A SIMPLE MODEL OF LONG-RUN PROFITABILITY IN PROVISION OF WIRELESS CONNECTIVITY

TTM4165, «IKT, organisasjon og marked»

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Key points & exam tips

Key points

- The telecommunication sector's *share of pocket* appears little affected by technological revolutions
- *Returns to scale* drive consolidation; governments define and enforce its limits
- Larger operators have cost advantages and should be profitable as long as the smallest survive (one of the operators in each market might have a hard time making a profit)
- The real winners appear to be consumers who pay the same and get more over time

For exam: At least..

- Remember the key messages in the context slides
- Replicate the model graphically and use it to perform the analysis (remember what it is meant to represent and its main simplifications compared to "reality")
- Note in particular the relevance of *increasing returns to scale* (as opposed to a flat or increasing Average Cost Curve)

THE FOLLOWING TWO SLIDES ARE INTENDED TO HELP YOU SAVE TIME WHEN LEARNING THE MODEL (NOT REQUIRED FOR EXAM)

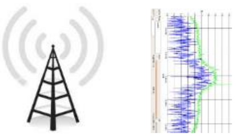
Total required study time should decrease if you spend 10 minutes working through this exercise prior to studying the model

(*It is very simple but intended to save NTNU students' time spent learning, not as an insult to their analytical skills*)

- There is a factory with 100 workers who buy and eat exactly 1 hot-dog each, every day
- There are three hot-dog vendors outside the factory
  - Each pay NOK 100 a day to rent a caravan from which they sell hot dogs (fixed cost)
  - They buy sausages & buns at REMA1000 at a cost of NOK 1 per hot-dog (marginal cost)
- Calculate the average cost per hot-dog per day for a vendor with 20, 35, and 45 % market share, respectively
- Plot the Average Cost curve in a *market share* (horizontal axis) – *Average Cost* (vertical axis) diagram (see next slide for tips)
- Assume the ”commodity sales price” per hot dog is NOK 6.5 and represent it by a horizontal line in your diagram
  - Calculate the daily profit for each vendor (both per hot-dog per day and total per day)
  - How much would the combined profit of the two smallest vendors rise if they consolidated (and sell from the same caravan)?
  - Which market structure (number of sellers and their associated market shares) creates the lowest Average Cost per hot-dog? What if competition authorities insisted there be at least three sellers?

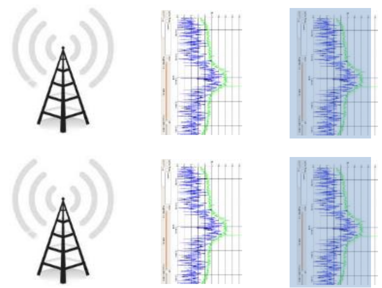
The real source of returns to scale in the radio access network

A small operator with one site and one license



One unit of capacity

One large operator with two licenses and two sites



The large operator produces four units of capacity at twice the total cost

50 % lower RAN and spectrum cost per unit of capacity produced

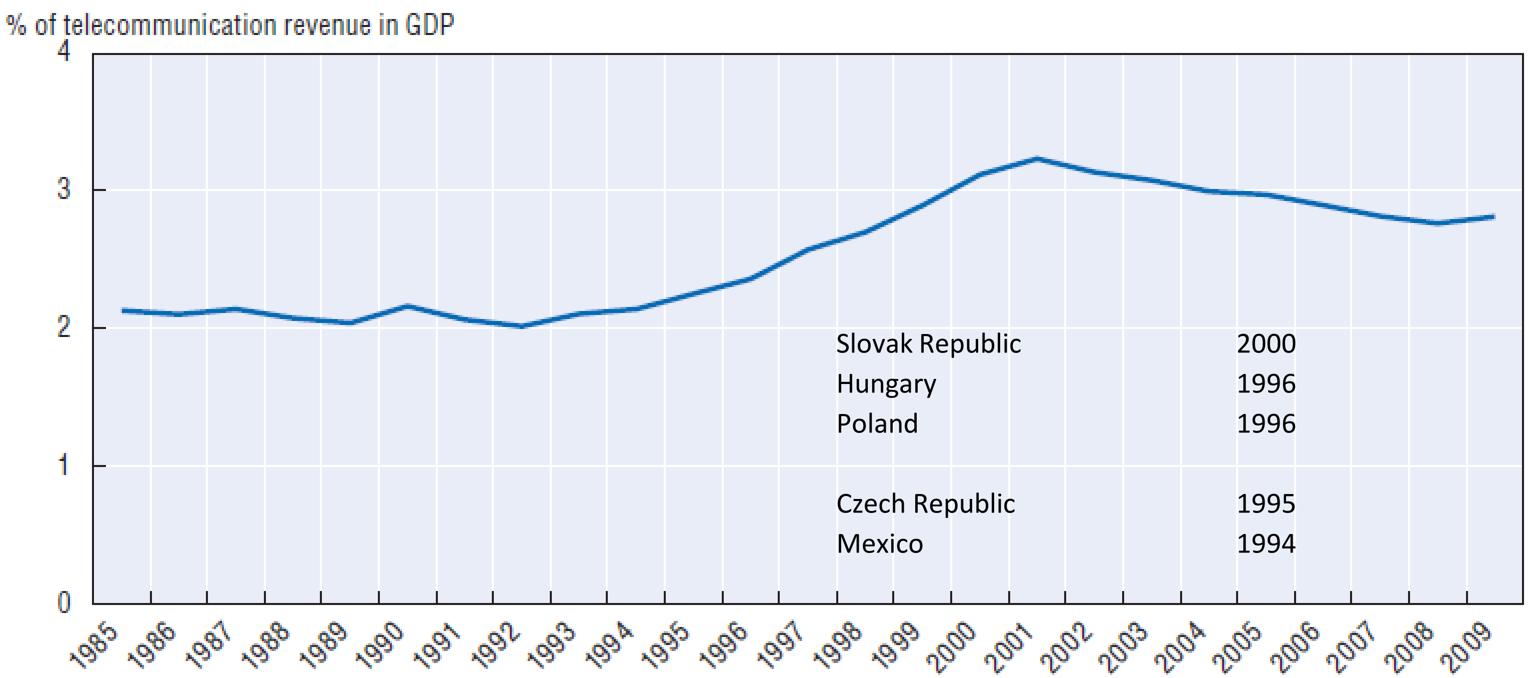
In a given geographical area:

- If you double sites and spectrum, you get four times the capacity
- This means **half the cost per unit of capacity produced**
- **This is a strong source of increasing returns to scale**

CONTEXT (EXAM RELEVANT – REMEMBER KEY MESSAGES)

“Share of pocket” appears constant: Economic growth and increased cost-effectiveness may become primary source of profit growth within wireless sector

Figure 3.2. Telecommunication revenue as a percentage of GDP for total OECD, 1985-2009

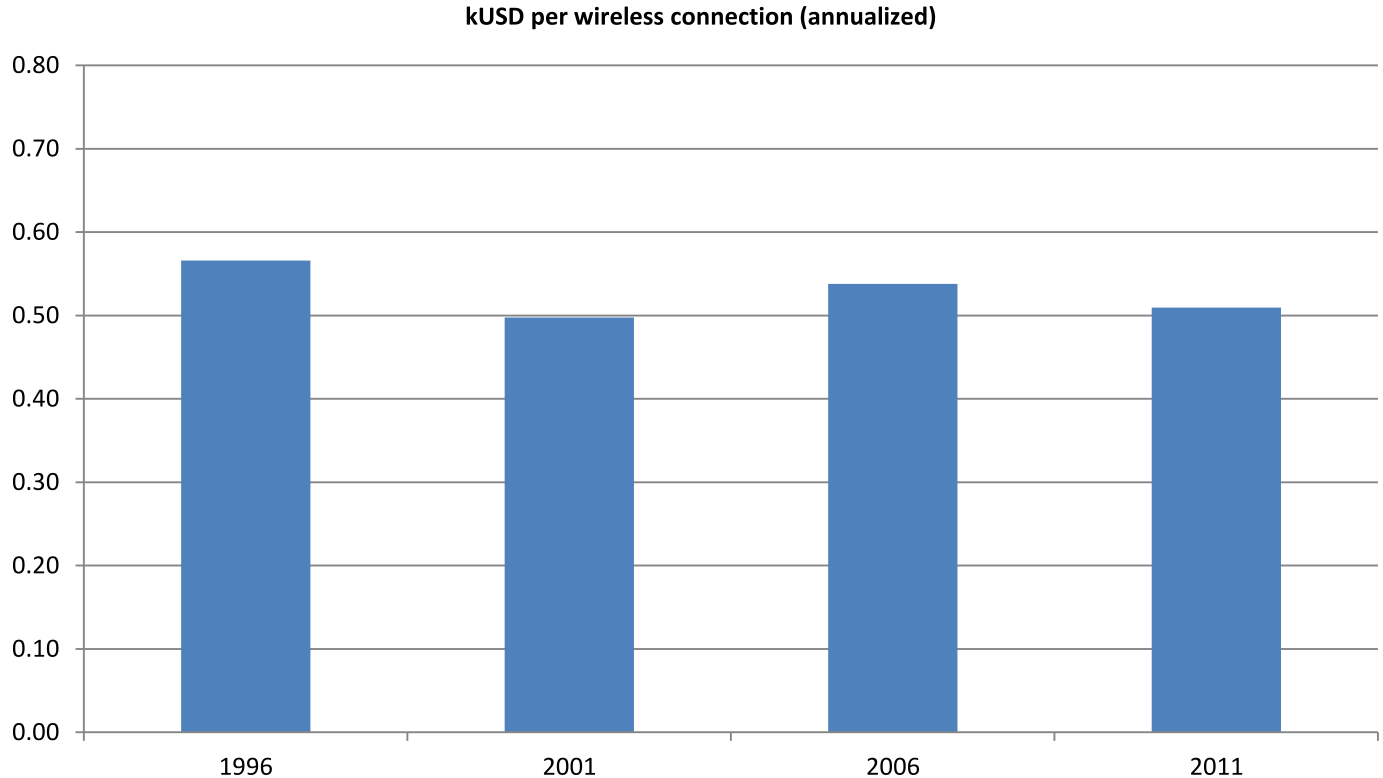


StatLink http://dx.doi.org/10.1787/888932394699

OECD average growth rate 2000-2010 = 4.3 %

Telecommunications revenue growth 2000 - 2010 = 3.9 %

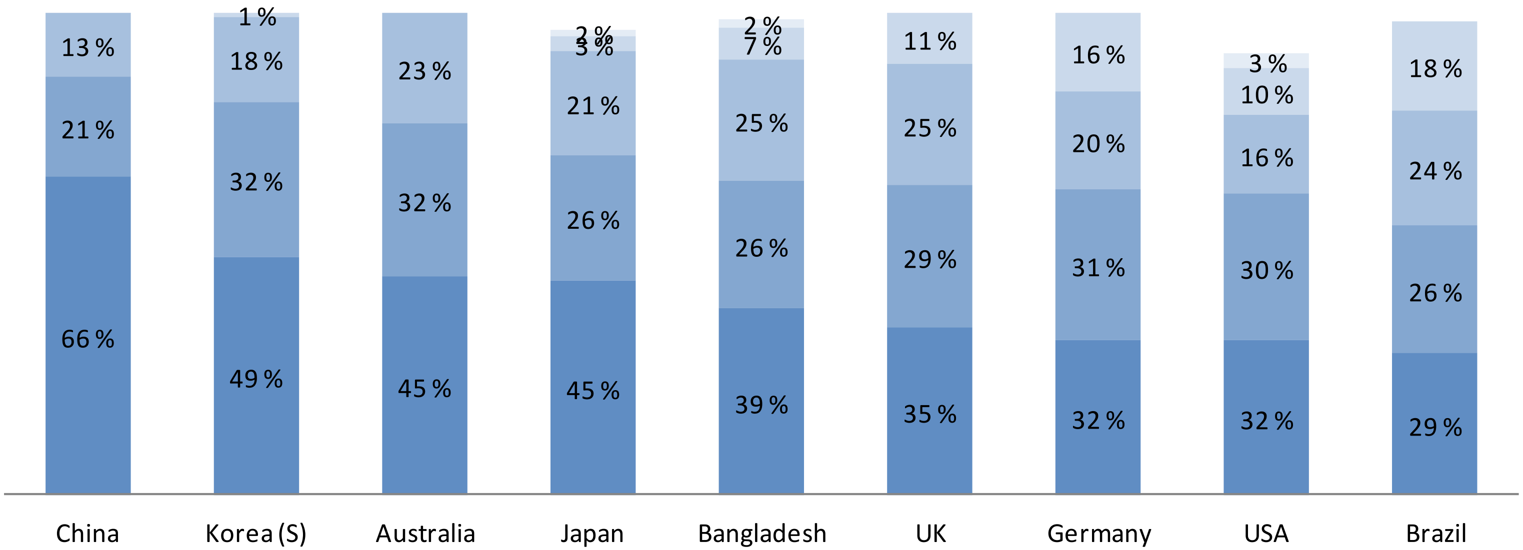
Another view of the "wireless revolution" in the US



US wireless Quick Facts (Source: CTIA)

Mid-year estimates (annualized)	1996	2001	2006	2011
Wireless connections (M)	38	118	220	323
Total revenue (B)	21,5	58,7	118,3	164,6
Revenue / connection (K)	0,57	0,50	0,54	0,51

Five largest operators (share of connections Q1 2012) in a set of markets: market structures are strikingly similar (why?)

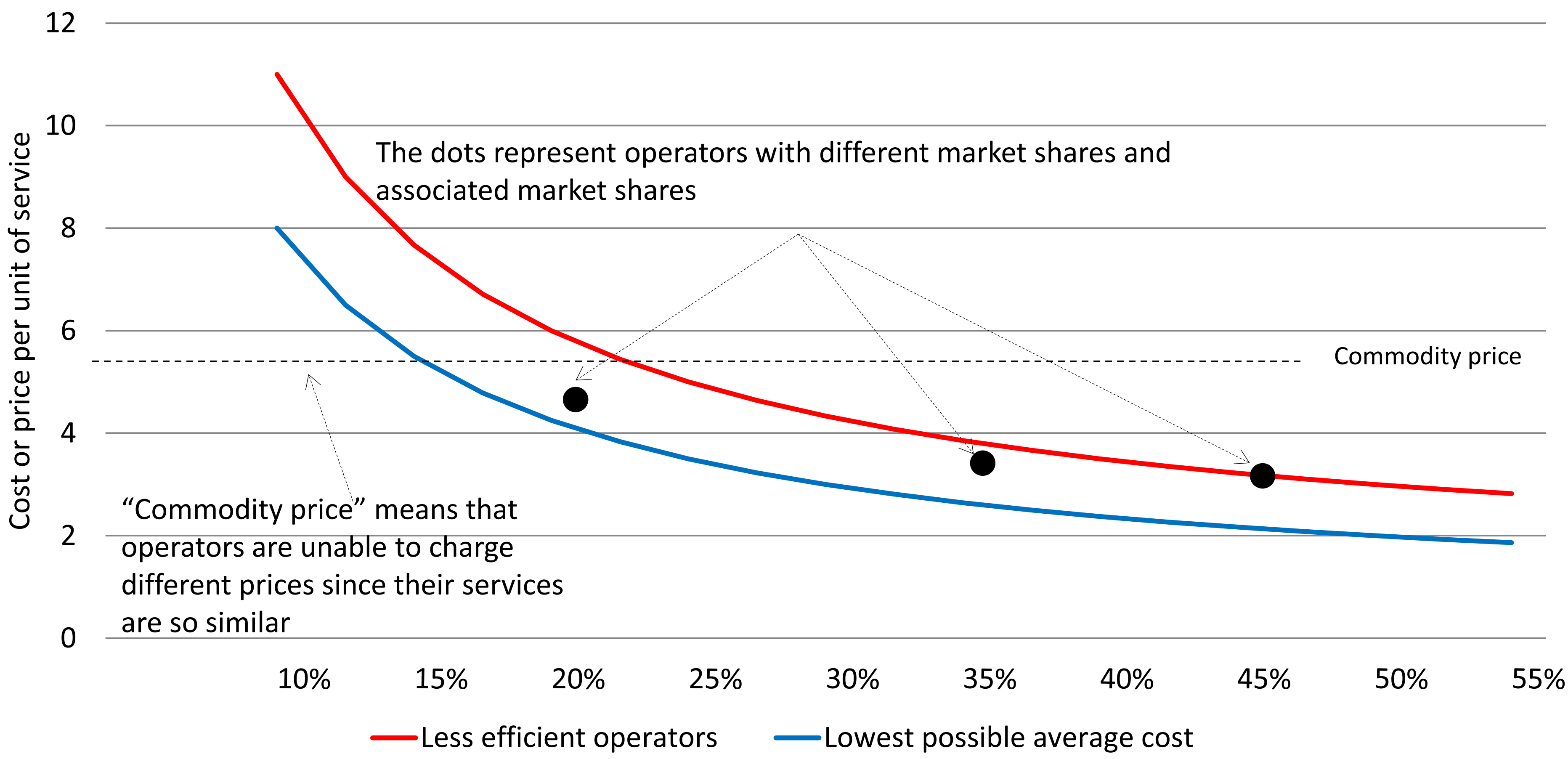


China		Korea(S)		Australia		Japan		Bangladesh	
China Mobile	66 %	SK Telecom	49 %	Telstra	45 %	NTT DOCOMO	45 %	Grameenphone (Telenor)	39 %
China Unicom	21 %	KT	32 %	Optus (SingTel)	32 %	au (KDDI)	26 %	Robi (Axiata)	26 %
China Telecom	13 %	LG Uplus	18 %	Vodafone Hutchison	23 %	SoftBank Mobile	21 %	banglalink (Orascom)	25 %
		KT Powertel	1 %			EMOBILE (eAccess)	3 %	Airtel (Bharti Airtel)	7 %
						UQ Communications	2 %	Citycell (Pacific Bangladesh	2 %
SUM	100 %		100 %		100 %		97 %		99 %

UK		Germany		USA		Brazil	
Everything Everywhere (Frar	35 %	Vodafone	32 %	Verizon Wireless	32 %	Vivo (Telefónica)	29 %
O2 (Telefónica)	29 %	Telekom (Deutsche Telekon	31 %	AT&T Mobility	30 %	TIM	26 %
Vodafone	25 %	E-Plus (KPN)	20 %	Sprint (Sprint Nextel)	16 %	Claro (América Móvil)	24 %
3 (Hutchison)	11 %	O2 (Telefónica)	16 %	T-Mobile (Deutsche Telekon	10 %	Oi	18 %
	0 %	NetCologne	0 %	CLEAR (Clearwire)	3 %	Algar Telecom	0 %
SUM	100 %		100 %		92 %		98 %

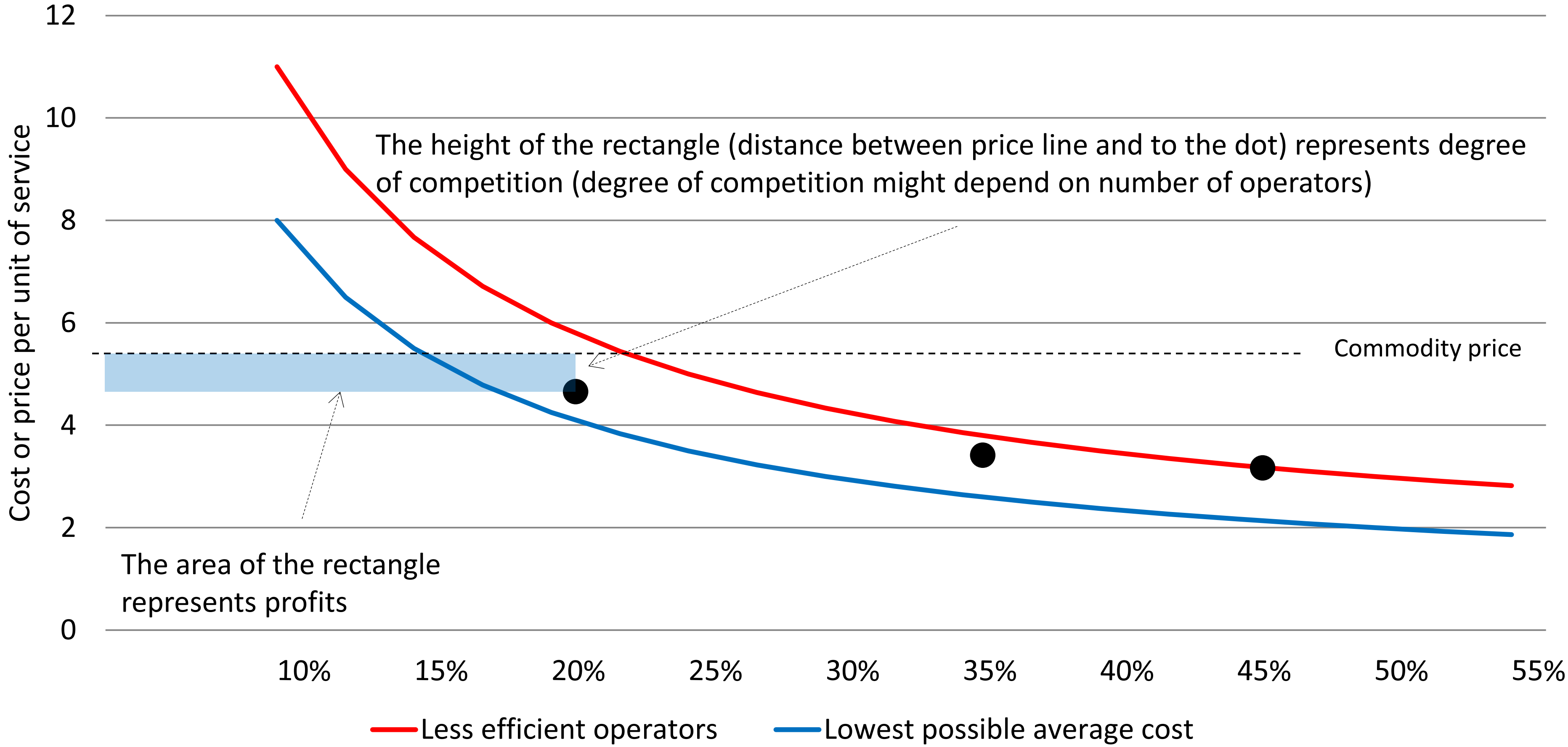
A SIMPLE MODEL OF MARKET STRUCTURE, COSTS, AND PROFITABILITY (EXAM RELEVANT)

Analytical framework: (Conceptual) Average Cost as function of market share 1:3



Businesses (like athletes and students) may not realize their full potential. In the diagram, a "perfect" operator would have an average cost per unit of services on the blue line. In this example, large operators are further away from their potential but that is not a natural law.

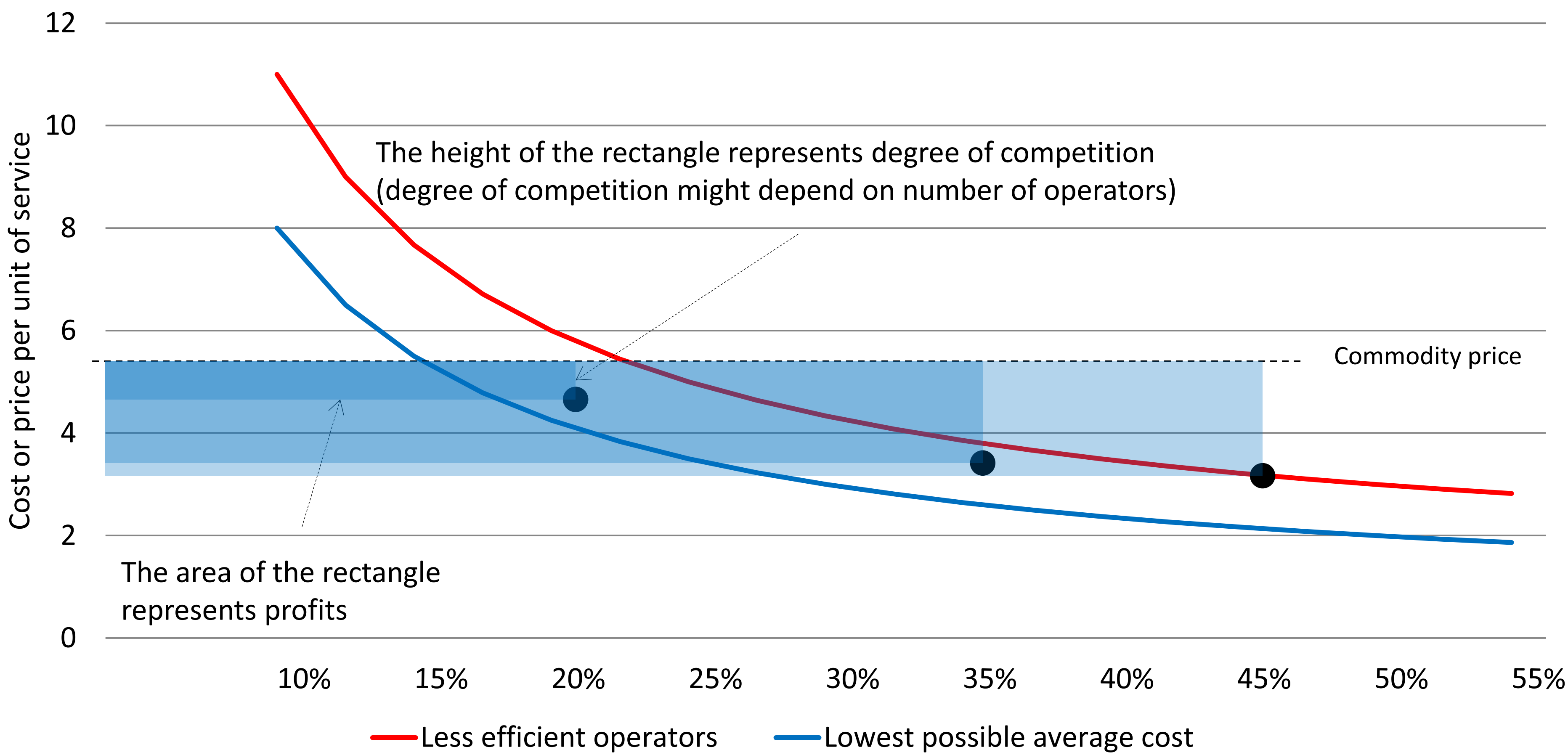
Analytical framework: (Conceptual) Average Cost as function of market share 2:3



If prices per unit are above average costs, operators earn a profit. In the model we assume prices are high enough to make the smallest operator profitable and explore the implications.

The model does not explain *why* all three are profitable and why the market does not consolidate into a monopoly. We simply assume that factors outside the model (governments, competition authorities) make this happen. The slide showing market shares across the world is intended to convince you that this assumption is reasonable.

Analytical framework: (Conceptual) Average Cost as function of market share 3:3



Analysis:
Will more operators lead to lower prices?
What is the government's tradeoff when determining optimal market structure?
How will technological development (shape of cost curves) affect this tradeoff?

Discussion (try to use this model to answer the questions without thinking too much about "reality") :
Will wireless operators' combined profits from provision of connectivity deteriorate as voice and SMS are phased out ?
How can the bargaining power of OTTs affect profits?
Who cares most about improving the efficiency of the largest two operators? (Government, customers, or owners?)

Key points & exam tips

Key points

- The telecommunication sector's *share of pocket* appears little affected by technological revolutions
- Economies of scale drive consolidation; governments define and enforce its limits
- Larger operators have cost advantages; a game of "musical chairs" challenges operators' strategy units (one of the operators will hardly make a profit)
- The real winners appear to be consumers who pay the same and get more over time

For exam: At least..

- Remember the key messages in the context slides
- Replicate the model graphically and use it to perform the analysis (remember what it is meant to represent and it's main simplifications compared to "reality")
- Note in particular the relevance of economies of scale (as opposed to a flat or increasing Average Cost Curve)

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High-level resume

Experience

2008 -> : Telenor ASA

- Director of Spectrum Acquisitions
- VP, Head of *Spectrum and Analytical Decision Support*

2007-2008: Simonsen Advokatfirma DA

2005-2007: FDH Consulting LTD

- Partner, Managing Consultant

1999-2005: Norwegian Post and Telecommunications Authority

Education

2009 -> PhD in Economics UiO

- Auctions
- Applied Game Theory

2007: MPhil in Economics UiO

- Microeconomics
- Industrial Organization
- Financial theory
- Game theory

1998: Cand Jur UiB

- EU Law
- Competition Law
- Treaty Law
- English Law