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Limit Pricing through Price Discrimination:

A Theoretical study among Telocommunication Companies in East Africa

Hillary Ekisa Nambanga

Abstract:
Limit pricing, which Competition Authorities view as anti-competitive and illegal, is an interesting issue in industrial organization. This is a case where firms with market power charge a price that is lower than their operational cost in order to prevent the entry of new potential competitors or drive out their smaller competitors out of business. This research paper examines limit pricing theoretically among telecommunications companies in the East African Community. The Community has experienced a consistent drop in mobile network service prices since the year 2000 with the smaller mobile network operators blaming their dominant counterparts for initiating these price cuts. These dominant firms are former monopolists who price discriminate between their two tariffs, the pre-liberalization (former monopoly) and post-liberalization (competitive), with a majority of their mobile subscribers still registered under their expensive pre-liberalization tariffs that have high switching costs compared to the competitive tariffs. The paper analyses limit pricing within an oligopoly framework involving a price discriminating dominant incumbent, a fringe (smaller) competitor and a potential entrant in a sequential three-stage game of price competition under complete information. The theoretical results show that the dominant incumbent can profitably use its pre-liberalization tariff price to deter market entry and force its smaller competitors out of business. These results have public policy implications for the East African Competition Authority and other policy makers. These should consider regulating the pre-liberalization tariffs among dominant firms thereby reducing their influence on pricing in order to enhance fair competition among firms in the market.

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About Author (s)

Dr. Hillary Ekisa Nambanga , School of International Trade and Economics, University of International Business and Economics (UIBE), Beijing, China.

1. INTRODUCTION

Since the year 2000, the East African Community's mobile network operator market has witnessed an alarming trend of consistent price cuts across its money transfer, internet data bundle, voice call and short text message services. This is despite the high cost of network equipment and civil works. This has made smaller mobile network operators to incur losses causing some of them to exit the market. A case in point is YU mobile that exited the Kenyan market in 2014. Despite this, the dominant mobile network operators still manage to make profits. The smaller mobile network operators have raised formal complaints against the dominant mobile network operators to the East African Competition Authority for initiating the price cuts (Deloitte, 2015). These dominant firms price discriminate between their two tariffs, the pre-liberalization tariff with high switching costs and the competitive post-liberalization tariff with low switching costs while the smaller firms offer only one tariff, which is the competitive tariff with low switching costs. This pricing situation is consistent with the theory of limit pricing which is illegal and anti-competitive in East Africa and other countries. How can a dominant price discriminating mobile network operator manage to make profits under declining service prices? Under what conditions can a price discriminating dominant mobile operator successfully use limit pricing as a strategy for entry deterrence under complete information? How do the dominant mobile network operators influence the pricing patterns of the pre-paid competitive tariff among the mobile network operators in the East African Community? To answer these questions, this research paper has theoretically analysed limit pricing within an oligopoly framework involving a dominant price discriminating mobile network operator, a fringe (smaller) mobile network operator and a potential entrant in a sequential three-stage game of price competition under complete information.

2. LITERATURE REVIEW

Theory shows that an established firm can use limit pricing as a strategy for entry deterrence both under incomplete and complete information. For incomplete information, the potential entrant is not sure about the true operating cost of the established firm. Limit pricing can deter entry within this framework of incomplete information (Milgrom and Roberts, 1982). Incumbent firms with market power can use the limit pricing strategy under complete information in both preventing entry and driving out their smaller competitors out of business (Kreps and Wilson, 1982; Hillary Ekisa Nambanga, 2020). The standard limit pricing model (Tirole 1988, 368-71) is outlined as follows: There are two firms, one being already in operation (incumbent) and the other which is intending to enter the market (potential entrant) within two periods. At the beginning of the first period, the incumbent firm is operating and its cost can be either high or low. The incumbent is aware of its true operating cost but the potential entrant is not certain of the true operating cost of the incumbent. The potential entrant only knows the probabilities of the true cost of the incumbent being either low or high. The cost of the potential entrant and its beliefs over the incumbent's cost are common knowledge. During the first period, the incumbent firm chooses a price or an output under the observation of the potential entrant. In the second period, the potential entrant decides whether to enter or not. If entry occurs, the potential entrant will learn about the true cost of the incumbent firm. This is in case it had not done so based on the incumbent's first period price (output). The two firms will then proceed to play a simultaneous price (output) setting subgame under full information. If entry does not occur, the incumbent firm remains a monopolist. Two main assumptions drive the model. First, the potential entrant would not enter the market if the incumbent firm is a low cost type but it would only enter if and only if the incumbent firm is a high cost type. Because the incumbent enjoys being a monopolist, it wants the potential entrant to believe that it is a low cost type

even if truly it is a high cost type. This ensures that the potential entrant does not enter the market. Secondly, the high cost incumbent firm acts as if it is a low cost type by pricing low in order to fool the potential entrant that it is a low cost type. The potential entrant will thus stay out of the market believing that the incumbent is a low cost type when truly it is not. The solution concept of this game is a perfect Bayesian equilibrium (PBE). Under this, given the beliefs of the potential entrant, the strategy of the incumbent firm is a best response to the strategy of the potential entrant while the strategy of the potential entrant is a best response to the strategy of the incumbent firm. The beliefs of the potential entrant are rational since they abide by Bayes' rule where applicable. A more patient potential entrant will enter the market under a dynamic context with N periods. This is because, the incumbent firm cannot be able to continue sustaining heavy losses over a longer period by pretending to be a low cost type when indeed it's a high cost type (Toxvaerd, 2017). However, many markets have more than one incumbent operating in them. For instance, under oligopoly markets, the operating firms can to signal to a potential entrant that entry is not viable. These firms may use their prices or output levels to convey this signal. Harrington (1987) verifies that the limit pricing analysis with a single incumbent is similar to the analysis involving multiple incumbents under the same context of incomplete information. He examines a limit-pricing model involving two firms with similar private information that choose the output level to produce. Depending on the resulting price, a potential entrant may decide to enter or stay out. Harrington shows there exists an equilibrium under which there is a consistent drop in the quantities produced. An important feature in Harrington's model is that the potential entrant only observes the resulting price and not the individual outputs of the incumbents. This feature is critical since signaling will not be effective when potential entrants observe individual outputs (Bagwell and Ramey (1991). It is clear from the review that much focus has been on the study of limit pricing in the absence of price discrimination among the involved incumbents.

3. THEORETICAL ANALYSIS

3.1 Model Setup

The study takes into account a three-stage sequential price competition game among three market players comprising of one dominant (former monopolist) mobile network operator, one fringe (smaller) mobile network operator and a potential new mobile network operator entrant under complete information. The potential entrant represents the threat of entry from new mobile network operators. The dominant mobile network operator, the first incumbent and the fringe (smaller) mobile network operator, the second incumbent, are already in the market and offer differentiated services for mobile communication. The dominant mobile network operator offers two tariffs: the pre-liberalization tariff (former monopoly tariff) and the post-liberalization (competitive) tariff. This first incumbent price discriminates within these two tariffs. The pre-liberalization tariff is more expensive and its mobile subscribers have high switching costs. This pre-liberalization tariff is the one that existed before the liberalization of the East African Community's mobile telephony industry in 1995. The dominant mobile network operators introduced the post-liberalization (competitive) tariff after the liberalization. This post-liberalization tariff is cheaper with its mobile subscribers having low switching costs. The dominant mobile network operators introduced this post-liberalization (competitive) tariff in order to compete with the competitive tariffs of the other new competitors who entered the market after the liberalization. The dominant mobile network operator prices its pre-liberalization (former monopoly) tariff at p_m and its post-liberalization (competitive) tariff at p_1 as the first incumbent. The study takes the fringe (smaller) mobile network operator to be a competitor of the dominant mobile network operator charging a price of p_2 for its service under the

competitive tariff as the second incumbent. The potential entrant will charge a price of p_3 for its service under its competitive tariff after entering the market as the third incumbent. The fringe (smaller) incumbent and the potential entrant each offers only one type of tariff which is competitive. The potential competitor, the third incumbent, will only enter the market if it expects to get profits that are at least zero. In the first stage, the dominant mobile network operator that was the former monopolist sets the price, p_m, for its pre-liberalization tariff. In the second stage, the fringe incumbent and the potential entrant observe this price, p_m, with the potential entrant deciding entry or not. In the third and final stage, if the potential competitor enters, all the three service providers select their competitive tariff prices simultaneously (at the same time). The dominant firm selects P_1 for its competitive post-liberalization tariff, the fringe firm selects P_2 for its competitive tariff while the potential entrant selects P_3 for its competitive tariff. In case the potential competitor does not enter, only two firms compete. The dominant mobile network operator and its fringe (smaller) competitor select their competitive tariff prices simultaneously with the dominant mobile network operator selecting p_1 and the fringe (smaller) mobile network operator selecting p_2. The total supply of mobile network subscribers in the market is 1 with each mobile subscriber individually asking for an identical quantity of service. The total market demand is inelastic with respect to price at least during the short run period. All the mobile network subscribers who have not yet migrated to any competitive tariff belong to the dominant incumbent's pre-liberalization tariff. Mobile network subscribers can only switch to an alternative competitive tariff if they can get a sufficiently big net utility increase. The analysis then follows the limit pricing theory involving fully informed firms that are maximizing their profits on the basis that the strategy of the dominant mobile network operator is binding. This means that when the dominant mobile network operator sets a price for its pre-liberalization tariff P_m, all its rivals will consider this price strategy as feasible. If for example the dominant mobile network operator reduces the price for its pre-liberalization tariff then an increase of the price by the rivals is not profitable since a number of mobile subscribers can switch to other competitive tariffs with cheaper rates. Because the mobile subscribers under the pre-liberalization tariff can switch yearly, the dominant incumbent can adjust its pre-liberalization tariff price annually. The demand for the service is a function of the respective tariff prices in the market. I maintain the usual assumptions of price in relation to demand. Letting S represent the total number of mobile subscribers who switch from the pre-liberalization tariff of the dominant mobile network operator to the other competitive tariffs, the study adopts the traditional Forchheimer model of the Dominant Firm Price Leadership (Tirole, 1988). Within this framework, the dominant firm sets its price first as the market leader and the other competitors set their prices based on this. The dominant firm optimizes its profit based on the residual demand (mobile subscribers).

Letting s_r denote the residual demand, we have:

$$S_r = 1 - \sum_{i=1}^{3} S_i$$

Where:

$S_r =$ The number of mobile subscribers that remain within the dominant firm's pre-liberalization tariff. These mobile subscribers do not switch from the pre-liberalization tariff of the dominant firm to other competitive tariffs.

$1 =$ The total mass of mobile subscribers within the market.

$S_i =$ The number of mobile subscribers under the respective competitive tariffs.

Specifically, since $i = 1,2,3$

S_1 = The number of mobile subscribers that switch from the pre-liberalization tariff of the dominant mobile network operator with price of p_m, to its own competitive tariff with a price of p_1.
S_2 = The number of mobile subscribers belonging to the competitive tariff of the fringe firm. These mobile subscribers switch from the pre-liberalization tariff of the dominant mobile network operator with a price of p_m, to the competitive tariff of the fringe (smaller) mobile network operator having a price of p_2.
S_3 = The number of mobile subscribers under the potential entrant's competitive tariff. These mobile subscribers switch from the pre-liberalization tariff of the dominant mobile network operator with a price of p_m to the competitive tariff of the potential entrant with a price of p_3 in case it enters the market.

Since the demand for the mobile network service is a function of the respective tariff prices, the market demand is $S_x = S_x(P_x)$, $x = 1,2,3,m$ where S is the number of mobile subscribers demanding for a service and P is the market price for the service. From the market demand, we can note that the number of mobile subscribers demanding for the service is a function of the market price. I maintain the usual assumptions of demand in relation to price for normal goods and services.

Throughout the theoretical analysis, the study makes the following assumptions:

Assumptions

1. $S(p)$ *and* $P_x(P_y)$ *are differentiable for* $S > 0$ *and* $P > 0$; *with* $x, y = 1,2,3,m$.
2. $S_x = S_x(p_x)$ having:

$$\frac{\partial S_x}{\partial p_x} < 0, \qquad x = 1,2,3,m$$

This assumption simply means that the demand for services in response to a firm's own price is downward sloping. The higher the service price, the less the demand for it by mobile subscribers and the lower the service price, the higher the demand for it by mobile subscribers.

3. Prices are strategic complements with cross-price effects being always positive. That is,

$$\frac{\partial p_x}{\partial p_y} \geq 0, \qquad x, y = 1,2,3,m \ \ with \ \ x \neq y.$$

This assumption makes sense and is consistent with the standard Bertrand duopoly model. In this case lowering a service price is the profit maximizing reaction to a competitor's price cut. The best reaction function has a positive slope.

4. Cross price effect on service demand is positive and own price effect on service demand is greater than the cross-price effect on service demand in absolute value:

$$\frac{\partial S_x}{\partial p_y} > 0, \qquad \left|\frac{\partial S_x}{\partial p_x}\right| > \left|\frac{\partial S_x}{\partial p_y}\right|, \qquad x, y = 1,2,3,m \ \ with \ x \neq y.$$

The demand for services in response to a competitor's price is upward sloping. This means that the service demand in a firm will reduce if its competitor lowers the price and it will increase if its competitor increases its price. The change in service demand due to the change in a firm's own price is greater than the change in service demand because of a change in the price of its competitor in absolute value.

5. The potential entrant will only enter the market if it expects to get a profit that is greater or equal to zero.
   $\pi_3\{p_m, p_1(p_m), p_2(p_m), p_3(p_m)\} \geq 0$
6. The potential entrant will not enter the market if it expects to get negative profits.
   $\pi_3(p_m^D, p_1^D, p_2^D, p_3^D) < 0$ *where D represents market deterrence.*

7. Entry deterrence is desirable. That is, the dominant mobile network operator's profit is greater under entry deterrence than its profit under entry.

$$\pi_1^D > \pi_1^* \quad where\ D\ represents\ market\ deterrence$$

3.2 Methodology for equilibrium analysis

The study adopts the method of Mathematical Induction in deriving the maximum possible service price that the dominant mobile network operator can charge under entry and entry deterrence respectively. The study analyses optimum pricing by the dominant mobile network operator on its pre-liberalization tariff price, p_m, under two case scenarios. To begin with, the study analyses a case where there is no strategic intervention from the dominant mobile network operator. This is a case where market entry occurs. Firm 3 enters expecting to make profit as per assumption 4. Then in the second case scenario, the study analyses a situation where market entry does not occur. The dominant mobile network operator expects to get more profits after deterring firm 3 from entering the market as shown in assumption 6. As a result, firm 3 does not enter the market since it expects to get negative profits in case it enters. In both the two case scenarios above, the analysis determines the respective maximum pre-liberalization tariff price, p_m, that can be charged by the dominant mobile network operator. The study derives the optimal pre-liberalization tariff price P_m of the dominant mobile network operator under the two case scenarios of entry and entry deterrence by way of partial derivatives using implicit reaction functions. This is because the dominant mobile network operator is facing an optimization problem and the relationship between tariff prices is implicit in nature. Based on the already existing body of knowledge, all optimization and minimization problems in Economics are analysed and solved by way of Calculus using partial or total derivatives. The study then proves the existence of a downward price distortion equilibrium for the pre-liberalization tariff price P_m of the dominant mobile network operator under which the potential mobile network operator entrant cannot enter the market.

3.2.1 Maximum pricing under market entry

***Stage* 3:** The potential competitor, firm 3, enters the market expecting to get profit as per assumption 4. Under ***Stage* 2 ,** the three firms compete in setting prices. The following are the profit functions of the three firms with π_1, π_2 and π_3 representing the profits for the dominant mobile network operator (firm1), the fringe (smaller) mobile network operator (firm2) and the potential competitor (firm3) respectively.

$$\begin{aligned} \pi_1 &= (p_1 - t - c_1)S_1 + (p_m - t - c_1)(1 - S) \\ \pi_2 &= (p_2 - t - c_2)S_2 \\ \pi_3 &= (p_3 - t - c_3)S_3 - K \end{aligned} \qquad (1)$$

Where, $S = S_1 + S_2 + S_3$ with S representing the total number of mobile subscribers who have switched from the dominant incumbent's pre-liberalization tariff with price p_m, to the other competitive tariffs with prices p_1, p_2 and p_3 .

All the mobile network operators incur the following costs:

Marginal costs, c_x, $x = 1,2,3,m$

Fixed cost, K for firm 3 .

Identical value added tax, t, per unit service provided.

***Stage* 1**: The dominant mobile network operator derives its optimum pre-liberalization tariff price p_m^* .

***Lemma* :** The dominant mobile network operator $firm\ 1$ uses its post-liberalization (competitive) tariff price, P_1, to prevent its mobile network subscribers within its pre-liberalization tariff with price p_m, from switching to other competitive tariffs with prices p_2 and p_3. The bigger the difference between the switching costs under its two tariffs, the higher

the gap between the prices paid by the respective mobile network subscriber groups under them.

***Proof*:** The analysis computes optimal prices using the first order condition (FOC) of the profit functions with respect to the competitive prices. This results into the following best response functions for all the competitive tariffs of the three mobile network operators.

Dominant mobile network operator's best price response function:

$$p_1^R = p_1^R(p_m, p_2, p_3, c_1, t).$$

Fringe mobile network operator's best price response function:

$$p_2^R = p_2^R(p_m, p_1, p_3, c_2, t).$$

Potential entrant's best price response function:

$$p_3^R = p_3^R(p_m, p_1, p_2, c_3, t).$$

Since by assumption 4 the potential competitor only enters if the following zero condition is satisfied,

$$\pi_3\{p_m, p_1(p_m), p_2(p_m), p_3(p_m)\} \geq 0 \quad ;$$

The study implicitly derives the optimal pre-liberalization tariff price $\boldsymbol{P_m}$, for the dominant mobile network operator by using the implicit price reaction functions in ***stage* 2** and the entry condition of the potential competitor in assumption 4 to obtain the following equation.

$$\frac{\partial \pi_1}{\partial p_m} = 1 + (p_1^R - t - c_1)\frac{\partial S_1}{\partial p_m} + S_1\frac{\partial p_1^R}{\partial p_m} - (p_m - t - c_1)\frac{\partial S}{\partial p_m} - S = 0 \qquad (2)$$

From equation (2) , the dominant mobile network operator considers the direct price effect, the first two terms, and an indirect price effect on its competitive post-liberalization tariff price,p_1 , the last term. It is noted that the dominant mobile network operator uses its competitive post-liberalization tariff price, p_1 , to prevent its mobile subscribers from switching to an alternative mobile network operator because the higher the pre-liberalization tariff price, p_m , the more mobile subscribers switch to the alternative competitive tariffs p_2 and p_3 . A higher demand for these competitive tariffs raises their respective prices. The higher the difference between the switching costs the bigger the gap between the prices paid by different mobile subscriber groups with different switching costs■

3.2.2 Maximum pricing under entry deterrence

***Stage* 3**: Firm3, the potential competitor does not enter. Like in the beginning, the study assumes that the other competitors consider the pre-liberalization tariff price p_m set by the dominant mobile network operator in the initial stage as binding. Depending on the elasticity of price, the loss caused by a reduction in the pre-liberalization tariff price p_m is lower than the loss from a lower demand if a new mobile network operator enters the market. Under this situation, the alternative pre-liberalization tariff price $p_m^D(p_m^D < p_m^*)$ has to satisfy the following exclusion condition as per assumption 5.

$$\pi_3(p_m^D, p_1^D, p_2^D, p_3^D) < 0$$

The letter D, represents the case of market deterrence.

***Stage* 2**: Firm1 and Firm2 compete in setting prices. Their profit functions will be as follows:

$$\pi_1^D = (p_m^D - t - c_1)(1 - S^D) + (p_1^D - t - c_1)S_1^D \qquad (3)$$

$$\pi_2^D = (p_2^D - t - c_2)S_2^D$$

With $S^D = S_1^D + S_2^D$, $\quad p_m^D < p_m^*$.

The new price response function for the dominant mobile network operator's competitive (post-liberalization) tariff price p_1^D is:

$$p_1^{DR} = p_1^{DR}(p_m^D, p_2^D, c_1, t)$$

The new price response function for the fringe mobile network operator's competitive tariff price p_2^D is:

$$p_2^{DR} = p_2^{DR}(p_m^D, p_1^D, c_2, t)$$

In this case, the demand for each tariff is higher since we have only two competitors and a lower pre-liberalization tariff price p_m^D.

$$S > S^D, \qquad S_1^D \geq S_1, \qquad S_2^D \geq S_2$$

***Stage* 1**: The dominant mobile network operator determines its optimum pre-liberalization tariff price p_m^D for entry deterrence.

Theorem: As long as the revenues are sufficiently high, there exists a Downward Price Distortion Equilibrium where by the dominant mobile network operator can strategically reduce its pre-liberalization tariff price p_m^D to a level lower enough to deter further market entry.

Proof: The potential entrant, the mobile network operator3, would enter the market if its profit just equals the profit from its option of staying out. That is:

$$\pi_3^D = (p_3^D - t - c_3)S_3^D - K = 0 \qquad (4)$$

$$p_m^* - p_m^D = \frac{p_3^*}{\partial p_3^R/\partial p_m} - \langle\frac{(t + c_3)S_3^D + K}{(\partial p_3^R/\partial p_m)S_3^D}\rangle \qquad (5)$$

In equation (5), the interval between the optimal pre-liberalization tariff price p_m^* with three mobile network operators and the optimal pre-liberalization tariff price p_m^D for entry deterrence depends mainly on the following two factors: First, it depends on the potential entrant's price reaction function. Secondly, it depends on the potential entrant's marginal and fixed costs. If the cross-price effect and the marginal costs are higher, then the relevant effort needed by the dominant mobile network operator to deter entry will be lower. Entry will deterred easily in this scenario. It is also obvious to note that the price-cost margin with market deterrence is less than the price-cost margin with market entry. That is:

$$\frac{p_m^D - t - c_1}{p_m^D} < \frac{p_m^* - t - c_1}{p_m^*} \qquad (6)$$

From the dominant mobile network operator's perspective, a price deviation is only profitable if the difference between its profit under entry deterrence and its equilibrium profit with market entry is strictly greater than zero. That is:

$$\pi_1^D = \pi_1^D - \pi_1^* > 0 \qquad (7)$$

Equation (8) shows the difference between the profits under entry deterrence and market entry.

$$\Delta_1^D = (p_m^* S - P_m^D S^D) - (P_m^* - p_m^D) - (t + c_1)\{(S - S_1) - (S^D - S_1^D)\} + (p_1^D S_1^D - p_1^* S_1) \qquad (8)$$

From equation (8), due to the price effect, the sign of the last term is unclear. Because prices are strategic complements, the competitive tariff price increases with increasing pre-liberalization tariff price. On the other hand, without the potential competitor, the demand for each of the other tariffs is higher. Therefore, except for the pre-liberalization tariff price p_m^D, the competitive tariff price could be set higher than in case of market entry. As without further specification, it is not obvious to see which of the two effects overrides the other. The earnings effect is in the first and second term while the increase in costs due to the demand effect is in the third term. All these terms are positive. The dominant mobile network operator could be better off choosing a lower pre-liberalization tariff price p_m^D if the demand-driven earnings are sufficiently high. This is one equilibrium solution, in which the dominant incumbent's pre-liberalization tariff price p_m^D is low enough to deter further market entry■ This finding is consistent with the results of previous theoretical scholars on the existence of a limit pricing equilibrium (Milgrom and Roberts, 1982; Flavio Toxvaed, 2017 and Hillary Ekisa Nambanga, 2020)

Corrolary: The profit of the fringe mobile network operator will reduce under this limit pricing equilibrium.

Proof: Because prices are strategic complements, a reduction in the pre-liberalization tariff price p_m belonging to the dominant mobile network operator will lead to a decrease in the

competitive tariff price p_2 of the fringe (smaller) firm. Firm2 will lose its revenues because of this, since the number of mobile network subscribers that switch from the pre-liberalization tariff of the dominant mobile network operator to other competitive tariffs are less under entry deterrence. This is due to the lower pre-liberalization tariff price p_m ■

Conclusion

The analysis has shown that, first, the dominant mobile network operator can make profit by highly price discriminating between its two tariffs based on their difference in the switching costs. Secondly, the dominant price discriminating mobile network operator can be able to lower its pre-liberalization tariff price p_m to a level lower enough to deter further market entry, as long as its revenues are sufficiently high. These findings are consistent with the previous theoretical studies on the existence of the limit pricing equilibrium (Milgrom and Roberts, 1982; Flavio Toxvaed, 2017 and Hillary Ekisa Nambanga, 2020). However, the theoretical findings differ from the results of previous theoretical studies on limit pricing in two ways. First, according to the previous theoretical studies, the limit pricing strategy is only viable within the short run period and will be successful only in the event that the new potential entrants are not patient enough to wait longer. Secondly, according to these previous studies, the incumbent firms using limit pricing as a strategy will always incur losses when implementing it (Milgrom and Roberts, 1982; Flavio Toxvaed, 2017 and Eray and Gabo, 2018). In our theoretical analysis, as long as incumbent firms have market power, there will always exist a limit pricing equilibrium. Under certain conditions, a price discriminating incumbent can make profit by strategically using its price. The theoretical findings in this research paper have positive policy implications for the East African Competition Authority and other policy makers. These authorities can regulate the pre-liberalization tariffs among the dominant mobile network operators by formulating policies aimed at reducing their switching costs. In addition, the competition authorities can formulate policies that prohibit over price discrimination by the dominant mobile network operators. On possible extensions, additional equilibrium solutions are feasible when we explicitly model the market demand within the context of switching costs and elasticities. Finally, interesting possibilities will emerge when the above model is analysed within a dynamic context where the entry of new mobile network subscribers takes place over time.

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