



# **ABSTRACT**

## **Consumer Switching and Competition Strategy in IT-enabled Markets**

by

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Doctor of Philosophy in Economics

University of California, San Diego, 2013

My dissertation studies consumer switching and firms' competition strategy in information technology (IT)-enabled markets, using the global wireless telecommunications industry as a testing field. Two of the chapters examine the impact of a public policy that reduces consumer switching costs – mobile number portability (MNP) – on market competition, and explore its asymmetric effects across firms and countries. The other chapter investigates how investment in customer acquisition would affect firm performance as competition intensifies, and how the adoption of innovative technology would complement customer strategy and enhance firm's competitive advantage.

# **EXECUTIVE SUMMARY**

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This dissertation studies consumer switching and competition in information technology (IT) enabled markets. IT-enabled markets – for example, wireless telecommunications, Internet, and cable services – are usually customer-centric and characterized by consumer switching between service providers (Katz and Shapiro 1985). However, switching can be costly, in terms of money and effort (Klemperer 1987). In fact, consumer switching costs are a salient feature of many IT-enabled markets (Shy 2001). Therefore, understanding and managing switching costs is critical for competition. As pointed out by Shapiro and Varian (1999, p.133), “you cannot compete effectively in the information economy unless you know how to identify, measure, and understand switching costs and map strategy accordingly.”

In my dissertation, I focus on two major sets of issues related to consumer switching: (1) How do industry regulations that reduce switching costs affect market competition? (2) Is investment in acquiring new customers effective when competition intensifies? I use the global wireless telecommunications industry as a testing field to explore these issues. The analysis reveals interesting findings, and provides insights into pro-competitive policymaking and firms’ competition strategy in a technology-intensive environment.

## **1. Reducing Consumer Switching Costs with Portability: Does Pro-competition Policy Achieve Intended Consequences?**

The strategic importance of switching costs becomes compelling given policymakers' recent interest in reducing switching costs in various industries to promote market competition (Chen 2011). Mobile Number Portability (MNP) is such a policy in the wireless telecommunications industry. By allowing customers to transfer phone numbers when changing wireless operators (firms), MNP eliminates "social network switching costs," a major barrier to switching due to the need to inform one's social networks such as friends and business contacts.

It has been observed that customer switching did not surge immediately after MNP in many countries (Global Wireless Matrix 2009). It is possible that firms took counter measures to offset the policy. For example, firms can raise contractual switching costs by locking customers into longer contracts through heavier subsidies for handsets (Grajek and Kretschmer 2009). The question is: to what extent can such a strategy moderate the MNP effect? In other words, how much of the change in competition can be attributed to the policy? Prior theoretical literature predicts that a reduction in switching costs can intensify competition and reduce prices (Farrell and Klemperer 2007). Empirically, it remains unclear whether this prediction is true. Gauging the effect of MNP is a significant research topic because it would evaluate the policy's effectiveness. In addition, it would provide important guidance for firms on managing switching costs and competing in a regulated, technology-intensive environment.

Furthermore, despite the importance of this pro-competition policy, little work has been done to understand its varying impact on different types of firms. Whereas large firms usually resist MNP for fear of market share erosion (Drucker 2003), it is unclear whether small firms indeed

have an opportunity to acquire a larger slice of the pie and gain pricing power. Given MNP's intention to level the playing field and facilitate the growth of small firms, it is important to identify the real "winners" of the regulation, and explore the driving mechanisms. Further, market conditions, such as cellular penetration, growth rate and market structure, vary greatly across countries where MNP has been introduced (Buehler et al. 2006). Yet no empirical study has examined how these variations affect the advantages small players may derive from the policy. Without this knowledge, it is difficult to determine specific market conditions under which the policy is more likely to be effective.

I seek to narrow these gaps in the literature. In Chapter 1, I model and empirically investigate the effects of MNP on the market share and pricing power of large and small firms. Specifically, I address three research questions: (1) Does MNP indeed decrease market concentration as switching costs are reduced? (2) Does the price of large and small firms converge as a result of MNP? (3) How does the composition of customer base affect these competitive outcomes between large and small firms?

To inform my study, I first construct an asymmetric duopoly model that incorporates key features of the wireless industry: switching costs, product differentiation, customer segmentation (contract vs. prepaid), and price discrimination.<sup>1</sup> I analyze how MNP would affect equilibrium market share and price. The model predicts that the overall market share of the large firm will decrease, while its average price may increase; the effect on the small firm is the opposite.

Then I test these predictions by collecting and analyzing a proprietary panel data of 218 wireless operators in 52 countries over six years (2003-2009). During the sample period, MNP was

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<sup>1</sup> The duopoly model is asymmetric because it has a large dominant firm and a small non-dominant firm.

introduced at different times to 30 countries with different market structures, providing a rare but excellent natural experiment to evaluate its effects. In the regression analysis, the dependent variables are market concentration index, market share, and price; the choice of explanatory variables is based on the analytical model, including switching costs (MNP), and initial market concentration. To control for country heterogeneity, I collect the second dataset from the Global Market Information Database (cellular growth rate, penetration, fixed-line telephone and Internet penetrations, GDP per capita, and demographic variables). I also obtain the third dataset, the Worldwide Governance Indicators from the World Bank, with indicators of institutional governance (government effectiveness, regulatory quality, and citizens' freedom of expression).

I find that MNP reallocates market share in favor of small firms. Yet, large firms still manage to sustain a higher average price than smaller firms. These two contrasting findings are called “market share convergence” and “price divergence.” Analysis of customer base composition suggests that large firms are able to retain higher-value contract subscribers, while small firms tend to attract lower-value “pay-as-you-go” prepaid subscribers. Contrary to popular belief, even with MNP, large firms continue to dominate. The asymmetric effects of the policy on dominant and non-dominant firms highlight that customer segmentation is important to understand and manage switching costs.

As an extension of the analysis, Chapter 3 delves further into the asymmetric effect of MNP based on firm heterogeneity (market position) and country heterogeneity (industry maturity), as well as the lagged effects of the policy. I highlight contractual switching costs as an important moderating factor influencing the effect of MNP. Service contracts are the most prominent switching costs in the wireless industry (Gerpott et al. 2001). Hence, it is useful to separate

contractual switching costs from other types, and understand whether their lock-in power mitigates the MNP effect.

I collect another panel dataset from 39 major wireless operators in eight countries over nine years (1997–2005) from the EMC World Cellular Database. In the regression models, the dependent variable is price, and the key explanatory variables include the implementation of MNP, the ratio of customers on contract for a firm (a measure of its customers' aggregate contractual switching costs), and the interaction term between the ratio and MNP.

The results show that MNP takes effect in lagged periods, possibly cushioned by firms' strategic management of service contracts in response to the policy; meanwhile, the power of contracts as a lock-in device is weakened by MNP. An implication follows that in order to compete effectively in a regulated environment, firms need to pay more attention to non-contract retention efforts rather than relying on contracts. Again, MNP does not necessarily make small firms better off. This is consistent with the findings in Chapter 1. Further, the pro-competitive effect of MNP is greater in less mature industries. After MNP, countries with lower penetration not only have lower prices, but also less price dispersion in favor of small firms.

Together, the above two chapters investigate the impact of reduced switching costs on the persistence of dominant oligopoly, and whether MNP can reverse the dominance by facilitating the growth of small firms. The results reveal *asymmetric* effects. While small firms gain market share after MNP, large firms are still in a better position to retain more contract customers with greater value, and let go those low-value, price-sensitive prepaid customers. These findings inform our understanding of the effectiveness of pro-competition policies and entrepreneurial opportunities that they provide, especially how portability policies may alter firms' ability to

compete, and how firms should adjust their strategies to better retain customers. In addition, whereas prior studies on MNP are limited to an individual market, my global datasets allow me to account for various market conditions in an international context, and to find that MNP effect may be more evident in markets that have low concentration. Hence, it seems more effective to introduce the policy at early stage while the market is still growing and has not been stuck with a sticky oligopolistic equilibrium. This kind of implication for policymaking is absent in smaller-scale studies on individual markets. In sum, with MNP as a valuable experiment in the wireless industry, my studies provide insights into evaluating entrepreneurship-friendly policies. Further, my approach is applicable to the analysis of public policies in other IT-enabled industries, such as personal data portability in the banking industry, and the healthcare industry.

## **2. Does Customer Poaching Payoff in the Face of Competition and Technology Change?**

In Chapter 2, I analyze the return of customer acquisition on business performance. Wireless operators often poach customers from rivals, usually with handset subsidies, cash rebates, and other financial incentives. These efforts reduce switching costs, and induce customers to switch to them. Meanwhile, the intense competition for customers also leads to more frequent switching in this industry than in others (Neslin et al. 2006). Hence, customer retention is a leading concern for firms. Retention is measured by churn rate (inversely), the percentage of customers leaving in a given period.<sup>2</sup> Replacing lost customers to maintain the subscriber base is costly, especially in a saturated market.

The increasing expenditure on customer acquisition in the past decade, coupled with significant churn, raised an important question for firms: Do these poaching efforts pay off as competition

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<sup>2</sup> For instance, the average monthly churn rate was 3% in the U.S. in 2005. This means that a firm lost about 36% of its customers each year.



intensifies? In this study, I investigate how spending on customer acquisition affects business performance along three stages of customer relationship management (CRM): acquisition, retention, and revenue generation. I focus on the role of competition in both acquisition spending and technology in these relationships.

First, successful implementation of customer strategy depends on whether firms can incorporate rivals' actions into decision-making (Boulding et al. 2005). As more firms respond aggressively to each other, a firm's acquisition effort may transform from being a success driver to being a failure preventer. The literature is extensive on customer acquisition and retention (e.g., Reinartz et al. 2005); however, it remains silent on the role of competition in CRM (Boulding et al., 2005). This is a surprising gap in understanding. To enhance our knowledge of whether customer poaching can lead to competitive advantage, we need to incorporate market competition into the analysis of customer acquisition.

Second, the effectiveness of customer poaching can also be influenced by firms' technology strategy, because marketing and innovation are two *complementary* "basic functions" crucial to firm performance (Ramaswami et al. 2009). This is indeed the case in my research context. Wireless service is enabled by communication technologies. For example, GSM and CDMA are 2G standards; WCDMA and CDMA2000 are 3G standards.<sup>3</sup> Technology advances rapidly in this industry, and is the key to service quality, brand differentiation, and user experience. This in turn may affect whether customer acquisition is effective; using newer technology may give firms a competitive edge in the poaching game. Hence, switching costs together with technological change are of strategic importance to manage customer behavior.

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<sup>3</sup> GSM refers to Global System for Mobile Communications, CDMA is Code Division Multiple Access, and WCDMA is Wideband CDMA. 2G and 3G refer to the second and third generations of wireless technologies, respectively.

Besides market competition, industry environment also affects the effectiveness of customer strategy (Jansen et al. 2006). Market penetration is one of such contextual factors. When market becomes saturated, aggressive competition for customers is likely to result in firms eating each other's share. By exploring the moderating effect of market penetration, I hope to provide insights into how firms should adjust their strategy at different stages of industry maturity.

In sum, I study the following research questions in Chapter 2: (1) How does customer acquisition spending affect acquisition rate, retention rate and revenue? (2) What is the role of rivals' competitive actions (in acquisition spending and technology) in these relationships? (3) How does market penetration moderate these relationships?

Based on the literature of switching costs and CRM, I develop six hypotheses to address these questions. Then I analyze a firm-level panel dataset of 38 operators in seven countries from 1997-2005. In the regressions, the dependent variables include customer acquisition rate, churn rate, and average revenue per user. The explanatory variable of major interest is acquisition costs, defined as a firm's average costs spent to acquire a new customer, i.e., cost per gross addition. Acquisition costs typically include handset subsidies, marketing, advertising, waiver of activation fees and SIM cards.

I find several interesting results. First, acquisition spending helps to attract new customers (higher acquisition rate). However, it does not improve customer retention or revenue. Customers with lower switching costs (prepaid) are more sensitive to firms' acquisition efforts. They are easier to lure, but also easy to lose, because they incur low switching costs without contract obligations. As a result, churn is higher and revenue is lower. Second, rivals' competitive actions substantially reduce the effectiveness of the focal firm's acquisition effort.

What appears to matter is the acquisition spending relative to rivals', i.e., the level of differentiation in acquisition efforts as opposed to the absolute level of spending. Third, increasing the focal firm's acquisition spending can lead to greater acquisition rate in the prepaid segment than in the contract segment; meanwhile, acquisition spending is effective to poach contract customers only if the innovative technology (3G) is present. Hence, differentiation in acquisition cost is important to keep up the race of customer poaching, especially in the low-value customer segment. Using new technology alleviates the adverse effect of competition, especially in the high-value customer segment. Fourth, higher market penetration is associated with lower acquisition rate and lower ARPU, but insignificant in churn rate. As a market gets saturated, it becomes harder to acquire new customers; aggressive acquisition spending can in fact aggravate ARPU in such markets. Also, the moderating effect of market penetration on acquisition spending differs across customer segments. With high penetration rate, acquisition spending is effective only to acquire prepaid customers. This is because customers who have not entered the market are those with low willingness to pay, i.e., prepaid customers.

These findings imply that in the race for poaching customers, investment in customer acquisition does not necessarily carry on to every stage of CRM. Devoting resources to customer acquisition can be costly, especially when rivals respond aggressively. Further, firms ambidextrous in both customer and technology strategies have an edge over competitors. To make customer acquisition strategy effective, it is important to make use of new technology to attract high-value customers, ahead of the competition or at least not falling behind. In short, before engaging in heavy spending to acquire customers, managers should be aware of the firm's customer base composition, incorporate the technology strategy, and assess the stage of the market development.

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