

Munich School of Management

First-Mover Advantages in the Mobile Phone Industry: A Consumer-Centric Perspective

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Motivation (1)

- First-Mover Advantages (FMA) are presumed to exist in many industries, including (and especially in) network industries with switching cost.
- First-Mover Advantages may generate sustained market dominance:
 - Within one technological generation if FMA are limited to single generations,
 - but also across generations if FMA can be transferred from one generation to the next.
- Many (in fact, most) studies of FMA conduct “existence proofs” (FMA exist in market X) rather than detailed analyses on the drivers of FMA:
 - Single measures of firm performance (profits, market share),
 - generation-specific definitions of first-movers (1st to market).
- Moreover, the role of consumers has been widely ignored:
 - Are early consumers different from later ones and how does this affect FMA?
 - Does this make a difference for the transferability of FMA across generations?



Motivation (2)

- Mobile telephony is a good testing ground for some of the questions above:
 - Technologically dynamic market with generation changes
 - Heterogenous adopters
 - Different performance measures: #subscribers, usage intensity
- Mobile operators compete fiercely in the early stages of the market:
 - Branding
 - Handset subsidies, introductory offers
 - Long-term contracts



Questions

1. Does a First-Mover Advantage exist in mobile telephony?
 - Examination of (post-startup phase) profits for different groups of firms
2. If so, what are the channels for FMA in the industry?
 - Consider # of subscribers (installed base) vs. minutes called (usage intensity)
3. Are specific capabilities or (pre-entry) experiences complementary to early market entry?
 - Interact different experience types with first-mover indicator



Entry in Mobile Markets

- No free entry – a national licence required:
 - Typical # of licences varies between 2 and 4 per country
 - Clear definition of early entrant: Whoever starts offering cellular service first
 - Typical procedure:
 - Industrywide technological standard(s) is/are set and right to use is granted on a nondiscriminatory basis → everybody has access to same technology
 - Licenses are issued and firms start service → no technologically “forced” entry sequence
- But: Previous generations and pre-entry experience also matter:
 - Fixed-line incumbent typically offers mobile through a subsidiary (same brand)
 - 1G was offered in most countries
 - Operators may have launched 2G in other countries before



First-Mover Advantages

- First-Mover Advantages can originate from:
 - i. Signing up early consumers and keeping them
 - ii. Establishing a brand name and signing up more consumers in general

- As early consumers are typically high-usage consumers, i. would be reflected in higher average usage, while ii. would be reflected in higher subscriber numbers.

- Do First-Mover Advantages depend on the history of a firm?
 - Established brand name (*Brand*)?
 - Fixed-line incumbency in the same country
 - 1G operation in the same country
 - Technological experience (*Tech*)?
 - 2G launch in another country



Data

- Sources
 - EMC/Informa (Market Research and Telecoms consultancy)
 - Merrill Lynch Global Wireless Matrix
 - IMF International Financial Statistics, World Bank World Development Indicators
 - Company reports and historical industry accounts
- Dataset covering 90+ network operators worldwide, quarterly over 5½ years
- Variables:
 - Minutes of use (MoU)
 - Total # of users
 - Revenue per minute - proxy for price
 - Fixed-line users and fixed-line price
 - *Brand* and *Tech* dummies
 - Controls: GDP per capita, share of prepaid card users

Descriptives

Variable	Early entrants			Latecomers		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
EBITDA	472	0.37	0.09	528	0.23	0.22
MoU	486	149.60	63.98	558	193.05	124.04
CellP	486	21.70	8.53	558	20.14	8.59
CellSubs	486	21.96	11.44	558	12.31	10.36

Descriptives – FMA exist (at first glance)

Variable	Early entrants			Latecomers		
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EBITDA	472	0.37	0.09	528	0.23	0.22
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Profit Regressions

(1)

Early entrant 0.046^{***}

Early Country -0.144^{***}

Brand 0.033^{***}

Tech -0.013

On Air 0.010^{***}

Operators

Prepay

CellP

CellSubs

MoU

Constant 0.101^{***}

r^2 0.342

N 1000

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Profit Regressions

	(1)	(2)
Early entrant	0.046 ^{***}	0.034 ^{***}
Early Country	-0.144 ^{***}	-0.139 ^{***}
Brand	0.033 ^{***}	0.050 ^{***}
Tech	-0.013	-0.018 [*]
On Air	0.010 ^{***}	0.009 ^{***}
# Operators		-0.027 ^{***}
Prepay		
CellIP		
CellSubs		
MoU		
Constant	0.101 ^{***}	0.211 ^{***}
r ²	0.342	0.364
N	1000	1000

* p<0.1, ** p<0.05, *** p<0.01

Profit Regressions

	(1)	(2)	(3)
Early entrant	0.046***	0.034***	0.034***
Early Country	-0.144***	-0.139***	-0.143***
Brand	0.033***	0.050***	0.048***
Tech	-0.013	-0.018*	-0.018*
On Air	0.010***	0.009***	0.009***
# Operators		-0.027***	-0.027***
Prepay			0.003***
CellP			
CellSubs			
MoU			
Constant	0.101***	0.211***	0.214***
r ²	0.342	0.364	0.376
N	1000	1000	1000

* p<0.1, ** p<0.05, *** p<0.01

Profit Regressions

	(1)	(2)	(3)	(4)
Early entrant	0.046 ^{***}	0.034 ^{***}	0.034 ^{***}	0.034 ^{***}
Early Country	-0.144 ^{***}	-0.139 ^{***}	-0.143 ^{***}	-0.144 ^{***}
Brand	0.033 ^{***}	0.050 ^{***}	0.048 ^{***}	0.047 ^{***}
Tech	-0.013	-0.018 [*]	-0.018 [*]	-0.018 [*]
On Air	0.010 ^{***}	0.009 ^{***}	0.009 ^{***}	0.009 ^{***}
# Operators		-0.027 ^{***}	-0.027 ^{***}	-0.027 ^{***}
Prepay			0.003 ^{***}	0.003 ^{***}
CellP				0.000
CellSubs				
MoU				
Constant	0.101 ^{***}	0.211 ^{***}	0.214 ^{***}	0.212 ^{***}
r ²	0.342	0.364	0.376	0.376
N	1000	1000	1000	1000

* p<0.1, ** p<0.05, *** p<0.01

Profit Regressions

	(1)	(2)	(3)	(4)	(5)
Early entrant	0.046***	0.034***	0.034***	0.034***	0.031***
Early Country	-0.144***	-0.139***	-0.143***	-0.144***	-0.167***
Brand	0.033***	0.050***	0.048***	0.047***	0.020*
Tech	-0.013	-0.018*	-0.018*	-0.018*	0.004
On Air	0.010***	0.009***	0.009***	0.009***	0.006***
# Operators		-0.027***	-0.027***	-0.027***	-0.003
Prepay			0.003***	0.003***	0.004***
CellP				0.000	0.001
CellSubs					0.006***
MoU					
Constant	0.101***	0.211***	0.214***	0.212***	0.116***
r ²	0.342	0.364	0.376	0.376	0.440
N	1000	1000	1000	1000	1000

* p<0.1, ** p<0.05, *** p<0.01

Profit Regressions – Brand/Tech effects disappear with # Subs & MoU

	(1)	(2)	(3)	(4)	(5)	(6)
Early entrant	0.046***	0.034***	0.034***	0.034***	0.031***	0.033***
Early Country	-0.144***	-0.139***	-0.143***	-0.144***	-0.167***	-0.175***
Brand	0.033***	0.050***	0.048***	0.047***	0.020*	0.015
Tech	-0.013	-0.018*	-0.018*	-0.018*	0.004	0.011
On Air	0.010***	0.009***	0.009***	0.009***	0.006***	0.006***
# Operators		-0.027***	-0.027***	-0.027***	-0.003	-0.006
Prepay			0.003***	0.003***	0.004***	0.005***
CellP				0.000	0.001	0.001*
CellSubs					0.006***	0.006***
MoU						0.000**
Constant	0.101***	0.211***	0.214***	0.212***	0.116***	0.083**
r ²	0.342	0.364	0.376	0.376	0.440	0.442
N	1000	1000	1000	1000	1000	1000

* p<0.1, ** p<0.05, *** p<0.01



Summary of Descriptive Statistics and Stylized Facts

- Early entrants enjoy higher profits than latecomers → suggests FMA
- Operating in an early adopting country results in lower profits → premature commitment and/or country-specific effects (e.g. Nordic countries)
- Brand (previous presence in the country) is positive, but loses significance once #Subscribers and MoU are controlled for.
- Tech (previous experience in the technology) is negative and marginally significant, but loses all significance once #Subscribers and MoU are controlled for.
 - Suggests that effects work through two channels #Subscribers and MoU
 - Run econometric model on #Subscribers and MoU and decompose firm-specific effects to identify early-mover advantages

Econometric Model

Simultaneous Equations: (1) Usage Intensity and (2) Penetration

$$\begin{aligned}
 (1) \text{ MoU}_{ijt} = & \alpha_{ij} + \delta_0 * \text{MoU}_{ij(t-1)} + \delta_1 * \text{CellP}_{ijt} + \delta_2 * \text{CellP}_{i(-j)t} + \delta_3 * \text{FixedP}_{it} + \\
 & + \delta_4 * \text{CellSubs}_{ijt} + \delta_5 * \text{CellSubs}_{i(-j)t} + \delta_6 * \text{FixedSubs}_{it} + \\
 & + \delta_7 * \text{GDP}_{it} + \delta_8 * \text{Prepay}_{ijt} + \varepsilon_{ijt}
 \end{aligned}$$

$$\begin{aligned}
 (2) \text{ CellSubs}_{ijt} = & \beta_{ij} + \gamma_0 * \text{CellSubs}_{ij(t-1)} + \gamma_1 * \text{CellP}_{ijt} + \gamma_2 * \text{CellP}_{i(-j)t} + \gamma_3 * \text{FixedP}_{it} + \\
 & + \gamma_4 * \text{MoU}_{ijt} + \gamma_5 * \text{CellSubs}_{i(-j)t} + \gamma_6 * \text{FixedSubs}_{it} + \\
 & + \gamma_7 * \text{GDP}_{it} + \gamma_8 * \text{Prepay}_{ijt} + \zeta_{ijt}
 \end{aligned}$$

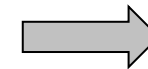
Estimation Method: GMM (Arellano-Bond, 1991) with additional instruments for price and penetration variables.

Regression Results show persistence over time and “watering down” effect

	MoU _t	CellSubs _{it}	
MoU _{j(t-1)} / CellSubs _{j(t-1)}	0.825***	0.839***	→ Persistence in usage and subscribers
CellP _j	-1.512***	0.025	
CellP _(-j)	-0.457	0.037	
FixedP	-0.581	0.046	
MoU _t		0.003	→ Larger networks are used less intensively on average
CellSubs _{jt}	-1.454***		
CellSubs _{(-j)t}	0.196	0.039**	
FixedSubs	-0.373	0.012	
Prepay	-0.526**	0.049***	
GDP	2.095***	-0.018	
AR(2) test	-1.18	-1.34	
Hansen J statistic	87.03(195)	74.59(195)	
Observations	1044	1013	

Explaining Operator-Specific Effects by First-Mover Indicators

	MoU	CellSubs _i
Early entrant	19.430 ^{***}	1.204 ^{***}
Brand	-2.653	1.469 ^{***}
Tech	2.129	-1.182 ^{**}
Early Country	0.329	0.096
Constant	84.519 ^{***}	-3.863 ^{***}
R ²	0.139	0.292
Observations	90	90

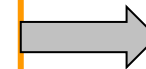


FMA exist for early entrants and incumbents, but differential effects

Contingent Nature of First-Mover Advantages: Interaction Terms

	MoU	CellSubs _i
Early entrant	11.465	1.662***
Brand	-0.549	1.348***
Tech	-5.696	-0.732
Early Country	2.188	-0.011
Tech	-5.696	-0.732
EarlyEnt * Tech	19.241*	-1.106
Constant	85.420***	-3.915***
R ²	0.170	0.305
N	90	90

* p<0.1, ** p<0.05, *** p<0.01



Early entrants with prior technological experience drive FMA in MoU

- Other interaction terms (not reported) not significant.

Long-Run Effects

- Magnitudes of effects seem small: n.s./19.4min resp. 1.2/1.5 per cent subscribers. However, these are static figures that ignore long-term effects.
- Derive equilibrium for equations (1) and (2) using estimated coefficients: $MoU_{ijt} = MoU_{ij(t-1)}$ and $CellSubs_{ijt} = CellSubs_{ij(t-1)}$
- Take into account correlation of equations through error term and specific effects for early entrants and incumbents.
- Lets us derive expected long-run advantages of early movers and incumbents:

	MoU	CellSubs _j
Early entrant	48.9mins	7.5%
Brand	-75.8mins	9.1%

- So in fact, branded operators have a disadvantage in terms of usage driven by large, “watered-down” network, but there are generally advantages for early movers in terms of subscribers.



Discussion

- Early movers and established brands enjoy first-mover advantages
- **Early entrants** have advantage in terms of **usage intensity**
- **Established brands** have higher advantage in terms of **penetration rate**
 - Entering early lets entrants capture high-intensity users.
 - Established brand helps capture more, but not necessarily more intensive users.
- Interpretation:
 - **Established brands** (from previous generations) are good at attracting more users across the board – FMA for incumbents originate from **brand awareness/reputation, moving subscriptions** across generations.
 - **Early movers** attract high-intensity users – FMA for early movers consists of a **time window** in which early, **heavy users can be tied** to the network.
 - This advantage is reinforced by prior technological experience (**Tech**)



Implications

For Firms:

- Lock-in of high-usage consumers by early entrants gives rise to long-lasting competitive advantage.
- Reputation and/or network effects carry over across generations.

For Researchers:

- For complex goods, a more refined definition of first-movers and their resulting advantages is needed to get to the true sources of FMA.
- Exploiting First-Mover Advantages is also affected by contingent factors like prior experience and capabilities.



Implications

For Regulators:

- First-Mover Advantages can be a source of persistent dominance and market power.
- A dominant position may persist over several generations and/or products/services due to established brand names and transferring installed base consumers, and therefore make entry for newcomers difficult.
- Granting newcomers a “grace period” (or time window) of exclusive entry may help them overcome the previous-generation disadvantage.



THANK YOU!

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