual companies and the statistics published by the Ministry of Information and Communication. The data were edited and modified as necessary, depending on the purposes of a given analysis.

fixed-line and mobile operators are growing increasingly similar, in spite of their differences in terms of types of network and services provided. More particularly noteworthy is the fact that the

per-subscriber cost of service provision is becoming roughly the same between the two segments of voice services. This is sufficient grounds to consider the fixed-line and the mobile telephone service as the same industry, at least at the level of service production structure. Second, thanks to the economy of scale in the telecom industry, coupled with the relatively smaller volume of mobile traffic, compared to fixed-line traffic, the initial price perception that mobile calls are much more expensive than fixed-line calls is rapidly fading away, amidst the growing subscription demand and accelerating substitution of the latter by former. What this means is that, as the structure of cost for providing mobile services, offering the added advantage of mobility and other extra functions, becomes similar to that for providing fixed-line services, the cost-driven competitive advantage initially enjoyed by fixed-line services is now almost completely eroded.

3.3 Pricing

The competition among telecom operators is normally determined by the cost of service provision and differentiation of service offerings. However, in the current telecom market where the subscription reached a point of saturation, the price competition is no longer as strongly driven by cost competitiveness, since the difference between fixed-line and mobile services, in terms of cost structure, is gradually being erased. Hence, competition is today chiefly based on service differentiation, accompanied by various pricing plans. This shift in the nature of competition is increasing the share of marketing cost in the overall cost of a telecom operator.³⁾

The price of a telephone service is generally comprised of two distinct components: basic charge and call charge, corresponding respectively to the costs of access to and use of call services. One consistently observed pattern in the pricing of telecommunications services is that prices continuously fall, as the demand grows (Byeon et al.,

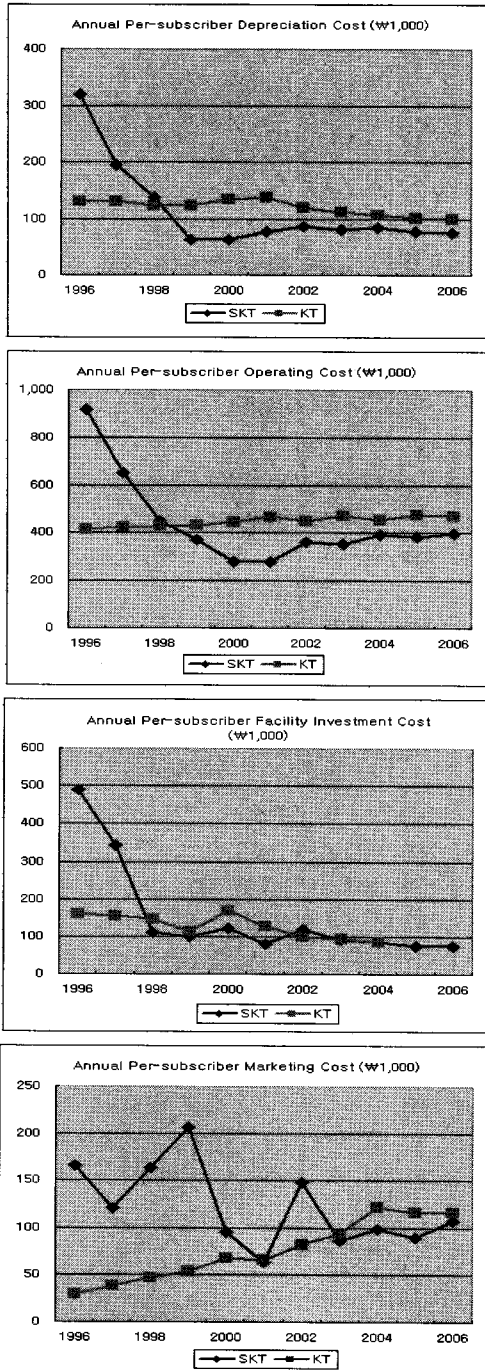


Fig. 3. Per-subscriber Cost Among Fixed-line and Mobile Operators by Cost Item

3) As of 2006, the share of marketing cost in the total cost of service provision was 24.6% for KT, 27.1% for SKT, 26.2% for KTF and 30.8% for LGT.

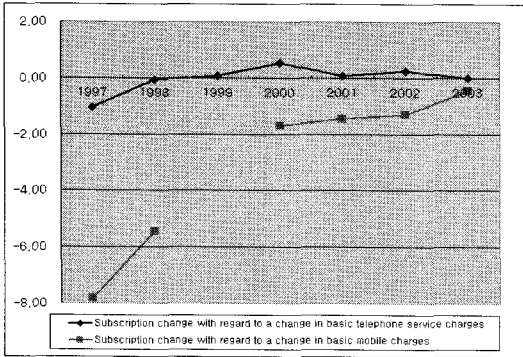


Fig. 4. Subscription Demand Changes with regard to Changes in Basic Charges

2003). To find out how demand actually responds to price changes, we compared fixed-line and mobile services in terms of interaction between demand changes and price changes. Changes in demand with regard to changes in price are defined as the status of demand following a change in a basic charge index and a call charge index, in other words, changes in the number of subscribers and changes in the call volume.⁴⁾ The index of changes in the number of subscribers, as a result of a change in the basic charge index (S_t : the index of subscription changes) is defined as follows:

$$s_t = \left(\frac{S_t - S_{t-1}}{S_{t-1}} \right) / \left(\frac{P_t - P_{t-1}}{P_{t-1}} \right) = \frac{\nabla S_t}{\nabla P_t} \frac{P_{t-1}}{S_{t-1}}$$

Here, S_t corresponds to the number of subscribers at the point-in-time t , and P_t the index of per-minute basic charges at the point-in-time t . Accordingly, when the basic charge index rises, decreasing the number of subscribers, the value of the index of subscription changes becomes negative. A price increase, since it leads to a decline in demand, most often results in a negative value for the subscription change index. Next, the index of changes in call demand with regard to changes in the call charge index (call change index: m_t) is defined similarly as

s_t , the subscription change index:

$$m_t = \left(\frac{M_t - M_{t-1}}{M_{t-1}} \right) / \left(\frac{R_t - R_{t-1}}{R_{t-1}} \right) = \frac{\nabla M_t}{\nabla R_t} \frac{R_{t-1}}{M_{t-1}}$$

Here, M_t is the volume of call traffic at the point-in-time t , and R_t the index of per-minute call charge at the point-in-time t . When the value of the call charge index increases, leading to a decrease in the volume of calls, the value of the call change index becomes negative, following a mechanism similar to how the movement of the basic charge index affects the value of the index of subscription changes.

The trends of the subscription change index (S_t), measuring changes in the number of fixed-line and mobile subscribers with regard to a change in basic charges are shown by the graphs in <Fig. 4>⁵⁾.

The value of the subscription change index tends to be negative, when there is a rise in basic charges, since this leads to a drop in subscription demand. However, the number of fixed-line subscribers has either slightly increased or stood still since 1998, even while the basic charge index for this voice segment has been on a mild upswing during the same period. The subscription change index for fixed-line services, therefore, has been hovering near 0 since 1998. This phenomenon, running counter to the assumption of the inversely proportionate relationship between basic charges and subscription demand, suggests that the impact of the basic charge index on the size of subscription and retention of subscribers may be rather minimal. Notwithstanding, a recent telecom user survey⁶⁾ found that a 50% or more increase in monthly telecom expenditure raises the probability for a user to cancel his or her fixed-line subscription to 83%. Therefore, a sharp increase in basic charges is likely to negatively affect the subscription demand for fixed-line services and the retention of existing subscribers, even if a minor increase may not.

However, in the mobile segment in which basic charges tend to drop only incrementally, there was a dramatic subscriber growth in late 1990, demonstrating that even a small decline in basic mobile charges can lead to a massive increase in subscription demand. Meanwhile, the subscriber

4) This definition is identical to what the price elasticity of demand is defined.

5) Mobile subscription change score for 1999 excluded due to singularity of the value in Fig. 3.

6) See Lee, J. H. et al. (2004) pp.15-18.

growth seen in 1997 and thereafter appears to owe more to aggressive marketing campaigns by individual mobile operators, such as generous handset subsidy programs, prompted by the intensifying competition following the launch of PCS services, than to drops in basic charges (the subscription change index for the year 1999 was 160.4). The subscription change index for the mobile segment, however, was brought down near 0 in 2003, with the market approaching the point of subscription saturation around this time.

Although the scope of change in the number of subscribers, attributable to a lowering of basic charges in the fixed-line and the mobile segment, remained in 2003 roughly the same, the trend in the preceding period was highly dissimilar. In fixed-line services, the subscription change index moved from a positive value toward 0, whereas in mobile services, it moved from a negative value toward 0. These index movements have distinct implications. What they suggest is that whilst in the fixed-line segment, an increase in basic charges is unlikely to affect the subscription demand in any significant fashion (even though this would depend on the scope of increase), in the mobile segment, a lowering of basic charges can effectively help maintain the demand at the level of the saturation point.

Meanwhile, the trends of the call change index (m_t), measuring changes in call traffic volume with regard to a change in call prices, for Korean fixed-line and mobile services are as shown in <Fig. 5>.

As was the case with the subscription change index, a drop in call prices generally tends to drive up the

call demand (call traffic) and bring down the call change index to the negative range. In the case of fixed-line local telephone services, in spite of a continuous price decline, the subscription change index remained within a positive range in early 2000. This is evidence that the drop in call prices alone is simply not enough to attract or retain demand for fixed-line services, and that there are other factors more decisively influencing the demand, such as the existence of alternative voice services like mobile services. Accordingly, in order to shore up the shrinking demand by cutting basic charges, fixed-line operators may need to slash them more drastically. Concerning fixed-to-mobile calls, a progressive price reduction appears the best, as the demand for this service maintains the known relationship between price and traffic volume, even if its size is rather modest, compared to the mobile demand. Further, the relationship between mobile call rates and the volume of mobile call traffic appears to obey the classical law of demand; in other words, demand is conditioned on price. Notwithstanding, given the saturation of subscription demand and overall slowdown of traffic growth, the influence of a price cut on the increase of traffic is likely to be modest.

Mobile operators, on the other hand, are offering pricing plans targeting different subscriber categories, as part of their service differentiation strategies, rather than slashing prices unilaterally. Mobile pricing plans are currently much more varied than equivalent plans offered by fixed-line operators. In the telecom market, both prices and pricing plans have traditionally been subject to regulation, as authorities seek to prevent operators from keeping consumer surplus resulting from price differentiation to them. However, this type of regulation is at the moment applied mostly to fixed-line services. More leeway is given to mobile operators. To stimulate competition, the three Korean mobile carriers are allowed to freely adopt pricing structures of their choice,⁷⁾ which suit their own

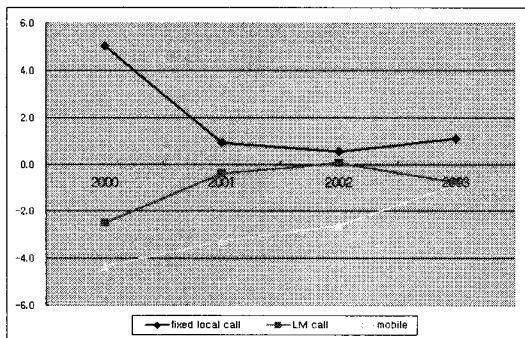


Fig. 5. Call Demand Changes with regard to Changes in Call Charges

7) Based on information provided in the official websites of the operators, SKT offers 37 pricing plans, KTF 49 and LGT 29. KT, the fixed-line operator, offers only 10 pricing plans, including the pricing scheme for land-to-mobile calls and the 'My Style' plan.

differentiation strategies. Mobile operators make a much more strategic use of pricing plans than do fixed-line operators, as these plans can be bundled with a variety of value-added services. Mobile operators, in other words, enjoy a far greater differentiation advantage than their fixed-line counterparts, thanks to the special price-related regulatory regime applying to this market and factors pertaining to device technologies involved in mobile services.

3.4 Performance

Internal, intra-industry factors of the telecom sector produce a direct impact on the performance of individual operators. This examination also included a discussion of the influence of changes in fixed-line and mobile technologies and regulatory factors on such those structural changes. Changes in the revenue structure of KT provide a measure of the process of fixed-mobile substitution and its characteristics and trends. According to the KT's IR from 2001 to 2006, the shares of long distance and international calls have been gradually diminishing, and local calls are accounting for a slowly but steadily growing share of the total revenue. In 2001, the share of long distance calls, amounting to 46.2%, was roughly the same as that of local calls. But, in 2006, the share fell to 36.5%, far below 52.7% claimed by local calls. This phenomenon certainly owes much to the fact that KT has to compete with other fixed-line operators in the long distance market. Yet, as important a contributing factor is the call substitution, a process more accelerated in the long distance segment where the price difference between fixed-line and mobile calls is far less significant than in the local call segment. As for the international call segment, the process of fixed to mobile substitution appears to take place more slowly, in spite of the high price competitiveness of mobile services, due to the poor call quality. Once call quality-related issues are fixed, the substitution process is likely to pick up momentum also in the international call segment.

And by using the IR materials of four fixed and mobile telecom operators such as KT, SKT, KTF and LGT we studied their revenue structure and changing

characteristics from 2001 to 2006. Connection income accounts for a much large share of the overall revenue for fixed-line operators than mobile operators. Meanwhile, the contribution of basic charge revenue to the overall revenue is quite important among mobile operators. The disparity in the revenue structure among these operators, just as with the price structure, was most marked in 2001, to progressively become less pronounced thereafter. The biggest cause of this is the slowly rising share of basic charge revenue in KT's total revenue. The expanding share of basic charge revenue at KT is likely to be a result of the shrinking call traffic. The decline in call traffic eroded the company's call revenue and connection revenue, and led to an increased share of basic charge revenue in the overall revenue, as the number of subscribers remains virtually unchanged. All in all, the trend is toward a gradual erasing of the difference between fixed-line and mobile operators⁸⁾, also in terms of revenue structure.

It has been noted earlier in this paper that the cost structures of these operators changed over the period studied, toward a convergence of per-subscriber cost between fixed-line and mobile services, concerning most cost items. However, even when the fact that the number of mobile subscribers is almost twice that of fixed-line subscribers is taken into account, the per-subscriber basic charge revenue among mobile operators is two to three times that of the dominant fixed-line operator, as can be seen in (A) in <Fig. 6>. Meanwhile (B) in <Fig. 6> shows that the highest call revenue is generated by SKT, the dominant mobile carrier. What this implies is that the size of excess profits in mobile services far exceeds that in fixed-line services, and these excess profits are realized primarily from basic charge revenue.

Hence, mobile operators rake in huge excess profits despite the trend toward convergence between fixed-line and mobile services, in terms of revenue structure; a phenomenon coinciding with a sharp

8) The coefficient of correlation between the revenue structures of KT and the three mobile operators changed from .48 in 2001 to .63 in 2004 and .69 in 2006. The coefficient of correlation was particularly high in 2006, between the revenue structures of KT and SKT, amounting to 0.771.

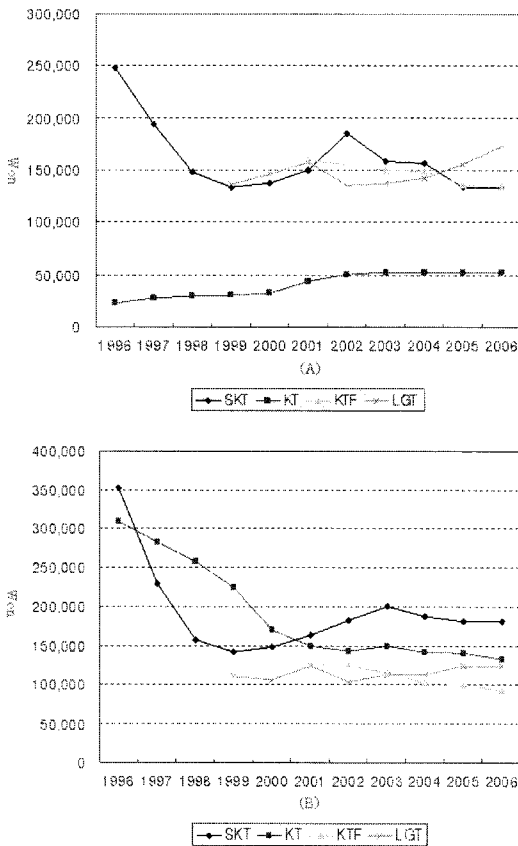


Fig. 6. Changes in Per-subscriber Basic Charge Revenue (A) and Call Revenue (B)

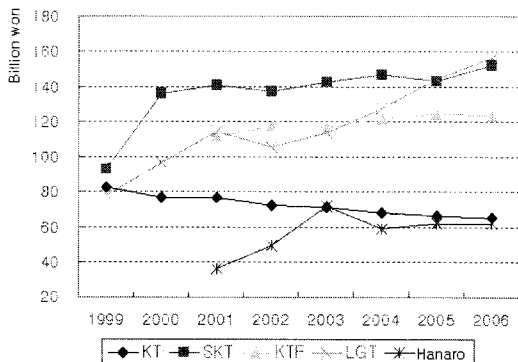


Fig. 7. Changes in Revenue per Market Share

growth of mobile subscriptions, greater similarity in cost structure between them and the introduction of differentiation strategies based on various pricing plans. This trend also has to do with the asymmetric regulation for the two voice segments, still in place, and the significant progress in mobile technologies in user-friendliness.

<Fig. 7> below provides a visual representation of changes in fixed-line and mobile operators' revenue per market share point. Revenue per market share among mobile operators largely exceeds that of KT and Hanaro Telecom, the two fixed-line telephone service providers, and the gap between them has been widening over time. As has been already mentioned, the revenue gaps between operators are mainly caused by changes occurring to demand and the structures of cost and price, with the regulatory environment, user preference and the development of mobile technologies toward a user-friendly direction also playing a role as direct and indirect contributing factors.

IV. Conclusion

This study has been an investigation of the demand, cost and price structures within the voice market of the telecom industry, considered as one integrated market including both fixed-line and mobile services, and their relationship to the revenue structure of this sector. The analysis of intra-industry factors was accompanied by an examination of the influence of the asymmetric regulation between fixed-line and mobile services and evolution of mobile technologies on these factors.

The main results of our analysis are: First, the process of fixed to mobile substitution has become a visible phenomenon and is further accelerating. Even though clear empirical evidence is still lacking, the phenomenon is nevertheless real and is directly contributing to widening the revenue gap between fixed-line and mobile operators. Second, the difference between fixed-line and mobile operators in terms of cost structure is slowly being erased. This development may be understood as a response on the part of fixed-line operators to the phenomenon of fixed to mobile substitution, and the most noteworthy part of it is that the unit cost of service provision for most cost items is becoming roughly the same between the two types of voice service. The implication of this phenomenon is clearly that the cost advantage previously enjoyed by fixed-line operators is now all but eroded. Third, concerning price

structure, the demand-oriented evolution of mobile technologies and price differentiation strategies adopted by mobile operators appear to be major contributors to the latter's efforts to increase subscription and call demand. These industry structure-related factors, we found, have a direct impact on the performance of telecom operators, helping them, in the case of mobile operators, gain and maintain competitive advantage. Our investigation also provided an indirect confirmation that asymmetric regulation between the two segments of the voice market had both a direct and indirect influence on the revenue disparity between fixed-line and mobile operators.

Telecom regulations, originally designed for the fixed-line telephone service sector, an industry possessing essential facilities, have evolved since then, but have retained much of their basic tone. There has been a sea change in the telecom market over the last decade; huge strides have been made in mobile communications technologies, significant changes occurred in the nature of demand, and powerful competitors have entered the market. Failure to provide conditions for free competition to a market whose dominant suppliers are likely to exert an even greater influence in an integrated fixed-mobile market runs counter to the goal of promoting a sound development of the telecom industry and maximizing user benefits through fair competition, and would pertain to managed competition imposing misguided regulatory constraints.

Hence, there is a clear need to modify the current asymmetric mode of regulation, especially if the goal is to assist the market prospects of certain operators or promote certain service categories. This does not mean a radical shift in the regulatory model toward a symmetric regulatory principle, but a simple easing of the existing model to stimulate competition among market participants. Restrictions on prices or pricing plans, for instance, should be lifted. The stagnant subscription growth and the sharp shrinking of call traffic are putting many of the facilities of incumbent fixed-line operators out of use. Price differentiation strategies to attract demand, consisting of a re-adjustment of existing pricing structures or optional

pricing plans can also increase benefits for telecom users.

This paper has examined the dynamic changes of the demand, cost, charge structure and revenue structure using the detail data of fixed and mobile operators with the framework of industrial structure analysis. This produced some limitations for further research. First of all, other elements of industrial structure analysis, such as the relations with suppliers, technological innovations and governmental institutions, etc., have to be involved in this analysis process to achieve more meaningful implications. Second, in order to understand the dynamic competition and performance structure of domestic service market comprehensively, data for study needs to expand time periods and number of samples. The last, related to the first and second issue, is to regard the practically new regulation tools that can be applied to the domestic voice service industry. To do this, benchmarking study on regulation and institution of advanced countries has to be included empirically as well as theoretically. Albeit such those limitations, we expect that the empirical results may give helpful implications for voice service operators and policy makers under the convergence of fixed and mobile service.

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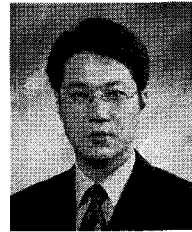
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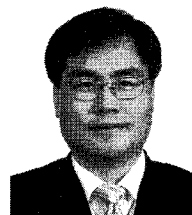
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