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Conference Paper

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22nd Biennial Conference of the International Telecommunications Society (ITS): "Beyond the Boundaries: Challenges for Business, Policy and Society", Seoul, Korea, 24th-27th June, 2018

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Jung, JinHan; Kim, Changwan; Lee, Jai Joon (2018) : Incumbents' Heterogeneous Strategic Responses to Entry Threat in the Mobile Telecommunication Market among OECD Countries, 22nd Biennial Conference of the International Telecommunications Society (ITS): "Beyond the Boundaries: Challenges for Business, Policy and Society", Seoul, Korea, 24th-27th June, 2018, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/190369>

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Incumbents' Heterogeneous Strategic Responses to Entry Threat in the Mobile Telecommunication Market among OECD Countries

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I. Introduction

Incumbents' entry deterring incentives are closely affected by potential entrants' various attributes as well as heterogeneous competitive market conditions. For example, potential new entrants will be able to differentiate their efficient cost structures from those of incumbents. Furthermore, potential new entrants will be better equipped with differentiated strategic positions and services through conducting a series of detailed market intelligence and competitor analysis.

When potential entrants are expected to intensify the market competition and to rapidly secure their strategic positioning, incumbents have strong incentive to deter any potential entries in order to avoid profit loss (or additional cost) as a result of intense competition. At the same time, if potential entrants' entry threat is expected to be low, incumbents will be better off not to take on actions immediately or sometimes those potential threats will be ignored by incumbents. In addition, these firm-level characteristics, along with market-level characteristics such as competition structure and market maturity will play a role in determining incumbents' deterrence strategy.

This paper is empirically investigating how incumbents are responding to potential new entry threats in the mobile telecommunication market. In particular, this paper deals with the incumbents' price deterrence strategy, focusing on how incumbents' heterogeneous attributes will have to do with the limit pricing mechanism. These attributes will be determined whether potential entry threat is actually realized or not. Also, they are going to be influenced by the maturity of market competition. In addition, this paper analyzes the incumbents' price fluctuations when actual entries have been made and the competition has intensified in the

market. As a result, this paper compares the price strategy of incumbents when potential vs. actual competitions take place in the mobile telecom market.

The threat of entry can be seen as potential new entrants bid and acquire the essential resources of wireless spectrum in order to serve the facility-based services in the mobile telecom industry. As a result, incumbents will come up with their strategic responses depending upon the characteristics of market-specific or firm-specific attributes. When the wireless industry is known to have higher entry barriers and is required to have the scope economies, incumbents will be less inclined to engage in their responses immediately to new potential entry threats. When incumbents perceive any potential entry to be an imminent threat, then incumbents will consider taking actions to minimize the new potential entry threats. In other words, incumbents will strategically assess each situation in selecting their responses to potential new entrants. When they assess the possibility of potential new entrants' threat is low, it will be better off for incumbents to avoid such situations where they incur any preemptive costs to deter any new entrants' entry into the market.

This study has collected various data sources in order to analyze how incumbents' strategic decision makings have to do with new entry threats and the actual intensity of competition in the wireless industry. Through analyzing the regulatory reports from multiple countries, Curwen and Whalley (2015) compiled the database of the following information such as the degree of actual new facility-based services and their sustainability in the marketplace. Their study identified the data such as new spectrum auction date, licensed firms, and their potential & actual service offering (or termination) date. This study enables to identify the existence of firms' potential & actual entry threats. In addition to the firms' entry-related data, this study has utilized the wireless matrix from Year 2000-2015 and has studied the incumbents' ARPU and other firm-level and industry-level data.

This study's empirically results show that incumbents will try to deter or limit any new entries in particular when they have higher chance of achieving the entry threat with the facility-based competition. When such potential entry threats are turned out to be low in creating any additional competition intensity, incumbents' strategy will be somewhat counter intuitive in that their pricing strategy is intact or even try to adjust their pricing strategy higher as a result. In this study, incumbent's entry deterring strategy can be further analyzed – their goal is to minimize their loss by selectively considering their entry deterring strategy only when

new potential entries are actually realized or highly expected.

In addition, this study discusses that the unique nature of wireless telecom market when it tends to be unfriendly to new entrants through higher entry barriers. However, this study implies that these characteristics play a mitigating role for incumbents to limit any new entries *ex-ante*. In addition, this study investigates that heterogeneous factors such as incumbents' market share, country-level market maturity, and the degree of competitive intensity have some plausible relationships between incumbents' entry deterring strategy and *ex-post* price differentials. When incumbents' market shares are low, and the corresponding market concentration is low, there is going to be stronger entry deterring incentives and the post-entry price adjustments will be higher. On the other hand, when the penetration rate is low, there tend to be higher entry deterring incentives. However, the post-entry price adjustments will be significant when the penetration rate is high. This study implies that incumbents will have a fairly good sense of assessing the new entries with impact and act upon their deterrence strategies accordingly. In other words, new entrants with higher entry barriers will be faced with the scope-based economic disadvantages, and they are trying to expand their subscriber bases as they are inclined to offer low pricing packages and subscribers' churning due to the incumbents' incompetent responses. In addition, when wireless telecom market shows a higher mobility barrier, new entrants will be positioned to destabilize the incumbents' future revenue streams. As a result, incumbents will tend to block any new entrants through incumbents' aggressive pricing strategy.

Unlike other prior studies, this study focuses on the empirical analysis of incumbents' entry deterring strategy and how it will be positively related to the firm and the market-level heterogeneity. There have been very limited number of empirical studies focusing on the incumbents' strategic entry deterrence, and the most of them have dealt with the existence of incumbent's basic deterrent strategy in response to entry threats (Morrison, 2001; Goolsbee and Syverson, 2008; Huse and Oliveira, 2012; Brueckner, Lee and Singer, 2013; Gayle and Xie, 2013; Gayle and Wu, 2013). This study analyzes the incumbents' strategic responses of entry threats, but at the same time, it studies how firm- and market-level heterogeneity affects firm's strategic decisions. In addition, this study investigates the ways incumbents make strategic decisions based upon various attributes such as market conditions and entry potentials. In particular, incumbents are to look for minimizing their overall costs by analyzing the entry

potentials not only from the existence of entry threats but also from the reasonable expectations of such entry's actual entry. Prior studies analyzed to what extent the incumbents are influenced by the changes of new entry policy and competitive structure (Majumdar, Mishra and Chang, 2007; Briglauer, Gugler and Haxhimusa, 2015; Percy and Savage, 2015). On the other hand, this study takes a good look at some heterogeneous attributes of each players in the mobile market and these attributes play a significant role in determining the incumbent's entry deterrent strategy. In that regards, this study is different from the previous ones by studying incumbents' pricing responses to potential and post entry threats in the mobile telecom market.

From the policy implications, this study is going to be helpful in developing a series of new entry policy in the mobile telecom industry, in particular for the ones with higher entry barriers for new entrants. Many mobile telecom markets, including those in the OECD member countries, have been oligopolistic (or become oligopolistic) as the momentum of facility-based entry has not been dynamic. While serviced-based competition is actively promoted in many countries, mobile virtual network operators (MVNOs) are structurally limited with their facility-based capacity, therefore, they lease mostly from the facilities of mobile network operators (MNOs). As a result, the competitive promotion of facility-based entry itself becomes very important issue in the consideration of competition policy, but also it can be considered as a supplemental to the serviced-based competition. In order to determine the effectiveness of facility-based competition, policy makers will find useful to analyze the post-entry price differentials based upon competition structure, market maturity, market shares and other market-related attributes.

II. Estimation Results

(1) Pricing behavior of Incumbents to credible and non-credible threat of entry

Table below shows the estimation results on pricing behavior of incumbents to entry threats and actual entries. The first specification, denoted by eq0, estimates the overall effects of entry attempts regardless of their types. The estimated coefficient of the entry threats variable, entry, is .003 with a standard deviation of .014; the data reveal that entry threats do not seem to affect the pricing behaviors of incumbents. This may due to the nature of wireless service market, in which many potential entrances tried in vain to launch the services. However, the coefficient of cpe has a statistically significant negative value, which implies that incumbents

lower their prices when new comers successfully make entrances and provide the services. The other specifications, presented on from column three to six, analyze the responses of incumbents to various types of entries; credible and non-credible entry threats, and post entry. Other variables appearing in the specifications are control variables.

[Table] basic estimation results (revised version)

Var	eq0	eq 1	eq 2	eq 3	eq 4
entr	.003				
y	(.014)				
cet		-.12 (.02)*	-.12 (.02)*	-.05 (.02)*	-.06 (.02)*
	*	*	*	*	
cpe	-.07 (.01)*	-.25 (.02)*	-.21 (.02)*	-.09 (.02)*	-.11 (.02)*
	*	*	*	*	
ncet		.15 (.02)*	.14 (.02)*	.07 (.02)*	.07 (.02)*
		*	*	*	*
hhi	.72 (.16)*		.97 (.18)*	.62 (.16)*	.67 (.16)*
	*	*	*	*	*
lte	-.23 (.01)*			-.21 (.01)*	-.22 (.01)*
	*		*	*	*
rev	.05 (.01)*				.06 (.02)*
	*			*	*

*, ** statistically significant at 95% and 99% respectively

The estimated coefficients of credible entry threats, cet variable, are negative and statistically significant in all the specifications. This implies that an incumbent lowers her prices to deter a potential entry if the entry is highly anticipated to happen.

The estimated coefficients of post entry, variable cpe, are negative and statistically significant. This suggests that incumbents lower their prices during the period in which new entrants provide the services. However, non credible entry threats, variable ncet, have positive signs. The proper interpretation seems that incumbents are capable of discerning the types of

entry threats and act accordingly. If potential entrants are likely to enter the market successfully, incumbents have incentives to suppress or delay the entry. On the contrary, incumbents tend to ignore or accommodate potential entrants when the odds of their success are not high.

A note on causality issues between results of entry attempts and incumbents' strategies is needed. It is possible that incumbent's deterrence strategy may cause the entry failures, which may invite an endogeneity problem. However, the estimation results suggest that incumbents ignore or accommodate the potential entrants who would not enter the market, which implies that there are no significant endogeneity problems.

The null hypothesis of the size of estimated coefficients is same for cet and cpe are rejected¹. This test result supports the hypothesis H3), which means incumbents act more aggressively after new entrants launch services. This implies that some factors such as entry uncertainty, entry barriers, may mitigate the incumbents' incentives to deter an entry ex ante in the wireless market.

(2) Entry deterrence in heterogeneous markets and incumbents

The previous estimations are extended to reflect market structures and market positions of incumbents. Table below shows the estimations results with the specification eq0 as a baseline. The specification eq5, presented in the third column, classifies the incumbents into the market leader and followers and measures the responses to entry threats and post entries overall. The responses from market leader and followers, $entry_m$ and $entry_o$ respectively, are estimated to be statistically insignificant. Indeed, the estimation results suggest that market leaders as well as followers do not have strong incentives to deter entry attempts. Two variables, cpe_m and cpe_o , that measure the price responses of market leader and followers to post entry period have negative and statistically significant coefficients. In addition, responses for the post entry show a higher absolute value in the group with relatively low market share. It suggests that the new entry may have a greater impact on followers than leaders. This also makes difference in relative responses between post-entry and entry threats between leaders and followers. That is, the mitigation effect on entry deterrence ex-ante is higher for followers than leaders.

¹ The null hypothesis is rejected at 95% of significant level.

[Table] extended estimation results

Var	eq0	eq 5	eq 6	eq 7
Entry	.003 (.014)			
Cpe	-.07 (.01)**			
entry_m		.01 (.02)		
entry_o		-.0009 (.01)		
cpe_m		-.05 (.02)*		
cpe_o		-.08 (.02)**		
entry_h_hhi			.18 (.03)**	
entry_l_hhi			-.03 (.01)*	
cpe_h_hhi			.03 (.03)	
cpe_l_hhi			-.09 (.02)**	
entry_h_pen				.01 (.01)
entry_l_pen				-.04 (.02)*
cpe_h_pen				-.13 (.02)**
cpe_l_pen				-.0006 (.02)
hhi	.72 (.16)**	.72 (.15)**	.74 (.15)**	.6 (.15)**
lte	-.23 (.01)**	-.23 (.01)**	-.22 (.01)**	-.23 (.01)**
rev	.05 (.01)**	.05 (.01)**	.06 (.01)**	.05 (.01)**

*, ** statistically significant at 95% and 99% respectively

The specification eq6 focuses how market structures affect the incumbents' incentive

to deter entry threats and response to actual entries. The estimation results show that the variables related with less concentrated markets, $entry_l_hhi$ and cpe_l_hhi , have negative coefficients. This means more aggressive entry deterrence and price competition after entries are expected in countries with diffused market structures. For the countries with concentrated market structures, incumbents seem to adapt new comers by showing positive coefficient of variable $entry_h_hhi$. Even cpe_h_hhi has a non-significant coefficient to imply that actual entry has little effect on the price of incumbent.

In sum, entry attempts appear to have larger impacts on incumbents in competitive markets. Therefore, the incumbents have a stronger incentive to avoid such risks both ex-ante and ex post. In concentrated and mature markets where customer retention is more important than customer acquisition, on the other hand, entry through the niche market has little impact on sales of incumbents. For incumbents in competitive markets, the expected additional revenue from entry deterrence may be smaller than the associated costs, which is consistent with the theoretical studies discussed above. The last specification, eq7, focuses on the relationship between wireless market penetration rates and entry deterrence. The table shows that variable $entry_l_pen$ has a negative coefficient. This suggests that incumbents in countries with low penetration rates have a stronger incentive for entry deterrence. The incumbents may lose more future profits from intensified competition by allowing new entrances in.

Also the estimated coefficient of post entry in countries with high penetration rates is negative. This may be explained in terms of competition behaviors of new comers. New telcos may be motivated to acquire subscriber base through aggressive pricing strategies, given the high penetration rates. This competition behavior of new entrants would lower incumbents' prices. However, the estimation results show that price competition between new and existing operators is not enhanced in a market with a low penetration market. It is attributed to the fact that new operators are more likely to expand their subscriber bases through other strategies.

III. Conclusion and Future directions

This study empirically examined the strategic responses of incumbents to entry threats and actual entries of facility-based operators in the mobile communication market. The analysis with the panel data set of 89 mobile operators focused on the pricing strategies of incumbents. The estimation results suggested that, in general, existing mobile operators did not deter or

even adapted new entry into the market. However, the incumbents were found to deter credible entry threats that would be the actual one. The incumbents' responses to entry threat are not different across their competitive positions in the market, however. Operators with relatively low market shares aggressively went into price wars after new comers started their businesses. In competitive markets, incumbents actively responded not only to the entry threat but to the initiation of services by new comers. Incumbents focused more on entry deterrence when penetration is relatively low. Meanwhile, they aggressively reduced their prices against entrants in highly penetrated markets.

The results indicate that, consistent with existing empirical literature, incumbents have incentives to deter entry. However, this study distinguishes itself from previous studies by showing that incumbents selectively react to entry threat, reasonably expecting whether or not the potential entry is realized. It is also worth noting that the strategic responses of incumbents to threats of entry and actual entry are affected by market characteristics. Incumbents' responses to the threat of entry and the actual entry depend on their competitiveness and market competitive structure and maturity. In addition, high entry barriers in the mobile communication market seem to significantly affect the strategic decisions of incumbents. Some policy implications are easily drawn from the price reactions of incumbents to post-entry. It is shown that the new competing force is likely to have more impact on followers than leaders. Our study also indicates that, contrary to general expectations, new entry has a significant effect on the prices of incumbents in more competitive and mature wireless markets. Considering the possible consequences of the facilities-based entry, a regulator should figure out the anticipated effect of entry is consistent with his policy goals.

Incumbents can respond to entry threats and actual entrants with not only price but also marketing strategy, excessive capacity, etc. It is also interesting to identify major factors which affect a success or a failure of entry in the mobile communication markets. Furthermore, identifying the mechanism in which such elements affect the strategic response of incumbents to entry threats would be a future research.

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