Telecommunications Competition in Indonesia: analysis of pricing behaviors

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Statement of Originality

This thesis is my own work and it contains no material which has previously been accepted in the award of any other degree in any other university. The thesis contains no material written by any other person, except where due reference is made in the text.

Canberra, 17 July 2009

Rolly Rochmad Purnomo

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Abstract

In the early period of the telecommunications sector liberalization begun in 1999, market structure reform has made incumbents bigger, stronger and more powerful. Growing market dominance by several operators guarded by ineffective regulations may put some relatively competitive markets such as internet and mobile cellular services at risk. Dominant operators may have incentive to abuse their power to soften market competition.

This research analyzes pricing behaviors of dominant operators in Indonesia. It focuses on two cases representing two different access structures namely one-way access and two-way access. One-way access is a condition where there is a vertically integrated operator owns a bottleneck facility in an upstream market and competes in a downstream market against rivals which need access to its upstream facility. In contrast, two-way access structure is a situation where two or more operators need access to each other's networks. Since this case-study is based on general economic principles, with some suitable adjustments, the analyses developed here could be applied to similar problems in different countries or different market sectors.

The first case is about competition in a one-way access structure. It analyses possible exclusionary behavior by Telkomnet, a vertically integrated operator, in its significant discount program for dial-up internet service between 2006 and 2007. There has been some concern by regulators about this case, but there was no in-depth investigation. This research shows that Telkomnet's discount is not profit maximizing in the short run, as indicated by its inelastic demand. However, since the discount has an economically insignificant effect on the overall traffic of the competitors as indicated by

small cross-price elasticity estimate, it is not necessarily a predatory conduct. Still, in a dynamic game context, Telkomnet's low but non-profit maximizing price may demonstrate a strategy to threaten competitors or to persuade the regulator to relax regulation in this market. For that reason, the regulator should still be aware of Telkom's behavior and should find a way to promote technology that can relax dependency on the local telephone network.

The second case-study analyses the mobile cellular telephone industry, which has a two-way access structure. This research analyses possible collusive pricing by dominant operators in this sector. The Competition Commission completed an investigation related to this case in late 2007 but the findings were opposed by some experts due to unconvincing analysis. Analysis in this thesis reveals that prices of dominant mobile operators are well above their profit maximizing or non-cooperative level, which is consistent with collusive outcome. Price regulation that set a high ceiling level and partial cross-ownership are two factors that may facilitate this outcome. In order to enhance competition, it may be useful to reduce the regulatory price ceiling and floor. Nevertheless, regulators should still continuously monitor and analyze pricing behavior in emerging competitive market like mobile cellular market.

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List of Acronyms, Abbreviations and Glossaries

3G	: Third Generation of Mobile Cellular System
AMPS	: Advanced Mobile Phone Service
APJII	: Asosiasi Penyedia Jasa Internet Indonesia
BBT	: Batam Bintan Telecom
BRTI	: Badan Regulasi Telekomunikasi Indonesia (Indonesian Telecommunications Regulatory Agency)
BTS	: Base Transceiver Station
CDMA	: Code Division Multiple Access
CPI	: Consumer Price Index
DGPT	: Directorate General Post and Telecommunications
EBITDA	: Earning Before Interest Tax Depreciation and Amortization
ECPR	: Efficient Component Pricing Rule
FSP-BUMN	: Forum Serikat Pekerja – Badan Usaha Milik Negara (Forum for Labor Union of the States Owned Enterprises)
FWA	: Fixed Wireless Access
GHHI	: Generalized Herfindahl-Hirschman Index
GHz	: Giga Hertz
GSM	: Global System for Mobile
HHI	: Herfindahl-Hirschman Index
IIX	: Indonesian Internet Exchange
IM2	: Indosat Multimedia
IM3	: Indosat Multimedia Mobile
IMF	: International Monetary Fund
Indosat	: PT. Indonesian Satellite Corporation
ISP	: Internet Service Provider
ITT	: International Telephone and Telegraph

Kbps	: Kilo bit per second
KM	: Keputusan Menteri (Ministerial Decision)
KPPU	: Komisi Pengawas Persaingan Usaha (Commission for the Supervision of Business Competition)
KRTI	: Komite Regulasi Telekomunikasi Indonesia (The Committee for Indonesian Telecommunications Regulatory)
LPEM-FEUI	: Lembaga Penyelidikan Ekonomi dan Masyarakat – Fakultas Ekonomi Universitas Indonesia (Institute for Economic and Social Research – Faculty of Economics University of Indonesia)
LRIC	: Long-run Incremental Cost
Mastel	: Masyarakat Telematika Indonesia (Indonesian Telecommunications and Information Society)
MHz	: Mega Hertz
MPPT	: Menteri Pariwisata, Pos dan Telekomunikasi (Minister of Tourism, Post and Telecommunications)
MVNO	: Mobile Virtual Network Operator
NAP	: Network Access Point
NGO	: Non-Governmental Organization
NMT	: Nordic Mobile Telephone System
Perumtel	: Perusahaan Umum Telekomunikasi
PM	: Peraturan Menteri (Ministrial Regulation)
PN Telkom	: Perusahaan Negara Telekomunikasi
PTT	: Post, Telegraph and Telephone Office
PSTN	: Public Switch Telephone Network / Fixed-Telephone Network
PWS	: Port Wholesale
Ratelindo	: Radio Telepon Indonesia
RBOC	: Regional Bell Operating Companies
RoE	: Return on Equity

Rp	: Rupiah (Currency of the Republic of Indonesia)
Satelindo	: PT. Satelit Palapa Indonesia
SCP	: Structure-Conduct-Performance
SME	: Small and Medium Enterprises
SMS	: Short Message Service
STT	: Singapore Technologies Telemedia
Telkom	: PT. Telekomunikasi Indonesia
Telkomsel	: PT. Telekomunikasi Selular Indonesia
UK	: United Kingdom
US	: United States of America
USO	: Universal Service Obligation
WiFi	: Wireless Fidelity
WiMax	: Worldwide Interoperability for Microwave Access
WTO	: World Trade Organization
X	: A measure productivity or efficiency
XL	: PT. Excelcomindo Pratama
Z	: A measure of input price changes

Chapter 1

Introduction

The structure of the telecommunications market has experienced some significant changes during the early period of second phase of telecommunication liberalization started in 1999. The market structure reform enables dominant operators to expand their business in various market segments that make them bigger and more dominant. Their advantages as the first movers in the sector may explain this achievement. However, the chance for the incumbents to exercise their power to soften competition may also contribute to this outcome as the market was still ruled by regulations that gave preferences to monopolistic incumbents.

This research analyzes competition in the Indonesian telecommunications market with focus on observing whether dominant operators' pricing indicate an anticompetitive behavior. It examines two cases related to pricing strategies of the operators in relatively competitive markets: Internet service and mobile cellular service. Anticompetitive concern about these two cases emerged between 2006 and 2007. The research provides an economic alternative analysis for these cases, based on new data sources, and lessons from the findings for policy consideration.

This introduction chapter presents several brief discussions related to the research including background, literature review, objective, methodology, and structure of the thesis.

1.1. Background

Enactment of the new telecommunications law number 36 in 1999 (Law 36/1999) started a new era of the Indonesian telecommunications market. This milestone is considered as the second phase of liberalization following the previous decade of partial deregulation phase (Lumanto and Kosuge 2005; Lee and Findlay 2005). The new law was intended to eliminate monopolistic practice in most segments of the telecommunications market. In addition, in the same year, law number 5 (Law 5/1999) concerning prohibition of monopolistic and unfair business practice was introduced. Both laws create key regulatory umbrellas to support the competitive market, protect public interest and improve economic efficiency.

In the early period of liberalization, the market structure experienced considerable changes especially in fixed-network services. For example, in 2002 the government decided to transform the monopolistic market into a duopolistic structure by preparing two complement incumbents, Telkom and Indosat, as competing vertically integrated operators. This duopoly policy eliminates cross ownership of both operators in some telecommunications companies. Furthermore, structural reform also affects market segments that had been relatively competitive. For example, Telkom and Indosat were allowed to enter the competitive retail Internet service market, which was previously dominated by small operators and allocated for young

entrepreneurs. This entrance creates unbalanced competition between vertically integrated and independent operators. Furthermore, in the mobile cellular market, acquisition of Satelindo by Indosat has reduced the number of competing operators from four to three, increasing market concentration. Moreover, ownership restructuring in mobile cellular operators also produced a potential anticompetitive effect when two different but related Singaporean companies partially held shares in two major mobile cellular operators, Telkomsel and Indosat.

In contrast, regulatory reform especially related to price regulations progressed relatively slowly. In fact, the government reviewed price regulation from 2001. However, after long regulatory processes, the new pricing regime was finally finished in 2006 and became effective in 2008. Therefore, during the early period of liberalization (between 1999 and 2007), telecommunications operators in Indonesia still referred to past price regulations for their pricing policy. These legacy regulations were designed in the monopolistic era that tended to favor dominant incumbents.

In short, structural reform strengthens the position of the incumbents in the market. A concentrated market dominated by few operators may put competition at risk, especially if regulations controlling the market do not effectively work. In this condition, dominant operators may have a chance to abuse their market power to lower competitive pressure at the expense of consumers and rivals.

This research analyzes possible anticompetitive behaviors by dominant operators in these telecommunications sectors, focusing on two anticompetitive concerns that recently emerged. The first case deals with a

significant discount offered by Telkomnet, a vertically integrated operator, for a bundled product of standard telephone service and dial-up Internet service between 2006 and 2007. This case has never been investigated thoroughly even though there have been some discussions about it. The second case examines allegation of collusive pricing in the mobile cellular market. The Competition Commission (KPPU) has completed investigation of this case, but some of its essential economic analyses have been criticized as unconvincing. The paragraphs below briefly describe these cases.

Competition in Dial-up Internet Service

Dial-up Internet service is a method to access Internet by connecting the computer of Internet users and the server of the Internet service provider (ISP) through a fixed telephone network. Consequently, in this case, local telephone and Internet services are complementary. In the Indonesian case, Telkom as an incumbent fixed-network provider dominates fixed telephone access. For that reason, the local telephone service is an essential or bottleneck product for dial-up Internet service offered by the ISPs. Subscribers of independent ISPs need local telephone service to access their Internet service.

In the mid- to late 1990s, the market for dial-up Internet service was relatively competitive with several independent ISPs competing for subscribers. The situation changed when Telkom entered the dial-up Internet service market in early 2000 through its subsidiary Telkomnet. In this case, dial-up Internet provision provided by Telkomnet is considered as a vertically integrated operation. Telkomnet only sells its dial-up Internet service (competitive product) in a bundle with local telephone service

(essential product). Telkomnet's Internet bundle offers a flexible subscription scheme with no prior registration, no monthly fee, and integrated Internet and telephone bill. In later development, Telkomnet has been able to be the most preferred dial-up Internet service and successfully attract Internet users.

Independent ISPs as competitors argued in 2003 that competition from Telkomnet is unbalanced. They claimed that these flexibilities offered by Telkomnet are unfair and they filed a formal complain to KPPU. However, the argument is relatively weak. Since the regular price of Telkomnet's Internet bundle is still relatively high if compared to its competitors and Telkomnet's flexibilities come from its initial advantage as a network provider, anticompetitive allegation is not appropriate.

A stronger anticompetitive concern arose when Telkomnet launched the WeekendNet promotion program in 2006. The program provides significant discount for weekend usage that makes the price of the bundle after discount is close enough to the price of local telephone service. It implies that Telkomnet may charge its dial-up Internet service at a very low level. Furthermore, the duration of the promotion is sufficiently long to justify concern. It was initially only for 3 months but then extended for another 6 and 3 months. In total, the program lasted for more than a year between 2006 and 2007. For that reason, Telkomnet's long promotion discount strategy leads to a question about possible below-cost pricing or cross-subsidy practice that gives predatory effect to independent ISPs as competitors.

Competition in Mobile Cellular Service

In Indonesia, there are three operators with GSM (global system for mobile) technology dominating the market: Telkomsel, Indosat-Satelindo, and Excelcomindo. These three operators enjoy their dominance and the market was relatively stable in terms of price competition.

In late 2006, FSP-BUMN, a non-governmental organization, filed a claim about price-fixing allegation indicated by parallel pricing of postpaid plans offered by two major operators, Telkomsel and Indosat. FSP-BUMN argued that cross-ownership structure facilitated this collusive outcome. At that time, two different Singaporean companies partially owned Telkomsel and Indosat. Sing-Tel had 35 percent shares in Telkomsel and Singapore Technologies Telemedia (STT) held more than 41 percent shares in Indosat. Furthermore, people believe that Temasek Holding Company controls these two Singaporean companies.

The Competition Commission (KPPU) investigated the case and in late 2007 announced its finding. KPPU concluded that partial cross-ownership has breached the law and ordered any of these Singaporean companies to divest its shares either in Telkomsel or Indosat. However, some economists opposed the decision because the economic analysis was inadequate.

1.2. The Literature

Interconnection is important in the network industry. It acts as an intermediate service that allows an operator to access other operators' networks in order to deliver a complete service. In telecommunications, interconnection may improve efficiency because it prevents unnecessary network duplication and may increase users' utility because it provides additional subscribers that can be connected (Armstrong 1997:66). In a competitive telecommunications market, interconnection also shapes market competition. An operator with large network may have an opportunity to abuse its power in interconnection service to soften market competition. The structure of network interconnection may shape anticompetitive behavior by the operators.

In general, there are two types of access model in telecommunications networks, one-way access and two-way access (Armstrong 1998:1). One-way access is the condition when there is a vertically integrated operator owning a bottleneck facility in an upstream market who competes with rivals in a downstream market. In this case, the rivals require access to the upstream essential facility owned by the vertically integrated operator. In this access structure, the competing operators are in an unbalanced situation. Thus, the vertically integrated operator dominating an essential access facility may have incentive to exclude downstream rivals. The dial-up Internet service market is an example of competition in the market with a one-way access structure.

Two or more operators are in two-way access structure if they need access to each other's network to be able to deliver a complete service. In this structure, operators are in a relatively equal position. Therefore, they may be motivated to collude in order to maximize joint profit. The mobile cellular market is an example of a market with two-way access structure.

A brief descriptions of the discussions in literature about operators' behaviors in on-way and two-way access structures is presented in the following paragraphs.

Exclusionary Behavior in One-way Access

In one-way access structure, a vertically integrated operator possesses monopolistic power over essential upstream facilities required by its competitors in the downstream market. Several papers in one-way access pricing indicate that the vertically integrated operator may have incentive to exclude its downstream rivals. The asymmetric structure of one-way access gives the vertically integrated operator a chance to abuse its power by discriminating between access service to its subsidiary and to its rivals. In general, there are two discriminatory strategies in one-way access including non-price discrimination or sabotage, and access-price discrimination (Weisman 2001).

Non-price discrimination or sabotage is a practice by a vertically integrated operator to provide different access service treatment to its subsidiary and rivals. It is usually exercised if price regulation is strict, especially when access price discrimination between subsidiary and rivals is unlikely to be implemented explicitly as well as implicitly. The purpose of sabotage is

usually to raise rivals' cost. There are several strategies to realize sabotage such as quality degradation, tying, bundling, refusal to deal, and boycott. Due to the rise in costs, the prices of rivals become relatively high and less competitive. This condition would decrease rivals' demand and, at the extreme, force rivals out of the market.

However, some papers also argue that sabotage is not necessarily implemented even though the vertically integrated operator has a chance to do so, especially if access price is sufficiently above cost (Weisman 1995; Sibley and Weisman 1998a and 1998b; Mandy 2000). The reason is that downstream rivals are revenue generators for the upstream division and eliminating them from the market would give adverse impact to the overall profit of the vertically integrated operator. In general, non-price discrimination strategies are harmful because it may soften market competition and raise retail price. Therefore, if the integrated operator exercises a sabotage strategy, it actually performs an anticompetitive conduct.

Access price discrimination is a practice by an integrated operator to set different access charges to its subsidiary and to its rivals. This practice is only possible if regulation is not severe. The regulator or competition commission usually prohibits explicit or naked price discrimination. However, the integrated operator may carry out implicit access price discrimination through several strategies such as access discount or bundling essential and competitive products. Because of price discrimination, a subsidiary of the integrated operator is able to offer lower prices. Thus, it may produce a predatory effect toward downstream rivals.

Similarly, a vertically integrated operator may be less motivated to discriminate against rivals if access price is set sufficiently above cost (Biglaiser and DeGraba 2001; Fjell and Foros 2008). However, implementing access price discrimination is not necessarily for excluding rivals but may be for maximizing profit (King 1999; Krouse and Krouse 2005; Fjell and Foros 2008). The logic is that low price would increase demand for its downstream subsidiary, which in turn escalates overall profit. For that reason, if the vertically integrated operator implements a price discrimination strategy, it is not always anticompetitive.

Consequently, bundling as one strategy to realize access-price discrimination is not always anticompetitive. A practice that bundles monopolistic and competitive products by a vertically integrated operator in a one-way access structure may indicate an anticompetitive behavior if the price of the bundle is significantly lower than the sum of the price of the elements in the bundle (Gans and King 2005). However, a bundling still needs a more thorough investigation before determining it as anticompetitive.

Collusive Behavior in Two-way Access

Two-way access structure is a condition where the competing operators need access to rivals' networks. In case where the operators are relatively symmetric, they have relatively equal bargaining position. For that reason, operators need to co-operate with each other. If there are only a few operators in the market, this mutual interest may give operators the chance to collude to maximize their joint profits (Motta 2004). An indirect way to achieve collusive equilibrium in retail price is by negotiating access price.

Alternatively, mutual understanding or conspiracy is a direct method to reach collusive outcome in retail price.

Literature on two-way access pricing mostly concerns possible use of access price as an instrument to produce collusive outcome in retail price. These papers also indicate that constraints in retail pricing also affect the power of access price to create collusive outcome. These constraints include whether retail price is linear (only consists of usage fee) or non-linear (consists of multiple fees such as monthly subscription and usage fees) and whether it should be uniform or can be discriminated based on call termination (intra-networks or inter-networks calls). Negotiated access price has a strong collusive effect if retail pricing is linear and non-discriminated (Armstrong 1998; Laffont et al. 1998a). In the case where retail pricing is non-linear and non-discriminated, with some strong assumptions, the power of an access price to produce a collusive outcome diminishes (Laffont et al. 1998a; Dessein 2003; Hahn 2004).

In the mobile cellular service market, the more realistic assumption is that retail prices may be discriminated based on call termination. In the case where retail pricing is non-linear and discriminated, such as in a post-paid plan, an access price is not able to create collusive outcome if it is set at cost (Laffont et al. 1998b). However, if the access price is set above cost it may induce collusive effect in retail price (Gabrielsen and Vagstad 2008). Furthermore, a below-cost access price would also produce a collusive outcome in subscription fees (Gans and King 2000). In addition, if the call externality is taken into account, that is, the subscriber also gets positive utility from receiving a call, non-cooperative pricing for off-net (inter-

networks) calls is higher than on-net (intra-network) calls (Berger 2005; Hoernig 2007).

In the case where retail pricing is linear and discriminated such as in a pre-paid plan, above cost access price would lead to partial collusive outcome especially in off-net price (Laffont 1998b). However, if the call externality is considered, a collusive effect of access price in off-net price would only be generated if utility from receiving a call is quite high (Berger 2004). In addition, the literature also concludes that non-cooperative on-net price is always lower than off-net price regardless of call externality (Hoernig 2007; Cricelli et al. 2005).

Termination-based price discrimination induces competition in retail price (Laffont and Tirole 2000). To attract subscribers, operators tend to keep a high off-net price and set a low on-net price. As indicated in the literature, the on-net and off-net price differential is an optimal condition for each operator. Therefore, if an operator set its on-net price at similar or close to its off-net price, it implies that the price may not maximize its individual profit. Furthermore, if two or more competing operators behave similarly, it may indicate a possible collusive behavior among the competing operators to maximize joint profit.

Moreover, several factors such as structural or regulatory aspects may facilitate collusive conduct. Small numbers of operators and cross ownership are among two structural aspects that may encourage collusive outcome. Duopolistic structure in German and the UK's mobile telephony market has enabled tacit collusion between the competing operators (Stoetzer and Tewes

1996; Valleti and Cave 1998). In addition, passive partial cross-ownership of the competing firms may also facilitate collusion (Gilo et al. 2006:82).

In the case of regulatory aspects, most pricing regulation such as price ceiling and price filing may also promote collusion. Hausman (2000) blames price regulation as a supporting factor behind high prices in US mobile telephony in the past. Knittel and Stango (2003) find that non-binding price ceiling was used as a focal point to set interest rate in the credit card industry in the US. Moreover, Ma (2007:13) also finds that relatively high non-binding price ceiling regulation in Taiwan's flour market has facilitated collusive outcome. Furthermore, MacAvoy (1995) and Choi et al. (2001:131) conclude that a requirement to submit price change plan to the regulator has caused lack of price competition in US long distance service and the Korean mobile telephony market respectively.

In short, collusive outcome is easier to achieve in a market with two-way access structure such as in mobile cellular, especially if there are only a few competing operators and ineffective regulations.

1.3. Research Objectives

As discussed above, during the early period of second phase liberalization, the telecommunications market structure in Indonesian experienced several changes that made dominant incumbents bigger and stronger. In contrast, regulatory reform especially related to price regulations progressed slowly. This condition may provide chances for the dominant operators to exercise power at the expense of rivals and consumers.

This research examines whether dominant operators in the Indonesian telecommunications market behaved anti-competitively during that period. It focuses on pricing behavior of the dominant operators and takes two anticompetitive pricing cases in Internet and mobile cellular services that emerged between 2006 and 2007. These cases also represent operators' pricing behaviors in two different access models, one-way access and two-way access. Moreover, these cases deal with two major anticompetitive behaviors, exclusionary and collusion.

Formally, the research is to answer the following questions:

- *Did pricing strategies of dominant operators in two cases of Internet and mobile cellular market indicate anticompetitive behaviors?*
- *What lessons do these experiences have for policy and regulatory consideration?*

The first question about operators' behaviors is the main topic of this research. Concluding whether a strategy is an anticompetitive behavior is not an easy task. Inappropriate analysis would lead to a decision error, either punishing an innocent party (type I or positive error) or failing to detect anticompetitive behavior (type II or negative error). Inappropriate decision due to inaccurate analysis would disadvantage market competition and consumers, in ways such as less available options or high prices for the services. A more thorough analysis and careful consideration may minimize mistakes.

In answering the first question, this research uses a standard principle in microeconomic theory. The purpose of this analysis is to provide alternative views or alternative analysis related to the selected cases by using different approaches. It is also of a general interest since the methods in the analysis

could be modified to analyze other cases with similar conditions in order to provide regulators or competition commissions with an alternative approach to analyze firms' behavior for case investigation and monitoring purposes.

Furthermore, as a response to the second question, this research briefly elaborates some policy implications by relating the findings of the first question with related regulatory conditions. The purpose of this discussion is to give an alternative opinion to be considered for further policy and regulatory improvement.

In addition to these purposes mentioned above, this research also contributes to the studies on telecommunications competition in Indonesia. Currently, there are only few studies dealing with behaviors of telecommunications operators in Indonesia.

1.4. Methodology and Analysis

In microeconomic theory, it is widely accepted that a firm as an economic agent has a main objective - to maximize its profit (Tirole 1998; Nicholson 1998). In this case, a firm can set its endogenous factors that affect profit such as quantity of production, inputs combination, or price. This research also employs the profit-maximizing assumption to predict operators' behaviors by focusing on price as an endogenous factor.

It is assumed that an operator sets price at a level that can maximize its individual profit. Therefore, any deviation from the profit-maximizing objective is questionable and may indicate a possible anticompetitive motive.

Furthermore, in order to identify the level of price that maximizes profit, two profit function models representing each case are developed. The models are constructed by relating profit as dependent variable with relevant dependent variables including cost, price, and quantity. Profit maximizing or non-cooperative price is calculated by partially differentiating profit function with respect to price, assuming other independent variables constant. The paragraphs below explain in more detail the methods and analyses for each case.

The First Case – Predatory Effect of Bundling in Dial-up Internet Service

In the case of competition in the dial-up Internet service market, the main issue is that Telkomnet as a vertically integrated operator offered significant discount to its dial-up Internet bundle. The bundle consists of telephone service as a monopolistic upstream product and Internet service as a competitive downstream product. Thus, the main concern is to see whether significant discount on dial-up internet bundle may indicate an exclusionary behavior.

Most common approaches to identify anticompetitive bundling case are imputation and the exclusionary bundling test. These tests are similar and mainly examine implied-price of an unbundled component in the bundle. If the implied-price is below cost, it may indicate an exclusionary bundling (Nalebuff 2005). Furthermore, in this case, since the bundling also gives predatory effect to rivals, the case can also be analyzed based on predatory pricing approaches. A usual test in most predatory pricing cases is the cost-based approach. If price is below cost, it may assume a predatory behavior

(Gelhorn and Kovacic 1994). Both approaches in bundling and predatory pricing seem similar and heavily depend on accurate cost information.

By applying the cost-based test to Telkomnet's case, the result shows that the implied price of Telkomnet's Internet service in the bundle is quite low. However, since there is no accurate information about cost of per unit Internet service, we cannot precisely compare calculated implied price to actual cost. In addition, the cost-based test might not appropriate for telecommunication service because it is difficult to define cost in an industry with high fixed cost that produces multiple products.

Alternatively, we can apply the profit sacrifice of predatory pricing concept proposed by Ordover and Willig (1981). They argue that predatory behavior is not necessarily below cost pricing but includes any profit sacrifice strategy that is harmful for competitors. In this research, profit sacrifice shows by any pricing strategies that do not maximize profit. In order to check whether Telkomnet's Internet bundle price is profit maximizing, we develop a simple model representing an integrated operator competing with a competitor in the downstream market. The model shows that if demand is elastic, the optimal price of the bundle is determined by cost of the bundle, traffic from the bundling product, traffic from competitors, and profit margin of the local telephone service. Furthermore, if the demand is inelastic, any reduction in the price of the bundle will lower profit or will not be profit maximizing. The reason is that because the additional revenue it gets from traffic increase cannot offset the revenue it sacrifices from lowering price.

Based on simple linear regression analysis on the actual daily traffic data of Telkomnet during the period of discount (2006-2007), we find that

Telkomnet's demand is inelastic. This result implies that the discount of Telkomnet's dial-up Internet service is not profit maximizing in the short run. In other word, Telkomnet gives up its profit through its discount program. However, profit sacrifice itself is not a sufficient condition to indicate a predatory behavior until there is evidence of damage to rivals. In this case, we use cross-price elasticity estimate as an indicator for injury of rivals. This cross-price elasticity measures the effect of Telkomnet's price change on rivals' traffic. Furthermore, by using another simple linear regression on actual traffic data of the ISPs, we see that the cross-price elasticity estimate is sufficiently small. It means that Telkomnet's discount program does not give significant effect to rivals' traffic. In short, this static analysis shows that even though Telkomnet's discount on its dial-up Internet bundle is not profit maximizing, this pricing strategy is not predatory pricing because there is no evidence of destruction to rivals.

However, the dynamic game concept may give a different analysis. Referring to recent theory of predatory pricing, low price and non-profit maximizing behavior may indicate a strategy by the dominant operator to threaten competitors. Furthermore, based on contestable market theory, by price discount, Telkomnet is persuading regulator that the market is competitive and does not require regulatory intervention.

For that reason, even though the significant discount of Telkomnet is not anticompetitive in the static sense, the regulator still needs to be concerned about competition in this market. In addition, there are several lessons that can be learnt from this case. Firstly, the regulator or competition authority still needs to continuously monitor the market with an unbalanced structure, such as one-way access structure. Improper monitoring of this kind of

market would increase the incentive for a vertically integrated operator to behave anti-competitively.

Secondly, the significant discount of dial-up Internet service offered by Telkomnet may indicate that the regulated price of upstream local telephone service is sufficiently above cost and profitable. It also may contradict the common assumption that the regulated local telephone tariff is still below cost. Therefore, the regulator should take extra consideration over any proposals requiring a tariff increase for the local telephone service.

Lastly, the regulator should relax the dependency of Internet service on the local telephone service by allowing and encouraging alternative technology that can bypass the bottleneck with a lower price. Eliminating bottleneck would reduce the regulatory and monitoring burden and increase competition.

The Second Case – Collusive Behavior in Mobile Cellular Service

In the case of mobile cellular competition, the main issue is possible collusive pricing of dominant operators especially between the two biggest operators, Telkomsel and Indosat. Furthermore, a foreign holding company partially cross-owned these operators. The Competition Commission (KPPU) has investigated this case, covering several analyses including retail tariff pattern, market share and concentration, relationship between cross-ownership and management control, profitability, and investment in base transceiver stations. Finally, KPPU concludes that partial cross-ownership breaches the law and finds that Telkomsel attempted to monopolize the mobile cellular market. However, the investigations do not provide a

convincing analysis, especially with regard to initial allegations about collusive behavior and price leadership.

This research contributes to the analysis and examines whether pricing behaviors in the mobile cellular market indicated a collusive outcome. It focuses on pricing behaviors of the competing prepaid plans because more than 95 percent of mobile telephone subscribers use prepaid plans instead of post-paid. In addition, subscribers of prepaid plans are relatively sensitive to price. Therefore, operators should use price as an important instrument to attract additional subscribers. Furthermore, the regulated non-binding ceiling price level for prepaid plans is much larger than that of post-paid. It means that operators may be more flexible in setting their prices. These facts above imply that the incentive to compete in price should be higher in pre-paid plans.

In the market with two-way access structure where retail price is linear and can be discriminated based on call termination, as in prepaid plans of the mobile cellular service, it is optimal for the competing operators to set a lower price for on-net calls and a higher price for off-net calls as a means to attract subscribers (Hoernig 2007). It implies that at a given high level of off-net prices, it is profit maximizing for the competing operators to set lower on-net prices. In other words, if the competing operators tend to set similar or uniform prices for on-net or off-net calls, it may indicate that they behave collusively.

The pattern of uniform on-net and off-net prices seems to occur in the mobile cellular market in Indonesia. At least until the end of 2007 there was no intense price competition between the two major prepaid plans, Simpati of

Telkomsel and Mentari of Indosat. Their regular prices for inter-network calls are similar. Moreover, prices of their on-net calls are also close to or equal to prices of their off-net calls even when the third operator, Excelcomindo, started to lower its on-net tariff. These facts may support allegation about possible collusive pricing. However, this pattern is not sufficient to give a strong indication of collusion. The reason is that there are many factors that may affect price including demand, preference, and costs.

One basic concept that explains collusive outcome is the prisoners' dilemma or coordination game. In this game two prisoners face an investigation related to a case. They are in a dilemma whether to confess or deny the allegation. If both of them confess, they all will get moderate sentences. If neither of them confesses, they will be free without charge because there is not enough evidence of criminal conduct. This is the maximum outcome they can achieve. However, both prisoners are at risk of receiving the maximum charge if he does not confess but the other does. In a static one-shot game, where the prisoners only meet each other once, confession is the safest strategy that leads to moderate punishment. However, actually they still can have an opportunity to be free if they could coordinate for not to confess.

The concept described above is used as a basic principle in analyzing pricing behavior in the mobile cellular market. In this case, the competing operators act as prisoners in the game. These operators will get the highest profit if both set high prices. This collusive outcome can be achieved explicitly through co-ordination or tacitly through mutual understanding. The main objective of this research is not to investigate explicit or tacit collusion, but only to examine whether the actual market price is in collusive outcome. As indicated by the game, behaving collusively (not to confess) will give higher

payoff than behaving selfishly (confessing). Thus, in the mobile cellular case, if actual prices for on-net calls of the competing prepaid plan are sufficiently above their individual profit maximizing or non-cooperative level, it shows a collusive outcome that also may indicate a collusive behavior.

In order to estimate the non-cooperative price for each prepaid plan, we develop a simple model of competition in two-way access. The model requires some indicators including price elasticity of traffic and subscription. Unfortunately, we could not gather actual data to calculate these elasticity indicators due to company confidentiality policy. Alternatively, we can estimate these elasticity measures based on consumer information collected from a survey. In this case, a simple conditional logit model of discrete choice analysis is used to estimate price elasticity of subscription and a simple linear regression is employed for predicting price elasticity of traffic demand. The estimates show that both elasticity estimates are relatively elastic. By applying these data into the model, we find that actual intra-network prices of the competing pre-paid plans are sufficiently above their non-cooperative price. This result shows a collusive outcome that may suggest a possible collusive behavior.

In addition to explicit co-ordination, collusive outcome can also be facilitated by several factors such as high market concentration, cross-ownership, and ineffective regulations. These factors existed in the Indonesian mobile cellular market condition at that time. Consequently, the regulator may need to re-consider policy related to these factors above. In recent development, KPPU's order has eliminated cross-ownership in Telkomsel and Indosat. Furthermore, several new operators have entered the market and they will reduce market concentration in the next few years.

In the case of price regulation, before 2008 the mobile cellular market in Indonesia still referred to past ceiling price regulation which was designed during the monopolistic era. Especially for prepaid plans, the ceiling level is quite high, that is, more than twice that of the post-paid plan tariff. In fact, some retail prices of prepaid plans were still under ceiling price level, meaning that the operators did not set an excessive price even though they have the chance to do so. However, since their prices are still above non-cooperative level, their pricing is still considered collusive. These operators might feel safe to set above non-cooperative retail prices because their prices are still below regulated ceiling level. It implies that collusive outcome has bee facilitated by ceiling price regulation.

In a recent development, the new price regulation eliminated the ceiling price. The regulator seems to assume that the entrance of several new operators reduces the risk of collusive behavior. However, the regulator is concerned about possible predatory behavior of incumbents toward new entrants. Therefore, in order to prevent predation, the regulator determines a floor price. Nevertheless, this floor price may also limit price competition. For that reason, we suggest to remove not only ceiling price but also the floor price from price regulation. Furthermore, excessive restriction in pricing such as a requirement to file a proposal before applying the new tariff would also disadvantage consumers and competition. In an emerging competitive market like the mobile cellular market, regulation should only focus on access price. Regular and active price monitoring by the regulator or competition commission may effectively replace regulation in retail price and control possible anticompetitive behavior by the operators.

1.5. Outline of the Thesis

This thesis consists of seven chapters including introduction, five body chapters, and conclusion. The information included in body chapters (between Chapter 2 and Chapter 6) contains the main and detailed discussion of the thesis. The paragraphs below briefly describe these body chapters.

Chapter 2 presents a general description of the telecommunications sector in Indonesia. It covers four major topics. Firstly, it discusses two institutions that oversee the market: the telecommunications regulator and the Competition Commission. Secondly, it describes the telecommunication liberalization processes. Then it exposes the development of price regulations including access and retail price regulations. Finally, it covers in more detail about two market segments, Internet service provision and mobile cellular service.

Chapter 3 reviews some papers related to operators' behavior in a one-way access structure. It identifies motivation to exclude rivals by a vertically integrated operator through sabotage and access price discrimination. Related to the case, it also explores possible use of bundling as a mean of access price discrimination. Since bundling may give a predatory effect, this chapter also reviews some approaches in identifying predatory pricing.

Chapter 4 analyzes the first case about competition in the dial-up Internet market. It examines possible predatory behavior of Telkomnet through its

long promotion discount. The discussion covers the background of the case, model development, data and analysis, and policy implications.

Chapter 5 studies some papers dealing with operators' behaviors in a two-way access structure. The discussion covers four combinations of retail price constraints. From several issues, it focuses on a condition that matches the Indonesian mobile cellular market especially related to optimal retail price conditions. Furthermore, it also reviews literature dealing with the facilitating factor of collusion and a simple game theory explanation of collusion.

Chapter 6 deals with the second case of competition in the mobile cellular market. The analysis concentrates on assessing whether high on-net prices are at their non-cooperative level. The chapter includes background, simple model of competition in two-way access, data and analysis, and policy implications.

Chapter 2

The Telecommunications Sector in Indonesia

The telecommunications sector in Indonesia is developing toward a more competitive market. Financial difficulties, external forces, and crisis play a role in accelerating the liberalization. In addition, reluctance and lack of resources also colored the reforms. In this early liberalization period, market structure experienced a significant change. In contrast, regulatory reform progressed slowly. During this imperfect reform, incumbents become more dominant and stronger.

This chapter describes several aspects of Indonesian telecommunications reforms especially related to regulatory institutions, market liberalization, regulatory changes, and the two market segments concerned in this study.

2.1. Regulatory Institutions

In general, there are some institutions that influence policies and regulations in telecommunications sectors. However, this chapter only focuses on two institutions that have a direct relation with implementation of competition policy in telecommunications. These institutions represent a sector-specific regulator and general competition authority.

The first institution is the Telecommunication Regulations Agency of Indonesia (BRTI) which comprises the Directorate General of Post and Telecommunications (DGPT) and the Committee for Telecommunications Regulation of Indonesia (KRTI). BRTI represents a sector-specific regulator reporting to the Minister in charge of telecommunications. The other institution is the Supervisory Commission for Business Competition (KPPU). It is an independent body dealing with general competition policy, reporting to the President and Parliament.

2.1.1. Sector Specific Regulators

The law on telecommunications mentions that telecommunications is controlled by the state and the Government of the Republic of Indonesia is mandated to manage this sector. In the implementation, the Directorate General of Post and Telecommunication (DGPT) acts as an arm of the government that administers policies and regulations of telecommunications provisions. A director general chairs DGPT and reports to the minister in charge of telecommunications. DGPT was established in March 1966 as a part of the Department of Transport. In 1983, DGPT became a part of the Department of Tourism, Post and Telecommunication and then joined back to the Department of Transport in 1998. However, since 2005, DGPT resides under the supervision of a newly established Department of Communication and Information.

The DGPT had the role of translating national telecommunications policies into operational policies and regulations. For that purpose, the DGPT was given powerful rights to manage the sector including granting licenses,

monitoring the market, and evaluating and punishing the operators in the corridor of telecommunications law and regulations.

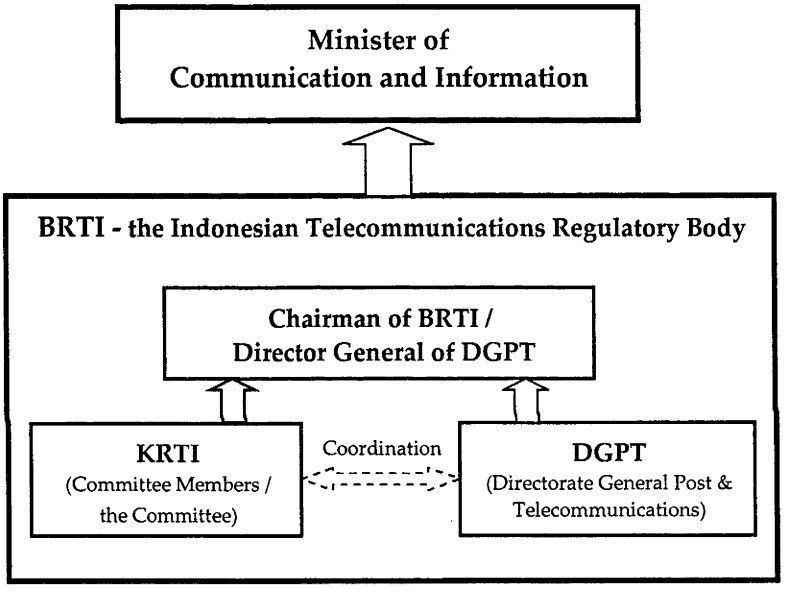
As a country that commits to WTO agreements, Indonesia has to create an independent regulatory body in telecommunications as required in WTO Reference Paper on Basic Telecommunication. This requirement is accommodated in Article 5 of Law No.36/1999, which mentions that in managing the sector it needs public involvement through an independent body consisting of the people representing associations of the operators, professionals, equipment producers, networks and services users, and experts in telecommunication. However, several years after the law was effective, government still could not establish that independent regulatory body.

After a widespread negative public reaction against a plan to raise telephone tariffs in early 2003, the parliament forced the government to create this independent regulatory body as one of the requirements to approve tariff increase. Finally, the body called BRTI (Badan Regulasi Telekomunikasi Indonesia / Telecommunication Regulation Agency of Indonesia) was established through a ministerial decision in mid-2003. This institution holds the mandate to regulate, supervise, and control the sector including administering licenses, regulating access price, establishing equipment standardization criteria, and controlling quality of telecommunication services.

BRTI consists of the whole institution of DGPT and a committee called KRTI (Komite Regulasi Telekomunikasi Indonesia / the Indonesian Telecommunications Regulatory Committee). The members of KRTI include

government representatives and some independent people with different backgrounds. These independent members are selected through an open selection method. The Director General of DGPT automatically becomes a member the committee representing the government and chairing this institution. Figure 2.1 shows relationship between the minister in charge of telecommunications and the BRTI.

Figure 2.1. Relationship between BRTI and the Minister



Source: BRTI's website (www.brti.or.id), 2006

The first appointment for KRTI was for a two-year term starting from 2004 and consisted of four independent members and the Director General. From these independent members, two of them are: a former high-level officer at the ministry in charge of telecommunications, and a former director of an incumbent operator. The second appointment was for a three-year position starting from 2006 with seven members where five of them are independent

members and the remaining two are government representatives including the Director General. Among the five independent members, two of them are previous KRTI members including the former director of the incumbent company.

Leadership and structure of the BRTI may indicate that the government is reluctant to reduce its role in managing the telecommunications sector. According to Angus et al. (2005:150), because BRTI is led by a government representative, its decision would tend to be in favor of the operators where government has a share in them. In addition, the structure of BRTI implicitly shows that the independent members are not equipped with sufficient resources since its relationship to the DGPT is only coordination. Being chaired by the Director General and the lack of power of BRTI shows that the telecommunications sector is still being politicized by the Government (Eick 2007:9).

2.1.2. The Competition Commission

KPPU or the Commission for Supervisory of Business Competition is an independent body created in 2000 to oversee implementation of Law No. 5/1999 concerning prohibition of monopolistic practices and unfair business competition. The law itself was a result of long discussion started in the early 1990s and culminated in 1999 as a part of Indonesian commitment to the IMF during the recovery process from the 1990s' financial crisis (Pangestu et al. 2002:213-5).

KPPU has two main tasks including law enforcement toward business entities, and thorough evaluation of policies and regulations to comply with

the law. The candidates for KPPU's commissioners are proposed by the president and selected by the parliament through a fit-and-proper test. The chairman of the KPPU is elected from these commissioners through an annual internal election process. Furthermore, in performing their tasks, the commissioners are supported by a secretariat headed by an executive director.

In 2000, there were 11 commissioners with various backgrounds including from the trade and industry chamber, co-operatives and Small and Medium Enterprises (SME), political parties, economists, lawyers, and government and non-government organizations. During that period, more than 50 percent of the anticompetitive cases were related to bidding undertaken by government offices or state-owned enterprises. The main issue is collusion among the bidders or between the bidder and the bidding committee. In this initial period, except for case handling procedures and bidding principles, other important guidelines such as merger and acquisitions were not completed yet. Several ambiguities in laws (Pangestu et al. 2002:216-7) may also contribute to this delay.

The second period started in 2006. There are 13 commissioners on duty with five years' appointment, and five of them are the incumbents from the previous period. Interestingly, in this period, the commissioners who have connections to political parties increased. It raises the concern of the commission potentially being captured by political interests.

In handling an anticompetitive case, KPPU acts as investigator, judge, and prosecutor. A multi-roles institution like KPPU is unusual in Indonesia's judicial system. Some people see it as monopolization of the law. In fact,

KPPU's decision can be appealed to the District or Supreme Court. It shows that KPPU's power is not as strong as what people think.

For that reason, socialization and policy harmonization still dominated the activities of the commission in this early period. In order to create the same perception about the rule mandated in the competition law, KPPU organized some intense socialization and close co-operation with the police, judges, public attorneys, and lawyers to explain that the law is somewhat different to the ordinary judicial system. Several cases of support for KPPU's decisions in the appealing process in the courts suggest that this socialization approach has been successful

In addition, several anticompetitive cases related to telecommunications sectors have been decided by KPPU. In the first period, there were at least two cases. One of them was about an allegation of unfair bidding conducted by a state-owned company. Another one was about an interconnection dispute between two competing incumbents leading to the blocking and diversion of traffic by the dominant one

Furthermore, in the second period, there have been at least two other cases related to telecommunications. Both of them dealt with collusion or price fixing in mobile cellular services. The first case was about partial-cross ownership of two competing mobile cellular operators causing high retail prices. In late 2007, the commission demanded elimination of that cross ownership and punished several parties involved. Some observers, economists and lawyers, claim this decision lacked economic justification (Ramayandi and Kong 2008:25-8). This case will be discussed further in the later chapter about competition in the mobile cellular market. Another case

related to mobile cellular service was about a cartel in short-message-service (SMS) by several operators. Based on the information in the contract made by these operators and information about the predicted interconnection cost of SMS from the regulator, the commission concluded that there was a naked collusive conduct and fined these operators.

2.2. Liberalization and Market Reforms

There are several papers explaining and analyzing liberalization processes in Indonesian Telecommunications. Sugondo and Bhinekawati (2004) argue that the reform should eliminate regulations that constrain development and should encourage private participation to finance the industry. Lee and Findlay (2005) claim that past partial liberalization was only dedicated to solve short-term financing problems, and current liberalization to create a competitive market must be supported with proper regulations and credible regulatory institutions. Lumanto and Kosuge (2005) also see that the reform was not optimal because the institutions developed in the process of reform did not function well. Young et al. (2005) conclude that the government is not fully committed to the privatization of the state-owned telecommunications operators, indicated by the ownership of golden shares with special rights in these privatized operators. In addition to privatization, Eick (2007) also suggest that the reform should also involve de-politicization through elimination of political influence in regulatory institutions.

In brief, these papers noted that Indonesia has faced two liberalization processes in 1989 and 1999. They conclude that the result of the first reform was not as expected and the on-going reform lacks a regulatory system.

There are several factors causing these results such as lack of resources, strong political interests, and insufficient commitment to improve efficiency. The discussion below briefly describes some influencing forces behind these liberalization and market conditions during the three periods.

2.2.1. Period Prior to Liberalization (before 1989)

In the period before 1989, the telecommunications sector in Indonesia was heavily under government control through its monopolistic state-owned enterprises. Until late 1980, there was only one state-owned operator, currently known as Telkom, providing a domestic telecommunications service. Telkom was founded during the Dutch colonization in Indonesia as a division in PTT (Post, Telegraph and Telephone Office). In 1965, the provision of post and telecommunications was separated and Telkom became a telecommunications operator. In this period, regulatory functions and operational functions overlapped. Even after the DGPT was established as a post and telecommunications regulatory institution in 1966, due to lack of resources the people in Telkom often also held positions in the DGPT.

At that time, Telkom held a role as an agent of development to build and operate domestic public telecommunication in profitable as well as in economically unfeasible areas (Kartahadimadja 1994: 78). In 1974, Telkom was transforming from a semi-government institution to be a more commercial state-owned company (from PN Telkom to Perumtel). This transformation made Telkom more flexible in its operation.

To provide international telecommunication services, in mid-1967 the government invited a foreign company, International Telephone and

Telegraph (ITT), to build and operate an international satellite system in Indonesia. Lack of financial and human resources capability to join in an international satellite consortium (Intelsat) were the main reasons to attract that foreign direct investment (Winarno 1996: 17-9). ITT then created Indosat (Indonesian Satellite Corporation) to provide the services with monopoly rights until 1989.

In the early 1980s, several high-level government officers discussed the possibility and benefit of self-operating international telecommunication services. The calculation indicated that the international telecommunication business is highly profitable and there was a rumor that the cost of ITT's investment in Indosat had been recovered in two years' operation. Based on this calculation and supported by a positive response from the president and the good financial condition of the country during the oil boom, the government then initiated the idea to terminate the concession and to acquire Indosat from ITT. After a tough negotiation, ITT and the government agreed to terminate the contract with compensation of USD 43.61 million for ITT. Thus, since December 1980 Indosat became a state-owned company (Winarno 1996:28-47).

Lately, the government has found it difficult to finance development of domestic telecommunication infrastructure. Therefore, it was decided to attract private participation. To support this idea, a new law of telecommunication was enacted in 1989 that also denoted the first liberalization period. In addition to accelerating telecommunication development, advice and recommendations from the World Bank, donor countries and other international institutions motivated this deregulation policy (Supriadi 1995:82).

2.2.2. Period during First Phase of Liberalization (1989-1999)

The Law No. 3 on Telecommunication launched in 1989 classifies public telecommunications into two services: basic services (telephone, telegraph, and telex); and non-basic services (paging, data communication, and value added services). The government controls public telecommunication by mandating provision of basic services to two state-owned operators, Telkom and Indosat. As in the past period, Telkom still had the right to monopolize domestic telecommunication services and Indosat had the right to monopolize international services. The difference from the previous regime is that Law No.3 gives the opportunity for private companies to participate in telecommunication development and operation through co-operation with one of these state-owned companies. In non-basic services, the market was more liberalized and there is no requirement for private operators to co-operate with either Telkom or Indosat.

The desire to keep the power to control telecommunication services under the government arm was relaxed a bit with the establishment of Satelindo as a new telecommunications operator in 1993. Satelindo, whose shares are held by Bimantara group (60%), Telkom (30%) and Indosat (10%), was awarded licenses to provide satellite, mobile and international services. Satelindo is the first mobile cellular operator deploying second-generation mobile cellular technology, known as Global System for Mobile (GSM).

However, the establishment of Satelindo was controversial and influenced by political and individual interests rather than the spirit to open the market. The were two major reasons for the controversy. First, Satelindo did not have joint-operation with the monopolists as required by regulation. Second, the

Bimantara group which dominated Satelindo was a holding company owned by the son of the president.

In order to soften the controversy, the government introduced a new telecommunication regulation (PP. 8/93) broadening definition of co-operation in providing basic services. Co-operation with the incumbents to provide basic services then was not only limited to joint-operation but also joint venture and contract management (Supriadi 1995:101-4). This new regulation was followed by establishment of several joint-venture companies.

For example in 1995, two new mobile cellular operators were created. One of them is PT. Telekomunikasi Selular Indonesia (Telkomsel) which was a joint venture company of Telkom (51%) and Indosat (49%). The other is PT. Excelcomindo Pratama (XL) which was a joint venture company of PT. Telekomindo Primabhakti (60%), a subsidiary of Telkom, and three other foreign companies (40%). At that time, Satelindo, Telkomsel, and XL were the only mobile cellular operators that used GSM technology. In contrast, other mobile cellular operators only held licenses for first generation analog technology.

Furthermore, in early 1994 the government announced a new plan to privatize Indosat that was targeted to finish before the APEC meeting in Jakarta in November 2004. The privatization was conducted through initial public offering (IPO) 35 percent of Indosat shares on the New York Stock Exchange and Jakarta Stock Exchange. This partial privatization was mainly aimed at obtaining funds for the government budget and for Indosat's further investment (Winarno 1996:193-204). One year after privatizing Indosat, Telkom had its turn at IPO in November 1995. Around 34 percent of

Telkom's shares were offered on the Jakarta Stock Exchange, New York Stock Exchange and London Stock Exchange (World Bank 2004a:152). Similarly as with Indosat, the main objective of this privatization was to get fresh funds for development.

The development of telecommunications infrastructure in Indonesia after 50 years of independence was very limited with only around 3 million fixed telephone lines. In order to accelerate the development to meet demand, in 1996 the government set an ambitious program to built 5 million additional fixed telephone lines in the next five years. Telkom, as the company awarded monopoly rights in domestic services, should bear this burden. Due to limited financial capability to meet the target, a new co-operation scheme known as joint-operation scheme (KSO) was created (Invent 1996:6). In this scheme, the national telecommunication area was divided into seven regions. The two most profitable regions, Jakarta and East Java, were still under Telkom's control. Development and operation in the remaining five regions were given to the private parties.

In 1996, Telkom signed five joint-operation schemes (KSO) with its partners to develop and operate telecommunication services in five regions including Sumatera, West Java, Central Java, East Java, Kalimantan, and the Eastern Part of Indonesia. The partners are a consortium of foreign big operators with local companies. This scheme obliged the partners to develop infrastructure in their respective regions during three consecutive years and to pay a certain percentage of operational revenue to Telkom. As compensation, the government awarded exclusive rights to the partners to use and operate Telkom's assets in those areas for 15 years.

However, this development scheme was considered unsuccessful. The financial crisis that hit Indonesia a year later had a negative effect on the co-operation. In addition to the crisis, several other factors such as uncertainty about the continuation of the scheme after the crisis, unsuccessful tariff adjustment, and transition management problems also contributed to the fiasco (Lee and Findlay 2005:348-50). Finally, Telkom bought back all these regions and became the dominant operator for domestic fixed telecommunications services again.

The forces to open telecommunications market in Indonesia did not only come from domestic financial difficulties. Two foreign forces, WTO and IMF, also contributed. In the last minutes of the WTO meeting on telecommunication in 1997, the Government of Indonesia signed its commitment to open its telecommunication market (Allen 1998:3). This commitment was then attached as the annex of the Fourth Protocol of the General Agreement on Trade in Services. The commitments are to reduce barriers for new entrants into telecommunication services, to consider other operators to compete with the incumbents, to promote competition, to increase percentage foreign equity threshold in local telecommunication companies, and to follow the principles in the WTO Reference Paper on Telecommunication (WTO 1997). As a consequence of the commitments, a thorough reform in telecommunication policies is required. These commitments lead to a reduced government role in telecommunication operation and development.

A few months after signing the commitment to WTO, an economic crisis hit Indonesia. This situation led to Indonesia asking IMF's assistance. As a part of the recovery program, IMF required Indonesia to restructure and reform

several sectors including telecommunications. The government's commitments related to telecommunication are listed in the Letter of Intent (LoI) to IMF. It covers some fundamental reforms such as further privatization of Indosat and Telkom, elimination of cross-ownership of Indosat and Telkom in several telecommunication companies, promotion of private investment, introduction of a new telecommunications law and supporting regulations, introduction of new tariff policy and new interconnection rules, establishment of a new regulatory agency, and competition.

These two external forces brought the Indonesian telecommunications sector to the second phase of liberalization. The introduction of the new telecommunications law in 1999 is considered as a starting point for the new era of telecommunications competition.

2.2.3. Period during Second Phase of Liberalization (1999 - at present)

The Law No.3 of 1999 is a new telecommunications law that classifies telecommunications services into network and service provisions. The law has a competitive spirit and does not discriminate against the parties that want to participate in all market segments.

In 2000, the government announced a plan to introduce a duopoly scheme. This policy was set as a transition period toward a competitive telecommunication market. Through this policy, both incumbents are prepared to be two competing full-service providers (vertically integrated service and network operators). Therefore, exclusive rights of both

incumbents were shortened only until August 2002 for fixed local service and August 2003 for long-distance and international services.

In addition, as a part of the plan to create a duopolistic market, in early 2001 Telkom and Indosat eliminated their cross-ownerships in several telecommunication providers. In this case, Telkom acquired Indosat's share in Telkomsel, the largest mobile cellular operator, and Indosat took over Telkom's share in Satelindo, its competitor in international service and the second largest mobile cellular operator.

In December 2002, the government sold 41.96 percent of its share in Indosat to Singapore Technology Telemedia (STT). The public opposed Indosat's privatization because the government finally held only around 20 percent of Indosat's share. This privatization made Indosat a foreign company, as it was before. However, even though the government's shares in Indosat is not a majority, it still has special rights in appointing Indosat's president director. In addition to the government ownership issue, lately people have also been concerned about possible anticompetitive effect in the mobile cellular market because Telkomsel, Indosat's competitor, is also partially owned by another Singaporean company, SingTel. People believe that STT and SingTel are controlled under the same holding company, Temasek.

Furthermore, in March 2004, the government released a formal announcement about implementation of telecommunication sector reforms. It was a comprehensive report of current reform activities in telecommunication covering several issues such as early termination of exclusive rights, some supporting regulations, regulatory institutions, supporting institutions, tariff rebalancing, universal service obligation, fixed-

wireless access provision, licenses for Telkom and Indosat, and management of funds generated from frequency utilization fees. This announcement clearly stated that monitoring and evaluation of these reforms would be conducted by BRTI.

As an implementation of that government announcement, the duopoly plan continued. Indosat received licenses to provide fixed local service in 2002 and domestic long-distance service in 2004. In addition, Telkom was also permitted to offer international service in 2004. However, although the licenses had been awarded and some broad regulatory principles had been introduced, the implementation was not smooth. Interconnection between Telkom and Indosat became a problem. Telkom offered a high interconnection tariff that meant Indosat could not sell its local service at a regulated tariff. Telkom argued that the current regulated local tariff applied to the public did not reflect the real operational cost and was subsidized from long-distance revenue. Then the government mediated this dispute and these operators finally agreed with the interconnection charged. However, the problem was not over yet. Telkom was often reluctant and slowly provided the access required by Indosat.

In long-distance services, the condition was not much different. In addition to the interconnection problem, Telkom was also reluctant to implement a new access code to accommodate Indosat's long-distance service in their switching system. Telkom argued that it needed time and huge financial resources to set up all of its equipment. Finally, through some notices and negotiations, the government ordered Telkom to employ new long distance code at least in five big cities (Jakarta, Surabaya, Denpasar, Batam, and Medan) in late 2007.

In mobile cellular service, the market was more competitive, with participation of several new entrants and consolidation of existing operators that used older technology. In addition, the 2004 government announcement also legalized fixed-wireless access provision by the fixed-service license holders (Telkom, Indosat, and Bakrie Tel). Fixed wireless access (FWA) service allows its subscribers to have a limited mobility in certain areas. In some degree FWA is a substitute that threatened ordinary mobile cellular service because its tariff was quite low, close to fixed wire line service. However, even though competition was more intense, price competition in the mobile cellular market was only considered effective after the first quarter of 2008. The discussion about this market will be presented in more detail in another sub-section of this chapter.

In non-basic service the competition was even tougher. However, there was a tendency for the big operators in network provisions (such as Telkom and Indosat) to also dominate this market segment as they did in internet service provision. This trend raised anticompetitive concern, especially when the vertically integrated operators turned out to be new monopolists or oligopolists.

In brief, market transformation in different segments during the second phase of liberalization is presented in Table 2.1. The table shows that liberalization has given the opportunity for Telkom, which previously only monopolized domestic network provisions, to be a dominant operator in most market segments.

Table 2.1. Market Transformation in Several Segments, 1999-2007

Market Segment	Operators		
	1999	2002	2007
Local Service (fixed wire line)	Telkom (national wide) Batam-Bintan Telecom	Telkom (national wide), Indosat (Jakarta & East Java) Batam-Bintan Telecom	Telkom (national wide), Indosat (national wide) Batam-Bintan Telecom
Local Service (fixed wireless)	Ratelindo- Bakrie (Jakarta & West Java)	Ratelindo - Bakrie (Jakarta & West Java)	Telkom (national wide) BakrieTel (national wide) Indosat (national wide)
Domestic long-distance service	Telkom	Telkom	Telkom Indosat
International service	Indosat Satelindo	Indosat Satelindo	Indosat - Satelindo Telkom BakrieTel
Mobile Cellular service	*GSM:* Telkomsel, Satelindo Excelcomindo *AMPS & NMT (analog):* Komselindo Metrosel Telesera Mobisel (450MHz)	*GSM:* Telkomsel, Satelindo Excelcomindo (XL) Indosat (IM3) Natrindo (NTS) – East Java *AMPS & NMT (analog):* Komselindo Metrosel Telesera Mobisel (450MHz) *Mobile Satellite:* Pacific Satellite Nusantara	*3G & GSM* Telkomsel Indosat (Satelindo- IM3), Excelcomindo (XL) Natrindo (NTS) Hutchinson (Three) *CDMA* Mobile-8 Smart Telecom Sampoerna Tel (450 MHz) *Mobile Satellite:* Pacific Satellite Nusantara
Internet Service (dial-up retail)	Indosat (IM2) Independent ISPs	Telkom (Telkomnet Instan) Indosat (IM2) Independent ISPs	Telkom (Telkomnet Instan) Indosat (IM2) Independent ISPs

2.3. Reforms in Price Regulations

In contrast to market reform, regulatory reform especially related to price regulations slowly progressed. The regulator finally launched new access and retail price regulations in early 2006. However, these new regulations

needed more than one year to be effective. Furthermore, before the new price regulations were effective, operators still referred to the past price regulations which were designed in the monopolistic environment. This subsection describes the past regulatory regime and the processes involved in coming to new access and retail regulations.

2.3.1. Access Price Regulation

Prior to the new access regulations, there were at least four past ministerial decisions related to access pricing. First was the Memo of the Minister of Tourism, Post and Telecommunications Number KU.506/I/I/MPPT-97 which regulates the revenue-sharing scheme between Telkom and Ratelindo as fixed-line operators. Second was the Decision of the Minister of Tourism, Post and Telecommunications Number KM.46/PR.301/MPPT-98 (KM.46/98) dealing with the interconnection tariff for telecommunications networks between telecommunications service providers. Third was the Decision of the Minister of Communications Number KM.37/1999 about revision of KM.46/98. Lastly was the Decision of the Minister of Communications Number KM.32/2004 emphasizing that cost base will be used as the new interconnection regime in telecommunications provision.

In general, access pricing in the first three ministerial decisions above can be categorized as revenue sharing and sender-keep-all (SKA) regimes. These regulations were still effective until 2007. Table 2.2 summarizes access price rules in these three ministerial decisions.

Table 2.2. Access Pricing Rules Prior to Regulatory Reform in 2008

Type of Service	Access Pricing Rule
PSTN to PSTN *Local service* - Telkom – Ratelindo - Telkom – BBT *Domestic long distance service* - Indosat - Telkom *International service* - Indosat / Satelindo - Telkom	 Sender Keeps All / Bill and Keep and bilateral negotiation Sender Keeps All / Bill and Keep Rp. 240 per minute access (bilateral negotiation) Access charge = Rp. 850 per call Usage charge = Rp. 550 per minute USO contribution = Rp. 750 per call
PSTN to Mobile Cellular *Local call* *Domestic long distance call*	 Access price for PSTN operator = 50% local PSTN tariff Access price for mobile operator = airtime tariff Access price for mobile operator = airtime tariff + 15%-60% of long distance tariff (depends on long distance portion carried by mobile operator) Access price for PSTN operator = the remaining percentage of long-distance tariff.
Mobile Cellular to Mobile Cellular Local call Short Message Service (SMS)	 Access price = airtime tariff Sender Keeps All / Bill and Keep

KM 32/2004 only informs that the access-pricing regime will be cost based. It does not give detailed directions or provide a global principle. It seems that this interconnection regulation was not well prepared and created only to supplement the government's announcement of telecommunications sector reforms. At that time, the detailed discussion on the access pricing method was not finished yet.

In fact, the effort to design a cost-based access regime had been initiated from 2001. At that time, the regulator proposed a draft of cost-based access pricing

regulation. However, due to its incompleteness, the draft was opposed by operators. In order to improve the draft, at least two studies were conducted. In 2002, Pan System developed a cost-based access pricing based on the top-down long run incremental cost (LRIC) approach. Moreover, Ovum completed similar study using the bottom-up LRIC approach in early 2005.

Based on the study by Ovum, the regulator set drafts for cost-based interconnection regulations. Socialization and consultation with operators took several months to finish. Some changes have been made from the original draft to accommodate operators' interests. Due to these long processes, the plan to launch a new cost-based access regime in early 2005 was postponed. Finally, a new ministerial decision on cost-based access price (PM.8/2006) was launched in February 2006.

Even though it is stated that the ministerial decision is effective at the date it is established, the new regulation still required some adjustment that led to quite a long delay in implementation. Finally, the amendment of the new access price regime was established in early 2008, to be effective in April 2008. Interestingly, the new access price for mobile cellular service is much lower than previously used and from the study of Ovum. One reason for this reduction is that mobile technology is getting cheaper. Table 2.3 compares the access price scheme for local PSTN and mobile cellular services.

Table 2.3. Access Prices Comparison from Several Schemes

Access Price Scheme	PSTN (local-peak)	Mobile Cellular (local-peak)
Prior to cost-based regime (before 2008)	Rp. 73	Rp. 406
Ovum Study (using incumbent data – 2006)	Rp. 157	Rp. 449
Ovum Study (using based practice data – 2006)	Rp. 80	Rp. 381
Ministerial Decision – cost based regime (2008)	Rp. 73	Rp. 261

2.3.2. Retail Price Regulation

In fixed telecommunications service (PSTN), Telkom monopolistically served the domestic market. Prices of PSTN services offered by the monopolist were strictly regulated. In 1995, the government through the Minister for Tourism, Post and Telecommunication established a Ministerial Decision (KM.79/PR.301/MPPT-95) dealing with the application of price cap formula for monthly and usage tariff adjustment of fixed local and domestic long distance services. The basic formula for tariff adjustment is CPI-X. CPI is the consumer price index reflected by the inflation level, and X represents the productivity measure of the basic service operator set by the Minister. This price cap formula implies that maximum tariff adjustment will not exceed the inflation rate. However, after the financial crisis in 1997, the price cap formula for tariff adjustment was modified to be CPI-X+Z. In this case, variable Z is used to accommodate price changes of input factors that are not included in inflation. This modified price cap rule indicates that retail tariff increase can be above inflation rate depending on the value of Z.

In 2002, a calculation based on price-cap formula CPI-X+Z has necessitated he decision to increase the telephone tariff on average 45.49 percent, distributed over three consecutive years. This calculation was based on the assumption that CPI reflected by inflation was 11.05 percent, productivity level of operator (X) was targeted to be 4 percent and value of Z was assumed 38.44 percent. In the first year of the implementation, 2002, the telephone tariff was increased on average 15 percent. In the second year, 2003, this plan did not work due to negative public reaction. The second tariff adjustment was finally be implemented in 2004 after the government established a new telecommunications regulation agency, BRTI. However, the third price adjustment was never carried out.

In the mobile cellular service, the regulator established different ceiling prices for post-paid and pre-paid plans. For a post-paid service, the regulator set a maximum rate of activation, monthly subscription, and airtime. Airtime tariff reflects a one-direction traffic fee. It can also be considered as access charge. In this post-paid plan, the regulator also ruled that the maximum usage fee is twice the airtime rate. Furthermore, for pre-paid service the operator could set a retail usage tariff at maximum 140 percent above the post-paid plan's tariff. It is quite a high ceiling level. However, no operator sets at the maximum level. Moreover, the airtime rate in mobile service has never changed since 2001.

New retail price regulations were introduced in February 2008 through two ministerial decisions for PSTN retail pricing (KM.09/2006) and mobile cellular retail pricing (KM.12/2006) respectively. The new regulations set two rules for PSTN retail pricing including initial tariff setting and adjustment method. These two methods require complex calculations. The initial tariff

setting is computed based on costs and traffic. Furthermore, tariff adjustment is still based on the previous price cap method. Moreover, in the mobile cellular service, new retail price regulation eliminates the ceiling price rule and replaces it with floor price. It determines that retail should not be lower than access price. However, there is still a filter before a price plan can be implemented. Operators should have approval by the regulator (BRTI) before they can apply a new tariff scheme. However, according to Herry Nugroho, former independent member of KRTI, this new price regulation is only a transitional regulation and the regulator currently is still preparing revision of these newly established price regulations (KPPU 2007:19).

2.4. Internet Service Market

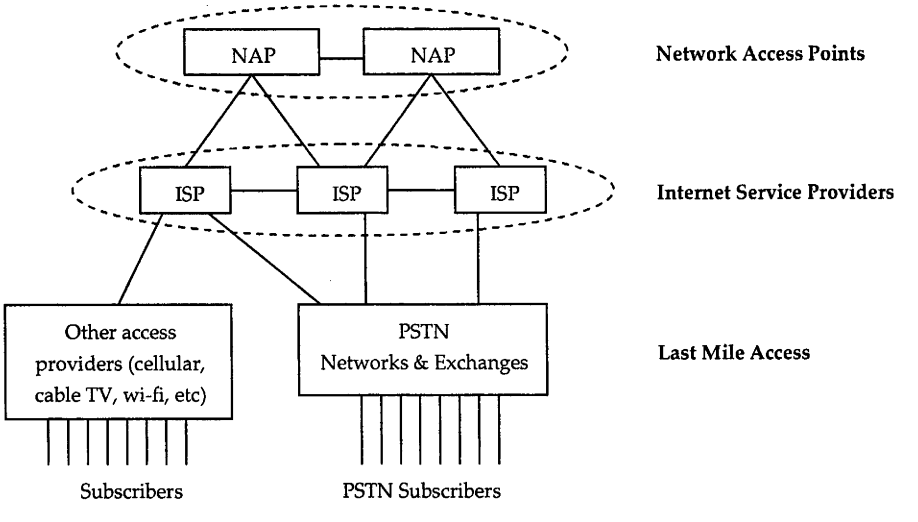
Internet access in Indonesia was initiated on campuses, especially in University of Indonesia and Bandung Institute of Technology. Commercial Internet provision in Indonesia was pioneered in 1994 when an independent ISP, Indonet, offered the service to the public using the international direct dialing service (APJII 2001:13). At that time, there was no regulation on Internet provision. Government involvement in the Internet market was started in 1995 when it awarded two licenses for Indonet and Radnet (APJII 2001:13).

In the early period of Internet provision, the government intended to prioritize this business for young entrepreneurs conducting small and medium business. This policy was positively responded to by many companies, shown by a spectacular increase in ISP licenses of around 27

licenses in 1996. However, there were only 15 ISPs that could operate due to limited access to the networks (APJII 2001:13).

In general, the structure of Internet provision in Indonesia can be illustrated in Figure 2.2. In that structure, an independent ISP only acts as an intermediary agent that requires access to global Internet networks through Network Access Point (NAP) and to its subscriber through PSTN's exchanges and local access networks. The bandwidth of access to the NAP affects speed of downloading or uploading data from and to global networks, while the access to PSTN determines the probability of successful Internet connection from end users. ISPs' expenditures for these inputs are around 20 percent for access to PSTN and 40 percent for access to international networks (Kontan 2008). This cost structure describes how external factors heavily affect ISPs' retail price.

Figure 2.2. Structure of Internet Provision in Indonesia



Moreover, although both connections are crucial, access to PSTN's exchanges is possibly the only bottleneck in this service (Economides 2002:393-4). This argument may be true since usually there are several competing NAPs while access to subscribers is still dominated by incumbent network providers like the conditions in Indonesia.

In addition, some ISPs created the association called APJII (The Indonesian Internet Service Provider Association) to solve their common problems which mainly related to a high access tariff. In mid-1997, APJII successfully developed an Indonesian Internet Exchange or IIX (APJII 2001:14). This exchange interconnects servers of the ISPs that make domestic Internet traffic does not need to re-route through international networks, which in turn increases the traffic and the utilization of domestic domain addresses.

Related to the last miles access network, an independent ISP which offers dial-up service faces two exogenous problems including price of leased-line to PSTN and the retail tariff of local access imposed on its subscribers. These problems may affect its Internet price and demand. In this case, an operator that provides leased lines and local access networks may exercise its power. In fact, there are some alternatives to access networks to reach retail subscribers such as mobile cellular service, cable TV, or broadband wireless networks, but the utilization is still limited due to some restrictions such as higher access tariff, small network coverage, or regulations.

During the economic crisis in 1997, some small ISPs could not operate well and the then government eliminated the restriction that prioritized young entrepreneurs (Minges 2002:10). Since then, major network operators such as Telkom and Indosat have started to participate in the industry. In 1999,

Telkom, which is also a domestic network provider, entered the Internet business through its multimedia division. Telkom offers a popular and flexible dial-up Internet service called Telkomnet Instan. It bundles Internet service and local telephone service. Moreover, users of this product do not need to register or pay a monthly subscription fee, but just dial a specific premium number (0809 89999) and the charge for Internet usage will be added in monthly telephone billing.

In less than two years, Telkomnet was able to attract more than 100,000 subscribers, which made it the biggest ISP in Indonesia (Minges, 2002:10). Telkomnet's subscribers grew from year to year and reached around 689,000 subscribers in 2006 (Telkom, 2007:5). Table 2.4 puts together some information about the market share of Telkomnet and some big ISPs between 2000 and 2007 from various sources.

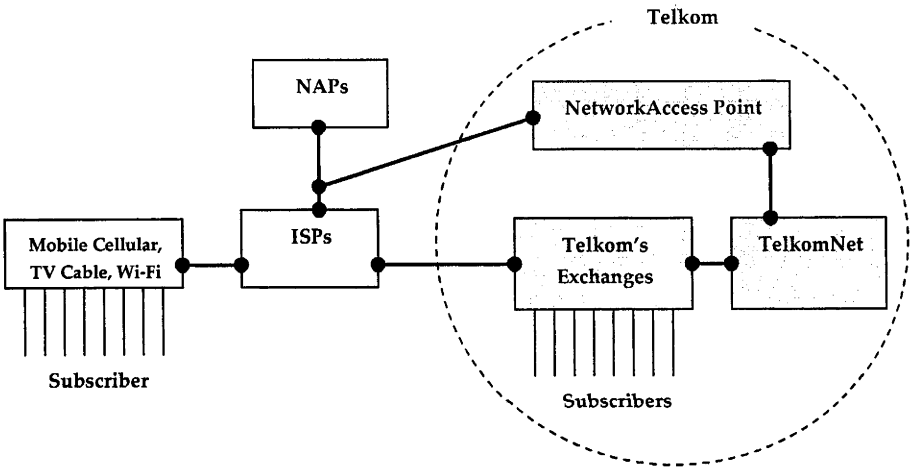
Table 2.4. Market Share of The ISPs

ISP	2000*	2002**	2003**	2004**	2007***
Telkomnet	-	55 %	60 %	72 %	73 %
IM2 (Indosat)	16 %	4 %	5 %	5 %	4 %
CBN	11 %	7 %	7 %	6 %	4 %
Radnet	8 %	3 %	3 %	3 %	1 %
Centrin	8 %	6 %	5 %	6 %	3 %
Indonet	6%	14 %	9 %	4 %	3 %
Others	51 %	11 %	5 %	4 %	12 %

Sources: *) APJII (2000:8), **) Processed from APJII data, ***) Susatyo (2008:8)

However, Telkomnet's achievement is also often associated with its behavior. Telkom's participation in Internet service provision obviously shows a vertically integrated operator because Telkom dominates the fixed-network service market, which is essential for Internet service provision. Figure 2.3 shows the position of Telkom's Internet service in the network structure. This unbalanced condition followed by Telkom's progressive pricing strategies often raises anticompetitive allegations from competitor ISPs.

Figure 2.3. Telkom's Position in Internet Service Market



Several complaints were addressed to Telkomnet. For example, Indosat claimed that the stagnation in its customer growth in 2000 was due to the difficulties of leased-lines connection to Telkom (Minges, 2002:10). In addition, in the report to the KPPU (Competition Commission), APJII indicated a discriminatory conduct, that is, Telkom charges a different commitment fee for the lines leased by ISPs in some regions. Moreover, Telkom often rejected independent ISPs' proposals to have an additional leased line channel, but it always provided an additional channel for

Telkomnet (Koran Tempo, 2002). In addition to access problems (discrimination and the difficulty to have a connection to PSTN networks), Telkomnet's retail pricing strategies may also engage in unfair conduct. Heru Nugroho, former APJII Secretary General, argued that Telkomnet is not fair because it only offers bundle price and integrated billing (Swa 2002:78).

In fact, that Telkomnet's product is superior in term of flexibility and bundled price is not necessarily anticompetitive. However, if a vertically integrated operator bundles its bottleneck facility, in some condition its behavior can be anticompetitive. Unfortunately, there has been no in-depth analysis related to this issue neither by the KPPU as competition watchdog nor by BRTI as sector specific regulator.

2.5. Mobile Cellular Service Market

The mobile cellular service was introduced in Indonesia in the early 1990s. In the early period of mobile cellular service, there were several operators which used analog technology including Komselindo, Metrosel, and Telesera with Advance Mobile Phone System (AMPS) technology and Mobisel with Nordic Mobile Telephone (NMT-450 MHz) technology. At that time, among these operators, only Komselindo and Mobisel had licenses for national operation and the rest could only serve certain regions.

In 1994, Satelindo was established as a new telecommunications operator. It is the first operator that used digital mobile cellular service based on Global System for Mobile (GSM) technology. A year later, Telkomsel and Excelcomindo also entered the market. Furthermore, Indosat also entered the

market in 2001. These four operators were awarded licenses for national operation. In addition, lately Natrindo also received a license as GSM operator but only for serving the East Java region. Furthermore, after acquisition of Satelindo by Indosat in 2002, practically there were only three national GSM operators. Moreover, former analog operators also adopted another digital system based on Code Division Multiple Access (CDMA) technology in 2003. However, for more than a decade these three national GSM operators still dominated the mobile cellular market.

In 2006, the government awarded licenses for third generation technology to five operators including these existing four GSM operators and a new entrant, Hutchison ('3'). Table 2.5 presents mobile cellular operators with national coverage licenses and the technology they used operating in late 2006. Table 2.6 shows market shares and subscriber distribution among these operators.

Table 2.5. Mobile Cellular Operators and Their Technologies

No	Operators	Technology
1	Telkomsel	GSM-900/1800Mhz and 3G-2.1GHz
2	Indosat (Satelindo and IM3)	GSM-900/1800Mhz and 3G-2.1GHz
3	Excelcomindo (XL)	GSM-900/1800Mhz and 3G-2.1GHz
4	Mobile-8	CDMA20001X-800 Mhz
5	Sampoerna Telekomunikasi Indonesia	CDMA20001X-450 Mhz
6	Natrindo Telepon Seluler	GSM and 3G-2.1GHz
7	Hutchinson CP Indonesia ('3')	GSM and 3G-2.1GHz

Table 2.6. Operators' Subscribers and Market Shares

	Operators	Subscribers			Share
		2004	2005	2006	2006
1	Telkomsel	15,101,000	24,269,000	35,597,000	55.79%
2	Indosat (Satelindo and IM3)	9,754,607	14,512,453	16,704,729	26.18%
3	Excelcomindo (XL)	3,791,000	6,978,519	9,527,970	14.93%
4	Mobile-8	500,000	1,200,000	1,825,888	2.86%
5	Sampoerna Telekomunikasi Indonesia	-	-	134,713	0.21%
6	Natrindo Telepon Seluler	-	-	12,715	0.02%
	TOTAL	29,148,611	46,961,977	63,803,015	

Source: DGPT in Table 5 of KPPU (2007:14-15)

The tables above indicate that until the end of 2006, the three biggest GSM operators (Telkomsel, Indosat, and Excelcomindo) still dominated the mobile cellular market with around 96.9 percent of market share. Moreover, among these three, the two largest operators, Telkomsel and Indosat, held almost 82 percent of the market share. This dominance continued until late 2007 even though some new operators entered the market.

At that time, the shares of Telkomsel and Indosat were partially held by two different Singaporean companies, SingTel and Singapore Telecommunications and Telegraph (STT) respectively. These two Singaporean companies are believed to be under the command of Temasek Holding Company. Moreover, Excelcomindo were also partially owned by a

foreign investor, Telecom Malaysia, but it has no cross relationship with its competitors. Since price-competition was less intense, that is, the operators tended to set retail price at/close to the maximum regulated price, partial cross-ownership of Telkomsel and Indosat was suspected to facilitate collusion.

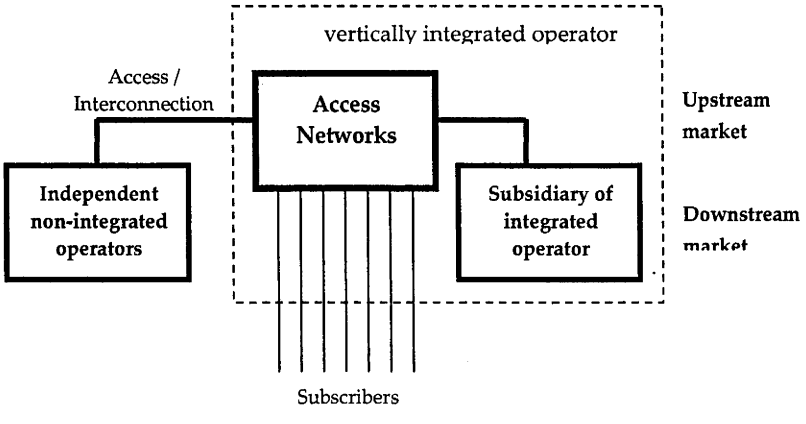
This partial cross-ownership and identical tariff pattern of Telkomsel and Indosat in mobile cellular service has led to allegations of possible price fixing or collusive pricing. Initially, a non-governmental organization called FSP-BUMN filed a formal allegation to the competition commission (KPPU) in late 2006. KPPU continued the investigation even though FSP-BUMN has withdrawn its report. In late 2007, KPPU concluded that the cross-ownership is one factor causing the high tariffs of Telkomsel and Indosat. Details about this case will be discussed further in the chapter about competition in the mobile cellular market.

Chapter 3

Exclusionary Behavior in One-way Access

One-way access structure is a condition when there is a vertically integrated operator monopolizing or dominating the upstream market with its own bottleneck facility who competes with non-integrated operators in the downstream market. In this case, only the vertically integrated operator has a direct access to subscribers. Downstream competitors cannot by-pass the bottleneck network to reach their subscribers due to several reasons, such as high investment cost or regulatory constraints. A simple description of a market with one-way access structure is illustrated in Figure 3.1.

Figure 3.1. Illustration of One-way Access Model



Services provided by the downstream competitors can only be delivered if they are connected to bottleneck networks of the vertically integrated operator. This structure creates unbalanced competition because

independent downstream operators highly depend on the access service of their competitor, a vertically integrated operator. Furthermore, the structure provides the vertically integrated operator with a chance to discriminate access provision to rivals either through access-price or non access-price strategy. Discriminatory practice would weaken the position of non-integrated operators in the market and in the extreme case it can exclude them from the market. However, the literature argues that strategies which force rivals out of business are not necessarily realized. The incentive to exclude rivals is influenced by several factors such as regulation in access price, level of competition in the downstream market, and substitutability of the downstream product.

In a market with one-way access structure, bundling is one strategy that can be used by an integrated operator to exclude downstream rivals. In this case, a practice that bundles monopolistic and competitive products by a vertically integrated operator in one-way access structure may be used to implement access price discrimination. Access price discrimination makes the retail price of the integrated operator lower than that of rivals. Therefore, this practice may predate downstream rivals. However, access price discrimination practice either through bundling or other strategies is also often used to maximize profit. Therefore, bundling in one-way access structure that is suspected as a mean to implement price discrimination is not necessarily anticompetitive. Bundling in one-way access can be considered as a predatory behavior if the pricing of the bundle leads to profit sacrifice and it gives adverse impact to rivals.

This chapter discusses three major topics. Section 3.1 describes some possible strategies of a vertically integrated operator in one-way access toward its

downstream rivals. This section shows that bundling is able to be used as a strategy to exclude rivals. Section 3.2 presents some argument from the literature about some motivations for these strategies. This part explores some papers indicating that access-price discrimination strategies, including bundling, are not necessarily anticompetitive. Section 3.3 looks at literature on anticompetitive bundling and the methods to identify it.

3.1. Exclusionary Strategies of a Vertical Integrated Operator

The incentive for an upstream monopolist to operate vertically integrated is influenced by the existence of access regulation and level of competition in the downstream market. If the downstream market is perfectly competitive and the price of upstream product is not regulated, the upstream monopolist might be less motivated to provide downstream service because it can extract all monopoly rent just from providing access (Tirole 1988:175). However, in most of the cases, the downstream market is not perfectly competitive and access price is regulated or at least tightly observed by the competition authority. This condition then encourages the bottleneck owner to compete in the downstream market as a vertically integrated operator to maximize its profit (Mandy 2000:157).

A vertically integrated operation enables the operator to internalize access-related problems, especially those related to cost or technical matters. This internalization can eliminate double marginalization which in turn increases efficiency. However, participation of the upstream monopolist in the down stream market as a vertically integrated operator in one-way access makes market competition unbalanced. A vertically integrated operator may have a

chance to abuse its power in the upstream market to exclude rivals or to soften competition. The risk of anticompetitive conduct is the main problem of allowing vertical integration (Vickers 1995:12). This risk made the regulator in the US decided to vertically separate an existing integrated incumbent into several independent companies in 1982.

However, the risk is believed to be controllable especially with appropriate access pricing regulation. The World Bank (2002:155-7) argues that allowing vertically integrated telecommunication operators owning essential facilities to compete with entrants should not weaken competition because (i) the industry/network has large economic scope, (ii) accounting separation between each segment of integrated operation to monitor possible price discrimination practices can be applied, (iii) undetected price discrimination has no significant effect on competition, and (iv) there are many operators interested in providing services in competitive segments that improve efficiency and choices for consumers. It implies that if regulation is effective, potential anticompetitive behavior in a vertically integrated operation can be minimized. For that reason, most of the countries permit vertical integrated operation. For example, the regulator in the UK permitted the vertically integrated incumbent to compete with new entrants with several restrictions (Laffont and Tirole 1994:1673-4). Moreover, in 1996 the US regulator finally relaxed a prohibition of vertical integrated operation by awarding a long distance service license for Regional Bell Operating Company (RBOC), a dominant local access provider (Zimmerman 2003:269-70).

In fact, regulating a vertically integrated operator in one-way access is not easy (Vickers 1995:12). Determining appropriate access price can be very complex due to asymmetric information between regulator and operators.

Furthermore, even though access price is regulated, the vertically integrated operator may still be able to behave anti-competitively through some strategies. Most papers on one-way access pay attention to some strategies implemented by a vertically integrated operator to exclude downstream rivals from the market. In most of these papers, anticompetitive conduct in one-way access is known as exclusionary behavior. However, there are slightly different definitions of exclusionary behavior.

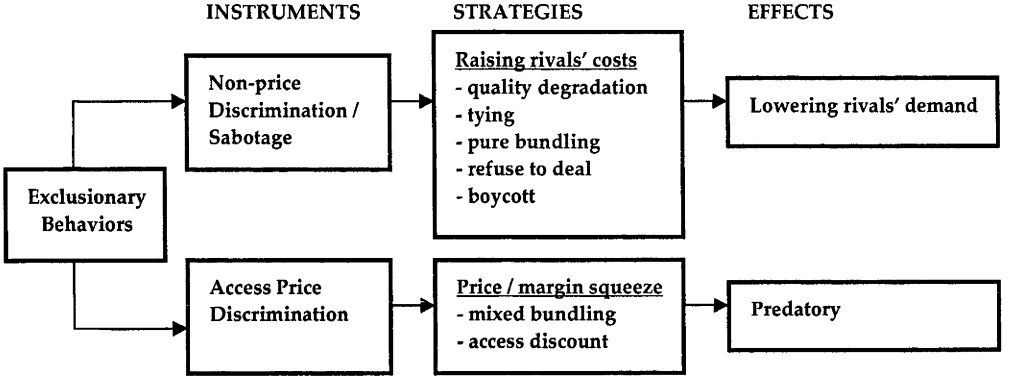
On the one hand, some papers use a narrower definition for exclusionary behavior. For example, Salop and Scheffman (1983:267) regard exclusionary behavior only as a strategy that does not require profit sacrificing, such as raising rivals' cost. Moreover, Laffont and Tirole (2000:161) limit the definition of exclusionary conduct only to non-price strategies including refusal to deal, raising rivals' costs, and lowering rivals' demand as non-price strategies by utilizing domination in a bottleneck to create market power in a competitive market.

On the other hand, some other papers define exclusionary behavior in broader terms. For example, Weisman (2001:121-2) classifies exclusionary conduct into two major strategies including access price discrimination and non-price discrimination or sabotage. In addition, Fallon and Menezes (2005:197) consider exclusionary conduct as the strategies implemented by a company with market power with intention to make rivals unable to compete profitably including predatory pricing, raising rivals' costs, exclusionary agreement, tying and bundling.

This review tends to follow the broader definition of exclusionary behavior. A general classification of exclusionary behavior is shown in Figure 3.2. In

one-way access structure, price of access to the bottleneck facilities owned by a vertically integrated operator is usually regulated or monitored by competition authority. In this case, behaviors of the operators are affected by regulation on access and consistency of its implementation.

Figure 3.2. Several Strategies of Exclusionary Behaviors



On the one hand, if price regulation is quite strict, the vertically integrated operator cannot discriminate access price between its subsidiary and rivals. Alternatively, the integrated operator still can realize its anticompetitive intention by means of non-price discrimination or sabotage strategies such as through lowering quality of access for rivals, tying or bundling the access and unnecessary services, refusing to give access, and boycott. The main objective of sabotage is to raise rivals' cost. Sabotage makes rivals unable to compete effectively in term of price, quality or availability that in turn would reduce rivals' demand and in the extreme case, would force rivals out of the market.

On the other hand, if regulation on access price is not severe, such as there is no absolute requirement of accounting separation between upstream and downstream operation, the integrated operator still has a chance to discriminate access price between its subsidiary and rivals. Since explicit price discrimination is usually illegal, the operator can implement implicit discrimination such as by giving access discounts to its subsidiary or by bundling essential and competitive products. By discriminating access price, the integrated operator is able to offer lower price by squeezing its prices or profit margin, which in turn may have a similar effect as predatory pricing on its rivals.

However, these exclusionary strategies are not necessarily implemented by the vertically integrated operators in one-way access structure even though they have the opportunity to do so. The main reason is that downstream rivals are also revenue contributors for the upstream division of the integrated operator. The following section presents the discussion in some papers related to motivation of a vertically integrated operator in the market with one-way access structure.

3.2. Motivation to Implement Exclusionary Strategies

As discussed above, the opportunity to implement either sabotage or access-price discrimination strategy by a vertically integrated operator is influenced by regulation on access. However, these exclusionary strategies are not necessarily exercised even though there is a chance to do so. In addition to the strictness of access regulation, the motivation to behave anti-competitively is also determined by other factors such as the level of access

price. If access price is sufficiently above cost, the integrated operator may not be motivated to implement exclusionary strategies either through sabotage or access-price discrimination. The main reason is that the strategy that leads to the exclusion of rivals would lower demand of the upstream market, which in turn reduces overall profit. Furthermore, if access price were relatively low or close to cost, the vertically integrated operator would be more aggressive and may be more motivated to exercise sabotage or access-price discrimination.

However, the motive to implement sabotage or access-price discrimination can be different. The motive to exercise sabotage strategies tends to be considered as anticompetitive. The reason is that, in addition to producing harmful effects on rivals and consumers in term of low quality, high retail price, or less product options, sabotage does not necessarily increase short-run profit. In this case, sabotage can be considered as an economically unjustified strategy that disadvantages the economy.

In contrast, motivation of an integrated operator to implement access-price discrimination strategy is not necessarily for anticompetitive purposes. Some literature indicates that price discrimination may also be intended to maximize profit. The logic is that low price due to access price discrimination stimulates downstream demand, which in turn may increase access revenue and total profit. Access price discrimination may have a predatory effect on rivals but it also gives benefit to consumers. Therefore, an implementation of access-price discrimination strategies such as through access discount or bundling is not a sufficient condition to conclude an anticompetitive behavior. For that reason, a careful analysis should be taken in examining

behavior of a vertically integrated operator in one-way access structure especially when an access-price discrimination strategy is exercised.

A brief description of the discussion about the incentive to sabotage and discriminate access-price in the literature is presented in two sections below.

3.2.1. Incentive to Sabotage

The papers dealing with sabotage have slightly different views about motivation to exclude rivals. One view tends to conclude that a vertically integrated operator most likely exercises sabotage. The others argue that exclusionary behavior is not necessarily implemented especially when access price is set above cost. One main reason is that the downstream competitors are also contributors to upstream revenue and raising rivals' costs might reduce the total profit of the integrated operator. Below are more detailed discussions about the findings from the papers on sabotage or non-price discrimination.

Economides (1998) is the one who argues that a vertically integrated operator will always undertake sabotage. His argument is based on a model assuming that downstream market of one-way access structure competes according to Cournot oligopoly. In his model, a variable that represents non-price discrimination is added in the profit function of the independent downstream operators. An increase in this variable reflects an escalation of rivals' costs. By maximizing profit with respect to this non-price discrimination variable, he concludes that any increase in this variable raises the profit of the vertically integrated operator (Economides 1998:278). This finding implies that a vertically integrated operator always has the incentive

to sabotage its rival to maximize profit. Moreover, by assuming linear demand in the model, the incentive to sabotage still exists regardless of the efficiency of the downstream subsidiary of the vertically integrated operator (Economides 1998:281).

In contrast, there are several papers that argue that a vertically integrated operator is not necessarily motivated to exclude downstream rivals. These papers are based on the analysis of possible behavior of Regional Bell Operating Companies (RBOC) if they are allowed to enter the competitive long-distance market. In this case RBOC are monopolists in the local telephone service (upstream market) providing access for operators of long-distance service (downstream market). RBOC's participation in long distance service will create vertically integrated operators competing with independent downstream operators which need access to RBOC. Prior to entrance, the regulator in the US requires that the local telephone market should have been opened for competition and RBOC's market share has been reduced. In general, these papers conclude that RBOC may have an incentive to discriminate if any of the following conditions are satisfied: (i) access price is set at cost, (ii) market share of the integrated operator in the downstream market has been relatively large, or (iii) domination in upstream market is threatened. This finding suggests that the policy which asks for reduction in upstream market share would have an adverse effect on the competition and encourage discriminatory practice towards downstream rivals. Below is a brief description of the analyses and findings of these papers.

Firstly, Weisman (1995) analyzes the case of RBOC entrance based on Stackelberg's leader-follower model and assumes that access price is regulated but RBOC still can raise rivals' costs through non-price strategy.

He concludes that if the share in the downstream market is still relatively small and it receives sufficient profit margin from the access market, RBOC would prefer a low downstream price in order to eliminate double marginalization and to stimulate downstream demand that increases its profit from access service (Weisman 1995:255-6). This conclusion implies that an integrated operator does not have an incentive to raise rivals' cost if it acts as a new entrant in the down-stream market and has sufficient profit margin in the upstream market.

Sibley and Weisman (1998a) investigate the same case based on the Cournot model. They argue that RBOC would be less motivated to behave anti-competitively if the price of the upstream product is set above cost and its downstream market share is still relatively small (Sibley and Weisman 1998a:457). These findings are similar with the one of Sibley and Weisman (1998b). In that case, the vertically integrated operator prefers to have more downstream competitors to increase upstream profit (Sibley and Weisman 1998b:88). In addition, they argue that *efficient component pricing rule* (ECPR) which requires access price to be set at marginal cost plus opportunity cost of providing access may be able to reduce anticompetitive motive of the upstream provider (Sibley and Weisman 1998b:81). Weisman (2001:124) also argues that access price below ECPR level would induce the integrated operator to sabotage its rivals.

Related to the case of RBOC entry in the competitive long distance market, Zimmerman (2003) undertakes an empirical study using state level panel-data between 1996 and 2001. During that period RBOC's upstream market started to open for competition. The study indicates that RBOC was engaged in quality discrimination strategy soon after it was allowed to enter the long

distance market (Zimmerman 2003:271). This finding shows that a vertically integrated operator is likely to sabotage downstream competitors if its upstream market is threatened.

In addition to the papers about RBOC above, Mandy (2000) reviews some literature related to non-price discrimination in one-way access. He finds several parameters that influence the motivation to exclude rivals and concludes that sabotage is likely if (i) downstream product is relatively homogeneous, (ii) cost of sabotage is relatively small from the gain it nets, (iii) downstream product has a decreasing return of scale, (iv) downstream rivals are relatively less efficient, (v) upstream and downstream subsidiaries are closely managed, (vi) downstream market is less competitive, (vii) lack of competition in upstream market, and (viii) upstream margin is relatively small (Mandy 2000:160-1). Furthermore, Mandy reexamines the model of Economides (1998) by varying three parameters related to competition and efficiency in the downstream market, and the profit margin of the upstream product. He finds different conclusion from Economides (1998): that the incentive to sabotage diminishes if the upstream margin is relatively high regardless of the downstream market conditions (Mandy 2000:166-7).

3.2.2. Incentive to Discriminate Access Price

Access-price discrimination by a vertically integrated operator, a practice that charges different access prices between its downstream subsidiary and competitors, is often considered illegal because it breaches equal treatment principles in access provision. Moreover, access-price discrimination can also be used to exercise an anticompetitive motive that may endanger market competition. In the short term, the low retail price because of access-price

discrimination may benefit customers, but after the competitors are excluded from the market, the integrated operator may be able to exercise its market power leading to high retail price.

The incentive to discriminate access price is stronger if access price is relatively low. In this case, access price discrimination is not necessarily implemented explicitly but can also be realized through indirect or in-disguise strategies such as access discount or bundling. However, in addition to anticompetitive purpose, the motivation for exercising access-price discrimination may also be aimed at maximizing profit.

In fact, in one-way access structure, the cost to serve one's own subsidiary can be lower than to serve rivals due to some factors such as location, economies of scale, or co-ordination process. Therefore, access price can also be different and the discrimination reflects the efficiency of a service. In other words, access-price discrimination can reduce double marginalization of upstream and downstream services. Since efficiency leads to lower price and higher demand, the discrimination can be considered as an effort to maximize overall profit. It implies that, even though low prices due to access-price discrimination may give predatory effect to downstream rivals, the discrimination is not always considered as a predatory conduct. The paragraphs below describe some papers arguing that access-price discrimination can be a profit-maximizing strategy.

King (1999) compares profit functions between an integrated operator and downstream competitors based on the Cournot model. He argues that access-price discrimination may adversely impact downstream competitors but it increases social welfare, which is desirable (King 1999:23). If the downstream

market is entered only by one competitor, an integrated operator would discriminate access price and set aggressive pricing leading to higher downstream output and lower retail price (King 1999:30). Furthermore, if there are several operators entering the downstream market, the aggressive pricing may give an exclusionary effect to downstream rivals but it increases total surplus (King 1999:32). In both cases, the incentive to discriminate access price is aimed at maximizing total profit of the vertically integrated operator.

Similarly, using a variation of the Cournot model, Krouse and Krouse (2005) examine the incentive to discriminate access price through an access discount offered by the integrated operator to its downstream subsidiary. They conclude that price discrimination is likely exercised because it increases downstream market share and profit (Krouse and Krouse 2005:41). Furthermore, even though regulated access price is at incremental cost, access-price discrimination is still likely exercised, especially if downstream products are sufficiently substitutable and the upstream-downstream divisions of the integrated operator can effectively co-ordinate their strategic behavior (Krouse and Krouse 2005:43). Their finding implies that the integrated operator may charge below cost access price to its subsidiary in order to maximize its total profit.

Biglaiser and DeGraba (2001) analyze two-period game competition in one-way access based on the Hotelling model of product differentiation by including an assumption that the downstream competitors are uncertain about the relative advantage of the integrated operator. They find that the incentive to set low retail price diminishes if access price is sufficiently high (Biglaiser and DeGraba 2001:311). The reason is that low downstream price

can predate rivals that reduce upstream demand and revenue (Biglaiser and DeGraba 2001:311). Furthermore, it implies that the decision to set low price that gives predatory effect to downstream rivals is influenced by short-run profit maximizing objective. This finding contradicts with the general perception that high access charge would give more room for an integrated operator to squeeze its price through access-price discrimination.

Fjell and Foros (2008) examine a similar case based on the Bertrand model of price competition with product differentiation. Similar to Biglaiser and DeGraba (2001), they conclude that if upstream input price is above cost a vertically integrated operator has less incentive to set low downstream price because it lowers total profit (Fjell and Foros 2008:23). If access price is lowered, the downstream integrated operator's pricing would be aggressive in order to maximize total short-run profit (Fjell and Foros 2008:23).

3.3. Anticompetitive Bundling

Bundling is a common business strategy that sells two or more different products in one package. In general, there are two types of bundling, pure and mixed bundling. In pure bundling the products are only sold as a package. In contrast, in mixed bundling consumers are provided with options whether to buy the package or individual products in the package.

Bundling, especially mixed-bundling, may benefit consumers in the form of low bundled price or availability of options that match their need. However, in certain circumstances bundling can also be used as a strategy to behave anti-competitively. A potential anticompetitive effect of bundling arises in

the situation when the firm offering the bundle monopolizes or dominates one or more elements in the package (Gans and King 2005:30). Therefore, a practice that bundles monopolistic upstream and competitive downstream products by a vertically integrated operator in a market with one-way access can be suspected as an anticompetitive behavior.

If upstream and downstream products are purely bundled, in which the upstream and downstream products are only sold as a package, this practice leads to high retail price because rivals' customers are forced to buy unnecessary downstream products in the bundle. This pure-bundling practice is also not a profit-maximizing strategy (Lewbel 1985:106). Therefore, this practice can be concluded to be an anticompetitive behavior. Furthermore, in the case of mixed bundling, that is when upstream and downstream products are offered in a bundle as well as separately, bundling can also be suspected as a mean to implement hidden predatory pricing or cross subsidy, especially if there is a significant bundled discount to the package (Gans and King 2005:33).

However, a mixed-bundling can also be considered as a profit-maximizing strategy, especially if the demands of competitive downstream product and the bundle are negatively correlated (Lewbel 1985:106). As discussed in the previous section, this profit-maximizing strategy may have exclusionary effect to the rivals but it may have no anticompetitive intention. It suggests that mixed-bundling in one-way access is not necessarily anticompetitive. Therefore, a careful analysis and judgment need to be made in identifying whether a strategy can be categorized as anticompetitive exclusionary conduct or efficient competitive strategies (Motta 2004:411; Melamed 2005:1249).

The following two sections explore some approaches to examine anticompetitive bundling and present an alternative concept to identify predatory behavior, which can be used in analyzing anticompetitive bundling.

3.3.1. Identifying Anticompetitive Bundling

There are several methods for identifying anticompetitive bundling. Economides and Lianos (2008) classified existing empirical approaches of bundling into two categories including (i)the anticompetitive foreclosure approach to bundling, and (ii) the modified predatory pricing rule approach to bundling. The decision in the case of *LePage's vs 3M* in 2003 is one example of the anticompetitive foreclosure approach to bundling. Moreover, a recent decision of the Ninth Circuit of the United States in the case of *Cascade Health vs PeaceHealth* in 2007 is an instance of a modified predatory pricing approach to bundling. In addition to empirical methods, there is also a concept to identify exclusionary bundling proposed by Professor Nalebuff (2005) of Yale that can be considered as one variant of the modified predatory pricing approach to bundling. The following paragraphs briefly illustrate these three approaches.

Anticompetitive foreclosure approach – *LePage's vs 3M*

A brief description of the case *LePage's vs 3M* in 2003 summarized from Ramirez (2005) is presented as follow. 3M is a dominant producer of transparent tape with around 90 percent of market share that also supplies other various products. LePage is a small producer of private transparent tape. Lately, 3M also produces private transparent tape and competes

directly with LePage. 3M offers its distributors a discount if they purchase private transparent tape in a bundle with other 3M products. LePage alleges that 3M's bundled discount is an exclusionary strategy. In fact, the difference between prices of 3M's bundle and the sum of prices of 3M's individual elements in the bundle without transparent tape is still above cost of transparent tape. However, 3rd Circuit Court does not merely stand its analysis on cost calculation. It then decides that 3M's bundled discount is anticompetitive in the sense that 3M as a dominant multi-products firm implement a strategy that may give potential exclusionary effect to its competitors, which only offer a limited number of products.

In this case pricing above cost still can be considered as anticompetitive if it is undertaken by a firm with power in several markets and it has potential exclusionary effect on small competitors in one of its markets. However, this decision faces some critiques because it does not gives clear principle in determining anticompetitive behavior.

Modified predatory pricing rule approach – *Cascade Health vs PeaceHealth*

A brief description of the case *Cascade Health vs PeaceHealth* in 2007 summarized from the published report of the United States Court of Appeal for the Ninth Circuit (2007) is presented below.

PeaceHealth and McKanzie are two providers of hospital service in a county in Oregon. PeaceHealth provides primary, secondary, and tertiary services of health care while McKanzie only offers the first two services. The tertiary service is a more complex health service. PeaceHealth offers higher discount to the insurance companies if they buy all these services in bundle. McKanzie

claims that strategy is exclusionary because it will prevent the insurance company to buy first and secondary services from it.

The Ninth Circuit applies a different principle from the Third Circuit. In this case, a bundled discount is considered anticompetitive if the implied price of the competitive product (the difference between the price of the unbundled competitive product and the bundled discount) is under average variable cost of the competitive product. The following paragraph shows a quotation from the Ninth Circuit decision about exclusionary bundled discount.

> .... to prove that a bundled discount was exclusionary or predatory for the purposes of a monopolization or attempted monopolization claim under § 2 of the Sherman Act, the plaintiff must establish that, after allocating the discount given by the defendant on the entire bundle of products to the competitive product or products, the defendant sold the competitive product or products below its average variable cost of producing them.
>
> (Ninth Circuit 2007)

In other words, the principle used by the Ninth Circuit can be expressed as follow. Assume there are two products x and y where x is competitive and y is monopolized. Their respective prices are p_x and p_y. A bundle of x and y is priced at p_b where $p_b < p_x + p_y$. Discount for the bundle is $d = (p_x + p_y) - p_b$. This bundled discount can be considered anticompetitive if $(p_x - d)$ is less than average variable cost to produce x.

The method used in this case is similar with the below cost pricing principle as commonly used in identifying predatory pricing. The decision also receives appreciation because it gives clearer principles.

Exclusionary Bundling Concept

In addition to these empirical cases, Prof. Barry Nalebuff also proposes a framework to identify exclusionary bundling based on incremental cost. He proposed a theory on exclusionary bundling, which is defined as below.

> Exclusionary bundling arises when a firm has market power in product A and faces competition in product B. A firm engages in exclusionary bundling when the incremental price for an AB bundle over A alone is less than the long-run average variable cost of B.
>
> (Nalebuff, 2005:328)

In other word, the test of exclusionary bundling can be expressed as follow. There are two products x and y where x is competitive and y is monopolized. Their respective prices are p_x and p_y. The competitive products are relatively homogeneous. Dominant or monopolist of product B provides a bundle of x and y which is priced at p_b where $p_b < p_x + p_y$. Exclusionary bundling exists if implied price of competitive product x or $(p_b - p_y)$ is less than its long-run average cost.

He also argues that exclusionary bundling differs with predatory pricing because the bundle does not necessarily incur loss and consequently does not require recoupment of that loss, but it may be equivalent to vertical price squeeze (Nalebuff, 2005:322). In general, for some extent, the principle of exclusionary bundling is similar with the approach used in *Cascade Health vs PeaceHealth* in 2007.

3.3.2. The Predatory Pricing Rule Approach to Bundling

As indicated above, the development of methods for identifying anticompetitive bundling tends to favor an approach based on the predatory pricing rule. In its standard concept, predatory pricing analysis requires at least three conditions to satisfy: (i) the predator to give-up its short-run profit, (ii) exclusion of rivals from the market, and (iii) recoupment of loss. In the modified predatory pricing rule approach to bundling, this requirement is much simpler. It only needs to prove that bundling practice indicates a profit sacrifice and evidence of injury of rivals, and it does not require the evidence of loss recoupment. The main reason is that anticompetitive bundling is not necessarily a loss-making strategy as in predatory pricing, but it may only be a price or margin squeeze strategy where in total the firm still retains a certain profit margin. In addition, this strategy is not always followed by the exit of competitors from the market.

In most practical anti-trust cases, profit sacrifice is mainly analyzed based on cost and price information or known as the cost-based approach. The initial idea of the cost-based approach was proposed by Areda and Turner, who suggest that below marginal cost pricing by dominant firms is considered as un-lawful predatory conduct (Gelhorn and Kovacic 1994: 137-8). Since information on marginal cost is sometimes hard to estimate, in practice, average variable cost or average incremental cost was used as a proxy. In general, the modified predatory pricing approach to bundling is similar to the cost-based approach of predatory pricing, in that anticompetitive bundling is also indicated if the implied price of an unbundled product is below cost.

Joskow and Klevoric (1979) propose an alternative view of profit sacrifice in predatory pricing. They argue that profit sacrifice does not necessarily require the below-cost pricing condition. Any price reduction, even though it is above cost, can also be considered as a predatory strategy as long as it has adverse effect on rivals. Their definition of predatory pricing is presented below.

> Predatory pricing behavior involves a reduction of price in the short run so as to drive competing firm out of the market or discourage entry of a new firm in an effort to gain larger profits via higher prices in the long-run than would have been earned if the price reduction had not occurred.
>
> (Joskow and Klevoric 1979: 219-20)

They also propose a two-tier framework of predatory pricing test which consists of structural analysis and cost-based test (Joskow and Klevoric 1979:245-55). The first tier is a structural analysis that examines the market power of the firm. In this stage, if the predating firm does not have market power, allegation of predatory behavior is rejected. The second tier is a behavioral analysis which observers the cost-price relationship. There are three criteria of pricing behaviors in the second tier test including (i) price below average variable cost is unlawful predatory behavior if it deters rivals, (ii) price above average total cost is considered lawful if there is no price increase in a certain period of time, and (iii) price between average variable cost and average total cost may imply possible predatory behavior if there is no convincing reason (Joskow and Klevoric 1979:250-5).

These methods, the cost-based approach and Joskow and Klevoric's predatory pricing test, seem to heavily rely on accurate cost information. In some industries cost information is more feasible to calculate. But in high

technology industries with high fixed assets producing multiple products, such telecommunications, the marginal or variable cost is almost negligible. It makes the approaches which depend on cost information less appropriate to apply because it would lead to inaccurate analysis and tend to pass these tests. In addition, these approaches seem only to rely on supply side information. In fact, demand also affects pricing behavior of the firms. Moreover, these approaches also assume that the competing products are relatively undifferentiated and consumers' preference to these products is similar. Actually, the products are often sufficiently differentiated and consumers' preference is different.

Another alternative concept of profit sacrifice is proposed by Ordover and Willig (1981). Their definition of predatory pricing is presented below.

> ..... a predatory behavior is a response to a rival that sacrifices part of the profit that could be earned under competitive conditions, were the rival remain viable, in order to induce exit and gain consequent additional monopoly profit.
>
> (Ordover and Willig1981:9-10)

Their definition above indicates that indication of predatory pricing requires three conditions including (i) short-run profit sacrifice, (ii) exclusion of competitors, and (iii) additional profit gain after exclusion. The main difference of this concept to the traditional cost-based approach is that profit sacrifice does not necessarily require below-cost pricing. If the main objective of a firm is to maximize its profit then profit sacrifice can be interpreted simply as a pricing strategy that does not maximize profit. The principle to determine profit sacrifice seems more suitable to be used in this research because it does not highly depend on cost information.

As mentioned above, the modified predatory pricing approach to bundling is simpler than the standard predatory pricing test. It only requires two conditions including (i) profit sacrifice, and (ii) indication of an adverse effect of the bundling on rivals. It does not entail the evidence of exclusion of rivals and loss recoupment. Applying the profit sacrifice concept of Ordover and Willig (1981) in the modified predatory pricing approach to bundling, the test of anticompetitive bundling requires two concurrent conditions:

(i) price of the bundle shows an economically unjustified strategy which is not profit maximizing;

(ii) there is an indication of injuries or adverse effect to rivals.

The requirements imply that any profit sacrifice pricing that does not harm competitors is not considered as an anticompetitive behavior. It may indicate that the firm is pursuing another objective instead of profit maximization. Furthermore, profit-maximizing pricing by a vertically integrated firm that adversely affects rivals is not assumed to be anticompetitive conduct. These principles are used in analyzing anticompetitive pricing of bundling by a vertically integrated operator in one-way access in this research.

Chapter 4

Competition in the Dial-up Internet Market

A Case of Exclusionary Bundling in One-way Access

Competition in providing dial-up Internet service has an unbalanced structure. Telkom, a vertically integrated operator dominating the upstream local telephone service, competes with independent Internet service providers (ISPs) in the downstream dial-up Internet service market through its subsidiary, Telkomnet. In this case, subscribers of the independent ISPs need local telephone service to access dial-up Internet service and pay both services, local telephone and Internet services, separately. In contrast, Telkomnet bundles dial-up Internet and local telephone services with flexible terms and conditions. An anticompetitive concern emerges when Telkomnet offers a significant discount on its Internet bundle that may predate downstream rivals.

This chapter analyses one case related to the discount program of Telkomnet's Internet bundle known as the WeekendNet promotion discount program. It is the longest Telkomnet discount program offered between 2006 and 2007. The discount is for weekend usage with a significant rebate that makes the price of the bundle close to the local telephone tariff. It implies that Telkomnet's Internet service is sold at a very low price. However, since there is no accurate information about the cost of dial-up Internet service, it is

not clear whether this low price is below cost and consequently cannot be used to identify predatory pricing strategy through bundling.

An alternative approach argues that predatory pricing is not necessarily below-cost pricing but also includes any unreasonable pricing strategy that sacrifices profit and adversely affects rivals. A static analysis based on actual traffic shows that own-price elasticity of Telkomnet demand is inelastic, meaning any discount program is not profit maximizing or sacrifices overall profit. Furthermore, the data also show overall ISP traffics is almost independent from Telkomnet pricing behavior. For that reason, the WeekendNet discount program is not considered an anticompetitive behavior.

However, in the dynamic sense, the discount can be considered as a strategy to threaten competitors or to persuade the regulator to relax its control over this market. Consequently, the regulator still should be aware of possible anticompetitive effect from the discount and be able to take lessons from Telkomnet's pricing behavior. The implications are that the regulator should be more critical in assessing Telkom's proposal to increase regulated local tariff, promote low Internet price not only on the weekend but also during any off-peak hours, force Telkomnet to give the ISPs similar opportunity to offer Internet bundles, and encourage alternative technologies to relax the bottleneck in local telephone services.

The following sections present more detail about the background of the case, methodology, analysis, and some policy implications.

4.1. Background of the Case

Dial-up Internet service is a simple method to provide Internet service that connects the computers of the users to an Internet service provider (ISP) through the public telephone network. In accessing the Internet, a subscriber needs to dial the ISP's telephone number and local telephone network forwards the call to the server of that ISP. In this case, an Internet user incurs a local telephone charge in addition to the Internet service fee. This type of service was extensively used in the early period of Internet provision for the public and is still popular, especially in locations where fixed-telephone (PSTN) is the only telecommunication service available or affordable. In Indonesia, despite recent growth in broadband and wireless Internet services, dial-up service is still dominant. The data from Synovate, a market research firm, shows that in 2007 the market share of dial-up service in Indonesia was still around 73 percent (Susatyo, 2008: 10).

Commercial Internet service provision in Indonesia was pioneered by two independent ISPs in 1994. The market grew rapidly in very short period and has become very competitive. However, most of these ISPs are small operators. Competition in the market became unbalanced when Telkom and Indosat entered the dial-up Internet market in the late 1990s. These two operators are network providers in which the ISPs as independent service providers need access to their networks. Among these two, Telkom has a stronger position in the market because it dominates the upstream local telephone network, which is an essential facility to reach subscribers.

Participation of Telkom in the competitive downstream Internet service market through its subsidiary, Telkomnet, makes it possible to consider the dial-up Internet service market as a market with one-way access structure. In this structure, the vertically integrated operator has an advantage over its rivals especially in term of access to a bottleneck facility. For that reason, it is not surprising that Telkomnet as a new player in commercial Internet provision is also able to lead the dial-up Internet market with more than 70 percent of market share in 2007 (Susatyo, 2008: 8).

Telkomnet Instan is one of Telkomnet's popular products that bundles telephone and Internet service for Telkom's telephone subscribers. The regular price of Telkomnet's Internet bundle is relatively high for an intensive Internet user. Telkomnet's regular rate is Rp.165,- per minute of access, including fees for local telephone access and Internet service. If the local telephone access fee for Internet access is Rp.100,- per minute, the implied price of Telkomnet's Internet service is Rp.65,- per minute (=Rp.165 – Rp. 100). It is relatively higher than ISPs' Internet service which is between Rp. 30,- and Rp.50,- per minute.

Although the price of the bundle is relatively high, Telkomnet is still very popular. Several awards were granted to Telkomnet, such as the Indonesian Customer Satisfaction Award (ICSA) in 2002, the most popular ISP during 2001 and 2004, and Cap Superbrand 2005-2006 (Info Komputer, 2005). One factor of this popularity is because Telkomnet offers some advantages such as instant usage without prior registration, free monthly fees, and integrated billing with telephone payment.

The ISPs as rivals in the downstream market complained about these Telkomnet features. They claimed that the competition is unfair because Telkomnet may have privilege as a subsidiary of Telkom that is not equally offered to the ISPs. A formal complaint[1] has been filed to the Competition Commission (KPPU) in 2003 but the investigation was not continued. Since the regular price is relatively higher than competitors', it seems less reasonable to argue that the flexibility offered by Telkomnet is an anticompetitive behavior.

An anticompetitive pricing concern emerges especially since Telkomnet Instan often offers significant price discount on its bundle. These discounts are usually in the form of promotional programs which are often associated with certain national or regional events. Table 4.1 presents several promotion discounts offered by Telkomnet between 2001 and 2008. The ISPs claim that Telkomnet's promotion programs make their product much less competitive compared to Telkomnet Instan, especially if the discount is high enough. However, among these promotion programs, only Telkomnet's progressive discount in Region 5 East Java in 2005 was formally opposed by the ISPs through the regional KPPU office. The case then could be solved by an agreement out of court. It seems that ISPs avoid having a conflict with Telkom to secure their businesses, which highly depend on Telkom's networks.

[1] APJII's report to KPPU, 2003.

Table 4.1. Promotion-Discounts of Telkomnet's Bundled Price

October-December 2001 40 percent discount between 00:00 and 08:00 20 percent discount between 08:00 and 16:00
Mei-July 2002 40 percent discount between 00:00 and 08:00 20 percent discount between 08:00 and 16:00
End November-December 2002 40 percent discount between 00:00 and 08:00 20 percent discount between 08:00 and 16:00
September-December 2003 - only in Region 5 (East Java) 20 percent discount between 22:00 and 06:59
August-December 2004 - only in Regional 3 (West Java) Progressive discount up to 40 percent
January-March 2005 - only in Regional 5 (East Java). Progressive discount up to 50 percent
April-June 2006 *WeekendNet promotion discount* - Rp. 100/minute (almost 40 percent discount during the weekend)
July-December 2006 *WeekendNet promotion discount* - Rp. 100/minute (almost 40 percent discount during the weekend)
January-March 2007 *WeekendNet promotion discount* - Rp. 100/minute (almost 40 percent discount during the weekend)
October-December 2007 - only in Region 2 (Jakarta) & 5 (East Java) *WeekendNet promotion discount* - Rp. 100/minute (almost 40 percent discount during the weekend)

Source: compiled from various news, press releases, and advertisements

In general, most of Telkomnet's promotion-discounts are only for short periods except for the WeekendNet program. This program was initially offered only for three months between April and June 2006, but it was extended twice. The first extension period was between June and December 2006 and the second one was between January and March 2007. In total, the WeekendNet program that covers nationallly lasted for around one year. In

addition, Telkomnet also re-introduced the WeekendNet program between October and December 2007 but it was limited to Region-2 Jakarta and surroundings, and Region-5 East Java.

In its press release, Telkom mentions two reasons behind the extension of the WeekendNet program (Telkom 2008b). Firstly, during the first three months of the program, Telkoment experienced 17.36 percent and 27.11 percent traffic increase for Saturday and Sunday respectively. This rise was actually much lower than its target which was 50 percent. Secondly, the WeekendNet program is a kind of corporate social responsibility to educate people. The effect on the corporate financial aspect is expected to be in the longer term.

In the WeekendNet promotion discount, Telkomnet's bundled price was reduced up to Rp.100 per-minute for usage during the weekend. In other words, the discount in the WeekendNet program was almost 40 percent off the regular price. This significant discount makes the price of Telkomnet's Internet bundle equal to the telephone tariff for Internet access or port-wholesale tariff which is also Rp.100,- per minute or close to the lowest tariff of local telephone service, which is Rp. 83.3,- per-minute[2]. It implies that during the WeekendNet program, Telkomnet's Internet service was sold at a very low price between Rp. 0,- and Rp. 16.7,- per minute. Table 4.2 compares prices between regular periods and the WeekendNet promo period and

[2] At that time, telephone tariff for local call service was Rp.250 per pulse. The duration of a pulse is determined by distance and time of the day (peak or off-peak) and it ranges between 1.5 and 3 minutes. The cheapest local tariff was Rp.250,- per 3 minutes or on average Rp.83.3 per-minute.

shows the incremental or implied price of Internet service offered by Telkomnet based on two methods of accessing dial-up Internet service[3].

Table 4.2. Tariff Comparison - Regular and WeekedNet Promo

	Regular Tariff (Rp/minute)	**WeekendNet Promo (Apr06 – Mar07)** (Rp/minute)
Telkomnet tariff	**165**	**100**
Telephone tariff for Internet access	100	100
Incremental price of the bundle or **Implied price of Telkomnet's Internet service** *(based on telephone tariff for Internet access)*	**65**	**0**
The cheapest local call tariff.	83.3	83.3
Incremental price of the bundle or **Implied price of Telkomnet's Internet service** *(based on the cheapest local telephone tariff)*	**81.7**	**16.7**

The ISP actually complained[4] about this significant discount, but they never formally filed the objection to the regulator or to KPPU. As a comparison, independent ISPs charge Internet service between Rp.30,- and Rp.60,- per-minute. This large price differential may indicate that Telkomnet's

[3] In accessing Internet service, a subscriber can use the ordinary telephone number of his ISP and the charge refers to the normal regulated tariff of a local telephone call which is Rp. 250 per pulse (between 1.5 and 3 minutes). Alternatively, if his or her ISP subscribes to a port-wholesale service, he or she can use a premium number which charges a flat rate of Rp.100 per-minute regardless of distance and time.

[4] In an informal discussion with an ISP CEO in early 2007, He mentioned that it is getting harder to compete with Telkomnet especially when it provides long promotion discounts through the WeekendNet program.

WeekendNet program engages in a cross-subsidy or loss-selling practice. However, no convincing conclusion can be made just based on this price information. There should be a more thorough analysis of this problem.

The discussions in Chapter 3 indicate that the cost-based method has become more popular to analyze bundling problems based on the predatory pricing rule principle. In this approach, the price discount of Telkomnet's Internet bundle is considered anticompetitive if two conditions are met. These are (i) the implied price of Telkomnet's Internet service is below long-run average cost or average variable cost, and (ii) the ISPs are adversely affected by the discount.

The analysis to assess whether Telkomnet price is below cost requires cost information. Table 4.2 above shows that the implied price of Telkomnet's Internet service is at maximum Rp. 16.7 per-minute. Assuming that the profit margin of the Internet service is 15 percent[5], the minimum cost of Internet service produced by independent ISPs is around Rp.25.5 per-minute[6]. Based on this calculation, one may think that Telkom is possibly engaged in below-cost pricing practice because the implied price of Telkomnet's Internet bundle is sufficiently below the ISPs' Internet cost.

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[5] Based on information in the Income Statement of PT Centrin's financial report (Centrin 2005), it is known that the ratio between operating profit (before interest, tax, and other indirect expense) and gross income or profit margin is 14.3 percent ≈ 15 percent.

[6] The lowest per-minute Internet service tariff offered by an ISP is Rp.30,-. If maximum profit margin is 15%, the minimum cost to produce per-minute Internet service is Rp.30x85% = Rp.25.5,- This cost reflects short-run average variable cost which is usually higher than long-run average variable cost.

This conclusion can be true under a strong assumption that the per unit cost of Telkomnet's Internet service is equal to the ISPs'. In fact, it is possible that Telkomnet's cost structure is more efficient due to vertical integration. As a result, without detailed and accurate information on costs, the conclusion based on the simple analysis above is also not convincing.

In addition, as discussed in Chapter 3, there is an alternative approach in identifying predatory pricing. The method proposed by Ordover and Willig (1981) is known as profit sacrifice. Basically, the profit sacrifice principle suggests that predatory pricing does not necessarily require a below-cost pricing condition but it includes any pricing behavior that sacrifices profit. It is the main difference between the profit sacrifice concept and the common predatory pricing rule approach to bundling. It reduces the dependency on accurate cost information which is not easily calculated, especially in an industry with high fixed-costs producing multi-products, like telecommunications.

In brief, by applying the profit sacrifice concept to the case, the price discount of Telkomnet's Internet bundle during the WeekendNet program is considered anticompetitive if the discount sacrifices profit and is harmful for rivals. However, it is just a main principle to analyze anticompetitive behavior. The next step is how to make this concept operational. The following section presents a method to identify profit-sacrifice pricing based on the profit-maximizing principle.

4.2. The Profit Maximizing Model of Dial-up Internet Service

In most economics literature, profit maximizing has been widely accepted as the main objective of firm (Tirole 1988). This principle basically assumes that a firm as an economic agent tends to maximize its profit by controlling its endogenous factors that can affect profit, such as quantity of production, inputs combination, or output prices. Consequently, if a firm does not set these factors to maximize its profit, this behavior can be considered as a strategy that sacrifices potential profit. In fact, a firm may deviate from the profit-maximizing objective for reasons such as social responsibility objective, accommodating regulatory mandate, or anticompetitive motive. For that reason, profit sacrifice is not necessarily anticompetitive but it is a necessary condition to conclude an anticompetitive behavior.

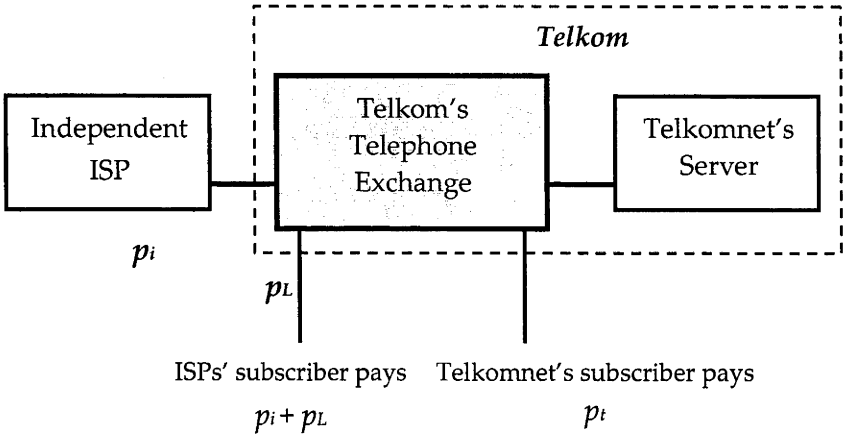
In case of the WeekendNet discount program, Telkomnet uses the price of its Internet bundle as an instrument to control its profit. Basically, the relationship between profit and some other endogenous factors can be expressed in a profit function as shown in Equation (4.1) where π, q, p, and c respectively represent profit, quantity, price, and cost.

$$\pi = f(q, p, c) \tag{4.1}$$

In addition, the structure of service provision determines the construction of variables q, p, and c in the Telkomnet profit function. Figure 4.1 illustrates a simplified structure of Internet provision for modeling purposes. In this structure, it is assumed that ISPs are relatively homogeneous and can be represented by one ISP. Furthermore, the dash line simplifies the business of

Telkom represented only by Telkomnet's Internet server and local telephone exchange.

Figure 4.1. Structure of Internet Provision for Modeling



An Internet user who wants to access an ISP's Internet service must use the local telephone service to be connected to the ISP's server. Consequently, he incurs two types of charge: a local telephone fee (p_L) from Telkom; and the Internet services fee (p_i) of the ISP. Furthermore, the ISP's profit is determined by its price Internet service (p_i), per unit cost to produce Internet service (c_i), its Internet traffic (q_i), and related fixed-cost (f_i). Mathematically, the profit function of the ISP is expressed as in Equation (4.2).

$$(4.2)\quad \pi_i = (p_i - c_i)q_i - f_i$$

In contrast, Telkomnet's user only pays one price for a bundle of Internet and local telephone services (p_t). Furthermore, Telkom's profit as a vertically integrated operator does not only come from Telkomnet's Internet bundle but also from delivering the Internet traffic of the ISP. In other words,

Telkom's profit is more complex because it is not only determined by the price of Telkomnet's Internet bundle (p_t), per-unit cost to produce Telkomnet's Internet bundle (c_t), Telkomnet's Internet traffic (q_t), and Telkomnet's fixed cost (f_t), but also by the price of the local telephone service (p_L), cost of the local telephone service (c_L), the ISP's Internet traffic (q_i), and the fixed cost of local telephone service (f_L). Equation (4.3) expresses the relation between Telkom's profit function and these variables.

(4.3) $\pi_t = (p_t - c_t)q_t + (p_L - c_L)q_i - f_t - f_L$

In dial-up Internet service competition, Telkomnet uses price as an instrument to stimulate Internet demand, especially in weekend or off-peak periods. Supposing that the Internet service is a normal good, thus, its own-price effect on traffic is negative and cross-price effect is positive. Moreover, the effect of local telephone price to traffic is negative for the ISP and positive for Telkomnet. These relationships between relevant prices and the traffic demand of Telkomnet and the ISP are summarized in Equation (4.4) and (4.5) respectively. Furthermore, it is also assumed that price change does not have an effect on constant marginal cost and fixed costs.

(4.4) $q_t = f(p_t, p_i, p_L)$ where $\partial q_t/\partial p_t < 0$; $\partial q_t/\partial p_i > 0$; $\partial q_t/\partial p_L > 0$

(4.5) $q_i = f(p_i, p_t, p_L)$ where $\partial qi/\partial pi < 0$; $\partial qi/\partial pt > 0$; $\partial qi/\partial pL < 0$

The analysis follows the Bertrand competition model because Telkomnet uses price as the main instrument in the competition and there is no issue about capacity constraint, especially the period of discount. In addition,

considering that Internet services offered by Telkomnet and the ISP are not exactly similar, differentiation of the products is also taken into account. A combination of the Bertrand model with product differentiation implies that equilibrium prices of the competing operators can be different, and the one which sets higher price does not necessarily lose all of its subscribers (Baye and Kovenock 2008). Moreover, in equilibrium, these prices are at their optimal levels which maximize profit.

One main objective of this chapter is to examine the optimal price of Telkomnet. Basically, the optimal price or profit-maximizing price can be analyzed by setting the first order condition equal to zero as shown in Equation (4.6). Partially differentiating Telkom's profit function as in Equation (4.3) with respect to Telkomnet price provides Equation (4.7).

$$(4.6)\quad \frac{\partial \pi}{\partial p} = \frac{\partial f(q,p,c)}{\partial p} = 0$$

$$(4.7)\quad \frac{\partial \pi_t}{\partial p_t} = q_t + (p_t - c_t)\frac{\partial q_t}{\partial p_t} + (p_L - c_L)\frac{\partial q_i}{\partial p_t} = 0$$

Furthermore, own-price elasticity of demand (η_t) is defined as a measure of sensitivity of Telkomnet's traffic with respect to price of the bundle, as presented in Equation (4.8). The negative sign in the equation shows that, as a normal good, the relationship between price of the bundle and traffic is in the opposite direction where an increase of price decreases the demand, and the reverse is true. In absolute terms, the value of own-price elasticity of demand lies between 0 and infinity where Telkomnet's demand is concluded inelastic if $\eta_t<1$, unitary elastic if $\eta_x=1$, and elastic if $\eta_x>1$.

$$(4.8)\quad \eta_t = -\frac{\partial q_t}{\partial p_t}\frac{p_t}{q_t}$$

In addition, a cross-price elasticity of demand (η_{it}) is also described as the effect of the price of the bundle on the ISP's traffic as shown in Equation (4.9). The positive sign of the cross-elasticity indicates that the price of Telkomnet's bundle has a positive relationship with its rival's traffic. The value of cross-price elasticity ranges between negative infinity and positive infinity. Negative cross-elasticity means that the products are complementary and positive cross-elasticity indicates that the products are substitutable. Furthermore, zero elasticity suggests that the products are independent of each other.

$$(4.9)\quad \eta_{it} = \frac{\partial q_i}{\partial p_t}\frac{p_t}{q_i}$$

By substituting Equations (4.8) and (4.9) into (4.7), the optimal price of Telkomnet's Internet bundle can be expressed in a common mark-up form[7] as shown in Equation (4.10)[8].

$$(4.10)\quad p_t^* = \frac{|\eta_t|}{|\eta_t|-1}\left(c_t + \frac{\eta_{it}}{|\eta_t|}\frac{q_i}{q_t}(p_L - c_L)\right)$$

---

[7] As in monopolistic conditions, in the Bertrand model with differentiation optimal price is also determined by its own-price elasticity of demand (Werden, 1997:371).

[8] Assuming equilibrium condition is met, or $\frac{\partial^2 \pi_t}{\partial^2 p_t}\frac{\partial^2 \pi_i}{\partial^2 p_i} - \frac{\partial^2 \pi_t}{\partial p_t \partial p_i}\frac{\partial^2 \pi_i}{\partial p_i \partial p_t} > 0$ is satisfied.

The result implies that a price discount in the Telkomnet bundle is profit maximizing only if one or some of the following conditions occurs:

(i) there is a cost reduction in producing the Internet bundle service (c_I), for example, due to efficiency or technological factors;

(ii) there is a decline in the profit margin of Telkom's local telephone service (p_L-c_L), for instance because of a regulatory or competitive pressure that pushes down the local telephone tariff;

(iii) there is a decrease in the ISP's Internet traffic which utilizes local telephone; there is an increase in Telkomnet's Internet traffic;

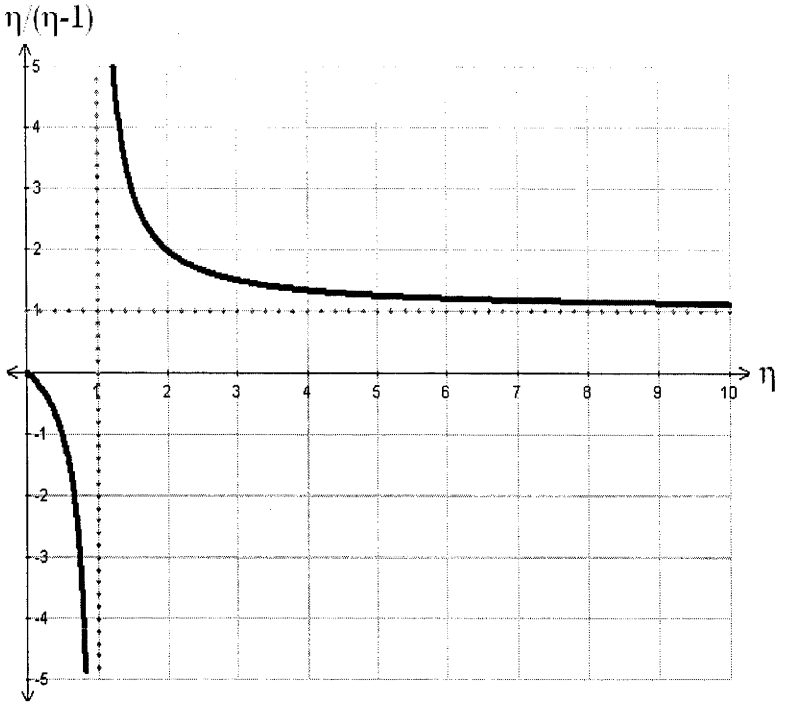
(iv) the ISP's traffic becomes less sensitive over Telkomnet's price change (η_{it});

(v) Telkomnet traffic is more responsive over its own-price (η_i).

In other words, in the absence of any of these conditions, a price reduction is interpreted simply as a pricing strategy that does not maximize profit or a behavior that sacrifices profit.

However, it is important to note that Equation (4.10) is only valid if Telkomnet's demand is elastic or the absolute value of η_i is greater than one. In the case that Telkomnet's demand is inelastic or the absolute value of η_i is less than one, the mark-up factor $|\eta_i|/(|\eta_i|-1)$ becomes less than zero, as shown in Figure 4.2. Thus, Equation (4.10) produces a negative optimal price which does not make sense. In this case, as in microeconomics theory, if demand is inelastic, price reduction will reduce profit because additional revenue as a result of an increase in traffic can not off-set the loss from the price cut. In short, if demand is inelastic, price discount is not a profit-maximizing strategy and it indicates a profit sacrifice behavior.

Figure 4.2. Own-price Elasticity and Mark-up Factor



In sum, Telkomnet's WeekendNet discount program sacrifices profit if it has inelastic demand, or in the case that it has an elastic demand, the price after discount is much lower than its optimal bundle price. That statement can be expressed as in Equation (4.11).

$$\text{(4.11) discount sacrifices profit IF } \begin{cases} |\eta_i| < 1; \\ \text{OR} \\ |\eta_i| > 1 \text{ and } p_t^* >> p_{t-after\_discount} \end{cases}$$

4.3. Analyzing Pricing Behavior of Telkomnet

The profit sacrifice approach discussed above indicates that the price discount of Telkomnet's Internet bundle can be considered anticompetitive if it is not profit maximizing and adversely effects rivals. If any of these requirements could not be proved, Telkomnet's price discount is not considered as an anticompetitive behavior. This section identifies whether these two conditions are satisfied. A brief description of the analysis is presented below.

Firstly, it identifies whether the discount is profit maximizing or profit sacrifice. The main objective at this stage is to examine whether Equation (4.11) is satisfied. Telkomnet's own-price elasticity of demand is analyzed first. If the demand is inelastic or Telkomnet's own-price elasticity of demand is less than one, then it can directly be concluded that Telkomnet's price discount is not profit maximizing and it sacrifices profit. In contrast, if the demand is elastic then all other variables in the equations need to be estimated. Furthermore, profit sacrifice is assumed if the actual price of the bundle after discount is much lower than Telkomnet's optimal price. However, if Equation (4.11) is not satisfied or there is no evidence of profit sacrifice, allegations about Telkomnet's anticompetitive discount should be dismissed.

Secondly, if there is evidence of a profit sacrifice then whether the discount has a negative effect on ISPs needs to be examined. In this research, cross-price elasticity of demand is used as an indicator of that effect. This cross-price elasticity represents the effect of Telkomnet's price change on ISPs'

traffic. High cross-price elasticity of demand means that Telkomnet's price discount reduces ISPs' traffic significantly and the discount is anticompetitive. Conversely, a small cross-price elasticity estimate suggests that ISP traffic is relatively unaffected and the discount is not anticompetitive.

Alternatively, these two conditions to assess anticompetitive discount can be written as in Equation (4.12).

$$(4.12)\quad \text{discount is anticompetitive IF} \begin{cases} |\eta_i|<1 \text{ OR } |\eta_i|>1 \text{ and } p_t^* >> p_t \\ \text{AND} \\ \eta_{it} \text{ is relatively high} \end{cases}$$

In brief, the analysis based on actual traffic data finds that the absolute value of Telkomnet's own-price elasticity of demand is less than one or inelastic. Consequently, based on Equation (4.11), it can be directly argued that Telkomnet's WeekendNet discount program is not profit maximizing nor does it sacrifice profit. Furthermore, examinations on the cross-price effect show that traffic of the ISPs is not significantly affected by the discount. For that reason, according to Equation (4.12), Telkomnet's price discount is not an anticompetitive behavior. Details of the analysis are presented in the following paragraphs.

4.3.1. Data and Elasticity Estimation

Estimating own-price and cross-price elasticity of demand requires several types of data, including Telkomnet's price (p_t), and the traffic data of Telkomnet (q_t) and the ISPs (q_i). The data about Telkomnet price is summarized from Telkom's press releases and some publications related to the WeekendNet discount program. Actual traffic data is gathered from the Multimedia Division of Telkom. Furthermore, if needed, other data required to examine Equation (4.10), such as local telephone cost and tariffs, can be extracted from several government and Telkom publications.

The actual traffic data provided by Telkom consists of Telkomnet's Internet call-data-record (CDR) for 2006, daily Telkomnet Internet traffic data for 2007, and daily ISP Internet traffic for 2006 and 2007. The ISPs' data only includes Internet traffic through port-whole sale (PWS) service from twelve ISPs. These twelve ISPs are mostly big, with a large consumer base and heavy traffic. Actually, there are many other independent ISPs which do not subscribe to PWS service but their traffic data are not available. However, these ISPs are relatively small in terms of size and traffic. For that reason, it is assumed that the traffic of these twelve ISPs is sufficient to represent the independent ISPs.

In addition, since Telkomnet's 2006 data has a different format, it needs to be transformed into a daily format. The processes to aggregate CDR into daily data were done by using Microsoft Access, a database-software. Finally, a series of traffic data for Telkomnet and the ISPs between 2006 and 2007 in each region are available for analysis. Unfortunately, there are two missing days in that series: these are Sunday, 26 November 2006 and Saturday, 3

February 2007. However, it does not have significant effect on the overall estimation results.

Elasticity of demand can be estimated based on simple linear regression. In this case, log-linear estimation is used because the coefficient belonging to variable price directly indicates an elasticity measure. The equations for estimating own-price and cross-price elasticity based on daily traffic data are presented in (4.13) and (4.14) respectively.

(4.13) $\log(q_t) = c_t + \eta_t \log(p_t) + a_t(weekend\_dummy)$

(4.14) $\log(q_i) = c_i + \eta_{it} \log(p_t) + a_i(weekend\_dummy)$

In these equations, p_t, q_t, q_i, and c respectively represent Telkomnet price, Telkomnet traffic, ISP traffic, and constant. Furthermore, η_t and η_{it} are the coefficients that correspond to Telkomnet's price elasticity of demand and cross-price effect of Telkomnet's price to ISPs' demand. Theoretically, the sign of η_t should be negative, implying that own-price and own-traffic has an opposite relationship. In contrast, the sign of η_{it} should be positive for substitute products, meaning that Telkomnet's price change would affect ISP traffic in the same direction.

Moreover, a *weekend_dummy* is employed to accommodate variation of traffic during peak and off-peak periods. If the observed day is a weekend or any public holiday, *weekend_dummy* is set as '1' and otherwise it is '0'. The sign of coefficient *a* in variable *weekend_dummy* shows the effect of holiday to traffic.

If the sign of a is negative, it means that during weekends and public holidays Internet traffic decreases.

Alternatively, instead of using *weekend_dummy*, the estimation can also use weekend traffic data alone. Consequently the linear equations are simplified as in (4.15) and (4.16) for own-price elasticity and cross-price elasticity respectively.

(4.15) $\log(q_t) = c_t + \eta_t \log(p_t)$

(4.16) $\log(q_i) = c_i + \eta_{it} \log(p_t)$

Furthermore, since the data is sufficiently detailed, the estimations can be run with several variations of data. Telkomnet's own-price elasticity of demand is estimated based on regional and national traffic data. Furthermore, cross-price elasticity of demand is estimated based on the individual ISP's traffic, regional and national traffic data. Results and explanations of these estimations are presented in the following sections.

4.3.1.1. Telkomnet's Own-price Elasticity of Demand

Telkomnet's own-price elasticity of demand is estimated based on aggregate regional traffic as well as national traffic data. In general, either based on daily traffic or weekend traffic data, the results show that the coefficients related to price are well below than one. Furthermore, most of these coefficients have expected signs and are statistically significant.

Consequently, it suggests that Telkomnet's own-price elasticity of demand is inelastic. The details are described below.

Estimation Based on Regional Traffic

Telkom divides its operational region into seven regions. These regions are Region-1 Sumatera, Region-2 Jakarta and surroundings, Region-3 West Java and Banten, Region-4 Central Java and Yogyakarta, Region-5 East Java, Region-6 Kalimantan, and Region-7 Eastern part of Indonesia. In terms of dial-up Internet traffic, Region-2 contributes the highest traffic with a daily average achieving more than 4 million minutes or around 40 percent of the daily traffic in periods 2006 and 2007. Region 6 generates the lowest daily traffic with only around 521 thousand minutes.

Telkomnet's Internet traffic in all regions is still much higher than the ISPs'. The differences are between 25 to 80 times. The largest traffic disparity is in Region-2 and the smallest is in Region-4. Figures 4.3 to 4.9 compare daily traffic of dial-up Internet services between Telkomnet and ISPs in these seven regions of Telkom. In addition, the figures also show that in most of the regions, except in Region 7, Telkomnet's traffic has an increasing pattern during the WeekendNet discount program. It indicates that Telkomnet users are relatively sensitive to price change. The magnitude of this sensitivity is represented by own-price elasticity of demand. This elasticity is estimated by regressing these traffic data and price as in Equations (4.13) and (4.15). The observed days for regression based on regional traffic data are between 1 January 2006 and 31 December 2007. Summary statistic and the estimations based on daily and weekend data are summarized in Table 4.3 and Table 4.4 respectively.

Figure 4.3. Daily Traffic in Region 1 (Sumatera)

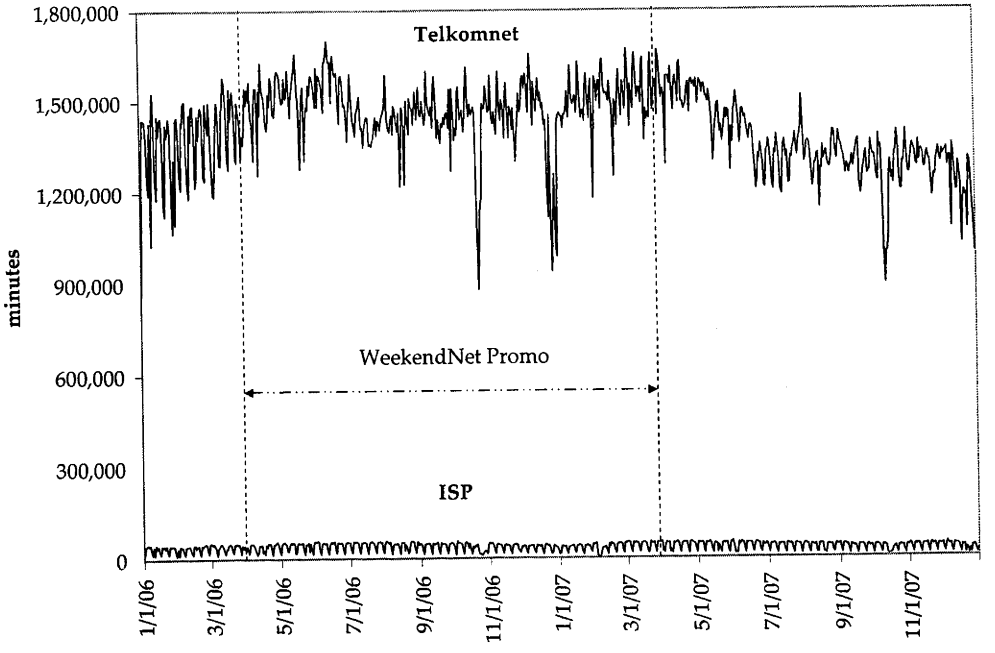


Figure 4.4. Daily Traffic in Region 2 (Jakarta & Surroundings)

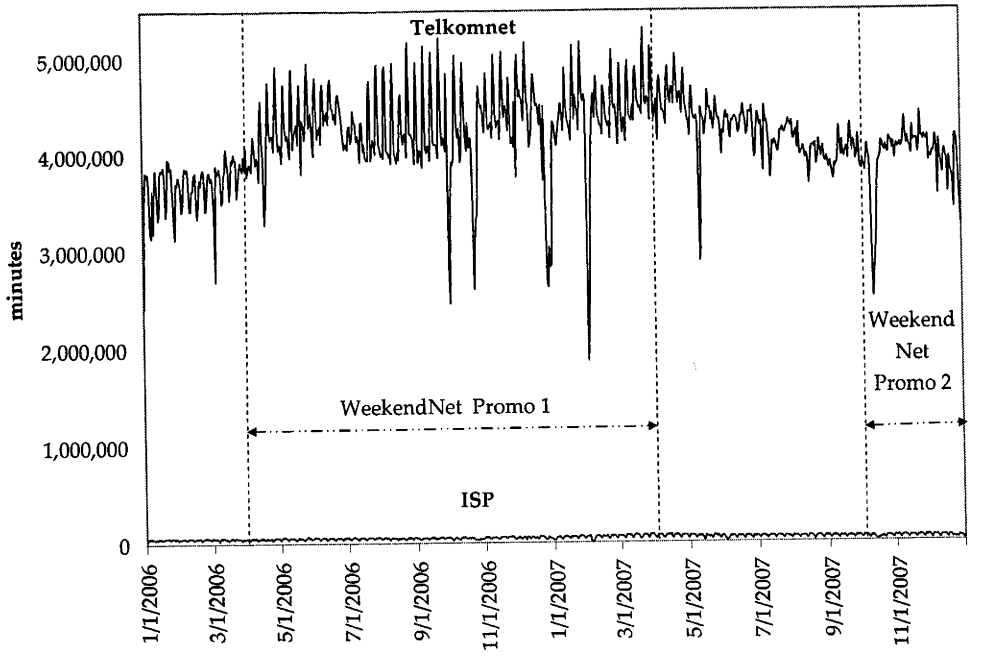


Figure 4.5. Daily Traffic in Region 3 (West Java)

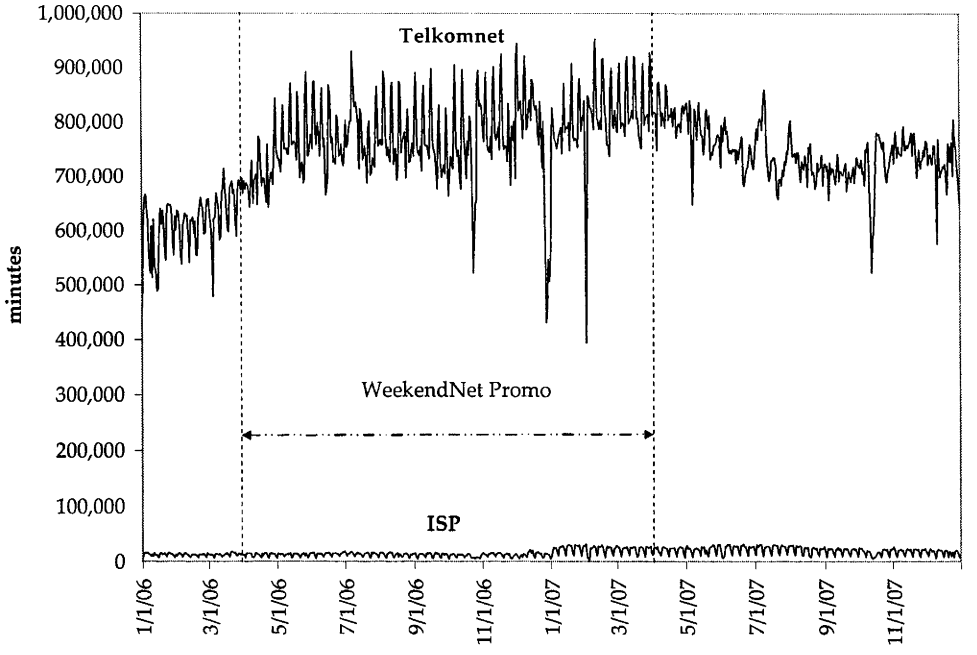


Figure 4.6. Daily Traffic in Region 4 (Central Java & Yogyakarta)

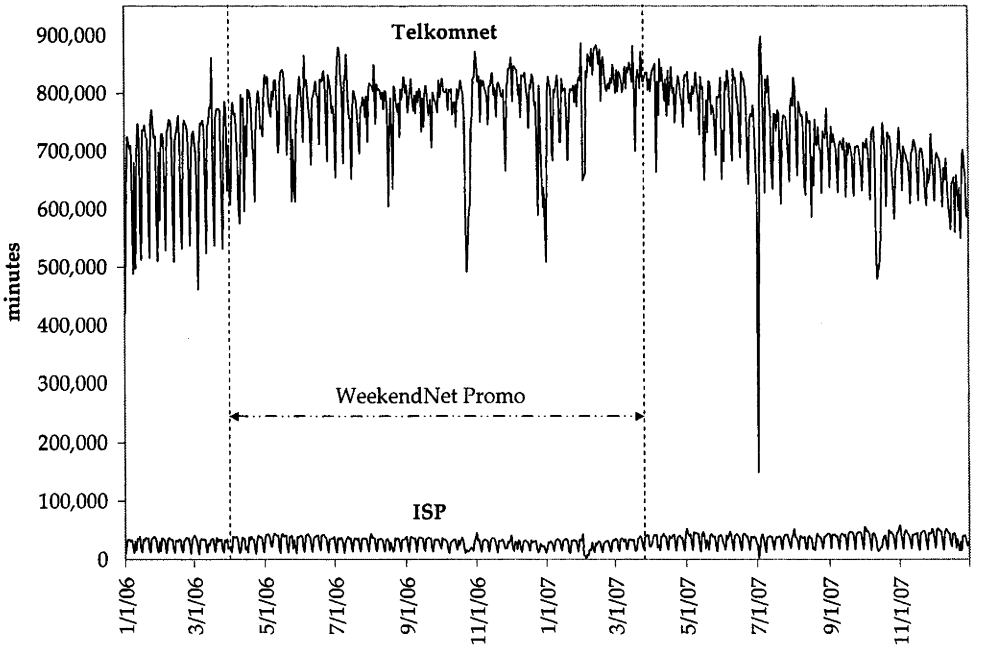


Figure 4.7. Daily Traffic in Region 5 (East Java)

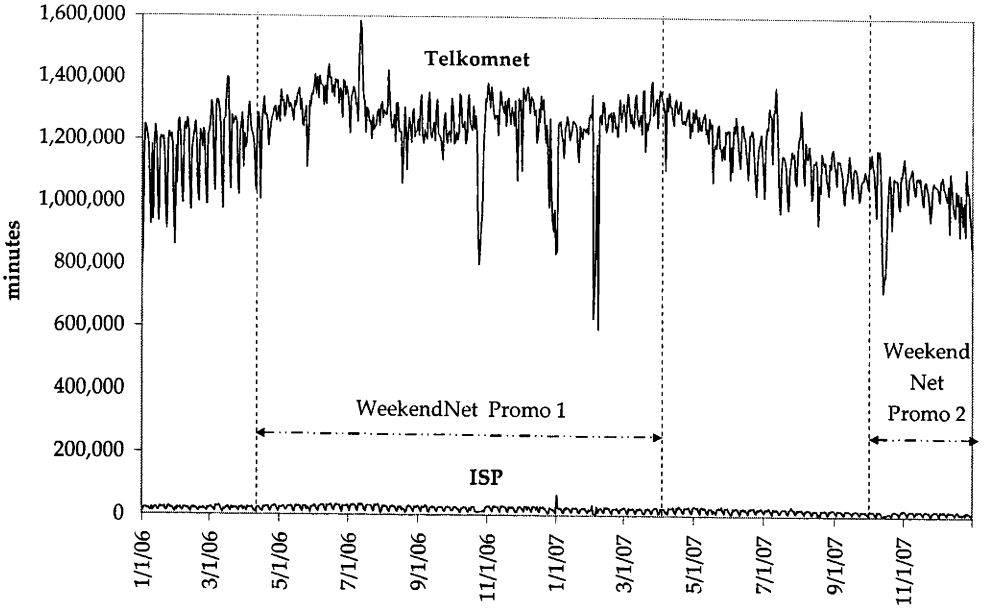


Figure 4.8. Daily Traffic in Region 6 (Kalimantan)

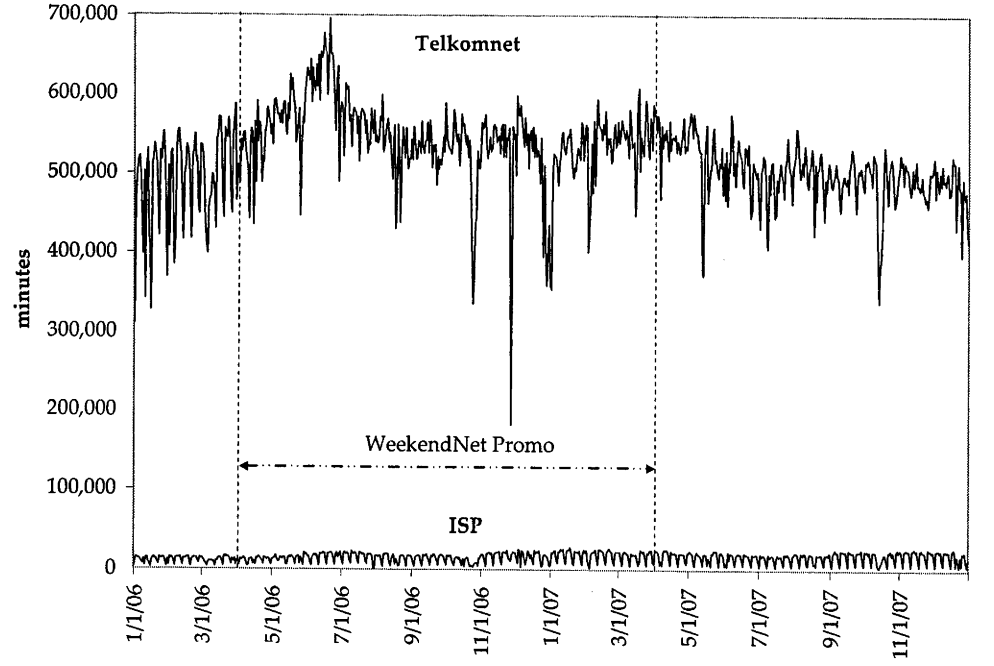


Figure 4.9. Daily Traffic in Region 7 (Eastern Indonesia)

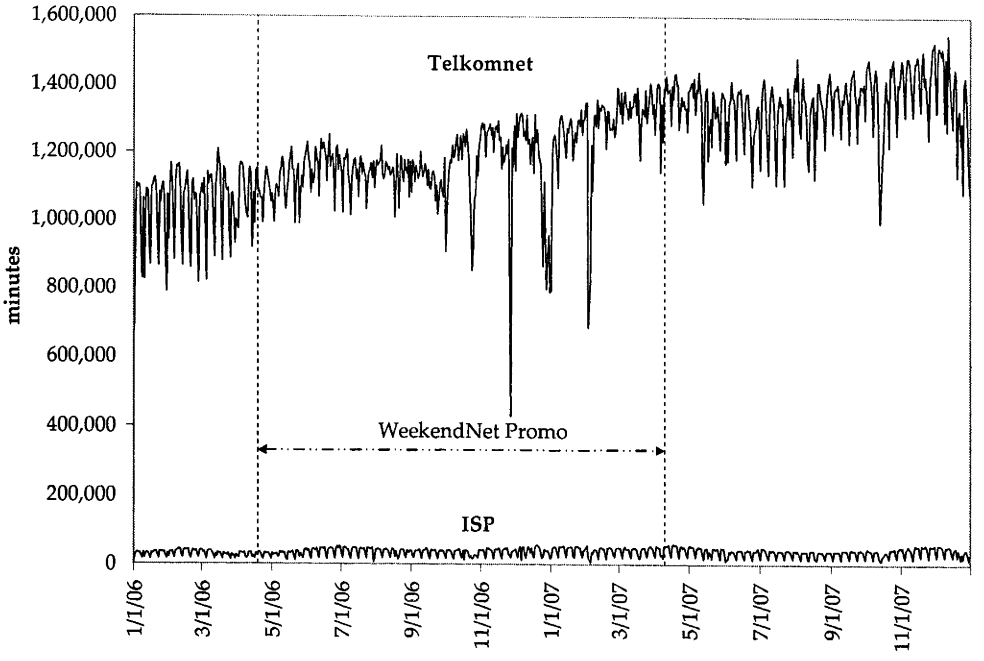


Table 4.3. Own-Price Elasticity –Daily Traffic

	Telkomnet's Daily Traffic (in minutes)						
	Region 1	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Mean	1,411,953	4,156,945	742,975	746,113	1,200,909	521,472	1,223,062
Stand.Dev	133,623	433,374	82,322	85,884	129,227	53,000	151,458
Minimum	864,109	1,874,635	394,444	149,580	594,075	180,692	428,684
Maximum	1,700,685	5,314,406	952,452	897,502	1,584,100	696,239	1,548,984

Parameter	**Region 1**	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Telkomnet_ price (in log)	**-0.339*** (0.021)	**-0.286*** (0.027)	**-0.361*** (0.027)	**-0.325*** (0.029)	**-0.270*** (0.027)	**-0.343*** (0.024)	**0.007** (0.033)
weekend_ dummy	-0.134* (0.008)	-0.070* (0.011)	-0.054* (0.010)	-0.198* (0.011)	-0.143* (0.011)	-0.141* (0.009)	-0.085* (0.012)
Constant	15.911* (0.109)	16.94* (0.137)	15.346* (0.138)	15.21* (0.146)	15.394* (0.137)	14.931* (0.125)	14.001* (0.168)
Observation	728	728	728	728	728	728	728
F-Stat	169.29	56.96	92.96	172.87	88.92	138.90	37.02
Adj R^2	0.31	0.13	0.20	0.32	0.19	0.28	0.09

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

Table 4.4. Own-Price Elasticity – Weekend Traffic

	Telkomnet's Weekend Traffic (in minutes)						
	Region 1	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Mean	1,391,250	4,278,371	770,449	698,355	1,170,687	508,943	1,162,518
Stand.Dev	158,385	605,859	112,801	92,756	156,272	60,984	153,932
Minimum	864,110	2,421,689	458,969	420,915	673,450	311,112	673,105
Maximum	1,670,516	5,314,406	952,453	881,378	1,424,409	652,308	1,460,371

Parameter	**Region 1**	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Telkomnet_ price (in log)	**-0.303*** (0.025)	**-0.253*** (0.041)	**-0.349*** (0.037)	**-0.304*** (0.032)	**-0.209*** (0.038)	**-0.312*** (0.027)	**0.047** (0.039)
Constant	15.607* (0.122)	16.468* (0.194)	15.236* (0.178)	14.922* (0.156)	14.966* (0.182)	14.644* (0.133)	13.729* (0.189)
Observation	209	209	209	209	209	209	209
F-Stat	146.12	38.90	90.36	89.44	30.51	129.01	1.45
Adj R^2	0.41	0.15	0.30	0.30	0.12	0.38	0.002

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

The results show that, except in Region 7, variable *Telkomnet_price* has a negative sign that is consistent with economic theory. It implies that a change in Telkomnet's price has an opposite effect to its traffic demand. The coefficients of that variable ranging from -0.209 to -0.361 directly correspond to Telkomnet's own-price elasticity of demand in these regions. It means that if Telkomnet's price decreases 1 percent, its traffic would only increase between 0.209 and 0.361 percent.

Furthermore, a ratio between the values of coefficient and standard error in a variable is used to asses whether that variable is statistically equal to zero or not. For *Telkomnet_price,* in most regions the variable is not statistically equal to zero but they are statistically significant at 1 percent level of significance. In the case of Region 7, the sign of coefficient in variable *Telkomnet_price* is theoretically incorrect and also not statistically significant. For that reason, it is concluded that the relationship between Telkomnet price and traffic can not be determined in Region 7.

In addition, the coefficient of variable *weekend_dummy* is negative and statistically significant at 1 percent level of significance. It implies that in all regions Telkomnet has a lower traffic in the holiday. Moreover, the F-statistics are sufficiently high, implying that the regression is significant and not all of the variables in the model are zero. In addition, adjusted R-squared are relatively small meaning that, except for Region-7, only 12 to 41 percent of Telkomnet's traffic variation can be explained by price changes.

In brief, it can be concluded that Telkomnet demand is inelastic. In other word, a decrease in Telkomnet's price discount would only stimulate additional traffic in much lesser percentage than the discount.

Estimation Based on National Aggregate Traffic Data

National level data is obtained by aggregating regional level data. In this national level, Telkomnet's average Internet traffic is almost 50 times higher than the ISPs'. Figure 4.10 compares the daily traffic of dial-up Internet service between Telkomnet and the ISPs. The figure also shows that during the WeekendNet promotion program between April 2006 and March 2007, Telkomnet's traffic has an increasing trend. It implies that Telkomnet's users are responsive enough to price change.

As in previous analysis, Equation (4.13) and Equation (4.15) are also used to estimate the elasticity. The observed days for regression are only between 1 January 2006 and 30 September 2007. The days between October and December 2007 are not included because the prices are not nationally uniform. Summary statistics of the data and results of regression based on daily and weekend traffic are presented in Table 4.5.

Figure 4.10. National Daily Traffic of Dial-up Internet Service

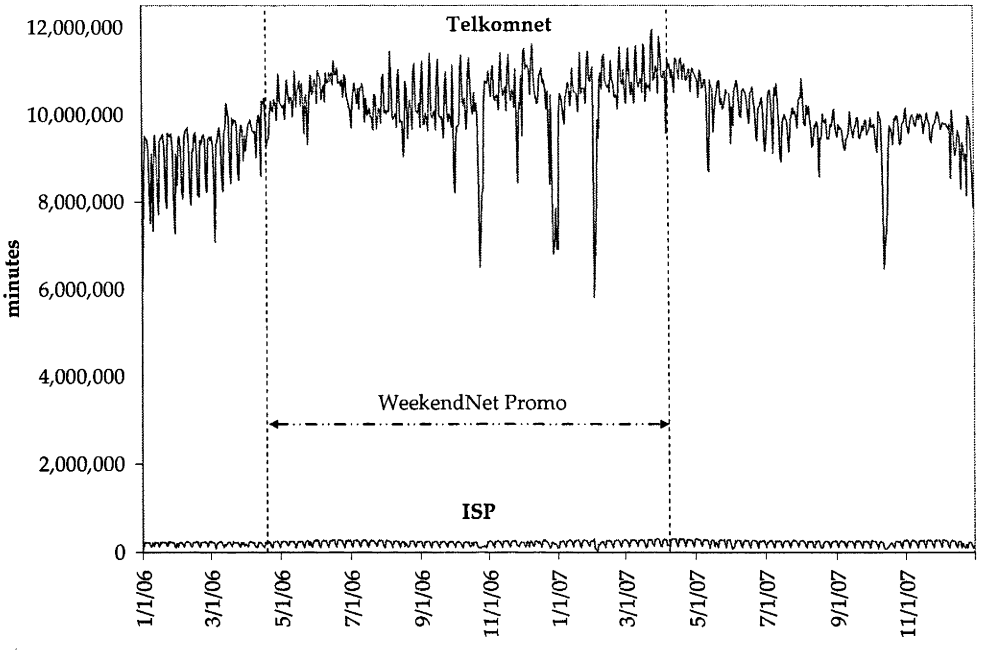


Table 4.5. Own-Price Elasticity Estimate - National Aggregate

Telkomnet Traffic	Daily Traffic (minute)	Weekend Traffic (minute)
Mean	1.01e+07	1.01e+07
Standard Deviation	869,169	1,189,720
Minimum	5,813,269	5,949,275
Maximum	1.20e+07	1.20e+07

Parameter	Daily Traffic	Weekend Traffic
Telkomnet Price (in log)	**-0.302** (0.023)*	**-0.279** (0.032) *
weekend-dummy	-0.103 (0.009)*	-
Constant	17.67 (0.117)*	17.46 (0.153) *
Number of Observation	636	181
F-Statistics	93.05	76.70
Adjusted R-Squared	0.22	0.30

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

The result shows that the sign for variable *Telkomnet_price* is also negative, which is consistent with the theory. The value of the coefficient of that variable which directly represents Telkomnet's own-price elasticity of demand is less than one and statistically significant at 1 percent level of significance. It implies that Telkomnet's demand is inelastic.

In addition, the coefficient of variable *weekend_dummy* is also negative and statistically significant at 1 percent level of significance. It shows that on weekends and public holidays Telkomnet's traffic decreases. Moreover, adjusted R-squared for both models are relatively small meaning that only 22 percent of Telkomnet's traffic variations can be explained by its price. In addition, the F-statistics are sufficiently high and significant at 1 percent. This indicates that the models are significant and not all of the variables in the model are zero.

4.3.1.2. Telkomnet's Cross-price Effect on ISP's Traffic Demand

Internet services offered by Telkomnet and the ISP are considered as substitute products. Intuitively, a price change in Telkomnet's Internet bundle will reduce traffic of the ISP. A degree of this responsiveness is measured by cross-price elasticity of demand. This section discusses some estimations of that elasticity based on the models in Equation (4.14) and Equation (4.16). The regressions are run on individual ISP traffic, regional traffic, and national aggregate traffic data.

In brief, based on individual ISPs' traffic, cross-elasticity estimates of some ISPs are significant and some others are not. It means some of the ISPs are affected by Telkomnet's price variation. Since the effects are not uniform for

all ISPs, a conclusion cannot be drawn. Furthermore, regression results based on regional level data show that Telkomnet pricing behavior has small effect on ISPs' traffic only in two regions. Again, it can be too early to assume that ISPs are not affected by Telkomnet pricing behavior. Finally, an estimation based on national aggregate data indicates that the cross-price elasticity is sufficiently small. For that reason, it is concluded that a change in Telkomnet's Internet bundle price does not have considerable effect on the average ISP's traffic.

This finding may imply that ISP subscribers are relatively loyal or reluctant to change their subscription scheme. In other word, the market is sufficiently segmented and the competing Internet services offered by Telkomnet and the ISPs are weakly substitute. The following paragraphs present the detail of these estimation results.

Estimation Based on Individual ISPs' Traffic

The effect of Telkomnet price on individual ISP traffic is estimated by regressing the ISP's traffic data with Telkomnet price based on Equation (4.14) and Equation (4.16) above. Summary statistics and the estimates are presented in Table 4.6 and Table 4.7. Observed days in the regression are different across the ISPs because during 2006 and 2007 some of the ISPs had just terminated PWS subscription and the others had just started to use the service.

Table 4.6. Cross-elasticity Estimates of Individual ISP - Daily Traffic

	ISP's Daily Traffic (in minutes)					
	IM2	CBN	Indonet	Centrin	Bitnet	Biznet
Mean	112,364	50,675	14,754	10,840	7,243	4,503
Stand.Dev	30,480	16,477	18,334	3,629	2,957	1,752
Minimum	7,907	6,012	2	1,450	123	8
Maximum	166,225	76,175	58,167	18,481	22,595	10,479

Parameter	IM2	CBN	Indonet	Centrin	Bitnet	Biznet
Telkomnet Price (in log)	-0.173*	-0.116**	*2.195**	-0.203**	*0.623**	*0.464**
	(0.058)	(0.053)	(0.515)	(0.079)	(0.131)	(0.144)
weekend-dummy	-0.606*	-0.802*	-0.637*	-0.573*	-0.430*	-0.543*
	(0.023)	(0.021)	(0.191)	(0.032)	(0.052)	(0.057)
Constant	12.645*	11.60*	-1.20	10.43*	5.783*	6.138*
	(0.074)	(0.272)	(2.636)	(0.406)	(0.671)	(0.735)
No. Obs	636	636	363	636	636	636
F-Stat	515.24	1143.56	34.93	236.07	120.77	120.26
Adj R^2	0.62	0.78	0.16	0.43	0.27	0.27

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

	ISP's Daily Traffic (in minutes)					
	Centralnet	Radnet	IPnet	Speednet	Pacificnet	Sistelindo
Mean	2,801	1,394	1,155	577	563	389
Stand.Dev	1,416	801	1,614	632	832	370
Minimum	86	10	1	2	2	7
Maximum	16,466	3,569	4,994	2,807	4,046	2,072

Parameter	Centralnet	Radnet	IPnet	Speednet	Pacificnet	Sistelindo
Telkomnet Price (in log)	-0.901*	*0.389**	*2.291**	-0.132	*1.757**	0.005
	(0.139)	(0.176)	(0.818)	(0.501)	(0.541)	(0.373)
weekend-dummy	-0.880*	-1.160*	0.426	-0.036	-0.071	-0.059
	(0.555)	(0.070)	(0.348)	(0.224)	(0.229)	(0.150)
Constant	12.645*	5.398*	-4.212	6.986*	-1.992	5.507*
	(0.074)	(0.899)	(0.899)	(2.56)	(2.764)	(1.907)
No. Obs	636	636	263	427	276	590
F-Stat	138.33	280.24	4.52	0.04	12.49	0.14
Adj R^2	0.30	0.47	0.03	0	0.08	0.00

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

Table 4.7. Cross-elasticity Estimates of Individual ISP – Weekend Traffic

	ISP's Weekend Traffic (in minutes)					
	IM2	CBN	Indonet	Centrin	Bitnet	Biznet
Mean	75,189	28,751	7,098	7,403	5,384	2,827
Stand.Dev	15,711	7,642	8,922	2,296	3,143	1,236
Minimum	12,956	6,012	2	1,450	123	8
Maximum	111,915	60,444	32,959	15,178	22,595	7,365

Parameter	IM2	CBN	Indonet	Centrin	Bitnet	Biznet
Telkomnet Price (in log)	-0.201*	-0.169**	2.748*	-0.297**	0.763*	0.409**
	(0.074)	(0.083)	(0.513)	(0.096)	(0.217)	(0.189)
Constant	12.171*	11.043*	-4.384***	10.291*	4.710*	5.850*
	(0.359)	(0.400)	(2.499)	(0.461)	(1.046)	(0.192)
No. Obs	181	181	103	181	181	181
F-Stat	7.31	4.14	28.66	9.65	12.35	4.67
Adj R^2	0.03	0.02	0.21	0.05	0.06	0.02

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

	ISP's Weekend Traffic (in minutes)					
	Centralnet	Radnet	IPnet	Speednet	Pacificnet	Sistelindo
Mean	1,827	618	955	584	347	350
Stand.Dev	980	462	1,378	655	555	359
Minimum	86	10	1	2	2	7
Maximum	5,045	2,749	4,737	2,796	2,345	1,722

Parameter	Centralnet	Radnet	IPnet	Speednet	Pacificnet	Sistelindo
Telkomnet Price (in log)	-1.109*	0.379	2.499*	0.027	1.954*	-0.159
	(0.176)	(0.274)	(0.946)	(0.585)	(0.529)	(0.392)
Constant	12.679*	4.285*	-4.745	6.219**	-12.971	6.203*
	(0.848)	(1.319)	(4.507)	(2.757)	(2.521)	(1.889)
No. Obs	181	181	75	121	76	161
F-Stat	39.78	1.92	6.98	0	13.63	0.16
Adj R^2	0.18	0.005	0.07	-0.008	0.14	-0.005

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

The results show that either based on daily or weekend traffic data, some ISPs have a positive sign in the coefficient related to variable *Telkomnet_price*

that are theoretically consistent. Among them, cross-elasticity estimates of six ISPs are higher than Telkomnet's own-price elasticity (0.302). Furthermore, most of these estimates are statistically significant at 1 and 5 percent level of confidence. It may suggest that subscribers of these six ISPs are most likely to switch to Telkomnet if there is a price discount. However, since six other ISPs are not affected by Telkomnet pricing behavior, in general, it cannot be concluded that the Telkomnet's discount program has a negative impact on the ISPs. There might be other factors occurring during the observation period that reduce the traffic of these three ISPs.

Estimation Based on ISPs' Regional Traffic

At the regional level, the regressions are also conducted based on daily and weekend traffic. The data for the regressions cover a period between 1 January 2006 and 31 December 2007. Table 4.8 and Table 4.9 present the results of regression over seven regions of Telkom for daily traffic and weekend traffic respectively.

Table 4.8. Cross-Price Elasticity – Daily Traffic

	ISPs' Daily Traffic (in minutes)						
	Region 1	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Mean	36,340	52,071	16,546	31,085	19,336	15,121	35,895
Stand.Dev	13,219	11,599	6,913	10,615	6,789	6,413	11,819
Minimum	2,383	6,351	2,179	1,970	2,806	950	5,586
Maximum	57,292	81,984	32,168	58,052	33,607	27,607	58,963

Parameter	**Region 1**	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Telkomnet_ Price (in log)	**-0.281*** (0.069)	**0.013** (0.048)	**0.446*** (0.083)	**0.437*** (0.071)	**-0.017** (0.061)	**0.031** (0.091)	**0.096** (0.061)
weekend_ dummy	-0.902* (0.026)	-0.399* (0.020)	-0.535* (0.031)	-0.592* (0.026)	-0.734* (0.025)	-0.911* (0.037)	-0.641* (0.023)
Constant	12.12* (0.353)	10.89* (0.247)	7.556* (0.425)	8.264* (0.361)	10.122* (0.312)	9.643* (0.463)	10.152* (0.311)
No. Obs	728	728	728	728	728	728	728
F-Stat	809.32	372.17	326.55	532.40	761.08	555.80	640.60
Adj R^2	0.69	0.50	0.47	0.59	0.68	0.60	0.64

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

Table 4.9. Cross-Price Elasticity – Weekend Traffic

	ISPs' Weekend Traffic (in minutes)						
	Region 1	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Mean	20,085	39,299	10,271	18,712	11,366	7,841	22,110
Stand.Dev	6,892	7,493	3,419	5,833	3,207	3,290	6,355
Minimum	2,383	6,351	2,179	1,970	2,806	950	5,586
Maximum	34,103	53,419	19,082	41,518	21,172	15,926	39,546

Parameter	**Region 1**	**Region 2**	**Region 3**	**Region 4**	**Region 5**	**Region 6**	**Region 7**
Telkomnet_ Price (in log)	**-0.335*** (0.103)	**-0.001** (0.069)	**0.444*** (0.088)	**0.407*** (0.089)	**-0.064** (0.087)	**-0.032** (0.139)	**0.036** (0.084)
Constant	11.468* (0.503)	10.561* (0.329)	7.028* (0.428)	7.811* (0.434)	9.603* (0.419)	9.024* (0.632)	9.785* (0.406)
No. Obs	207	207	207	207	207	207	207
F-Stat	10.48	0.99	0	0	0.54	0.81	0.66
Adj R^2	0.04	-0.005	0.11	0.09	-0.002	-0.005	-0.004

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

The results show that the coefficients of variable *Telkomnet_price* are positive in several regions. It implies that Telkomnet pricing behavior has an opposite influence to ISPs' traffic in these regions. However, only in Region-3 and Region-4 are the cross-effects estimates significant and slightly higher than Telkomnet's own-price elasticity of demand. It indicates that in these two regions additional traffic gained from Telkomnet's price discount comes from ISPs' traffic reduction. In contrast, in other regions the discount generates new traffic instead of acquiring it from the ISPs.

These finding suggest that Telkomnet's price discount would have negative impact on ISPs only in Region-3 and Region-4. Interestingly, in late 2007, Telkomnet continued the discount only in Region-2 and Region-5 where ISPs' traffic is relatively independent from the effect of the discount. This pricing behavior creates new Internet traffic and does not bother the ISPs' traffic. Moreover, since Telkomnet pricing behavior only has considerable effect on ISPs' traffic in two regions, it also cannot be concluded that the discount has a harmful effect on rivals.

Estimation Based on National Aggregate Traffic Data

In the national aggregate traffic, regressions over the model in Equation (4.14) and Equation (4.16) are also run based on daily and weekend traffic. Table 4.10 shows the result of the regressions. A more detailed discussion is presented in the following paragraphs.

Table 4.10. Cross-Price Elasticity Estimate - National Aggregate

ISP Traffic	Daily Traffic (minute)	Weekend Traffic (minute)
Mean	207,263	130,974
Standard Deviation	58,574	26,798
Minimum	23,066	23,066
Maximum	307,619	180,999

Parameter	Daily Traffic	Weekend Traffic
Telkomnet Price (in log)	**0.013** (0.048)***	**-0.015** (0.071) ***
Weekend_dummy	-0.62 (0.019)*	-
Constant	12.32 (0.245)*	11.83 (0.341) *
Number of Observation	636	181
F-Statistics	925.18	0.05
Adjusted R-Squared	0.74	0.01

(*) p< 1% ; (**) p< 5% ; (***)p<10% ; the number in parentheses is standard-error

The results show that regression based on daily traffic data provides a better and more consistent result. It is shown by the positive sign for the coefficient of variable *Telkomnet_Price* which is theoretically consistent. In addition, the F-statistics is high, meaning that the model is significant and not all of its variables are equal to zero. Moreover, adjusted R-squared is also relatively high, also indicating that 74 percent of ISP traffic variation can be explained by Telkomnet's price changes. Furthermore, the coefficient of *weekend_dummy* is negative, meaning that ISP traffic also reduces during weekends and public holidays.

The cross-elasticity estimate is sufficiently small (0.013) compared to Telkomnet's own-price elasticity of demand. It implies that a reduction in Telkomnet price creates new additional traffic and only takes very little traffic from the ISP. It implies that Internet services of Telkomnet and the

ISPs are weakly substitutable or almost independent. In other words, it can be concluded that in general ISPs' traffic is not affected by Telkomnet's pricing behavior.

4.3.2. Analysis

Telkomnet's WeekendNet program that offers a significant price discount to its Internet bundle can be suspected as an anticompetitive behavior because the implied or unbundled price of Internet service after the discount is quite low. Based on a strong assumption that Telkomnet and the ISPs have a relatively equivalent cost structure, the cost-based analysis discussed above shows that Telkomnet is likely engaging in below-cost pricing. However, it is possible that Telkomnet has a much lower Internet cost structure due to vertical integration.

Alternatively, the case can also be analyzed based on the profit-maximizing concept. In this approach, Telkomnet's discount program is considered anticompetitive if the discount is not profit maximizing and it adversely affects ISPs. A model is developed to identify the profit-maximizing price. The model presented in Equation (4.10) reveals that a price reduction can only be a profit-maximizing pricing if own-price elasticity of demand is relatively elastic. In other word, if the demand is inelastic, price discount will sacrifice profit.

Linear regression analyses based on the model in Equation (4.11) conclude that the estimates for Telkomnet's own-price elasticity of demand are much less than one either for regional or national actual traffic data. In other words, that price reduction only increases traffic much less than the

percentage of the discount and additional profit earned from traffic increase cannot compensate for the loss from the discount. It means that Telkomnet's own-price elasticity of demand is inelastic. Consequently, as indicated in Equation (4.11), Telkomnet's Weekendnet discount program can simply be concluded to be a profit-sacrifice pricing.

However, as shown in Equation (4.12), profit sacrifice is necessary but not a sufficient condition to judge an anticompetitive behavior until there is evidence of damage to rivals. In the Telkomnet case, an indication of the harmful effect of a non-profit maximizing discount on competitors is analyzed through Telkomnet's price-cross effect on ISPs' demand. The Telkomnet discount program may lead to harmful effects on the ISPs if this price-cross effect is relatively high. In contrast, if it is sufficiently small the competing Internet services are considered almost independent from each other.

Regression analyses on individual ISP's traffic data indicate that only few ISPs are affected by Telkomnet pricing behavior. Furthermore, similar analyses based on regional ISP data also show that Telkomnet pricing strategies have relatively little effect on the ISPs' traffic in two regions. In other regions, the effect is very small and negligible. Moreover, by aggregating the data as national level data, the estimate for cross-effect is also sufficiently small. For that reason, it is concluded that on average Telkomnet's aggressive pricing is not harmful to its competitors. Based on these findings, there is no strong evidence to support predatory pricing or exclusionary bundling allegations of Telkomnet's pricing behavior. Consequently, according to this static analysis, the Telkomnet Weekendnet discount program is not anticompetitive.

This conclusion is also supported by the fact that Telkomnet continued the WeekendNet promotion discount during October –December 2007 only in Region-2 and Region-5. The cross-price elasticity estimates of these regions are quite small and negligible. If Telkom had an intention to predate or exclude the ISPs, it should have carried on the discount in the regions with higher cross-price effects such as in Region-3 (West Java) and Region-4 (Central Java).

In addition, Telkomnet's average daily traffic is much higher than the traffic of all the ISPs. It is too risky for Telkom to predate the ISPs just to gain a small amount of additional traffic. If Telkom's discount program is aimed at excluding rivals, in addition to reduction in profit due to price discount, it would also have faced costly legal problems.

Furthermore, Telkom claims that the WeekendNet discount program is a part of its corporate social responsibility program to educate people in using Internet services. This loss-making strategy can also be interpreted as an investment to create future demand and to build a positive image of the company. Moreover, low cross-price elasticity indicates that the products are sufficiently differentiated, which makes the market quite segmented. In that market condition, price might be not an important instrument for competition and price reduction may benefit consumers with less negative effect on market competition.

The benefit of Telkomnet's Weekendnet program for Internet service users can be estimated by assessing net traffic increase due to the discount. Table 4.11 presents a simple computation of consumer benefit produced by the discount program. It uses elasticity estimates calculated based on daily traffic

at a national level. The reason is that daily traffic and national aggregate traffic data give better and more conclusive estimation results, especially for cross-price elasticity. A more detailed explanation of the calculation is described below.

Table 4.11. Benefit from Telkomnet's WeekendNet Program

Telkomnet's WeekendNet Discount (*From Rp.165 to be Rp.100 per minute*)	39.4%
Telkomnet's own-price elasticity (η_t) Cross-price elasticity (η_i)	0.302 0.013
Telkomnet's traffic increase due to discount (η_t x discount) ISPs' traffic decrease due to Telkomnet's discount (η_i x discount)	11.89 % 0.51 %
Net Internet traffic increase (consumers benefit) {(η_t - η_i) x discount}	11.38 %

Telkomnet offers special Internet bundle price for weekend usage through its long WeekendNet promotion program. Compared to the regular price, which is Rp. 165 per minute, this special Internet price which only charges Rp. 100 per minute is equivalent to a 39.4 percent discount of normal Internet service bundle. Seeing that Telkomnet's own-price elasticity of demand is 0.302, this discount increases Telkomnet's traffic by around 11.89 percent. Furthermore, the discount also has an adverse effect to ISPs' Internet service. Since the cross-elasticity of demand is quite small, is only 0.013, Telkomnet's discount program only decreases 0.51 percent of ISPs' traffic. Because the increase of Telkomnet's traffic is greater than the decrease of ISPs', in total

the discount program raises 11.38 percent net additional Internet traffic. This additional Internet traffic is considered as a benefit for consumers created by Telkomnet's WeekendNet program.

4.4. Policy Implications

Up to 2007, the dial-up Internet service market in Indonesia especially for residential users is considered as a market with many players but dominated by few operators. These major Internet service providers usually gain the advantages from their related businesses such as network providers. Telkomnet is an ISP in which the parent company, Telkom, provides access to Internet backbone as well as to local networks. A vertically integrated operation between local telephone and Internet services gives Telkomnet an opportunity to bundle these services. Since local telephone access is still highly dominated by Telkom, this vertical integrated operation represents a one-way access structure. Furthermore, a practice of bundling in this structure can be used to support hidden price discrimination, cross subsidy, and internal transfer pricing leading to low prices that can predate rivals.

In the case of Telkomnet's discount program leading to low bundling price, the static analysis discussed in the previous section concludes that the discount is not anticompetitive even though the low price sacrifices profit. The main reason is because the Internet services provided by Telkomnet and independent ISPs are weakly substitutable. In addition to that static analysis, two theories based on dynamic concept provide alternative perspective related to the Telkomnet case.

Firstly, the recent theory of predatory pricing, based on a dynamic game with asymmetric information, suggests that a dominant firm may set low price as a strategy to inform rivals that it has enormous financial resources (deep pocket theory), cost advantage (signaling game), or a powerful position in the market (reputation game) (Kobayashi 2008:10-14). In the context of the Telkomnet case, a discount program that makes the price of the bundle sufficiently low can also be interpreted as a strategy to threaten the ISPs. Since rivals are uncertain about Telkomnet's resources, they avoid having a conflict with Telkom. As a result, the market becomes less competitive.

Secondly, contestable market theory suggests that regulatory intervention can be relaxed in the market with a costless barrier because the dominant firm's pricing will be disciplined by the threat of rivals' entry (Schwartz 1986:37). In the perfectly contestable market, the dominant firm sets a low unregulated price to deter entry. However, if the dominant firm can easily change its price, low entry or exit barrier can not be regarded as a threat to control pricing behavior of the incumbent (Schwartz 1986:55). In this case, the dominant firm can set a low price when it faces entry and a high price when rivals leave the market.

The dial-up Internet market is considered as a contestable market with low entry barrier in term of license and financial aspects. This is shown by the existence of some small ISPs. Related to the Telkomnet case, price discount can be interpreted as a way to persuade the regulator not to worry about the market because it has been contestable, or to warn potential entrants not to enter the market because it is unprofitable. In fact, contestability of the market is questionable because Telkomnet can easily change its price that is relatively high in peak time and sufficiently low in only certain periods of

off-peak time. This behavior may indicate that Telkomnet uses price as a strategy to relax regulatory control to the market and to soften market competition.

In brief, even though in the formal static analysis Telkomnet's WeekendNet program is not concluded to be anticompetitive, this pricing behavior still can be regarded as a strategy to threaten rivals or to persuade the regulator to loosen regulatory constraint in this market. For that reason, the regulator needs to be aware of Telkomnet pricing behavior and any possible motivation behind it. The following paragraphs discuss several implications related to Telkomnet's WeekendNet program.

Firstly, Telkom often asked the regulator to regularly adjust the fixed line tariff. Adjustment is a soft terminology to propose an increase in the local telephone tariff because they claim that the regulated local tariff is still below cost. Telkom's argument about tariff adjustment may contradict Telkomnet's WeekendNet discount program because it reduces the price of a bundle that contains a component that is priced below cost. If the discount is not a loss-making pricing and only sacrifices part of its profit due to margin squeeze, it may indicate that the current local telephone tariff is sufficiently profitable. The implication is that the regulator needs carefully reconsider Telkom's proposal for tariff adjustment.

Secondly, Telkom claims that the WeekendNet discount program is a form of corporate social responsibility to educate people to use the Internet by offering low Internet price. If this is the case, the regulator should encourage Telkom to provide a regular low Internet price especially in the off-peak time, not only limited to during the weekend but also during public holidays or at night. Alternatively, Telkom may also be asked to give equal

opportunity for the ISPs to provide a similar bundle product because competition of the bundles will benefit consumers.

Thirdly, if these options are not financially feasible for Telkom, meaning that the Telkomnet promotion discount is really a loss making activity, the regulator needs to reduce the monopolization bottleneck access. Mobile cellular service is one alternative network to access the Internet. However, this service is still relatively costly for long Internet usage. Furthermore, since mobile cellular operators also provide Internet service, these independent ISPs will be less preferred to be accessed by mobile subscribers.

Alternatively, the regulator can encourage independent ISPs to provide a limited access network just to connect their servers and subscribers. Up to the end of 2007, several ISPs have offered Internet connection through wireless technology. However, since the technology, Wi-Fi (wireless fidelity), is only for short distance, they only offer this service in several spots in public places. Furthermore, their charges are still relatively high. There is another wireless technology that can reach longer distance known as WiMAX (worldwide interoperability for microwave access) or broadband wireless access. However, the technology is not implemented yet and, up to May 2009, the regulator currently is still offering the license through public bidding. If the independent ISPs can also be awarded licenses for WiMAX operation, they can compete equally with current vertically integrated operators. However, in the open bidding these ISPs will face competition from dominant incumbents. It seems that regulator needs to give special attention to these small operators.

In addition, the government should also support community-based Internet networks. At the moment, there is a movement to create community Internet

networks, known as RT/RW Net. In this network, the Internet users are interconnected to their neighbors and create a community local area network (LAN). The server of the community network net is attached directly to an ISP either through wire-lines or wireless technology, depending on which one is most efficient. Even though these community Internet networks have been developed in several places, this practice is still considered 'illegal' in terms of network regulation. The regulator may need to review regulation on telecommunications network provision and must take into account the potential of community Internet networks in order to the narrow digital divide.

Related to cross-subsidy issue, there was a suspicion that Telkom may involve in that practice (cross-subsidizing profit from local telephone service to Internet service) making it possible for Telkomnet to offer low Internet bundle price. In fact, to avoid a cross-subsidy problem by a vertically integrated operator such as Telkom and Telkomnet, the regulation requires accounting separation between the upstream and downstream divisions. However, this obligation was not fulfilled by Telkom and was not enforced by the regulator. It seems that the problem is not at the regulation itself but at the motivation of the regulator. The reason, perhaps, is because of the weakness of the regulator either due to lack of resources or because of its closeness with Telkom as a state-owned company.

In some developed countries where telecommunications network has covered nation-wide, to prevent the upstream-downstream cross-subsidy, the regulator often require the vertically integrated operator to unbundle its local-loop (last-mile or access network). However, in Indonesia the unbundling policy is not a choice because the spirit of the policy maker is to

enlarge network coverage in order to improve telecommunications density which was still low.

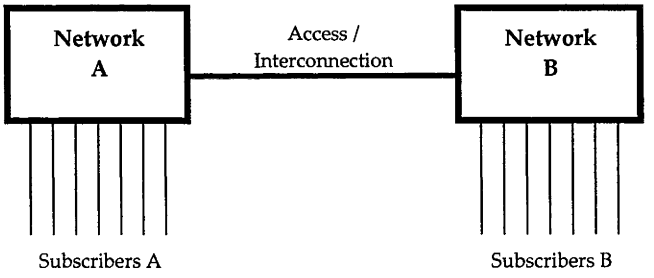
However, in the recent development where there are several mobile cellular operators with their network coverage have been close to national wide, unbundling policy may be relevant to consider. In addition to unbundling, virtual network operation (VNO) scheme can also be taken into account. In a VNO scheme, the new operators do not necessarily have to have their own network (access or backbone network) but they can just act as resellers of the service offered by the existing network providers. An example of this VNO scheme in Australia can be seen in some mobile virtual network operator (MVNO) such as Virgin Mobile and Dodo Mobile which use OPTUS' networks.

Chapter 5

Collusive Behavior in Two-way Access

Two-way access is a condition when operators need to access each other's network in order to deliver a complete service. In this case, each operator holds monopolistic access to their subscribers. A simple illustration of two-way access is shown in Figure 5.1. As a result of this interdependency, these operators must co-operate in providing interconnection service. Consequently, this interdependency influences behaviors of the interconnected operators.

Figure 5.1. A Simple Illustration of Two-way Access Structure



Interconnection between operators in two-way access can be classified into two categories. First is interconnection between non-competing operators. For example, interconnection between international telephony service providers in different countries. Second is interconnection between the competing operators. For instance, interconnection between mobile cellular

operators located in the same regions. In both cases, there is a common concern about possible collusive behaviors leading to high retail prices. In addition, a fear of possible predatory behavior has also emerged recently, especially it there is large asymmetry between incumbent and new entrant as the competitors. Related to the case, this research only concentrates on the possible collusive behavior of competing operators in a two-way access structure.

This chapter reviews literature in two areas that discuss possible collusive behavior between symmetric firms. Firstly, it looks at papers on access pricing in two-way access. The concern of the papers in this field is on possible use of negotiated access price to produce collusive outcome in retail price. Secondly, it explores literature on collusion, with focus on some factors that facilitate collusive outcome. Combination of the papers in both areas is able to explain collusive outcome in the mobile cellular market.

The access pricing papers indicate that operators in a market with two-way access structure are not always able to produce collusive outcome in retail price through access price. It depends on retail price constraints in that market. The literature analyzes the possibility of collusive effect of access price in four combinations of retail pricing. Furthermore, in the mobile cellular market, access price may influence retail prices of off-net (inter-network) calls. Moreover, the literature also indicates that on-net (intra-network) price should be lower than off-net price. This price differential between inter-network and intra-network calls is optimal for each operator.

In actual market conditions, there is a situation when the competing operators tend to set uniform price, that is, they charge off-net calls at

relatively the same rate as on-net calls. The access pricing literature does not explain whether this uniform pricing indicates a possible collusive behavior. However, by referring to the papers dealing with collusion, this uniform pricing can be a collusive outcome, especially if there are some facilitating factors such as limited number of firms in the market, cross-ownership between the competing firms, and ineffective regulations.

The following sections briefly present some papers on access pricing and facilitating factors. In addition, it also illustrates a game theoretical concept explaining a collusive outcome that can be used as a method to identify possible collusive behavior.

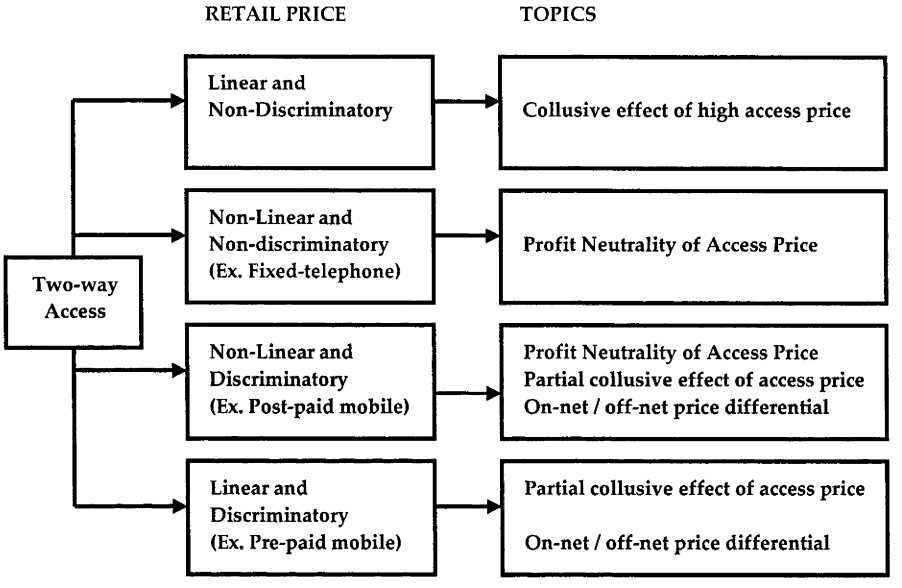
5.1. Pricing Behavior in Two-way Access Structure

Most discussions in the literature of access pricing in two-way access structure concern the possible effect of negotiated access price in producing collusive outcome in retail prices. The reason is that most of these papers are intended to identify operators' behavior in a competitive era where price regulation has been eliminated. Furthermore, the analyses in the literature are mostly theoretical and the conclusions are strongly shaped by the assumptions used in the models. The works of Armstrong (1998) and Laffont et al. (1998a and 1998b) are considered two pioneer papers in this area. In general, the papers indicate that access price is not always able to create a collusive effect in retail price. Some constraints in retail pricing, especially related to linearity and the possibility of discriminating price based on call termination, also influence the power of access price to give collusive effect.

In term of linearity, retail price can be categorized as linear and non-linear. Linear retail price means that the price only consists of usage fee where subscribers are charged only if they use the service. In contrast, in non-linear retail price, in addition to usage fee, subscribers are also charged with other fees. The most common form of non-linear retail price is a two-part tariff which consists of a fixed monthly subscription fee and usage fee. Furthermore, in term of possible discrimination based on call termination, retail price is differentiated into non-discriminatory and discriminatory. A non-discriminatory or uniform retail price is a condition when the prices of the call terminated in the same networks (intra-network or on-net calls) must be identical to the call terminated in the competitor's networks (inter-network or off –net calls). In contrast, a discriminatory retail price happens if on-net and off-net prices can be different.

These two basic characteristics of retail price produce four combinations of retail price constraints including linear and non-discriminatory, non-linear and non-discriminatory, linear and discriminatory, and non-linear and discriminatory. In their paper, Laffont et al. (1998a and 1998b) also differentiate their analyses into these four combinations. Similarly, this review also structures the discussion into these four classifications and the main topics discussed in two-way access papers can be summarized as in Figure 5.2.

Figure 5.2. Topics Discussed in Two-way Access Literature



In the mobile cellular service, the most appropriate assumption is discriminatory retail price. Discriminatory retail price may reduce the collusive effect of access price and promotes more intense competition in retail price (Laffont and Tirole 2000). In this case, in order to create a network externality, the competing operators may set high off-net price and low on-net price. In pre-paid plans of mobile cellular services where retail price is linear, high off-net price might be affected by the level of access price. However, some papers that consider that subscriber utility increases not only by making a call but also by being called argue that on-net and off-net price differential is optimal, even though access price is at cost (Hoernig 2007). Therefore, in a pre-paid plan, ideally there should be a price competition in on-net price regardless of the level of access price.

The following sections briefly present analyses and findings of literature on two-way access. Even though this research only observes cases with

discriminatory and linear retail price, this chapter also reviews other papers that assume other retail price conditions.

5.1.1. Linear and Non-Discriminatory Retail Price

The competing operators in a market with two-way access structure constrained with linear and non-discriminatory retail price are only able to use usage price as the instrument for competition and revenue making. Furthermore, retail price must be uniform either for a call terminated to its own network or to competitor networks. If access price is left unregulated, the competing operators may have a chance to negotiate a high access price which inflates retail prices. High access charges make the operator less motivated to compete in retail price. The reason is that lowering retail price would encourage inter-network traffic, which increases interconnection cost leading to access deficit. This argument implies that access price can be used to produce collusive outcome in retail price. A more detailed discussion on the literature is presented below.

The works of Armstrong (1998) and Laffont et al. (1998a) are two pioneer papers in analyzing collusive effect in two-way access structure with linear and non-discriminatory retail price. Their analyses are based on the profit-maximizing model of two competing operators with several assumptions including (i) retail prices are unregulated, linear, and uniform, (ii) access price is reciprocal and negotiated between the competing parties, (iii) operators are in symmetric equilibrium meaning that in equilibrium condition their market share and retail price are relatively equal, (iv) traffic is balanced as a proportion of market share, (v) each subscriber has a homogeneous calling pattern, (vi) the services offered are similar according

to subscribers' point of view implying identical elasticity of calling or usage demand, and (vii) operators have full coverage networks, and (viii) people subscribe to only one operator. Their main conclusion is that negotiated access price can be used as an instrument to provide collusive effect in retail price (Armstrong, 1998:553-4; Laffont et al. 1998a:10-1). Armstrong (2002:364) also argues that collusive effect of access price is still likely even if the competing products are sufficiently differentiated.

Moreover, Dessein (2003) slightly changes the assumption that consumers are differentiated into two categories (heterogeneous users), light and heavy users. Based on this assumption, the calling pattern is not necessarily balanced. He concludes that, in symmetric equilibrium, high access charges still lead to collusive outcome in retail price, especially if the light users receive more calls than they make (Dessein 2003:6-7).

In addition, Carter and Wright (1999) consider an asymmetry in their analysis. The asymmetry means that demand, market share, and retail prices of the competing parties can be different. Based on numerical simulation, if an incumbent dominates the market, joint profit maximization can be achieved through reciprocal access price and identical retail tariff rules (Carter and Wright 1999:17 - 21). This conclusion implies that reciprocal access price in an asymmetric environment would disadvantage consumers (Carter and Wright 1999:21). In order to minimize collusive outcome, they argue that regulation in access price is more effective than regulation in retail price (Carter and Wright 1999:23). In the case where the regulator lacks information to calculate the appropriate access charge, they recommend zero access charge or bill-and-keep regime (Carter and Wright 1999:24).

Armstrong (2004) analyzes another variation of the model by considering heterogeneous calling pattern and asymmetry between incumbent and entrant. He also assumes that there are two groups of subscribers, high and low volume users, who face two different schemes of retail price. He concludes that if demand for calls is inelastic, meaning that volume of calls is relatively stable, high reciprocal access price encourages an entrant to reduce retail price for low volume users and increase the price for high volume users in order to minimize access deficit (Armstrong 2004:386-7). Furthermore, in the case that access price is asymmetric where the entrant can charge a higher access price than incumbent, the entrant will reduce retail price to both users which leads to more intense price competition (Armstrong 2004:387). The conclusion shows that the collusive effect of high access price partially disappears if the assumptions, such as heterogeneous calling pattern and third degree price-discrimination, are relaxed.

In brief, the literature reveals that, in some strong assumptions, access price has a central role to shape competition. Retail price regulation may not be sufficient to eliminate collusive outcome in retail price because it is the result of cost factor, especially related to access charge. Consequently, regulation of access price is more appropriate in disciplining the operators' behaviors.

5.1.2. Non-Linear and Non-Discriminatory Retail Price

In a market with two-way access structure limited with non-linear and non-discriminatory retail pricing, operators are equipped with multi-pricing instruments. Especially in a two-part tariff system, these pricing instruments include monthly subscription and usage fees. An example of a market with this retail pricing constraint is fixed telecommunications service.

In this case, some papers argue that access price is neutral to operators' profit, implying that negotiated access price cannot be used to mute competition. The reason is that operators can attract subscribers by lowering subscription fees. Therefore, even though the high access price reduces subscription demand, it is offset by a low subscription fee that is an access charge free. Consequently, operators still can compete even though access price is high. However, again, this argument is based on strong assumptions such as a balanced calling pattern. With a more realistic assumption, access price may still affect profit and can be used as instrument to create collusive outcome in retail price. Interestingly, collusive effect can also be generated by low access price instead. The paragraphs below briefly describe the analyses and findings of these papers.

Laffont et al. (1998a) develop a basic model of competition in two-way access with non-discriminatory two-part retail tariff. They find that in a symmetric equilibrium operators' profits are not affected by the level of access price or known as profit neutrality of access price (1998a:20-2). This conclusion shows that access price cannot be used as an instrument to soften market competition. Furthermore, Armstrong (2002:365) also finds that profit neutrality still holds, even if the market shares of the competing operators are not equal. The reason is that an increase in access price raises retail price and reduces the incentive to subscribe to the network. In order to maintain market share, the operator attracts subscribers by lowering fixed fees. As a result, the ability of access price as an instrument to maximize joint profits diminishes. In this case, it is socially optimal if access price is set equal to termination cost (Armstrong 2002:366). However, the operators may still have an incentive to set high access price leading to high usage price,

especially if they have imperfect information about the customers (Laffont et al. 1998a:22).

In contrast to the basic model assuming that every person subscribes to a network (full consumer participation), Schiff (2002) considers that not all consumers are attached to the networks (partial consumer participation). The implication of this assumption is that competition is not only to attract rivals' subscribers but also the people who do not subscribe to the service (Schiff 2002:296). In this model, market participation rate is defined as the total number of people joining the networks. Schiff (2002: 301) finds that profit neutrality still holds if the participation rate is exogenous, meaning that price is not an important factor to subscribe, and profit-maximizing access price is at termination cost. Profit will be affected by access price if the participation rate is endogenous, implying that the decision to subscribe to a network is influenced by some factors such as price and market share of the network (Schiff 2002:304).

Moreover, Carter and Wright (2003) assume that the competing operators are asymmetric. If access price must be reciprocal, larger operators prefer to set access price at termination cost, but smaller operators would only favor access price at cost if its share is below one-third (Carter and Wright 2003: 33). This conclusion implies that large operators are less motivated to use access price as a collusive device to lever usage tariff. Consequently, effective regulation can just be implemented by requiring reciprocal access charges and by asking the incumbent to set the level of access price (Carter and Wright 2003: 40).

In addition, Dessein (2003) assumes that subscribers are heterogeneous and can be differentiated into light and heavy users. A heterogeneous calling pattern provides the ability for operators to discriminate the tariff for different types of users (Dessein 2003:8). He finds that access price still does not affect profit but it may influence operators' pricing strategies in discriminating their subscribers (Dessein 2003:9). Using a similar assumption for heterogeneous subscribers, Hahn (2004:621) also comes up with a similar conclusion about the profit neutrality of access price. However, if subscription demand is elastic, meaning that the decision to choose which network to join is influenced by retail price, profit can be maximized by setting below-cost access price (Dessein 2003:10). This conclusion may raise another concern that not only high access price may be used as an anticompetitive device but also low access price (Dessein 2003:13). Moreover, Poletti and Wright (2004:349) also find that profit neutrality does not hold if subscribers are heterogeneous and not all potential consumers participate in networks.

In another paper, Dessein (2004) considers heterogeneous subscribers and heterogeneous calling patterns. He argues that access price is still neutral to profit but an unbalanced calling pattern may impact the price discrimination strategy of the operators (Dessein 2004:334). However, profit may be affected by access price if subscribers have different perceptions of substitutability of the competing services (Dessein 2004:336).

The papers discussed above show that profit neutrality of access price in two-way access with a non-discriminatory two-part tariff is only valid with some strong assumptions. Under assumptions that are more realistic, some of these papers argue that access price still can be used as a collusive

instrument leading to high retail tariff. Again, access price-regulation is still important in this kind of market in order to control operators' behavior and to reach an optimal social outcome.

5.1.3. Non-Linear and Discriminatory Retail Price

In a market with two-way access structure constrained with non-linear and discriminatory retail pricing, the operators possess at least three pricing instruments. In terms of the non-linearity of the retail tariff, the operator has at least two instruments of tariff, subscription and usage fees. Furthermore, the usage price can be discriminated between the calls within the network and out of the network. One good example of a market with this condition is a post-paid mobile cellular service.

Some of the papers discussing competition in this kind of market still put their attention on the topic of whether access price can be used to produce collusive outcome. In this case, the conclusions show that profit is still neutral to access price. In addition, several others also deal with analyses related to optimal level of retail prices. In general, the analyses can be classified into two major groups, the one that does not consider call externality and the one that does. Considering the call externality implies that the subscriber's utility increases not only because he can make a call but also due to the ability to receive a call. The analyses that do not include the call externality assumption tend to conclude that optimal retail price would reflect perceived marginal cost and be uniform (non-discriminatory). In contrast, the analyses which consider call externality argue that in the optimal condition there should be a price differential where the retail price for calls terminated in rival networks (off-net calls) is higher than that for

calls ended in the same networks (on-net calls). A more detailed description of these papers is presented in the following paragraphs.

Laffont et al. (1998b) create a basic model by assuming a balanced calling pattern and no call externality. They conclude that if the products are less substitutable, in a symmetric equilibrium, operators prefer to set access price at cost and retail price at its perceived marginal cost (Laffont et al. 1998b:52). This finding implies that the power of high access price to produce collusive outcome disappears. In addition, since access price is set at cost, optimal on-net price will be equal to off-net price, meaning there will be no termination-based price discrimination.

However, Gans and King (2001) argue that the analysis of Laffont et al. (1998b) above is not complete. They claim that below-cost access price will produce a collusive effect in retail price (Gans and King 2001: 419). Below-cost access price makes on-net calls more expensive than off-net calls. Therefore, subscribers of smaller networks will face a lower average price because the probability of making on-net calls is also small. Consequently, people tend to join operators with smaller networks. This condition puts larger operators at disadvantage, as they have higher probability to receive off-net calls from rivals which in turn leads to access deficit. As a result, operators are less motivated to compete for subscribers by setting a high subscription fee. For that reason, they prefer a cost-based access regime rather than a bill-and-keep regime which is below cost (Gans and King 2001: 419). Theoretically, this analysis is justified but it is less sensible in practice because the evidence that on-net price is higher than off-net price would never be found.

Alternatively, Berger (2005) analyzes behaviors of symmetric operators by considering call externality. He finds that, in symmetric equilibrium, optimal access charge is below marginal cost and off-net price is always higher than on-net price (Berger 2005:111). In contrast to the argument of Gans and King (2001), this conclusion suggests that the bill-and-keep regime is socially more optimal than the cost-based access regime (Berger 2005:112).

Moreover, Hoernig (2007) also considers a call externality in analyzing pricing behaviors of asymmetric operators. His main objective is not to observe whether access charge can be used as a collusive device but rather to examine whether low on-net price can be considered as predatory. He concludes that optimal on-net price is always below optimal off-net price (Hoernig 2007:178). Furthermore, if the initial equilibrium is symmetric, meaning that market shares and off-net prices of the competing operators are identical, an increase in access price raises off-net price, decreases the subscription fee, and does not change on-net price (Hoernig 2007:179).

In addition, Gabrielsen and Vagstad (2008) examine why on-net price is usually cheaper than off-net price. They find that this price differential is mainly imposed by above-cost access charge, and high off-net price will create tariff-mediated network externalities to raise the switching cost for subscribers who have the tendency to call only to certain people / calling club (Gabrielsen and Vagstad 2008:106). For that reason, they conclude that operators can use high access charges to soften competition and argue that optimal access price should be set at cost (Gabrielsen and Vagstad 2008:111). In general, their finding is similar to the one of Laffont et al. (1998b) who implicitly claim that cost-based access charge is optimal.

The discussion above shows that the findings and conclusions of papers can be different according to the assumptions used in the models. In general, there are four points can be drawn from the literature including (i) access price can be neutral to profit, (ii) below-cost access price may lead to collusive effect, (iii) high access price may give partial collusive effect to off-net price, and (iv) on-net/off-net price differential is an optimal equilibrium if call externality is taken into account.

5.1.4. Linear and Discriminatory Retail Price

The operators constrained with linear retail pricing are only equipped with usage retail price as an instrument for competition. However, since the usage price can be discriminated based on call termination, the operators possess two pricing instruments including price for inter-network calls (off-net price) and price for intra-network calls (on-net price). One example of a market with this pricing scheme is the pre-paid plan of the mobile cellular market.

The papers analyzing this kind of market argue that access price may still have a partial collusive effect, that is, an increase in access charge will raise off-net price. Furthermore, an on-net/off-net price differential will create a tariff-mediated network externality. If the operators are asymmetric in size, this externality may affect subscription decision, especially if people tend to join an operator where their call ended most. In this case, an incumbent with many subscribers might be the most preferred operator. Therefore, when the market becomes more competitive where several new operators enter the market, people are also concerned about the exclusionary effect of a large price differential on small operators. However, it is not the interest of this section to review papers related to exclusionary behavior in two-way access.

Rather, it pays more attention to the optimal retail price condition. Most of the papers indicate that equilibrium off-net price is always above on-net price, even if access price is at cost. The paragraphs below present brief descriptions of the papers related to linear and discriminatory retail price.

Laffont et al. (1998b) model the competition with several strong assumptions including (i) the proportionality rule, meaning that optimal prices are determined by perceived marginal costs, (ii) identical price elasticity of calling demand, (iii) symmetric equilibrium or similar market share and retail prices, (iv) balanced calling pattern which balances access revenue and cost in the reciprocal access price rule. They argue that if the competing products are sufficiently differentiated or the degree of substitutability is low, an increase in access price decreases on-net price but raises off-net price (Laffont et al. 1998b:48). This conclusion implies that collusive outcome in off-net price and the on-net/off-net price differential may only exist if access price is above cost. However, if access price is at cost, on-net and off-net prices will be uniform and the collusive effect of access price diminishes.

Berger (2004) considers a positive call externality in his model. Call externality means that the utility for the subscriber increases not only because he can make a call, but also because he can be called. Based on graphical analysis, he also concludes that an increase in access price decreases on-net price and raises off-net price (Berger 2004:9). However, in contrast with Laffont et al. (1998b), he argues that profit-maximizing and welfare-maximizing access charges are below cost and optimal on-net price is lower than off-net price (Berger 2004:14).

Moreover, using a numerical simulation, Cricelli et al. (2005) analyze competition in the mobile telecommunications industry based on the model of Laffont et al. (1998b) and take into account asymmetry between the competing operators. They run three simulations by varying level of asymmetry, level of substitutability, and elasticity of demand. The first simulation assumes that operators are identical in costs and demand elasticity. In this case, they find that optimal off-net price is always higher than on-net price (Cricelli et al. 2005:4). The second simulation keeps the degree of asymmetry constant and they conclude that optimal retail prices decrease if the products are more substitutable and on-net/off-net price differential is larger for the incumbent (Cricelli et al. 2005:5). Lastly, the third simulation assumes that operators are asymmetric and product substitutability is low. The result is that the more inelastic the incumbent's demand, the higher is its profit and market share (Cricelli et al. 2005:6). In brief, one interesting point from their findings is that on-net/off-net price differential is an optimal equilibrium.

In addition to asymmetry, Hoernig (2007) also takes into account call externality in his model. The model also assumes a balanced calling pattern, meaning that call probability is determined by market shares. However, it does not necessarily imply a balanced traffic between competing networks because traffic is not only a function of calling pattern but also of duration of call. In this case, he concludes that off-net price is always higher than on-net price (Hoernig 2007:176). Furthermore, he also concludes that operators with higher market share will have higher optimal off-net and on-net prices, and price differential increases in access charge (Hoernig 2007:177).

Again, the papers discussed above show that the analyses can produce different findings depending on the assumptions used in the models. However, there is one interesting point from these papers. Most of them argue that optimal on-net price is lower than off-net price. It implies that on-net price competition in this kind of market should be relatively competitive.

5.2. Facilitating Factors of Collusion

The on-net prices for the pre-paid plan of the mobile cellular service, which represents a market with two-way access structure constrained with linear and discriminatory retail price, should relatively be competitive. The literature on two-way access indicates that network externality created from termination-based price discrimination encourages competitive pricing such as high off-net price and low on-net price. The literature also argues that the on-net / off-net price differential is optimal. For that reason, if the competing operators set a uniform price for on-net and off-net calls, one may suspect a collusive behavior. However, this concern does not appear in the two-way access pricing papers discussed in the previous section.

This section is intended to explore other literature dealing with collusion. The objective is to have some view about the incentive of the competing operators setting uniform prices in the pre-paid mobile cellular market. These papers indicate several factors that may contribute to the collusive outcome in the mobile cellular market, including structural aspects such as the limited number of competing firms and cross-ownership, and regulatory aspects such as ineffective price regulation. The paragraphs below present a brief description of these papers.

In legal terms, collusion is often described as co-operative actions intended to, or conspiracy to deter competition (Buccirossi 2006:88; Buccirossi 2008, 305). In contrast, in economics, collusion is defined in broader terms, that is, as a condition where prices are sufficiently high above the Nash equilibrium of the static game or close to monopolistic level (Motta 2004:138, Buccirossi 2006:88). Furthermore, the evidence of collusive equilibrium can be a necessary but not a sufficient condition to judge a conspiracy (Buccirossi 2006:88-89).

There are several ways to achieve collusive outcomes. One of them is through a conspiracy that is forced through an agreement or a contract. However, in most countries, this kind of explicit collusion is unlawful. Alternatively, collusive outcome can also be tacitly maintained through some strategies such as mutual understanding and price leadership (Rees 1994:39; Phlips 1995:81-123; Phlips 1996:499). These practices are also considered unlawful in some countries, especially in Europe. Moreover, a collusive outcome can also result from independent behavior of firms, such as conscious parallelism (Hylton 2003:81). However, this argument is still debated (Hylton 2003:86).

In addition, collusive outcome is usually achieved if the situation supports it. There are several factors that can be considered to facilitate collusion or collusive outcome. Motta (2004:142-59) classifies these facilitating factors into structural aspects, price transparency, information exchange, pricing rules, and contract. Furthermore, Feuerstein (2005:179-181) indicates several practices which can be used to maintain collusive outcome including information sharing, price policy, vertical restraint, and intra-firm structure. Moreover, Buccirossi (2008) puts more attention on how communication and

information-sharing among the competing operators can help collusion. Related to the case in this research, the discussion is limited to structural and regulatory aspects that make collusion or collusive outcome more feasible.

Market concentration and cross-ownership are among the structural aspects that may affect collusive outcome. High market concentration means that only few firms possess significant power in the market. If the dominant firms in the concentrated market are relatively symmetric in terms of market share, costs or capacity, collusive outcome is more likely to be maintained (Ivaldi et al. 2007:220-223). A duopolistic market is one example of a highly concentrated market. From some empirical studies, it is known that there were indications of tacit collusion between the operators during the duopolistic era of mobile telephony competition in German and the UK (Stoetzer and Tewes 1996:305; Valleti and Cave 1998:115-116). In addition, in some circumstances passive partial cross-ownership of the competing firms may also facilitate collusion (Gilo et al. 2006:82). This argument also implies that active cross-ownership would also have a perverse effect on competition because the owners of the competing firms would have more ability to coordinate firms' strategic behavior.

In the case of regulatory aspects that may affect collusive outcome, pricing regulations such as price ceiling, price cap, and price filing may also promote collusion. There are several empirical studies concluding that price regulation encourages collusive outcome. Hausman (2002:591-4) blames price regulation as a supporting factor behind high prices in the US mobile telephony industry in the past. Knittel and Stango (2003:1718) argue that, to some extent, a non-binding price ceiling is used by the competing firms in the credit card industry in the US as a focal point to set interest rate. They

also argue that price cap regulation would also give a similar collusive effect as ceiling price regulation (Knittel and Stango 2003:1726). Moreover, Ma (2007:13) also finds that an evidence of tacit collusion in Taiwan's flour market was facilitated by non-binding price ceiling regulation, which was set relatively high above competitive price. In addition to price ceiling, the regulation that obliges operators to report and file their price change to the regulator may also encourage collusive outcome. MacAvoy (1995:158) finds that identical prices offered by the three largest long-distance service providers was facilitated by the pricing process which requires the dominant operator to submit a proposal of tariff changes to regulator. Choi et al. (2001:131) also conclude that disincentive to compete in price in the Korean mobile telephony market was caused by regulations that oblige market leaders to get approval prior to adjusting the tariff.

5.3. Identifying Collusion

Identifying collusive behavior is not a simple task. Evidence of collusive outcome does not necessarily conclude a collusive behavior because the equilibrium could also be a product of an un-coordinated reaction such as price leader-ship, parallel behavior, or conscious parallelism. Buccirossi (2006:99-100) argues that parallel behavior can be a collusive equilibrium but it does not prove a conspiracy.

Harrington (2008: 215) proposed three stages of detecting cartel or collusion including screening or identification, verification, and prosecution. In the screening stage, collusion is usually identified based on market share or price data. Furthermore, in the verification the examination usually requires more

complex analysis, involving more detail of data and an advanced method. Finally in the prosecution stage, a legal institution or competition commission will utilize the findings from previous stages to undertake further investigation. The first two stages of Harrington's proposal may involve economic analysis, which is more relevant to the scope of this research.

There are several indicators that can be used in the screening stage. Highly and positively correlated retail prices, or stability of prices during a certain period, is one initial indicator of possible collusive behavior (Harrington 2008:236-46). In addition, parallel pricing can also be used as an alternative indicator. Alternatively, market share analysis can also be employed. However, the analysis only shows the pattern of possible collusive outcome. In fact, parallel pricing or stability in some market indicators can be a result of many factors such as cost, demand, or regulatory changes. However, this information is important for further analysis in the verification stage.

In the verification stage, the analysis is more complex. It should be able to explain whether the indicators provided in the screening stage can be justified as a possible collusive behavior. For example, it may need to prove price is sufficiently high above optimal level. Consequently, it requires an appropriate method and extensive market data, such as characteristics of consumers and demand elasticity.

One alternative method that can be used to identify collusive outcome in the verification stage is based on its fundamental explanation of collusion. Collusion is often associated with a condition where prices are sufficiently high above the Nash equilibrium of the static game (Buccirossi 2006:88). The

stable Nash equilibrium of the prisoners' dilemma game shows a competitive outcome where the parties involved behave selfishly to maximize their own interest. In fact, there is a higher outcome than this Nash equilibrium, but it is unstable and risky. However, they can achieve it through co-ordination. A more detailed illustration of the prisoners' dilemma game modified for the telecommunications case is presented in the paragraph below.

Assume that there are two dominant operators, x and y, competing in the market. They face a dilemma whether to set low non-cooperative price p_o or high collusive price p_c. The consequences or pay-off from setting these prices are described in Figure 5.3. If both operators, x and y, set a low non-cooperative price p_o, each of them will earn moderate pay-off 4. Actually, they can get higher pay-off 7 if they altogether set a high price p_c. However, setting a high price will put them at risk because if any of these operators changes its mind and sets a low price, the one that set the high price will have the lowest outcome 2. Due to that risk, it is safer for these competing operators to set a low competitive price. However, the chance to co-ordinate or collude may encourage these operators to set p_c that maximize their joint-profit, 7.

Figure 5.3. Pricing Dilemma: non-cooperative or collusive price

		operator y	
		p_o	p_c
operator x	p_o	4 , 4	10 , 2
	p_c	2 , 10	7 , 7

The game illustration above is only conceptual. One method to make it operational is by examining the profit-maximizing prices of the operators, which are assumed as non-cooperative prices. These non-cooperative prices are then compared to actual prices set by the operators. A collusive outcome is shown if these competing operators together set prices above their non-cooperative prices. In this case, the operators tend to maximize their joint-profits instead of individual profit.

Chapter 6

Competition in the Mobile Cellular Market

A Case of Collusive Pricing in Two-way Access

Three major operators, Telkomsel, Indosat, and Excelcomindo, dominate mobile cellular market in Indonesia. In 2007, the Commission for Supervisory of Business Competition of Republic of Indonesia (KPPU) investigated possible anticompetitive behavior in the mobile cellular market. KPPU sees that mobile cellular prices were relatively uniform and profitability of the operators was considered high. This market performance is associated with market structure which was oligopolistic and the two major operators, Telkomsel and Indosat, are partially cross-owned by the Temasek group of Singapore.

Based on these facts, KPPU argues that cross-ownership has enabled the Temasek group to control behaviors of major operators which in turn increased market concentration and softened competition. Therefore, in its decision, KPPU demands elimination of cross-ownership and punishes several companies involved. However, the decision faces some objections from some economists. They claim that KPPU's analyses are inappropriate and not based on sound economic justification.

This chapter presents an alternative analysis dealing with pricing behavior especially related to price fixing or collusive pricing as initially concerned. It limits the attention on the pre-paid plan of the mobile cellular service which has more than 95 percent of market share. The analysis is based on a game theoretical concept that argues that a coordination or collusion likely exists if the competing operators tend to set prices sufficiently above their non-cooperative level. In this case, non-cooperative price is defined as a profit-maximizing price which is estimated through a profit-maximizing model of competition in a two-way access structure.

Based on consumer preference information collected from a survey, the analysis concludes that in the year 2006 prices of all pre-paid plans were above non-cooperative level. It implies that the market is in collusive equilibrium. In contrast, in 2007, only the prices of Telkomsel's and Indosat's pre-paid plans were above their non-cooperative level. Furthermore, XL's price was at its non-cooperative level. This finding supports an allegation about possible collusion between two major mobile cellular operators which were cross-owned by Temasek. Moreover, one of Indosat's pre-paid plans tends to set quite a high price above its non-cooperative level. In fact, this pricing may lead to self-destruction. This usual pricing behavior may indicate a possible strong control of Telkomsel and Indosat by Temasek, or there is an attempt to weaken Indosat as claimed by KPPU.

Furthermore, in its regulatory aspect, the finding seems in line with some empirical works which conclude that price regulation which sets a high ceiling price may produce collusive effect. The policy to eliminate ceiling price level is considered appropriate. In a market which faces more intense competition, like the mobile cellular market, price regulations can be relaxed

and operators' pricing behavior may be better just monitored by the regulator and the competition commission.

6.1. Background of the Case

In general, there are two types of mobile cellular services in Indonesia. The first one is cellular service with unrestricted mobility. Three operators with GSM technology and national coverage dominate the market of this service. The second one is cellular service with limited mobility, also known as fixed-wireless access (FWA). The FWA operators are basically awarded a license as fixed network providers. However, since the operators utilize cheaper wireless technology instead of copper cable, subscribers can use it as a mobile cellular service with coverage limitation. This limited mobility is constrained by regulation but not the technology. Therefore, FWA can offer limited mobility service with a low price. However, even though to some extent mobile cellular service and FWA are substitutable, they are considered to reside in different markets. This argument is supported by the facts found in the survey conducted for this research and from the analysis by KPPU.

The case discussed in this chapter refers to real mobile cellular services with unrestricted mobility. Three GSM operators, Telkomsel, Indosat, and Excelcomindo have dominated the mobile cellular market in Indonesia for a long time. Before 2008, competition in this market was limited mainly to coverage, product, and quality of service. Competition in price or usage tariff was very rare except during certain occasions. Due to lack of price competition, the competing operators were suspected to behave collusively. Partial cross-ownership has been blamed as a condition that may facilitate

coordination among the operators. Some paragraphs below briefly describe the history and analysis of that allegation.

Price-Fixing Allegation in the Mobile Cellular Market

The anticompetitive issue in the mobile cellular market was raised formally after F.X. Arief Poyuono, a leader of a non-governmental organization (NGO) called FSP-BUMN (Federasi Serikat Pekerja – Badan Usaha Milik Negara / United Federation of State-Owned Enterprise Workers), filed a formal report to KPPU in mid-October 2006 about an indication of price fixing between Indosat and Telkomsel. The report is mainly based on a post-paid tariff pattern of mobile to fixed line calls offered by the two biggest operators, Telkomsel and Indosat (Hukum On-line 2006a). The report indicates that as competing operators Telkomnet and Indosat should not set uniform prices for their mobile cellular service and argues that this pricing behavior is possible because both operators have close affiliation in ownership as well as in management (Hukum On-line 2006a). Table 6.1 compares the tariff of Telkomsel and Indosat that was used to justify the price fixing allegation by FSP-BUMN.

Table 6.1. Price Indicators Used by FSP-BUMN to Claim Price Fixing

Time-band	**Mobile to Fixed-line Tariff (Rp/minute)**	
	Indosat (Matrix)	**Telkomsel** (Halo)
Peak (08.00-22.00)	503,75	504
Off Peak (22.00-08.00)	422,5	423

Furthermore, they also argue that since Telkomsel and Indosat are dominant operators, their smaller competitors will imitate this pricing strategy and act as the market followers (Hukum On-line 2006a). In mid-November 2006, FSP-BUMN submitted additional data showing that the commissioners representing Singaporean share holders in Telkomsel and Indosat may have control over operational aspects in both competing operators (Hukum On-line 2006b).

In short, this NGO claims that partial ownership of the competing mobile cellular operators by Singaporean companies is a practice of cross-ownership leading to high prices in the mobile cellular market. At that time, KPPU considered that the allegation was weak and not supported by sufficient evidence (Hukum On-line 2006c). FSP-BUMN revised the report in late December 2006 and claimed that there were 11 telecommunications companies which should be responsible for the monopolization of the mobile cellular market in Indonesia (Hukum On-line 2006c).

However, in early April 2007 FSP-BUMN withdrew its report to KPPU (Hukum On-line 2007). They argued that the timeframe to investigate the case had expired and they could not find strong arguments to continue the case (Hukum On-line 2007; Rakyat Merdeka 2007). This action is incomprehensible, because it was still the clarification stage. Since the information and documents of the submitted report were not complete yet, the potential case could not enter the investigation stage. Lately, there has been information revealed that F.X. Arief Poyuono as the leader of FSP-BUMN has met Temasek high-level officers and received some financial assistance for not continuing the case (Jurnalnet 2007).

Investigation and Decision by KPPU

KPPU still continued the case based on their initial information. In early April 2007, the Secretariat of KPPU presented its initial view related to pricing behavior of the competing operators in the mobile cellular market and proposed the case be passed into the investigation stage[9]. The Commission agreed on this proposal and created a team to undertake a preliminary investigation which was conducted between 9 April 2006 and 22 May 2006. The report of the preliminary investigation shows strong indications that Temasek Group may breach Article 27[10] of Law No 5/1999

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[9] According to KPPU's case handling procedure established in 2006, every report of a potential case either the one comes from third party or as an output of internal monitoring activity must be clarified within 30 to 60 working days. In this stage, the Secretariat of KPPU examines several aspects including the party filing the case, rationale of the case, and possible relevant articles of the Law. If there is an initial indication of possible unlawful conduct, the clarification process may continue to the filing process. At this stage, the Secretariat should complete the document and gather information from the parties involved, which should be finished within 30 working days. Results and analysis in the filing stage must be presented by the Secretariat in front of the Commissioners within 14 working days afterward. If the Commissioners agree to these initial findings, they create a team to undertake preliminary investigation. The process takes at maximum 30 working days to finish. If the defendants refuse the conclusion in the preliminary investigation stage or the findings need to have stronger indication, the Commission can continue the case into further investigation which should be completed in 60 working days with possible extension of 30 working days. Furthermore, based on the analyses in these investigation processes, the team is given up to 30 working days to prepare the final decision of the case. The defendant can appeal KPPU's decision to the District Court in the first stage. If the defendants are not satisfied with the decision made by the District Court, they can appeal it to the Supreme Court. The decision of the Supreme Court is binding for all parties and must be exercised.

[10] Article 27 of Law No. 5/1999 mentions that "Business actors shall be prohibited from owning majority of shares in several similar companies conducting business activities in the same field on the same market, or establishing several companies with the same business activities on the same market, if such ownership causes: (a) one business actor or a group of business actors to control over 50% of the market share of a certain type of goods or services; (b) two or three business actors or a group of business actors to control over 75% of the market share of a certain type of goods or services."

about cross-ownership[11] that leads to domination of more than 50 percent market share by a group business entity, and Telkomsel may violate Articles 17[12] and 25[13] of the law about monopolization practice causing high tariff in the mobile cellular market and abuse of dominant position. Based on these findings, the Commission agreed to give a mandate for the team to carry out an advance investigation which ended at the end of September 2007.

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[11] According to KPPU, Telkomsel is owned by Telkom (65%), a state-owned company, and Sing-Tel (35%), a mobile cellular operator in Singapore. Moreover, STT, a telecommunication company in Singapore, dominates 41% of Indosat's shares. These companies, Sing-Tel and STT are allegedly owned by Temasek Holding. This condition leads to the assumption that policy making in Telkomsel and Indosat can be influenced by Temasek.

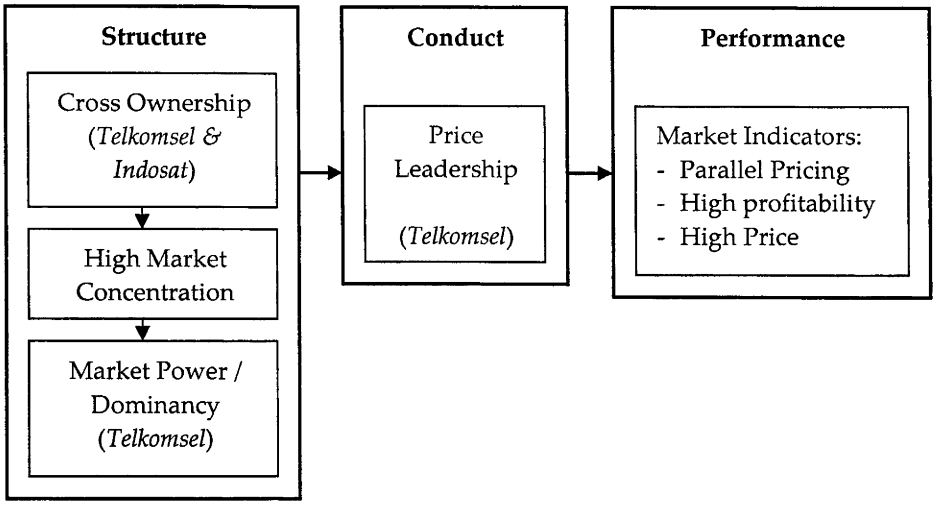
[12] Article 17 of Law No. 5/1999 says that
" (1) Business actors shall be prohibited from controlling the production or marketing of goods and or services which may result in monopolistic practices and or unfair business competition.
(2) Business actors may be reasonably suspected or deemed to control the production and or marketing of goods and or services as intended in paragraph (1) in the following events: (a) there is no substitute available yet for the goods and or services concerned; or (b) causing other business actors to unable to enter into business competition for the same good and or services; or (c) one business actor or a group of business actor controls over 50% of the market segment of a certain type of goods or service".

[13] Article 25 of Law No. 5/1999 says that
" (1) Business actors shall be prohibited using dominant position either directly or indirectly to: (a) determine the conditions of trading with the intention of preventing and or barring consumers from obtaining competitive goods and or services, both in terms of price and quality; or (b) limiting market and technology development; or (c) bar other potential business actors from entering the relevant market.
(2) Business actors shall have a dominant position as intended in paragraph (1) in the following events: (a) if one business actor or a group of business actors controls over 50% of the market segment of a certain type of goods or services; or (b) if two or three business actors or a group of business actors control over 75% of the market segment of certain type of goods or services".

Finally, on Monday 19 November 2007, the commission announced its decision on the case. It concluded that Temasek and several related companies breach Article 27.a of the law about prohibition to cross-own the firms with 50 percent of market share, and that Telkomsel violates Article 17.1 of the law in its attempts to dominate production or marketing in the mobile cellular market that leads to monopolistic and unfair business practices. However, the Commission could not find any evidence that Telkomsel abuses its dominant position to deter competitors as indicated in Article 25.1 of the law. As punishment, in addition to monetary fines, Temasek group had to divest its shares either in Telkomsel and Indosat, and Telkomsel was asked to lower its tariff at least 15 percent.

KPPU's effort to combine economics and legal approaches in its analysis should be appreciated. It might be the first case of KPPU that involves more advanced economics analysis. A structure-conduct-performance (SCP) approach is used in the analysis. In this approach, an anticompetitive behavior is identified by relating market structure and market performance. Figure 6.1 summarizes the approach used by KPPU in analyzing the case (KPPU 2007:73-5).

Figure 6.1. KPPU's Approach in Analyzing the Mobile Cellular Case



KPPU finds that cross-ownership of Telkomsel and Indosat by Temasek Group has increased their joint market share and market concentration which in turn strengthened the market power of the dominant operator (KPPU 2007:87-92). KPPU argues that in the cross-ownership scheme Temasek acts as an active share holder which tends to strengthen Telkomsel as the dominant operator and weaken Indosat as the closest competitor, through their strategic decision related to the development of a base transceiver station / BTS (KPPU 2007:97). By assuming that the Stackelberg competition model works in the mobile cellular market, Telkomsel , a dominant operator with the highest number of BTS, acts as a first mover and price leader, and competitors as followers imitate Telkomsel's pricing behavior (KPPU 2007:92-7). Statistical analyses on mobile cellular prices show that the patterns of Telkomsel and Indosat's prices are identical (KPPU 2007:97-9). In addition, the data also indicates that the profitability of the

three biggest mobile cellular operators in Indonesia is sufficiently high[14], and their retail prices are also higher than in other comparable countries[15] either for inter-network or intra-network calls. Table 6.2 summarizes several points in KPPU's report (KPPU 2007). Based on these facts, it is concluded that Telkomsel's price is excessive[16] and is followed by competitors causing high retail prices in the mobile cellular market (KPPU 2007:114).

[14] Profitability is measured based on EBITDA (earning before interest, tax, depreciation, and amortization).

[15] These comparable countries include Malaysia, Brunei, Thailand, India, Singapore, and Vietnam.

[16] KPPU is aware that this excessive price is still below the ceiling level of regulated price.

Table 6.2. Several Issues and Findings in KPPU's Decision

No	Topics	Finding / Conclusion
1	**Relevant market** (determined by product similarity -function, price, characteristics and market geography)	Relevant market for Indosat and Telkomsel is mobile cellular service with nation-wide coverage (not including fixed wireless access with limited mobility).
2	**Market share** (calculated based on operating income instead of subscribers)	Average market shares for Telkomsel, Indosat, and Excomindo are 61.24%, 25.15%, and 13.61% respectively.
3	**Market concentration** (measured based on Herfindahl-Hirschman Index or HHI to see market concentration, and Generalized HHI or GHHI to see cross-ownership effect on market concentration)	The HHI is getting higher indicating market is more concentrated. The GHHI is also getting higher indicating cross-ownership leads to higher market concentration. KPPU interprets it as that cross-ownership leads to more market power.
4	**Tariff regulation**	Operators still referred to past tariff regulation. New regulation was still in transition.
5	**Retail Tariff**	There is a pattern of price parallelism in post-paid service. KPPU assumes it is a practice of price leadership or tacit collusion. Telkomsel's and Indosat's tariffs are relatively higher compared to cost-based interconnection charge and the operators in some Asian countries.
6	**Investment growth** (indicated by number of Base Transceiver Station/BTS).	Between 2004 and 2005, Indosat experienced the lowest BTS growth. It is inferred that cross ownership weakened Indosat in order to soften market competition.
7	**Interconnection problem**	KPPU was informed that cost-based interconnection is not effective yet. KPPU was informed that there were some demanding requirements to have interconnection from Telkomsel such as minimum traffic and ownership of interconnection link.
8	**Profitability** (indicated by Earning Before Interest, Tax, Depreciation, and Amortization / EBITDA, and Return on Equity/ROE)	Telkomsel has the highest EBITDA in the Asia Pacific region (more than 70%) and Indosat also has high EBITDA (above 50%). Telkomsel has high ROE (55%). These indicators are interpreted as excessive profit of Telkomsel.
9	**Cross-ownership and Control of Management**	Temasek is able to control Telkomsel and Indosat through its subsidiaries even though they only held partial ownership.

Some Critiques of the KPPU's Analysis

Price analysis of the mobile cellular service is rather complex. Operators may discriminate prices according to several factors such as time band, termination of call, and type of scheme. Prices in peak time are usually higher than off-peak time. Furthermore, calls ending in the same operator (on-net calls) are usually cheaper than calls terminating in a rival operator (off-net calls). Moreover, pre-paid plans are usually more costly than post-paid plans. In this case, KPPU focuses on peak-time prices of post-paid and pre-paid plans.

In general, there are three major issues related to pricing behavior in the analysis. Firstly, based on price pattern, it is concluded that parallel pricing is obviously identified in post-paid plans but not in pre-paid plans (KPPU 2007:86). Secondly, the analysis also indicates that Telkomsel's post-paid price tends to increase and the pre-paid price is stable, while its competitors have decreasing price trends in both plans (KPPU 2007:86-7). Finally, based on paired sample tests, KPPU concludes that post-paid and pre-paid prices of Telkomsel and Indosat move in relatively similar directions (KPPU 2007:97-9).

These findings are used to support Telkomsel's price leadership argument. Even though the analyses have been conducted from several perspectives, KPPU still faces some critiques either internally or externally. Some domestic and foreign economists and experts have submitted their arguments to counter KPPU's analyses. Some objections related to economic and price analyses are described in paragraphs below.

Dr. Benny Pasaribu, one of KPPU's commissioners who is also a member of the investigation team, has dissenting opinions (KPPU 2007:114-9). He argues that, based on legal aspects, the cross-ownership argument could not be supported and consequently high market concentration is not a result of ownership by these two different Singaporean companies. Furthermore, he could not find any evidence of cartel, and the parallel price pattern is not necessarily a result of price fixing. In contrast, he supports the arguments of some studies that conclude that mobile cellular price has a decreasing trend. Moreover, he also claims that mobile cellular prices are still in the corridor of price regulation, and, if the ceiling is considered high, it is not the role of KPPU but government as regulator to lower ceiling price.

Likewise, Dr. Chatib Basri, Head of the Institute of Economic and Social Research of the Faculty of Economics of the University of Indonesia (LPEM-FEUI), also argues that parallel prices in the mobile cellular market are not necessarily a result of anticompetitive conduct and cannot be assumed to be an indication of price fixing (KPPU 2007:302). In addition, in contrast to KPPU, Dr. Sri Adiningsih claims that mobile cellular prices are being competitive, as shown by some price wars especially in off-peak periods (KPPU 2007:303-5).

In addition, some other critiques related to the methodology and calculation are mentioned below. KPPU is claimed to inappropriately use the Stackelberg competition model (KPPU 2007:401). The price-leadership model is used to analyze behavior of a dominant player competing with several very small competitors. In reality, three big operators dominate the mobile cellular market in Indonesia. Therefore, the Stackelberg price-leadership model should not be used in this case. Moreover, the Generalized

Herfindahl-Hirschman Index (GHHI) as a method to calculate market concentration is questioned because it is not commonly used and the calculation is not transparently described (KPPU 2007:306-7).

Re-focusing Price Analysis

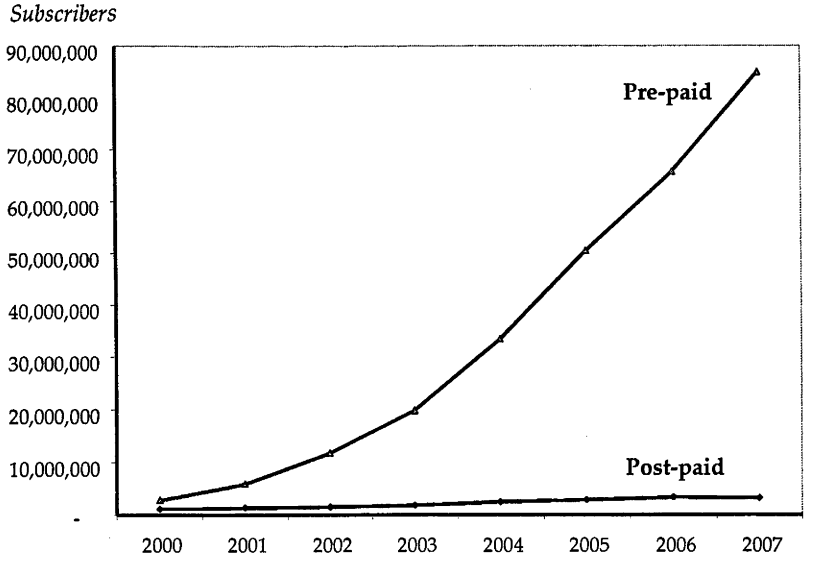
In addition to these critiques, KPPU's price analysis is considered rather unclear. Two findings based on the price pattern of post-paid and pre-paid plans seem contradictory. KPPU claims that it finds parallel price patterns in post-paid plans but not necessarily in pre-paid plans. This finding is used to support an assumption of price parallelism and leadership. In pre-paid plans, KPPU argues that Telkomsel tends to maintain the level of its price while Excelcomindo, one of its competitors, has a decreasing pattern either in on-net or off-net prices. It implies that there is no price leadership in pre-paid plans.

In fact, the analysis does not take into account the reality that the ceiling price of pre-paid plans is much higher than that of post-paid plans. The high ceiling level is aimed to provide ample room for operators to include subscription fees in the usage fee because pre-paid plans do not have such monthly fees. This high ceiling regulation gives pre-paid plans much greater pricing flexibility. In contrast, the ceiling level for the post-paid price is quite low. Price variations in post-paid price are mainly driven by changes in regulation. The evidence that off-net prices of post-paid plans behave uniformly is due to the fact that there was a change in price regulation that affects interconnection costs. But, since Telkomsel responded the change more quickly than rivals, it seems there is price leadership behavior.

These facts show that analysis based only on price information is not enough to draw a conclusion about price leadership behavior. Furthermore, even though KPPU could convincingly find evidence of parallel pricing, it does not necessarily show collusive behavior. Other factors such as cost, demand, and regulatory changes should also be regarded.

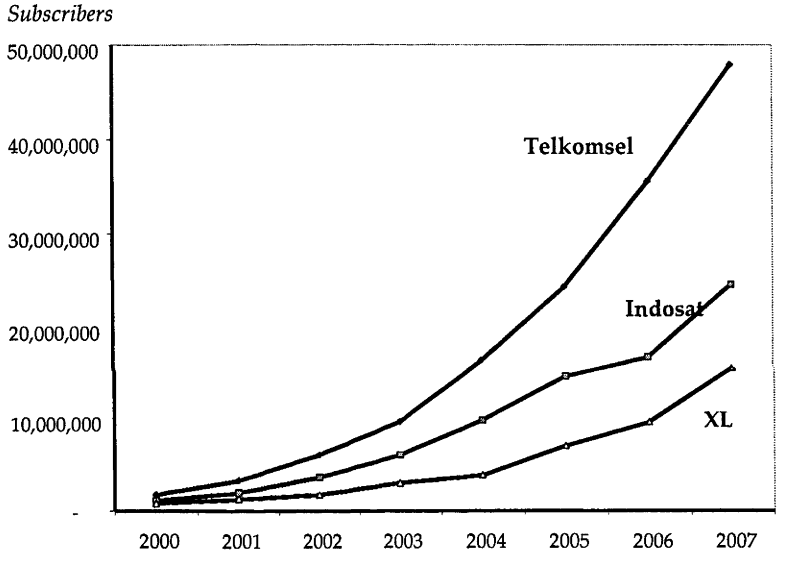
Moreover, since there are several segments in the mobile cellular market, price analysis should be focused on a certain segment in which price is a substantial aspect for subscribers. In this case, KPPU should pay more attention to possible collusive pricing in pre-paid plans. The reasons are that because pre-paid plans have a high ceiling price that makes pricing more flexible, and pre-paid plans also hold a large market share, which is around 96 percent of mobile cellular subscribers. Figure 6.2 compares subscriber growth of pre-paid and post-paid plans based on the data from the three biggest operators, Telkomsel, Indosat, and Excelcomindo (XL).

Figure 6.2. Pre-paid and Post-paid Subscribers



In the pre-paid market segment, Telkomsel has more than 50 percent of market share followed by Indosat and XL. Figure 6.3 illustrates subscriber growth for these three big operators. Furthermore, there are five major pre-paid plans including Simpati and Kartu-As of Telkomsel, Mentari and IM3 of Indosat, and XL-Bebas of Excelcomindo. Simpati, Mentari, and XL are the three major incumbent pre-paid plans. IM3 had just joined the market in 2001 and Kartu-As in 2003.

Figure 6.3. Pre-paid Subscribers of the three Biggest Operators



In Indonesia, mobile cellular operators are not prohibited to discriminate their prices based on call termination and time band. Operators can set different prices between calls terminating in their own networks (on-net) and calls ending in rivals' networks (off-net), or between peak and off-peak hours. It means that, an operator can have four combinations of prices for its pre-paid plan. Figures 6.4 to 6.7 compare the price patterns of five major pre-paid plans classified into these four combinations.

Figure 6.4. Pre-paid Prices for *Off-net* Calls in Peak Hours

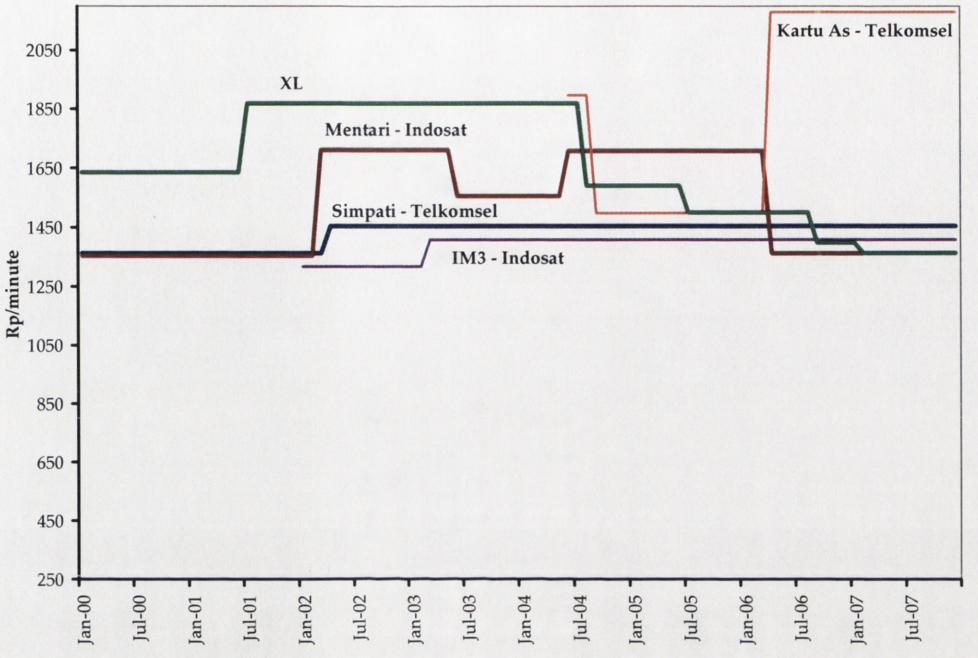


Figure 6.5. Pre-paid Prices for *Off-net* Calls in Off-peak Hours

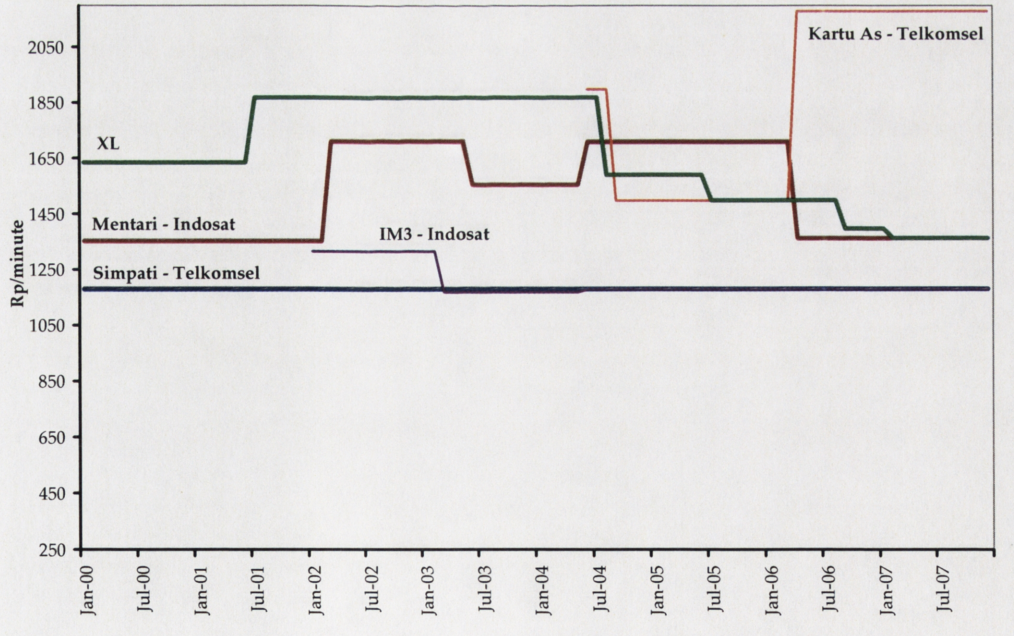


Figure 6.6. Pre-paid Prices for *On-net* Calls in Peak Hours

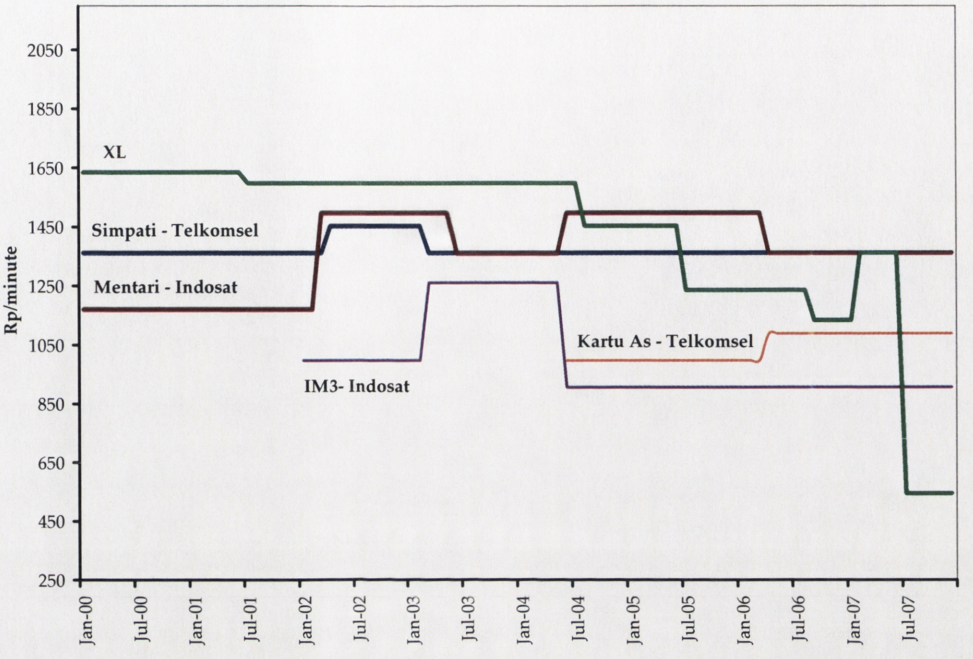
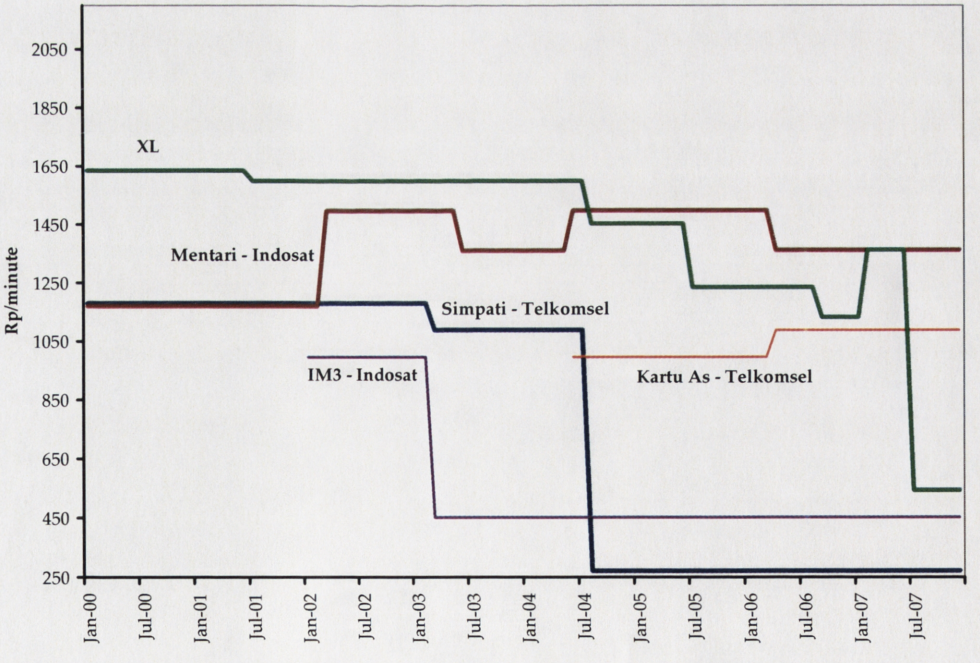


Figure 6.7. Pre-paid Prices for *On-net* Calls in Off-peak Hours



In general, as shown in Figure 6.4 and Figure 6.7, except for Kartu-As, off-net prices tend to converge close to Simpati's price either in peak or off-peak hours. However, this pattern does not indicate price leadership of Telkomsel because Simpati's off-net price is relatively stable and at the initial stage its level has been relatively lower than others. Furthermore, some pre-paid plans exhibit a decreasing trend of their on-net prices as revealed in Figure 6.6 and Figure 6.7.

Interestingly, in peak-hours, Simpati and Mentari keep their on-net prices high. In late 2007, their prices were similar and the highest. In contrast, XL, which initially set a higher price than rivals, decreased its price to be the lowest in the year 2007. Moreover, by comparing Figure 6.4 and Figure 6.6, it can be seen that Simpati and Mentari have close and even similar on-net and off-net prices in peak hours. It means that there is almost no price differential between the on-net and off-net prices of both plans.

Theoretically, as discussed in Chapter 5, in a market with two-way access and where retail price is linear and it is possible to discriminate based on call termination, such as the pre-paid plans of the mobile cellular market, off-net price is higher than on-net price. High off-net price is not only shaped by the level of access charge. Even though the access price is at cost, non-cooperative off-net price is still higher than on-net price. Low on-net price is to attract additional subscribers and high off-net price is to keep existing subscribers in its network (increase switching cost).

Since Simpati and Mentari are two competing pre-paid plans, does high on-net price indicate a collusive pricing? The prisoners' dilemma or co-ordination game that is often used to explain collusion can be utilized to

analyze the pricing behavior of the competing operators. In fact, in its report, KPPU uses a prisoners' dilemma game to explain possible collusive outcome in an oligopolistic market (KPPU 2007:79). But, this concept is not applied in their analysis.

In this game, competing parties would get a higher pay-off if they co-operate than if they behave selfishly. In the case that these parties met each other only once, a collusive outcome is hard to achieve except when there is an enforceable agreement. In this static game, they tend to betray to earn a much higher return. In contrast, if they interact infinitively, a collusive equilibrium is likely to sustain. In this dynamic game, betrayal will trigger punishment by the rival, leading to lower pay-off. A more detailed discussion of this concept is presented in Chapter 5 above.

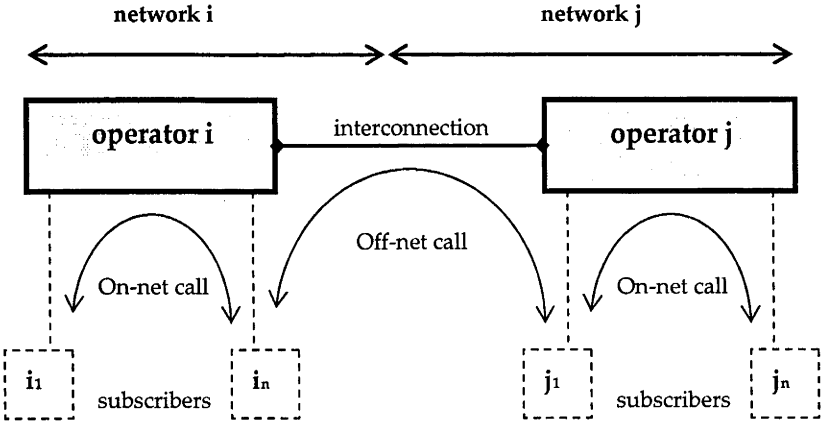
This game concept can be employed in the mobile cellular competition case. Since on-net price is the main variable in the observation, a collusive outcome can be interpreted by a condition where on-net prices of the competing operators are above their non-cooperative level. In practice, the profit-maximizing model can be used to estimate non-cooperative on-net price. These non-cooperative prices are then compared to actual on-net prices. If prices of the competing pre-paid plans are above their-own non-cooperative prices then it shows a collusive outcome which may be achieved through conspiracy, implicit agreement, or mutual understanding.

The following two sections present an application of the game theoretical concept to identify whether on-net prices are in collusive equilibrium. It is started by model development for the case and followed by analysis based on available data and information.

6.2. The Profit-Maximizing Model of Mobile Cellular Competition

In a competitive mobile cellular market operators do not only face a competition problem, but also co-operation. They compete to attract subscribers and, at the same time, they must co-operate to be able to access each others' networks. Network interconnection plays a crucial role because it makes it possible for a subscriber of one operator to call subscribers of the rivals. Therefore, the mobile cellular market can be considered as a market with two-way access. In the literature, a competition in two-way access structure is usually modeled as a market consisting of two competing operators (for example, see Armstrong 1998, Laffont et al. 1998a and b). Therefore, competition in the mobile cellular market can be illustrated in a simple model as presented in Figure 6.8.

Figure 6.8. Two-way Access in Mobile Cellular Service



The model assumes that there are two operators, i and j, where each of them has n subscribers. A call originating and terminating in the same operator's network is named an intra-network or on-net call. This on-net call incurs originating and terminating costs. Supposing that the transit or switching cost is negligible, the marginal originating cost (c_O) and marginal terminating costs (c_T) are constant and identical, and the competing operators face similar cost function, then the cost of an on-net call for both operators can be expressed as in Equation (6.1).

(6.1) Cost of on-net call = $c_O + c_T = 2c$

Furthermore, a call ending in a rival's network is labeled inter-network or off-net call. Cost for an off-net call consists of originating cost (c_O) and interconnection cost or access charge (a) as stated as in Equation (6.2).

(6.2) Cost of off-net call = $c_O + a = c + a$

In the case where access charge is equal to terminating cost ($a = c_T = c$) then costs of off-net and on-net calls are identical at $2c$. However, it does not mean that prices for off-net and on-net calls should necessarily be the same. In addition to cost, there are some other factors that may shape price setting, such as demand and regulatory constraints. For that reason, tariff or prices of calls are differentiated into on-net prices p_{ii} and p_{jj}, and off-net prices p_{ij} and p_{ji} respectively for operator i and j. The order of the subscript indicates the direction of call. For example, p_{ij} represents a price charged by the operator i for a call originating in its network and terminating in j's network.

Furthermore, since the case deals with pre-paid plans, the monthly subscription fee is not included.

In addition, it is defined that the market share of operator *i* is s_i and of operator *j* is s_j. Since there are only two operators in the model then the sum of these market shares represents the whole market as expressed in Equation (6.3). In addition, these market shares are a function of prices as notated in Equation (6.4).

(6.3) $s_i + s_j = 1$

(6.4) $s = S(p_{ii}, p_{ij}, p_{jj}, p_{ji})$

The total profit of an operator is determined by several components including profit from on-net calls, profit from originating outgoing off-net calls, profit from terminating incoming off-net calls, and fixed cost. In a linear and discriminatory retail price system, the basic form of profit function for operator *i* (π_i) can be expressed as in Equation (6.5) (Laffont 1998b:44; Hoernig 2007:174). The profit function of operator *j* can also be stated in similar way with some modification in the subscript of variables. To avoid duplication, the discussion below focuses only on operator *i*.

(6.5) $\pi_i = s_i\left[s_i(p_{ii} - 2c)q_{ii} + s_j(p_{ij} - a - c)q_{ij} - f_i\right] + s_i s_j(a - c)q_{ji}$

In this case, q_{ii}, q_{ij}, and q_{ji} are the average duration of on-net calls, outgoing off-net calls, and incoming off-net calls respectively. Furthermore, based on a balanced calling pattern assumption, that is the percentage of traffic is

reflected by market share (Laffont 1998a:3), the number of calls for on-net and off-net are defined as s_i^2 and $s_i s_j$ respectively. However, it does not mean that traffic is balanced, because call duration can be different for each operator (Hoernig 2007:174). Interaction between number of calls and average duration of calls represents a measure of traffic. Moreover, f_i is defined as fixed cost to maintain subscribers, such as the costs for initial connection and billing system.

In addition, access price a can also be written as a function of cost and access mark-up m as in Equation (6.6). Access mark-up may have positive value, meaning that access charge is above cost, or zero, implying that access price is set equal to termination cost. By substituting Equation (6.6) into (6.5), another form of profit function is shown as in (6.7).

(6.6) $a = (1+m)c$

(6.7) $\pi_i = s_i^2(p_{ii} - 2c)q_{ii} + s_i(1-s_i)\left[(p_{ij} - (2+m)c)q_{ij} + mcq_{ji}\right] - s_i f_i$

In this case, the focus is to see whether on-net price is optimal given off-net price. Suppose that the operators compete in price only for market share (s) and traffic duration (q), non-cooperative on-net price can be estimated by maximizing profit function π_i with respect to on-net price p_{ii} as presented in Equation (6.8). Since the competing services are sufficiently differentiated, equilibrium prices are not necessarily equal.

(6.8)

$$\frac{\partial \pi_i}{dp_{ii}} = 2s_i \frac{\partial s_i}{\partial p_{ii}}(p_{ii} - 2c)q_{ii} + s_i^2(p_{ii} - 2c)\frac{\partial q_{ii}}{\partial p_{ii}} + s_i^2 q_{ii} + \left[\frac{\partial s_i}{\partial p_{ii}}(1 - s_i) - \frac{\partial s_i}{\partial p_{ii}} s_i\right](p_{ij} - (2+m)c)q_{ij} + mcq_{ij}\Big] - \frac{\partial s_i}{\partial p_{ii}} f_i = 0$$

In the mobile cellular service, a change in on-net price may have an effect on subscription and calling decisions. The effect of on-net price change is accommodated in two measures of own-price elasticity of demand. Firstly, price-elasticity of subscription demand represents the impact of a change in on-net price to people's decision about which plan or operator to choose. It can be written in the mathematical form as in Equation (6.9).

$$(6.9)\quad \eta_{sii} = -\frac{\partial s_i}{\partial p_{ii}} \frac{p_{ii}}{s_i}$$

Secondly, price elasticity of usage demand denotes the effect of variation in on-net price to usage duration as shown in Equation (6.10).

$$(6.10)\quad \eta_{qii} = -\frac{\partial q_{ii}}{\partial p_{ii}} \frac{p_{ii}}{q_{ii}}$$

The negative sign in both elasticity estimates indicates that the mobile cellular service is a normal good where price change has the opposite effect to subscription or usage demand. Furthermore, by substituting Equation (6.9) and (6.10) into (6.8), a non-cooperative on-net price of operator *i* can be written as in Equation (6.11).

$$(6.11)\quad p_{ii}^{*}=\frac{\left[2\eta_{sii}+\eta_{qii}\right]}{\left[2\eta_{sii}+\eta_{qii}-1\right]}(2c)+\frac{\eta_{sii}}{\left[2\eta_{sii}+\eta_{qii}-1\right]}\left[\frac{(2s_i-1)}{s_i}\frac{\left[(p_{ij}-(2+m)c)q_{ij}+mcq_{ji}\right]}{q_{ii}}+\frac{f_i}{s_i q_{ii}}\right]$$

The result shows that on-net price is shaped by mark-up factors. The value of mark-up is determined by elasticity of subscription and usage demand. Furthermore, there are two major elements that construct non-cooperative on-net price. The first element only consists of on-net cost ($2c$) which is always positive. The second part contains several variables including average profit margin of delivering outgoing and incoming off-net calls$\left(\frac{(2s_i-1)}{s_i}\frac{\left[(p_{ij}-(2+m)c)q_{ij}+mcq_{ji}\right]}{q_{ii}}\right)$ and fixed cost/ on-net traffic ratio$\left(\frac{f_i}{s_i q_{ii}}\right)$.

This second part can be positive or negative. In general, all else equal, as long as fixed cost is small enough, the higher the market share the higher on-net price is. However, if the fixed cost is quite high, the reverse may be true.

Furthermore, off-net price can be defined as a function of cost and price/cost ratio k as shown in Equation (6.12). In addition, the on-net and off-net price differential d is also defined as a ratio between these prices as presented in Equation (6.13),

$$(6.12)\quad p_{ij}=k(2c)$$

$$(6.13)\quad d=\frac{p_{ii}}{p_{ij}}=\frac{p_{ii}}{k(2c)}\ \text{or}\ d^{*}=\frac{p_{ii}^{*}}{p_{ij}}=\frac{p_{ii}^{*}}{k(2c)}$$

In this case, the objective is on examining whether on-net price represented by price-differential is optimal at a given value of off-net price. By

substituting Equation (6-4) into (6.11), a non-cooperative on-net/off-net price differential condition can be written as in Equation (6-14).

$$(6.14)\quad d^* = \frac{\left[2\eta_{sii}+\eta_{qii}\right]}{\left[2\eta_{sii}+\eta_{qii}-1\right]}\frac{1}{k} + \frac{\eta_{sii}}{\left[2\eta_{sii}+\eta_{qii}-1\right]}\frac{1}{k(2c)}\left[\frac{(2s_i-1)c}{s_i}\frac{\left[(2(k-1)-m)q_{ij}+mq_{ji}\right]}{q_{ii}} + \frac{f_i}{s_i q_{ii}}\right]$$

Access price is equal to cost

In Indonesia, access charges are still regulated and the magnitude is close to cost[17]. In the case that access price reflects cost, then there is no added mark-up on top of access cost, implying $m=0$. Consequently, non-cooperative on-net price and optimal price differential as shown in Equations (6.11) and (6.14) can be re-written as in Equation (6.15) and (6.16) respectively.

$$(6.15)\quad p_{ii}^* = \frac{\left[2\eta_{sii}+\eta_{qii}\right]}{\left[2\eta_{sii}+\eta_{qii}-1\right]}(2c) + \frac{\eta_{sii}}{\left[2\eta_{sii}+\eta_{qii}-1\right]}\left[\frac{(2s_i-1)}{s_i}\frac{q_{ij}}{q_{ii}}(p_{ij}-2c) + \frac{f_i}{s_i q_{ii}}\right]$$

$$(6.16)\quad d^* = \frac{\left[2\eta_{sii}+\eta_{qii}\right]}{\left[2\eta_{sii}+\eta_{qii}-1\right]}\frac{1}{k} + \frac{\eta_{sii}}{\left[2\eta_{sii}+\eta_{qii}-1\right]}\frac{1}{k}\left[\frac{(2s_i-1)}{s_i}\frac{q_{ij}}{q_{ii}}(k-1) + \frac{1}{2}\frac{f_i}{cs_i q_{ii}}\right]$$

The prisoners' dilemma or co-ordination game discussed in Chapter 5 indicates that co-ordination can give higher joint profit than behaving selfishly. In this case, profit-maximizing or non-cooperative on-net price

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[17] Access charges for mobile cellular service used to be named air-time, and before 2008 it was set at Rp. 406 per minute for mobile-to-mobile interconnection in peak hours. As a comparison, a calculation of cost-based access charges for mobile service by an International consultant, Ovum, results in a value between Rp. 381 and Rp. 449. For that reason, it is assumed that access charges used before 2008 have been close to cost.

represents a selfish behavior. Accordingly, in the mobile cellular case, a collusive equilibrium can be identified if the competing operator set their actual on-net prices above their non-cooperative level. In other words, collusive pricing is suspected if the non-cooperative price differential is sufficiently lower than the actual price differential ($d^* << d_{actual}$).

Consequently, in the case that access price is set at cost, an allegation of collusive behavior does have sufficient grounds if Equation (6.17) is satisfied. In this case, x is the fixed cost factor which is defined as $\frac{1}{2}\frac{f_i}{cs_i q_{ii}}$.

$$(6.17) \quad \frac{\left[2+\frac{(2s_i-1)}{s_i}\frac{q_{ij}}{q_{ii}}(k-1)+x\right]\eta_{sii}+\eta_{qii}}{(2\eta_{sii}+\eta_{qii}-1)k} << d_{actual}$$

The following section examines whether pricing behavior of mobile cellular operators in Indonesia indicates a collusive outcome. The game theoretical principle discussed above is used as a method of analysis.

6.3. Analyzing Pricing Behavior of Mobile Cellular Operators

The discussion in previous sections indicates that in 2007 and before, dominant mobile cellular operators in Indonesia set high on-net price close to off-net price for their pre-paid plans. Theoretically, the non-cooperative on-net price should be lower than the off-net price. The lack of on-net price competition raises a concern about possible coordinated pricing among these competing operators. This section examines whether that price pattern may indicate a collusive behavior. It uses the idea explained in the prisoners'

dilemma or co-ordination game as a basic principle of analysis. In brief, the concept mainly argues that collusive behavior is identified if the competing parties set prices above their non-cooperative level.

Furthermore, as indicated above, the focus is on examining the on-net price of the pre-paid plans offered by three major mobile cellular operators in Indonesia: Telkomsel, Indosat, and Excelcomindo. The analysis compares the actual and non-cooperative on-net and off-net price differential. There are several sets of data and information required in this process including cost, price, and demand. Ideally, these indicators should be estimated based on actual operators' operational data. However, since these actual data are not available due to confidentiality reasons, they are estimated based on consumer information gathered in a survey conducted in April and May 2008 and some available publications.

In short, the analysis finds that in 2006 the prices of all pre-paid plans were sufficiently above their non-cooperative level. Furthermore, in 2007, there was a pre-paid plan that had a lower actual price differential than its non-cooperative level. For that reason, allegation of collusive pricing between Telkomsel and Indosat is supported. Moreover, it is also found that there was an unusual pricing behavior in one Indosat's pre-paid plans that may indicate a co-ordination of pricing between Telkomsel and Indosat. The paragraphs below discuss the process of analysis in more detail.

6.3.1. Data Collection and Estimations

This section describes the method of gathering data and the process of estimating some required variables to confirm whether Equation (6.17) is satisfied. The data used in the analysis are mainly based on consumer information collected in a survey. It is the best available data because actual data and information, especially related to traffic and subscription demand, could not be obtained from operators due to confidentiality reasons. Data and information gathered from the survey were mainly used to estimate elasticity indicators (η_{sii} and η_{qii}) and traffic ratio (q_{ij}/q_{ii}). In addition to the survey, some data especially related to costs and prices are extracted from various published sources. These data were employed to estimate mark-up of off-net/cost ratio (k), actual on-net/off-net price differential (d), market share (s), and fixed cost factor (x). A more detailed description of these data estimation processes is presented below.

Consumers' Preference Survey

Initially, the survey was prepared to collect data and information about consumer preferences and usage patterns for dial-up Internet service and mobile cellular service. Although questionnaires for these two services are put together in one form, they are independent of each other, meaning that the respondent is not necessarily a person who subscribes to both services. Appendix 1 shows some information gathered in the questionnaire.

The questionnaire contains some questions about demographic information of the respondents, their choice of mobile cellular service, their opinion about several important factors in choosing mobile cellular service, their usage

pattern during peak time, and hypothetical questions about what percent of their usage pattern will change as a response to a certain percent of price change during peak time. Demographic data, choice, and important factors in mobile cellular services are used to estimate elasticity of choice demand using discrete choice analysis. Furthermore, information on usage or traffic pattern is used to estimate traffic ratio between on-net and off-net calls. Finally, the hypothetical question on price change is used to estimate elasticity of usage demand during peak time.

The survey was conducted between 28 April and 23 May 2008 in several sub-districts of Jakarta and surrounding areas. It is considered that mobile cellular subscribers are relatively similar regardless of region. Thus, the information from subscribers in Jakarta represents the behavior of all subscribers. The survey was carried out mainly in some public places such as shopping centers, public parks, universities, or community centers. The locations were chosen randomly and potential respondents were also selected randomly from people visiting survey locations.

Most questionnaires were completed through assistance, that is, the interviewer read a question from questionnaire and wrote down the answer. It was intended to get accurate and complete information. In some situations, respondents were willing to participate in the survey but they did not have time to be interviewed directly. In this case, the interviewer gave the questionnaire form to respondents and made an appointment where and when the completed form could be taken. In total there were 412 people who were asked to participate in the survey. Among them, 320 people agreed to be respondents and the rest refused for several reasons, such as they did not have enough time, were not interested, or were not pre-paid subscribers.

There are 233 questionnaires which have complete information. The remainder of the forms filled in cannot be used due to lack of important information.

In general, the number of male and female respondents was relatively equal. It is almost similar to the sex ratio in Jakarta (BPS Jakarta 2007:55). The respondents were mostly people with an age below 36 years. This is comparable with statistical data showing that 65 percent of the population in Jakarta is below 35 years old (BPS Jakarta 2007:62). The respondents were mostly resident in east and south Jakarta. Statistics of Jakarta show that almost 50 percent of the population lives in these two municipalities (BPS Jakarta 2007:63). Moreover, most of the respondents were employees with incomes between Rp. 1 million and Rp. 5 million, and their monthly spending for mobile cellular service was below Rp. 100,000.-.

Furthermore, around 58 percent of the respondents subscribe to pre-paid plans offered by Telkomsel, either Simpati or Kartu As. Around 37 percent of them use Indosat's pre-paid schemes, Mentari and IM3. Moreover, the respondents see that tariff for voice calls and quality of signal are the most important factors influencing subscription decision. It implies that with a similar quality of signal, tariff is still considered as a strategic instrument for competition. In addition, around 57 percent of the respondents also subscribe to a secondary mobile cellular service. Most of the respondents who have a secondary mobile cellular service use fixed-wireless access (FWA) service with limited mobility due to its low tariff. It indicates that GSM and FWA services are not competing products (not substitutable). Summary statistics of respondents' demographic information and subscription choices are presented in Appendix 2.

Price Elasticity of Subscription Demand (η_{sii})

Own-price elasticity of subscription demand is an indicator that explains the effect of a change in price on consumers' decision of which operator to join. Discrete choice analysis is one alternative method that can be used to analyze market demand including elasticity measure. Currently, this technique has become more popular in some empirical studies on the telecommunications market. For example, the works of Madden and Simpson (1997) Rappaport et al. (nd), Kim and Kwon (2003), Ida and Kuroda (2005), and Ida and Kuroda (2006) use discrete choice method to estimate some demand parameters based on consumer preference information.

Discrete choice technique basically analyzes individual choice probability from several available alternatives. In this method, utility of an individual n over alternative i is expressed as a function of observable component v_{ni} and random component ε_{ni} as shown in Equation (6.18).

$$u_{ni} = v_{ni} + \varepsilon_{ni} \quad (6.18)$$

Assuming that the error component ε_{ni} is independently and identically distributed (iid), the probability of individual n choosing alternative i can be expressed in logit model as written in Equation (6.19).

$$P_{ni} = \frac{e^{V_{ni}}}{\sum_{j} e^{V_{nj}}} \quad (6.19)$$

Observable component v_{ni} is usually expressed as a linear function that consists of several attributes as in Equation (6.20).

(6.20) $v_{ni} = \beta_{ni}' x_{ni}$

In this case, x_{ni} is a vector of attributes of the representative utility i and β_{ni} is vector of coefficients of the corresponding attributes. If vector x only contains the characteristic of alternatives, the model is called a conditional logit model in which coefficient β is constant across the alternatives but value of attribute x may vary for different alternatives. In contrast, if the attributes only comprise individual characteristics of the consumers or respondents, it is named a multinomial logit model where each attribute x is constant across the alternatives but the coefficient β varies. Furthermore, the vector x may also contains alternative and individual attributes which is known as mixed logit model. However, by some adjustment on individual characteristics, either multinomial or mixed logit can be estimated based on the conditional logit approach (Cameron and Trivedi 2005:495).

In the mobile cellular case, the attributes are mixed involving alternative and individual characteristics. Specific alternative attributes are basic tariff of pre-paid plans during peak time including off-net price, on-net price, and mobile-to-fix price. Information about these prices is extracted from several publications and advertisements. These prices do not vary with individuals because all people face a similar price for the same service. Furthermore, attributes for individual characteristics covers some specific information about the respondents that participate in the survey. The information includes age, gender, working status, living conditions, income, expenditure,

and three preferences out of six factors related to mobile cellular service. These characteristics may be different across individuals. Table 6.3 summarizes the attributes and their value.

Table 6.3. Attributes and Their Values

Attributes	**Value**
Off-net price	Positive continuous
On-net price	Positive continuous
Fix-to-mobile price	Positive continuous
Age	Positive continuous
Male	0 (female); 1 (male)
Working	0 (Not working); 1 (Working)
Living_with_family	0 (not living with family); 1 (living with family)
Income	1 (less than Rp. 1 million); 2 (between Rp.1 and Rp.3 million); 3 (between Rp.3 and Rp.5 million); 4 (between Rp.5 and Rp.7 million); 5 (more than Rp.7 million);
Monthly_expenditure	Positive continuous
Tariff_preference	0 (less important); 1 (important)
Group_preference	0 (less important); 1 (important)
Signal_preference	0 (less important); 1 (important)
SMS_preference	0 (less important); 1 (important)
Feature_preference	0 (less important); 1 (important)
Coverage_preference	0 (less important); 1 (important)

These attributes and a constant are used to construct a conditional logit model. The alternatives are five pre-paid plans offered by three major mobile cellular operators. Since attributes that represent respondents' characteristics do not vary across alternatives, they need to be interacted with constant.

Three models with three different constants are regressed by using NLOGIT 4, specific software designed for discrete choice analysis.

In model 1, the constant is valued 1 if the choice is Telkomsel's pre-paid plans (Simpati and Kartu As) and 0 otherwise. Furthermore, in model 2, the constant is set at 1 if the respondent chooses pre-paid plans from Indosat (Mentari and IM3) and 0 otherwise. Moreover, in model 3, the constant is 1 if it is the pre-paid plan of XL and 0 otherwise. Regression results of these three models are presented in Table 6.4.

Table 6.4. Regression Results of Discrete Choice Model

Attributes	Model 1 Constant = Telkomsel		Model 2 Constant= Indosat		Model 3 Constant= XL	
	Coeff (β)	SE	Coeff (β)	SE	Coeff (β)	SE
Constant	2.031	1.454	-1.343	1.481	2.348	2.123
Off-net Price	**-0.007***	0.002	0.001	0.001	0.006*	0.001
On-net Price	**-0.002***	0.0005	**-0.001****	0.0003	-0.00004	0.0003
Mobile-To-Fix Price	**-0.001****	0.0003	**-0.002***	0.0004	**-0.0029***	0.0005
Constant*Age	**0.064****	0.029	-0.040	0.0304	-0.0544	0.0449
Constant*Male	-0.351	0.322	0.944*	0.315	**-0.8867****	0.3946
Constant*Working	**0.951****	0.452	-0.209	0.426	-0.7554	0.5542
Constant*Living_with_family	-0.276	0.374	0.081	0.367	0.1348	0.4739
Constant*Income	0.035	0.119	-0.039	0.115	-0.0185	0.1465
Constant*Monthly_expenditure	8.01e-07	2.01e-06	**-5.43e-06****	2.33e-06	**5.00e-06****	2.23e-06
Constant*Tariff_preference	**-1.430***	0.496	1.102**	0.539	0.8393	0.6996
Constant*Group_preference	-0.409	0.526	0.231	0.532	0.4641	0.7153
Constant*Signal_preference	-0.397	0.433	0.412	0.464	0.2371	0.6461
Constant*SMS_preference	-0.588	0.439	0.658	0.466	0.0538	0.6681
Constant*Feature_preference	-0.535	0.560	0.794	0.585	-0.0954	0.7745
Constant*Coverage_preference	0.214	0.446	-0.034	0.478	-0.0747	0.6789
Observation	233		233		233	
LR Chi-Square (16)	105.64		84.85		80.62	
Pseudo R-squared	0.14		0.11		0.11	
Log likelihood	-322.18		-332.57		-334.69	

(*) p< 1% ; (**) p< 5% ; (***)p<10% ; Coeff = Coefficient ; SE = Standard Error

In this result, only sign and level significance of the coefficients are informative while value of coefficient does not tell anything due to the non-linearity of the logit model. Among these three, model-1 is superior for several reasons. Firstly, it has negative sign in all coefficients related to price that is theoretically consistent. Secondly, these coefficients of prices are statistically significant at one percent and five percent level of significance. Thirdly, it fits the data better as shown by the highest pseudo R-squared value. For that reason, the regression results of model 1 are chosen in estimating own-price elasticity of demand.

In general, own-price elasticity of subscription demand can be defined as a change of choice probability over an alternative due to variation in its price. Furthermore, cross-price elasticity of subscription demand measures a fluctuation of choice probability of an alternative as a result of a change in the other alternative's price. Equations (6.21) and (6.22) respectively show mathematical expressions for own and cross-price elasticity. In these equations, P_i is probability choice of alternative i, p_i is its price, and p_j is other alternative j.

(6.21) $\eta_{ip_i} = -\frac{\partial P_i}{\partial p_i}\frac{p_i}{P_i}$ (own-price elasticity of alternative i)

(6.22) $\eta_{ip_j} = \frac{\partial P_i}{\partial p_j}\frac{p_j}{P_i}$ (cross-price elasticity of alternative i)

Substituting Equation (6.8) into (6.21) and (6.22) produce individual n own-price elasticity of alternative i and cross-price elasticity of alternative i with respect to alternative j can be estimated as shown in Equation (6.23) and

(6.24) respectively (Ben-Akiva and Lerman 1985:111; Train 2003:63-4). In the equations, parameter β_p is the coefficient of variable price obtained in the regression, p_{ni} is price of alternative i faced by individual n, and p_{nj} is price of alternative j faced by individual n.

(6.23) $\eta_{i_{p_{ni}}} = (1 - P_{ni})\beta_p p_{ni}$ (own-price elasticity of choice i for individual n)

(6.24) $\eta_{i_{p_{nj}}} = -P_{nj}\beta_p p_{nj}$ (cross-price elasticity of choice i for individual n)

Furthermore, Equation (6.24) indicates that cross-elasticity of individual is uniform for all alternatives.

Based on these mathematical equations, on-net price elasticity of choice probability can be estimated. Fortunately, NLOGIT4 has a feature to compute average elasticity of demand over elasticity of individual respondent. The numbers in bold in Table 6.4 are average on-net price elasticity of choice probability for each pre-paid plan, while the rest are cross-price elasticity estimates. Absolute values of all estimates of own-price elasticity of subscription demand have values greater than one, which means they are relatively elastic.

Table 6.5. Average On-net Price Elasticity of Choice Probability

Choice	Effects on probabilities of choice (Model-1)				
	Simpati	Kartu As	XL	Mentari	IM3
Simpati	**-2.0665** (0.6209)	1.1868 (0.6209)	1.1868 (0.6209)	1.1868 (0.6209)	1.1868 (0.6209)
Kartu As	0.2011 (0.1052)	**-2.4016** (0.1052)	0.2011 (0.1052)	0.2011 (0.1052)	0.2011 (0.1052)
XL	0.2932 (0.1215)	0.2932 (0.1215)	**-1.3334** (0.1215)	0.2932 (0.1215)	0.2932 (0.1215)
Mentari	0.4952 (0.2053)	0.4952 (0.2053)	0.4952 (0.2053)	**-2.5412** (0.2053)	0.4952 (0.2053)
IM3	0.4189 (0.1736)	0.4189 (0.1736)	0.4189 (0.1736)	0.4189 (0.1736)	**-1.5331** (0.1736)

the number in parentheses is standard-deviation of the mean

Price Elasticity of Usage Demand (η_{qii})

Own-price elasticity of usage demand is defined as a measure of sensitivity of calling duration as a result variation of price. Estimating this elasticity indicator requires information about traffic and price. Ideally, these data should be gathered from operators. However, due to unavailability of actual data, this elasticity is estimated based on information from subscribers.

In the survey, respondents were asked a hypothetical question about percentage of increase in mobile cellular usage if their pre-paid plan reduces its on-net price in peak hour by 20 percent, 30 percent, and 40 percent. Price elasticity of traffic demand is estimated by relating usage and price variations. Since usage and price changes are stated in percentage, the coefficient attached to variable price directly indicates own-price elasticity of

demand η_{qii}. Equation (6.25) shows the equation used in the ordinary least square regression. The result of the regression for each pre-paid plan is presented in Table 6.6.

(6.25) $\%\_increase\_of\_usage = const + \eta_{qii}(\%\_price\_reduction)$

Table 6.6. Own-Price Elasticity of Usage Demand

	Simpati (Telkomsel)	**Kartu As** (Telkomsel)	**XL-Bebas** (Excelcom)	**Mentari** (Indosat)	**IM3** (Indosat)
Mean	0.746	0.383	0.383	0.600	0.479
Standard Deviation	1.344	0.585	0.406	0.883	0.614
Minimum	0	0	0	0	0
Maximum	9	3	2	4	3.333

Parameter	**Simpati** (Telkomsel)	**Kartu As** (Telkomsel)	**XL-Bebas** (Excelcom)	**Mentari** (Indosat)	**IM3** (Indosat)
% Price reduction	**3.712***	**2.662***	**1.300***	**2.999***	**2.390***
	(1.006)	(0.913)	(0.429)	(0.977)	(0.585)
Constant	-0.367	-0.415	-0.007	-0.299	-0.238
	(0.313)	(0.284)	(0.133)	(0.304)	(0.182)
Observation	255	54	126	114	150
F-Statistics	13.62	8.50	9.19	9.43	16.72
Adjusted R-Squared	0.05	0.12	0.06	0.07	0.10

(*) p< 1% ; (**) p< 5% ; (***)p<10%; the number in parentheses is standard-error

The result shows that on-net price elasticity of usage demand of each pre-paid plan is relatively elastic and statistically significant at one percent level of significance. The magnitudes are relatively moderate between -1.3 and -3.7. As a comparison, elasticity of usage demand for the mobile cellular industry in 2003, 2004, 2005, and 2006 estimated by LPEM-FEUI are -8.39, -32.12, -6.92, and -3.84 respectively (LPEM-FEUI 2007:45). Furthermore, KPPU's elasticity estimations for average price in 2003, 2004, 2005, and 2006

are -10.13, -25.42, -7.89, and -14.24 respectively. Moreover, KPPU's estimations for on-net price in similar years are -28.67, -8.43, -7.83, and -17.54 (KPPU 2007:122). Elasticity estimates of both institutions are quite high, meaning that demand for mobile cellular service is quite elastic and KPPU is also aware that the estimates might be too high (KPPU 2007:123).

Off-net and On-net Traffic Ratio (q_{ij}/q_{ii})

Traffic ratio between outgoing off-net calls and on-net calls is one indicator that needs to be estimated based on consumer information. In the survey, respondents are asked about their monthly spending, daily usage duration (in minutes), and traffic pattern (in percent). However, the information about usage duration seems inaccurate. Their approximations about average daily usage duration are often too high compared to their monthly expenditure. For that reason, it was decided to estimate their usage duration based on monthly expenditure, traffic pattern, and regular tariff of the corresponding pre-paid plan. Equation (6.26) shows the formula for estimating individual monthly total usage duration q.

$$(6.26)\quad q = \frac{Monthly\_Expenditure}{\left(p_{ii} * \%q_{ii} + p_{ij} * \%q_{ij} + p_{if} * \%q_{if} + \hat{p}_{ii} * \%\hat{q}_{ii} + \hat{p}_{ij} * \%\hat{q}_{ij} + \hat{p}_{if} * \%\hat{q}_{if}\right)}$$

In this case, $\hat{p}_{ii}, \hat{p}_{ij}, \hat{p}_{if}$ are peak time tariffs for on-net, off-net, and mobile-to-fixed phone calls respectively; p_{ii}, p_{ij}, p_{if} are off-peak time tariffs for on-net, off-net, and mobile-to-fixed phone calls respectively; $\%\hat{q}_{ii}, \%\hat{q}_{ij}, \%\hat{q}_{if}$ are percentage of traffic in peak hours for on-net, off-net, and mobile-to-fixed

phone calls respectively; and $\%q_{ii}$, $\%q_{ij}$, $\%q_{if}$ are percentage of traffic in off-peak hours for on-net, off-net, and mobile-to-fixed phone calls respectively.

Furthermore, in order to have detailed information of usage duration, total usage duration of each subscriber is multiplied with the percentage of traffic of each type of call in a certain period as shown in Equation (6.27).

(6.27) $q_{ii} = q * \%q_{ii}$; $q_{ij} = q * \%q_{ij}$; $q_{if} = q * \%q_{if}$ (off-peak hours traffic)

$$\hat{q}_{ii} = q * \%\hat{q}_{ii} \;;\; \hat{q}_{ij} = q * \%\hat{q}_{ij} \;;\; \hat{q}_{if} = q * \%\hat{q}_{if} \quad \text{(peak hours traffic)}$$

Moreover, total usage duration for each call type is obtained by aggregating corresponding usage duration of all respondents who were attached to the same pre-paid plan. In addition, dividing total usage duration of each type of call by the number of respondents provides average usage duration per subscriber as indicated in Equation (6.28).

(6.28) $avg(q_{ii}) = \frac{\Sigma q_{ii}}{n}$; $avg(q_{ij}) = \frac{\Sigma q_{ij}}{n}$; $avg(q_{if}) = \frac{\Sigma q_{if}}{n}$ (off-peak hours)

$$avg(\hat{q}_{ii}) = \frac{\Sigma \hat{q}_{ii}}{n} \;;\; avg(\hat{q}_{ij}) = \frac{\Sigma \hat{q}_{ij}}{n} \;;\; avg(\hat{q}_{if}) = \frac{\Sigma \hat{q}_{if}}{n} \quad \text{(peak hours)}$$

Calculations of average usage duration for each pre-paid plan are summarized in Table 6.7.

Table 6.7. Average Usage Duration of Each Pre-paid Plan

Pre-paid Plan	Average Usage Duration (in minute)					
	Peak Hours			Off-peak Hours		
	On-net	Off-net	To Fix	On-net	Off-net	To Fix
Simpati – Telkomsel	41.93	17.53	9.63	24.14	7.43	6.40
Kartu As - Telkomsel	37.26	13.18	3.18	18.39	6.08	2.04
XL – Excelcomindo	115.12	35.62	16.00	35.81	11.10	6.20
Mentari – Indosat	85.28	40.31	20.08	31.27	12.11	5.62
IM3 – Indosat	39.93	14.94	4.22	19.63	3.97	0.86

Based on the average usage duration for each pre-paid plan, the traffic ratio between outgoing off-net calls and on-net calls can be calculated by dividing average usage duration of off-net calls with related average duration of on-net calls. Table 6.8 presents the ratio between off-net and on-net calls. The ratio indicates that most calls are intra networks (on-net calls) especially in the off-peak period. The pattern of this estimation is in line with a statement in one of Telkomsel's quarterly reports mentioning that since 2003 their on-net traffic is higher than off-net traffic (Telkomsel 2003:2).

Table 6.8. Traffic Ratio of Each Pre-paid Plan

Pre-paid Plan	Traffic Ratio (Off-net/On-net)	
	Peak Hours	Off-peak Hours
Simpati – Telkomsel	0.42	0.31
Kartu As – Telkomsel	0.35	0.33
XL – Excelcomindo	0.31	0.31
Mentari – Indosat	0.47	0.39
IM3 – Indosat	0.37	0.20

Off-net Price/Cost Ratio (*k*) and On-net/Off-net Price Differential (*d*)

Mark-up in a product or service exists if price is set above its cost. Therefore, identifying mark-up requires information on cost and price. In the mobile cellular service, price information is available publicly but not for costs. The only available information related to cost is access charge, which represents the cost for terminating a call.

In this estimation, it is assumed that access charge is set at cost, and the cost for originating a call is identical with the cost for terminating a call. The reason for this assumption is that cost-based access price calculated by an International consultant is close to the airtime tariff used during 2000 and 2007 as shown in Table 6.9. This airtime tariff reflects half the price of a mobile-to-mobile call of post-paid service. It implies that the cost of a call for post-paid service (origination and termination) is equal to twice of access charge.

Table 6.9. Access Charge and Estimated Cost of a Call

	Access Price (Local Call-peak time)	**Cost of a Call (2 x Access price)**
Airtime Tariff applied in 2000-2007	Rp. 406	**Rp. 812**
Ovum's cost-based calculation (based on incumbent data)	Rp. 449	Rp. 898
Ovum's cost-based calculation (based on best practice data)	Rp. 381	Rp. 762

The condition is different in pre-paid plans. Operators are allowed to set a higher pre-paid price than twice the air time tariff. Therefore, if the tariff of pre-paid plans is above Rp. 812,- per minute, it indicates that a mark-up is applied on top of cost. Thus, the ratio between off-net price and cost of a call, k, can be expressed as in Equation (6.29).

$$(6.29)\quad k = \frac{p_{off-net}}{812}$$

In addition to off-net price-to-cost ratio, a ratio is also required between actual on-net price and off-net price. This ratio is called price differential d and can be formulized as in Equation (6.30).

$$(6.30)\quad d = \frac{p_{on-net}}{p_{off-net}}$$

Furthermore, Table 6.10 shows values for k and d for each pre-paid plan calculated based on average prices in 2006 and 2007.

Table 6.10. Off-net price/cost Ratio (k) and Actual Price Differential (d)

Pre-paid Plan	Average Price (Rp)		k	d
	Off-net	On-net		
2006				
Simpati – Telkomsel	1,455	1,364	1.79	0.94
Kartu As – Telkomsel	2,011	1,068	2.48	0.53
XL – Excelcomindo	1,466	1,202	1.81	0.82
Mentari – Indosat	1,450	1,398	1.79	0.96
IM3 – Indosat	1,409	909	1.74	0.65
2007				
Simpati – Telkomsel	1,455	1,364	1.79	0.94
Kartu As – Telkomsel	2,182	1,091	2.69	0.50
XL – Excelcomindo	1,366	935	1.68	0.68
Mentari – Indosat	1,364	1,364	1.68	1.00
IM3 – Indosat	1,409	909	1.74	0.65

Source: various publications

Market Share (s)

Market share of pre-paid services indicates a ratio between subscriber numbers of certain pre-paid plans and total subscribers of pre-paid plans. Information about subscriber numbers can be collected from operators'

quarterly and annual reports. Telkomsel, which has two major pre-paid plans, regularly publishes subscriber number of Simpati and Kartu-As. Furthermore, XL also normally states the number of its pre-paid subscribers in its reports. Similarly, Indosat also used to give detailed information about Mentari and IM3's subscribers.

However, since 2006, Indosat does not provide details of subscribers of each pre-paid plan in its report but only the total of pre-paid subscribers. In the calculation, subscribers of Mentari and IM3 can be estimated by assuming they still have similar portion of the total of Indosat's subscribers as in the previous year. Subscriber details and estimated market share of these five pre-paid plans for 2006 and 2007 are presented in Table 6.11.

Table 6.11. Estimated Market Share of Pre-paid Plans in 2006 and 2007

Pre-paid Plan	Subscribers (market share) 2006	Subscribers (market share) 2007
Simpati – Telkomsel	21,378,000 (36.3%)	23,986,000 (28.2%)
Kartu As - Telkomsel	12,557,000 (21.3%)	21,991,000 (25.9%)
XL - Excelcomindo	9,141,000 (15.5%)	14,988,000 (17.7%)
Mentari – Indosat	8,733,329* (14.8%)	13,169,987* (15.5%)
IM3 – Indosat	7,145,451* (12.1%)	10,775,444* (12.7%)

(*) Estimated based on previous year proportion
Source: Quarterly and Annual Reports of Telkomsel, Indosat, and Excelcomindo

Fixed-Cost Factor (x)

Fixed-cost factor is defined as a ratio between fixed cost and total on-net cost of the pre-paid plan as shown in Equation (6.31).

$$(6.31)\quad x = \frac{1}{2}\frac{f_i}{cs_i q_{ii}}$$

The denominator, on-net cost of the pre-paid plan, may be estimated based on available information on cost of a call ($2c$), market share (s), and on-net traffic (q_{ii}). However, the data about fixed cost (f_i) is not available.

Alternatively, this ratio can be approximated based on accounting data of the operator. In this case, fixed cost is represented by operating expense, which is relatively constant whether there is a production or not. Furthermore, on-net cost is replaced by operating cost which varies depend on total output or production. Operating cost can be calculated by excluding earning-before-interest-tax-depreciation-amortization (EBITDA) from operating revenue. Based on this approach, the fixed-cost factor can be written as in Equation (6.32).

$$(6.32)\quad x = \frac{operating\_expense}{operating\_cost} = \frac{operating\_expense}{operating\_revenue - EBITDA}$$

Furthermore, Table 6.12 presents the fixed cost factor for 2006 and 2007 of three major mobile cellular operators calculated based on the information in annual reports of Telkomsel, Indosat, and Excelcomindo.

Table 6.12. Fixed Cost Factor

	Operating Expense *(billion Rps)*	**Operating Revenue** *(billion Rps)*	**EBITDA** *(billion Rps)*	x
2006				
Telkomsel	12,836	29,145	20,737	0.763
Indosat	8,840.7	12,239.4	5,187.5	0.852
Excelcomindo (XL)	3,224	6,466	3,912	0.412
2007				
Telkomsel	16,791	36,670	25,604	0.758
Indosat	11,968.9	16,488.5	8,714.8	0.769
Excelcomindo (XL)	4,480	8,365	3,509	0.461

Source: Annual Reports of Telkomsel (2007), Indosat (2007),and Excelcomindo (2007)

6.3.2. Analysis

As discussed in Chapter 5 above, theoretically on-net price should be lower than off-net price (Berger 2004:14; Cricelli et al. 2005:4; Hoernig 2007:176). This on-net and off-net price differential is related to operators' strategy in competition. High off-net price may increase the switching cost for subscribers who have calling groups (family or friends) in that network, which makes subscribers less motivated to change subscription. Low on-net price may attract subscribers who have calling groups (family or friends) to join that network. The size of the gap between on-net and off-net prices is determined by several factors, including cost and demand of the service.

In the analysis, it is assumed that the existing off-net price has been at its optimal level. Furthermore, an optimal on-net price is reflected by its profit maximizing or non-cooperative level at a given off-net price. However, instead of on-net price, we prefer to use price differential reflecting a ratio between optimal on-net and off-net prices. Therefore, the purpose of this analysis is to examine the non-cooperative level of price differential of each pre-paid plan.

A possible collusive behavior is identified based on the principle of a simple game explained in Chapter 5 above. If actual price differentials of the competing pre-paid plans are altogether sufficiently higher than their own non-cooperative level, then it exhibits a collusive outcome. This collusive equilibrium may indicate a possible explicit or implicit collusive behavior by the competing operators. In contrast, it implies that if only one operator sets high price above its non-cooperative level, it does not show possible collusive conduct in the market.

In this case, actual price differential is obtained by dividing of on-net and off-net prices. Furthermore, the non-cooperative price differential is calculated by applying several variables estimated above in Equation (6.17). Calculations of these actual and non-cooperative price differentials for 2006 and 2007 are summarized in Table 6.13. The result indicates that actual on-net and off-net price differentials (d_{actual}) of most pre-paid plans are above their non-cooperative level ($d_{non\text{-}cooperative}$) except for XL-Bebas in 2007.

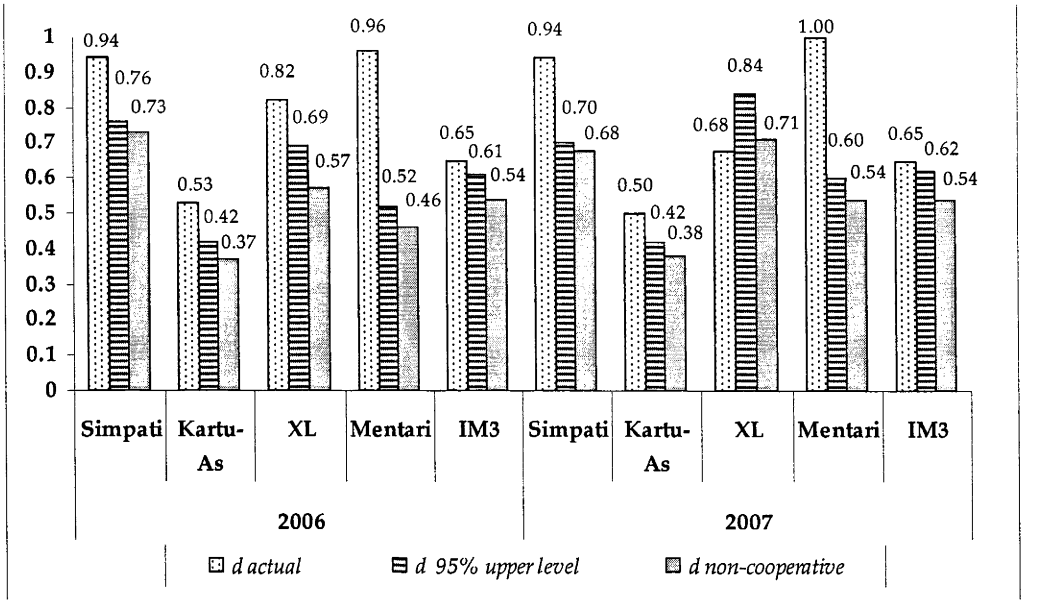
Table 6.13. On-net and off-net Price Differential

Pre-paid Plan	k	Traffic ratio (q_{ij}/q_{ii})	Market share (s)	$\lvert\eta_{sii}\rvert$	$\lvert\eta_{qii}\rvert$	X	$d_{non\text{-}cooperative}$	d_{actual}
2006								
Simpati – Telkomsel	1.79	0.42	36.3%	2.0665	3.712	0.763	**0.73**	**0.94**
Kartu As – Telkomsel	2.48	0.35	21.3%	2.4016	2.662	0.763	**0.37**	**0.53**
XL-Bebas – Excelcom	1.81	0.31	15.5%	1.3334	1.300	0.412	**0.57**	**0.82**
Mentari – Indosat	1.79	0.47	14.8%	2.5412	2.999	0.852	**0.46**	**0.96**
IM3 – Indosat	1.74	0.37	12.1%	1.5331	2.390	0.852	**0.54**	**0.65**
2007								
Simpati – Telkomsel	1.79	0.42	28.2%	2.0665	3.712	0.758	**0.68**	**0.94**
Kartu As – Telkomsel	2.58	0.35	25.9%	2.4016	2.662	0.758	**0.38**	**0.50**
XL-Bebas – Excelcom	1.74	0.31	17.7%	1.3334	1.300	0.461	0.71	0.68
Mentari – Indosat	1.73	0.47	15.5%	2.5412	2.999	0.769	**0.54**	**1.00**
IM3 – Indosat	1.74	0.37	12.7%	1.5331	2.390	0.769	**0.54**	**0.65**

However, the non-cooperative on-net and off-net price differential of each pre-paid plan reflects only a mean of a statistical distribution. Since some of these actual price differentials are close to their non-cooperative level, we need to now whether these actual price differential are inside or outside of a certain range of that distribution. In this case, we are only concerned with the upper level of the non-cooperative price differential. If actual price differential is higher than the upper level, we conclude that on-net price is sufficiently high.

The upper level of these non-cooperative price differentials with 95 percent level of confidence is calculated by bootstrapping the data that is used for estimating elasticity. Bootstrap is a method to take a sample with replacement from available sample data. In this case, 1000 sub-samples are generated from the sample data and each sub-sample has independent and identical distribution. The purpose of applying this technique is to obtain variance of the mean average of the data. Upper level is defined as a maximum value over 95 percent of confidence interval. Figure 6.9 graphically compares actual, upper-level and non-cooperative price differentials of five major pre-paid plans in 2006 and 2007.

Figure 6.9. On-net/Off-net Price Differential (*d*)



The figure above indicates that in 2006 on-net prices of all pre-paid plans were above what they should be. It demonstrates a collusive outcome which may imply that there was a possibility of collusive or price leadership behavior in 2006. Furthermore, in 2007 other pre-paid plans were relatively unchanged but XL had a lower actual price differential than its non-cooperative level. This indicates that in 2007 XL changed its strategy not to be a follower or not engage in collusive behavior. These two facts may support KPPU's allegation of price leadership or collusive pricing in the past.

Furthermore, the price differentials of four pre-paid plans offered by Telkomsel (Simpati and Kartu As) and Indosat (Mentari and IM3), which were relatively stable in these two observed years, may suggest that pricings of these two related operators had been coordinated. The unusual pricing behavior of Mentari may also support this allegation. In both years, Mentari

of Indosat kept its on-net price sufficiently high above its non-cooperative level. In fact, considering its subscription demand is relatively elastic, lowering on-net price would gain more subscribers and increase profit. In the prisoners' dilemma game, Mentari's pricing strategy reflects a non-profit maximizing and non co-operative behavior leading to minimum pay-off. As a result, if this pricing is maintained, it may give adverse impact to Mentari itself. This conclusion may be in accordance with KPPU's allegation that there is an attempt to weaken Indosat and strengthen Telkomsel by Temasek. However, KPPU's analysis is mainly based on the growth of the investment performance of Indosat in base-transceiver station (BTS) development that was relatively stagnant compared to Telkomsel.

If this allegation is true, Temasek's strategy to weaken Indosat is difficult to understand. In term of ownership, Temasek indirectly holds majority shares in Indosat and minority shares in Telkomsel. Therefore, it may be profitable for Temasek to do the reverse—that is, strengthening Indosat and weakening Telkomsel.

One possible reason for this behavior is that there might be an internal policy of both operators not to compete in price. Simpati of Telkomsel and Mentari of Indosat are two major pre-paid plans and their on-net prices in peak hours are relatively similar. This coordination is possible since Temasek indirectly owns Telkomsel and Indosat. Temasek might expect a leader-follower effect where competitors would imitate their prices. It seems that this strategy worked in 2006 but not in 2007. After Hasnul Suhaimi[18] led the company, XL

[18] Hasnul Suhaimi used to be the President Director of Indosat. After resigning from Indosat, he became the President Director of Excelcomindo.

reformed its positioning and pricing strategy in 2007 (Excelcomindo 2007:21). This new paradigm makes XL a real competitor rather than a market follower. Moreover, it seems that Indosat and Telkomsel could not respond this market situation quickly, perhaps because their strategic decision should indirectly be made with consultation with Temasek as an active shareholder.

6.4. Policy Implications

There are two lessons can be taken from the Indonesian mobile cellular case. The first is related to analysis of operators' pricing behavior. A conclusion about competitive or price leadership is not sufficiently justified if only based on price pattern or price movement analysis. There are several factors that may influence a price movement including cost, demand, and regulatory constraint.

The discussion above shows that allegation about collusive pricing or price leadership in the mobile cellular market based on off-net price of post-paid plans is misleading. Parallel movement of off-net price may give an impression that there has been a price leadership. In fact, post-paid price is regulated at a low ceiling level that makes operators tend to set their price at the ceiling. Consequently, a regulatory change that affects access charge, as happened in early 2004, leads to an increase in off-net prices of all operators. In this case, Telkomsel adjusted its tariff earlier than other operators. Therefore, it seems like a price leadership pattern. Actually, cost was the main factor driving parallel pricing in post-paid plans.

In contrast, in pre-paid plans, price was regulated at a sufficiently high ceiling level. All operators set their price below this ceiling but with different patterns. Some pre-paid plans start from a high level and then gradually reduce the prices. Furthermore, the others maintain their price at moderate levels. In general, off-net prices tend to converge to a point but on-net prices are rather diverging. This pattern may give a figure that suggests competition in on-net price is getting more intense. In fact, the profit-maximizing analysis above reveals that most on-net prices of these pre-paid plans are still sufficiently above their non-cooperative level. It implies that despite price movement showing an aggressive pattern, it does not always indicate competitive level.

The second lesson is about price regulation. The case of pre-paid plans describe above shows that a high ceiling price may give operators sufficient room to set price at different levels. It seems that operators feel safe to set price at any level as long as it is still below ceiling. As a result, prices are above their profit-maximizing level. This finding may indicate that ceiling price regulation has encouraged operators to set high prices. It is similar with conclusions of some empirical studies about the collusive effect of price regulation as discussed in Hausman (2002), Knittel and Stango (2003), and Ma (2007).

Current development shows that, as there are some new operators entering the market, Indonesia's regulatory regime has eliminated price ceiling regulation in mobile cellular service. However, the new policy still controls pricing behavior by creating a floor price. The objective of this policy is to prevent predatory behavior by dominant operators. However, this restriction may deter limited price competition. Hausman (2002) suggested that price

regulation could be removed if there are four or five competing operators with relatively equal position in the market. This advice implies that in a relatively competitive market, retail price should not be constrained either by ceiling or floor price. Furthermore, any other retail pricing rule such as price filing should also be avoided. MacAvoy (1995) and Choi (2001) find that a requirement to file a proposal or to report a plan for price change has discouraged price competition in the US and Korea respectively. Price regulation may lead to market distortion or limiting competition. In terms of retail pricing, a continuous price monitoring by the regulator or competition commission may be more effective in controlling operators' pricing behavior.

In addition to pricing matters, there is another lesson about policy making process in the privatization that can be drawn from the case. The divestment of government's shares in Indosat in late 2002 raised controversies especially about transparency and accountability of the process. In addition, KPPU revealed another concern about potential breach of Anti-monopoly Law (Law No 5/1999) related to cross-ownership, merger, and acquisition particularly when the winner of the bidding was Singapore Technology Telemedia (STT) of the Temasek group. It was based on the fact that another Temasek affiliated company, Sing-Tel, also holds significant shares in Telkomsel, Indosat's main competitor.

At that time, the State Minister for State-Owned Company, Laksamana Sukardi, argued that there is no obligation for the government to have a consultation with the KPPU in a privatization process. The minister is formally right because in term of ex-ante regulatory process KPPU is only mandated by the law to provide non-binding policy advocacy to the government. It means that the government has discretion whether to follow KPPU's advice or not. The condition might have been different if KPPU's

opinion on this cross-ownership issue was taken into account. Temasek would have not been able to buy Indosat and collusive pricing facilitated by cross-ownership would have not happened.

This experience shows that, in order to avoid potential anticompetitive conduct, competition analysis should also be included in the privatization or foreign direct investment review particularly if it leads to the cross-ownership of the competing firms. For that reason, in the policy making process, the policy makers in Indonesia should always take into account the views of KPPU as the institution dealing with the competition law and policy.

Chapter 7

Summary and Conclusion

Two cases related to pricing behavior of dominant operators between 2006 and 2007 have been examined in previous chapters. In both cases, the dominant operators are allegedly engaged in anticompetitive conduct. This chapter presents summary and conclusion of analyses, findings, and policy implications of these cases.

The first case is about the significant discount of the dial-up Internet bundle offered by a vertically integrated operator, Telkomnet. The main concern here is about possible predatory behavior behind the discount strategy. If the discount is not profitable and gives adverse impact to rivals, it indicates that Telkomnet may engage in predatory conduct. The analysis shows that Telkomnet's discount is not profitable as indicated by its inelastic demand. However, the discount does not have much effect on rivals, as revealed by the small cross-elasticity measure. For that reason, Telkomnet's discount program is not predatory behavior. Nevertheless, in the dynamic sense, the Telkomnet discount still may indicate a strategy to threaten competitors or to persuade the regulator not to regulate the market.

The second case deals with pricing in the mobile cellular market. The interest here is in possible collusive behavior among the competing operators, especially between Telkomsel and Indosat. Collusive outcome that may

indicate a collusive behavior is identified if prices of the competing operators are above their profit-maximizing or non-cooperative level. The analysis finds that prices of mobile cellular services offered by Telkomsel and Indosat are sufficiently high above their non-cooperative level. In other word, prices of both operators are in the collusive equilibrium. Since these two operators were partially cross-owned by a foreign holding company, this finding may support an argument that cross-ownership of Telkomsel and Indosat has facilitated collusion.

These findings indicate that the purpose of this research to provide an alternative approach in analyzing these cases and to indicate lessons for regulatory and policy improvement has been accomplished. However, we still expect that the approach used in the analyses can be modified to investigate similar cases. Furthermore, although the approach requires more demanding effort especially related to modeling and demand information, it is still feasible to carry out and it may produce a theoretically accountable conclusion. Moreover, since the use of economic method in competition analysis is emerging, this alternative becomes more interesting to consider. Moreover, the research also contributes to the study of telecommunications competition in Indonesia, which is relatively rare.

In addition, in the analyses, both cases use a profit-maximizing assumption as a main hypothesis in identifying operators' behaviors. Price that maximizes individual profit is not an anticompetitive conduct as long as it is still in the corridor of price regulation. In contrast, a non-profit maximizing price may indicate an anticompetitive behavior. However, non-profit maximizing behavior is not a sufficient condition to conclude an illegal conduct. To determine whether an operator breaches the law, there should be

a further investigation and deeper analyses of related documents and people involved.

Consequently, investigation based on the profit-maximizing approach does not conclusively determine an illegal behavior. Rather, it only gives initial or preliminary indication of a possible anticompetitive conduct. A finding about non-profit maximizing behavior can be used either as an entry point for further investigation or to initiate suggestion for regulatory improvement. Furthermore, one should also take into account whether the profit-maximizing assumption is relevant to the case under observation.

In addition to pricing behavior analysis, these two cases also give a general lesson about regulatory options. It provides two messages about regulations in two different market conditions that may be useful in regulatory making process.

In a market with one-way access structure, in some extent, government intervention through price-related (ex-ante) regulation may still be required. Competition in this market is asymmetric where there is a vertically integrated operator dominating upstream bottleneck market competes with several rivals in the downstream market requiring bottleneck product. An example of this market is as presented in the case of competition between Telkomnet and the independent ISPs. The purpose of the price regulation here is to prevent exclusionary conduct of the vertically integrated firm with dominant position in the upstream market that may give predatory effect to its downstream competitors. Access price regulation is common in this type of market and can also be combined with accounting separation to prevent internal transfer pricing or cross-subsidy. In addition, the regulation

requiring the dominant upstream operator to unbundle its last-mile to be available for the downstream competitors to lease at a certain regulated price may also be relevant in some situation. However, in the case that price-related regulation could not be effectively implemented, regulator may have to find a way to make by-passing the bottleneck network possible. The logic of this regulatory strategy is that when the upstream market faces competition or close substitution, the bottleneck owner would be less motivated to refuse interconnection demand from the downstream competitors or to implement cross-subsidy for predatory purpose.

In contrast, the regulatory option is different for a market with two-way access in which the competing firms are relatively symmetric and the market is relatively competitive. The competition in mobile cellular market in Indonesia as discussed in this thesis is one instance of the type of this market. In this market, due to asymmetric information, regulator usually fails to set regulated price close to competitive level. As a result, the competing parties tend to set prices at or slightly below the regulated price to maximize their joint profit. For that reason, it is often said that price regulation may facilitate collusive pricing. Furthermore, in order to eliminate distortion due to inappropriate price regulation, it seems more appropriate to relax price regulation and let the market works. Consequently, the competition authority should play an active role to monitor and supervise pricing behavior of the competing firms (ex-post regulation) to ensure that the competing parties do not jointly exercise their power.

The following consecutive sections briefly present a summary of the cases and findings.

7.1. Case 1: Telkomnet's Discount on Dial-up Internet Service

One-way access structure is a condition when there is a vertically integrated operator competing in the downstream market and dominating the upstream facility that is also essential for downstream rivals. Competition in this access structure raises a concern about possible exclusionary behavior of the vertically integrated operator toward its downstream competitors. In general, sabotage and price discrimination are two common forms of exclusionary behavior.

In one-way access, the vertically integrated operator can bundle upstream and downstream products to implement price discrimination in providing upstream service between its subsidiary and rivals. However, price discrimination does not always imply an anticompetitive conduct, but can also be a profit maximizing strategy. It needs a careful analysis to determine whether a bundling practice is anticompetitive or not. Price discrimination through bundling may indicate a predatory conduct if the price of the bundle is sufficiently lower than the sum of prices of elements in the bundle.

The dial-up Internet service market is one example of a one-way access structure. In the Indonesian dial-up Internet market, Telkom acts as a vertically integrated operator. It offers dial-up Internet service through its subsidiary, Telkomnet. Furthermore, it also provides a local telephone service, which is an essential facility for dial-up Internet service. In competing with independent Internet Service Providers (ISP), Telkomnet offers a flexible dial-up Internet service called Telkomnet Instan. This service has several features such as: it does not require prior registration; it does not

charge a monthly fee; it integrates Internet and telephone bills; and it bundles Internet service and local telephone service. These advantages make Telkomnet Instan a popular dial-up Internet service even though its regular tariff is relatively high.

An anticompetitive issue emerges when Telkomnet launched a long promotion program for weekend usage named WeekendNet. This program offers a significant discount to Telkomnet's dial-up Internet bundle that makes its bundle price close to the regular price of one element in the bundle, local telephone service. This pricing may imply that Telkomnet charges Internet service at a very low level or close to zero. For that reason, the discount program raises a concern whether this long promotion program involves below-cost pricing, which is predatory.

Common analysis related to bundle and predatory behavior usually requires accurate cost information. However, since there is no precise information about Telkomnet's Internet cost, cost-based analysis cannot give a convincing conclusion. Alternatively, the profit sacrifice approach can identify predatory pricing behavior. Using this concept, if Telkomnet's discount program leads to a lower profit and gives an adverse effect to rivals, it may indicate a predatory behavior. The analysis uses non-profit maximizing price to reflect a price that sacrifices profit. Therefore, we develop a simple profit-maximizing model of competition in the Indonesian dial-up Internet market. Furthermore, it also uses cross-price elasticity between Telkomnet's price and ISP demand as an indicator of Telkomnet price's effect on rivals.

The model is analyzed based on actual traffic data provided by the Multimedia Division of Telkom. The data contains the daily traffic of

Telkomnet and several ISPs. The analysis uses log linear regression that relates actual traffic data and price. We find that Telkomnet's dial-up Internet bundle has an in-elastic demand. It implies that in this demand condition Telkomnet's discount is not a profit-maximizing pricing. Furthermore, by regressing aggregate traffic of ISPs and Telkomnet's price, we see that the cross-price elasticity is relatively small. It means that Telkomnet's price change does not have a significant effect on rivals' traffic. Overall, we conclude that even though Telkomnet's price discount sacrifices profit, it is not necessarily a predatory behavior because the traffic of the rivals is not affected.

This conclusion is also supported by the fact that lately Telkomnet has continued to create other promotion discounts not in the regions where cross-price elasticity is relatively high (West Java and Central Java), but in areas where that cross-price effect is quite small (Jakarta and East Java). In addition, since Telkomnet's average daily traffic has been much greater (around 50 times) than the total traffic of the ISPs, it seems unreasonable to acquire that small portion of market through risky anticompetitive conduct. Moreover, low cross-price elasticity indicates that the products are sufficiently differentiated to make the market quite segmented. In that market condition, price might be not an important instrument for competition and price reduction should be appreciated because it benefits consumers with less negative effect on market competition.

However, a short-run analysis might not give a complete explanation of the predatory issue. Some theories based on a dynamic game may give a different perspective. In dynamic predatory pricing theory, Telkomnet's discount can be interpreted as a strategy to threaten rivals. Furthermore, in

the contestable market theory, the discount can be assumed as an effort to persuade the regulator how competitive is the market so that it does not require regulatory intervention, or to signal potential entrants not to enter the market because it is unprofitable. For that reason, although Telkomnet's discount program is not anticompetitive conduct in a static sense, the regulator still needs to be aware of Telkom's behavior.

There are several implications related to this finding. Firstly, Telkomnet's discount strategy may imply that the local telephone tariff is sufficiently profitable so it can subsidize the low bundling price. It may contradict the common perception that the regulated local telephone tariff is still below its cost. For that reason, the regulator should consider carefully any Telkom proposal to increase the local telephone tariff.

Secondly, the regulator should encourage Telkom to provide regular low Internet prices especially in any off-peak times. Alternatively, the regulator can also force Telkom to give equal opportunity for the ISPs to provide similar bundling products. It is in line with Telkom's WeekendNet objective to educate people to use the Internet.

Thirdly, the regulator should encourage any technology that reduces the dependency of Internet users on the bottleneck, local telephone network. Currently, there have been several options for technology used to access Internet services such as through mobile cellular service, cable television, and Wi-Fi (wireless fidelity). However, they mostly are only available in some big cities. Even if they can be accessed from rural areas, the price is still high. Alternatively, government should support cheaper technology that can penetrate to rural or most residential areas such as community Internet

networks, known as RT/RW Net. This method is quite effective to by-pass the bottleneck network and lowers the cost to access the Internet.

7.2. Case 2: Pricing Behavior of Mobile Cellular Operators

Two-way access structure is a situation where competing operators need access to each other's networks. This inter-dependency motivates these competing operators to cooperate. However, this cooperation may lead to collusion causing a high retail price. Some papers that deal with access pricing in two-way access indicate that collusive outcome in retail price can be achieved indirectly through negotiation in determining access charge. The reason is that access charge is a component of retail price and an increase in access charge will raise retail price. However, in some developing countries like Indonesia, the regulator still regulates access charge. It implies that creating collusive retail price through access price negotiation is less likely. Alternatively, operators still can achieve collusive outcome directly through coordination or mutual understanding in setting retail price. Some papers dealing with the collusion issue identify several factors that may facilitate collusion including symmetry, cross-ownership, and ineffective regulations.

Mobile cellular service is one instance of a market with two-way access structure. Three major operators, Telkomsel, Indosat, and Excelcomindo, dominate the mobile cellular market in Indonesian. Two foreign companies under a Singaporean holding company, Temasek, partially own the two biggest mobile cellular operators, Telkomsel and Indosat. This ownership structure may be risky for market competition. In late 2006, LSP-BUMN, a non-governmental organization, filed an allegation of price fixing by

Telkomsel and Indosat to the Competition Commission (KPPU). They used the uniform pattern of mobiles to fix prices of Telkomsel and Indosat as the main argument. KPPU started formal investigation in early 2007 and announced its findings in late 2007. KPPU concluded that partial cross-ownership breaches the law and it ordered Temasek to divest its share either in Telkomsel or Indosat. Furthermore, KPPU also found that Telkomsel was engaged in an attempt to monopolize the Indonesian mobile cellular market.

However, some experts opposed KPPU's decisions and analyses. One of the objections was about KPPU's price analysis. KPPU observes operators' behavior mainly based on movement, growth rate, and statistical differences of the prices. Then, it concludes that there is a parallel pricing and price leadership conduct in the market. Some of the economists argue that parallel pricing does not conclusively indicate price leadership behavior. There are some factors those may affect price movement such as cost and demand. For example, regulatory and cost changes are two major factors that make tariffs in the competing post-paid plans move in the same direction. In addition, KPPU also compares the mobile cellular tariff in Indonesia with several comparable countries. It then argues that the price in Indonesia is relatively high. In fact, benchmarking can be misleading because each country may have different characteristics not only in macroeconomic indicators, but also geographic, demographics, consumer behavior, and regulations.

This research provides an alternative price analysis by using another approach and a different focus. It mainly examines prices of pre-paid plans in peak time because it has around 96 percent of the mobile cellular market share. Retail price in pre-paid plans is linear, meaning that subscribers do not need to pay a monthly subscription fee, only a usage fee. Furthermore, retail

price in pre-paid plans can also be discriminated based on call termination. It implies that the price for a call ending in the same network (on-net price) can be different to the one terminating in rivals' networks (off-net price). Theoretically, in a market with this retail price characteristic, on-net price should be lower than off-net price. The size of the gap between on-net and off-net prices is determined by some factors including demand.

The data shows that on-net and off-net prices of major pre-paid plans, Simpati of Telkomsel and Mentari of Indosat, are relatively similar. The small on-net and off-net price differential of both competing operators raises a question about possible collusive pricing in setting on-net prices. The concept of the prisoners' dilemma game is used in the analysis. Referring to this game, an operator can set its price either selfishly or co-operatively. These operators will get higher profit if they could co-operate in determining prices. However, co-operation without enforceable power can be risky because operators may betray each other to get the highest profit at the expense of rivals. Therefore, without co-operation it is safer for these operators to behave selfishly. In this context, selfish behavior is interpreted as pricing that maximizes individual profit. This non-cooperative principle is applied in analyzing possible collusive behavior in on-net pricing. In brief, a collusive behavior likely exists if competing operators altogether set their prices above their non-cooperative levels.

In the analysis, we develop a simple mathematical model of the mobile cellular market. In order to calculate profit maximizing or non-cooperative price of each pre-paid plan, the model requires several sets of data related to market share, price, cost, traffic, and demand. Unfortunately, most of these data are not available due to company confidentiality policy. Alternatively,

information on traffic and demand elasticity is estimated based on the data gathered during a consumer preference survey in Jakarta between April and May 2008. The result of the analysis shows that in 2006 on-net prices of pre-paid plans offered by these three dominant operators are above their non-cooperative level. Furthermore, in 2007 only the on-net prices of Telkomsel and Indosat's pre-paid plans are well above their non-cooperative level.

This result indicates that in 2006 market was in a collusive equilibrium. This evidence may reveal that there was a price leadership or collusive behavior in 2006. It is in line with KPPU's allegation related to the mobile cellular case. Furthermore, in 2007 only Telkomsel and Indosat maintained collusive outcome in their prices. In addition, during these years, Mentari of Indosat set quite a high price above its non-cooperative level. Since Mentari's elasticity of demand is relatively elastic, this high price strategy may lead to self-destruction. It seems that Mentari kept its price high in order to avoid competition with Telkomsel. Overall, these findings may support KPPU's claim about a possibility of price coordination facilitated by cross-ownership of these two competing operators. For that reason, KPPU's order to eliminate cross-ownership is considered appropriate.

Furthermore, from the regulatory point of view, prices of the mobile cellular service are still in the corridor of retail price regulation. At this time, the price of pre-paid plans is regulated at a high ceiling level. Even though all operators set their prices below the maximum allowed level, the high ceiling price might give incentive to the operators to set a relatively high price above their non-cooperative level. Similar to findings in some empirical studies, this Indonesian case also shows that ineffective regulation can facilitate collusive outcome.

In the new price regulation, the price ceiling has been eliminated and replaced with a floor price rule. Since there are some new operators in the mobile cellular market, the regulator seems less worried about the threat of collusive behavior. Rather, it pays more attention to possible predatory behavior of the incumbents toward new entrants. However, price floor regulation may also carry the risk of deterring price competition. For that reason, we suggest removing not only price ceiling but also price floor and any pricing constraints that may deter competition, such as the requirement to file a proposal before applying a new tariff. In an emerging competitive market, the role of price regulation to control operators' anticompetitive behavior can be relaxed and substituted by regular market monitoring by the regulator as well as the competition commission.

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Appendix 1

Questions in Consumer Preference Survey

General Information about the Respondent

1. In what year you were born? .....

2. Sex *Male / Female*

3. What is the best description about your main occupation?
   - □ *High School Student*
   - □ *University Student*
   - □ *Employee (private / government)*
   - □ *Self-employed / Entrepreneur*
   - □ *Home Duty*
   - □ *Un-employed / Job-Seeker*

4. In what suburb (*'kelurahan / kecamatan'*) do you live? .....

5. What is the best description about how you live?
   - □ *I live alone*
   - □ *I live with my family*
   - □ *I live with relative who take-care of me*
   - □ *I live with friends / others (non relative)*

6. Please approximate your monthly household income:
   - □ *less than Rp. 1 million*
   - □ *between Rp. 1 million and Rp. 3 million*
   - □ *between Rp. 3 million and Rp. 5 million*
   - □ *between Rp. 5 million and Rp. 7 million*
   - □ *more than Rp. 7 million*
   - □ *I prefer not to answer*

7. How many times in a week do you come to this place (the place of survey is conducted)? .....

Information about Subscription and Usage of Pre-paid Plan of GSM Mobile Service

8. What are three most important factors for you in choosing a pre-paid plan of GSM mobile service?
   - □ *Low on-net tariff*
   - □ *Similar to the one used by family or friends*
   - □ *Signal Quality*
   - □ *Low SMS tariff*
   - □ *Additional features (data, internet, etc)*
   - □ *Network coverage*
   - □ *Other ..... (please specify)*

9. What is your *main* pre-paid plan?
   - □ *Simpati (Telkomsel)*
   - □ *Kartu As (Telkomsel)*
   - □ *XL-Bebas (Excelcomindo)*
   - □ *Mentari (Satelindo-Indosat)*
   - □ *IM3-Smart (Indosat)*
   - □ *Other ..... (please specify)*

10. Do you use other pre-paid plan of mobile cellular service? Yes / No
    If Yes, what is that pre-paid plan? .....
    What is the main reason you subscribe other pre-paid plan?
    - □ *Cheap*
    - □ *Coverage*
    - □ *Back-up*
    - □ *Other ..... (please specify)*

11. How much is your monthly expenditure for *main* pre-paid plan? *Rp.....*

    How much is your monthly expenditure for secondary pre-paid plan (if any)?

12. Please indicate average duration per outgoing call you make by using your main pre-paid plan
    - □ *1 minute*
    - □ *2 minute*
    - □ *3 minute*
    - □ *4 minute*
    - □ *5 minute*
    - □ *Other ..... minute*

13. How many outgoing calls do you make by using your main pre-paid plan in a day?

14. How many percent do you use your pre-paid plan to make outgoing calls during peak hours (between 07:00 and 22:00) in a day?

15. Please approximate your daily usage pattern of *main* pre-paid plan as indicated in the table below

Average Traffic pattern	**Peak hours (07:00-22:00)**	**Off-peak hours (23:00-07:00)**
Call to the same network (on-net calls)	%	%
Call to other GSM networks (off-net calls)	%	%
Call to Fixed-line	%	%
TOTAL	100 %	100 %

16. What is your reaction if tariff for a call to the same network (on-net call) reduces as indicated in the table below?

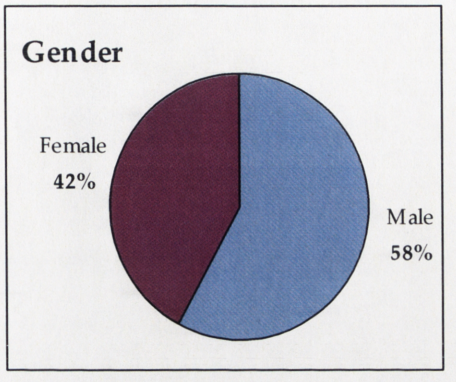
Percentage of the decrease of on-net price	**Percentage of increase in usage (voice call)**
10% decrease of on-net price	%
20% decrease of on-net price	%
30% decrease of on-net price	%

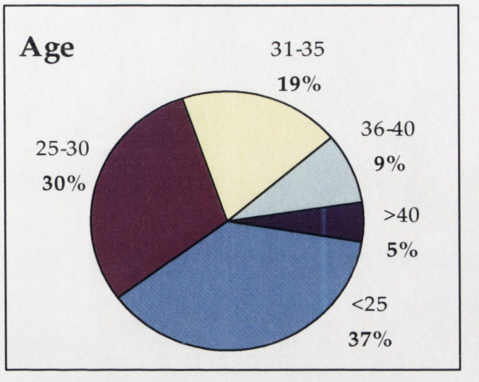
Appendix 2
Survey Statistics

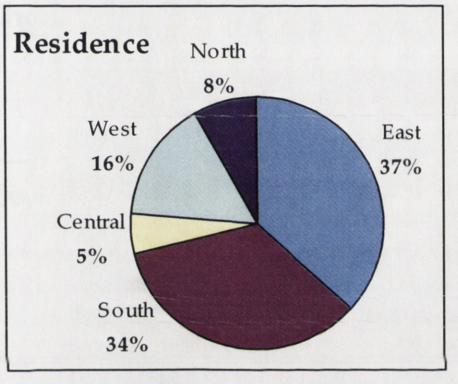
Locations of survey

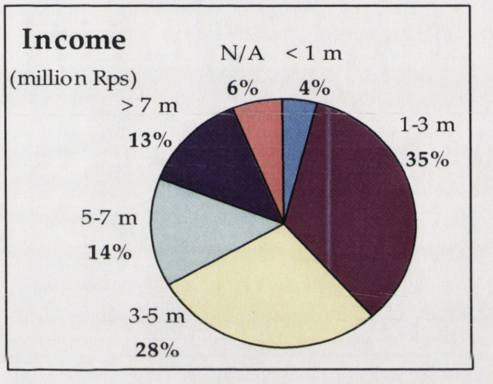
Municipality	Sub-District / Sub-urban / Area
East Jakarta	Cililitan, Condet, Cimanggis, Rawamangun, Pulomas
South Jakarta	Ragunan, Cilandak, Lebak Bulus, Kebayoran Lama, Kuningan, Senayan (Gatot Subroto), Lenteng Agung & Depok
Central Jakarta	Cempaka Putih, Menteng, Kebon Sirih, Senen, Pasar Baru, Roxy
West Jakarta	Grogol, Tanjung Duren, Kemanggisan, Meruya, Kembangan
North Jakarta	Kelapa gading, Pedongkelan, Sunter Podomoro, Sunter Jaya, Mangga Dua

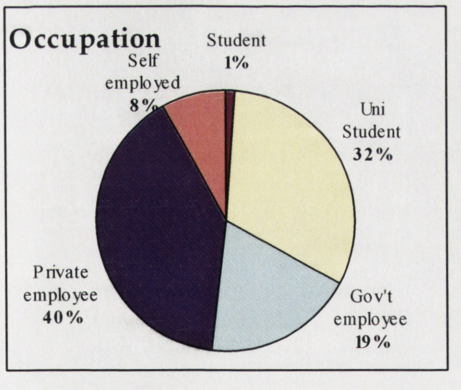
Demographic Illustration of the Respondents

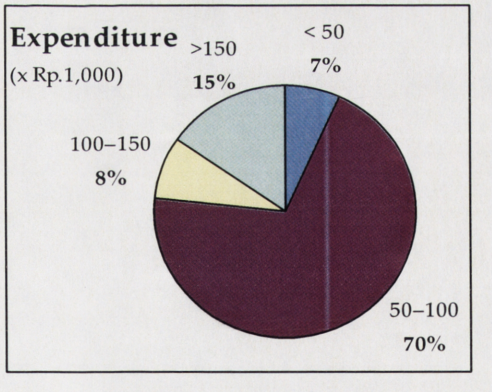




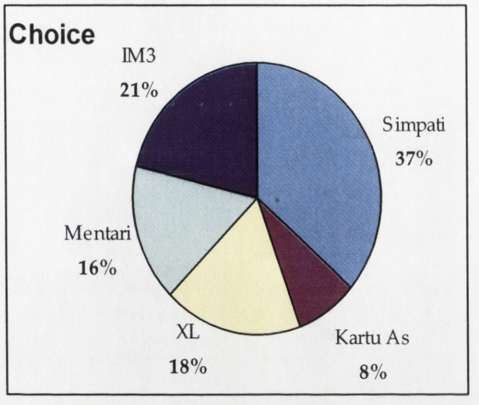


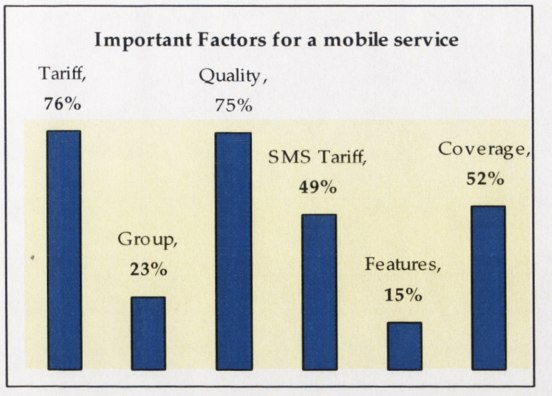






Choice and Important Factors of Mobile Cellular Service





Choice and Reason to Use Secondary Mobile Cellular Service