

# Can Wireless Infrastructure Keep Up In Ultra Broadband? Gigabits vs. Megahertz

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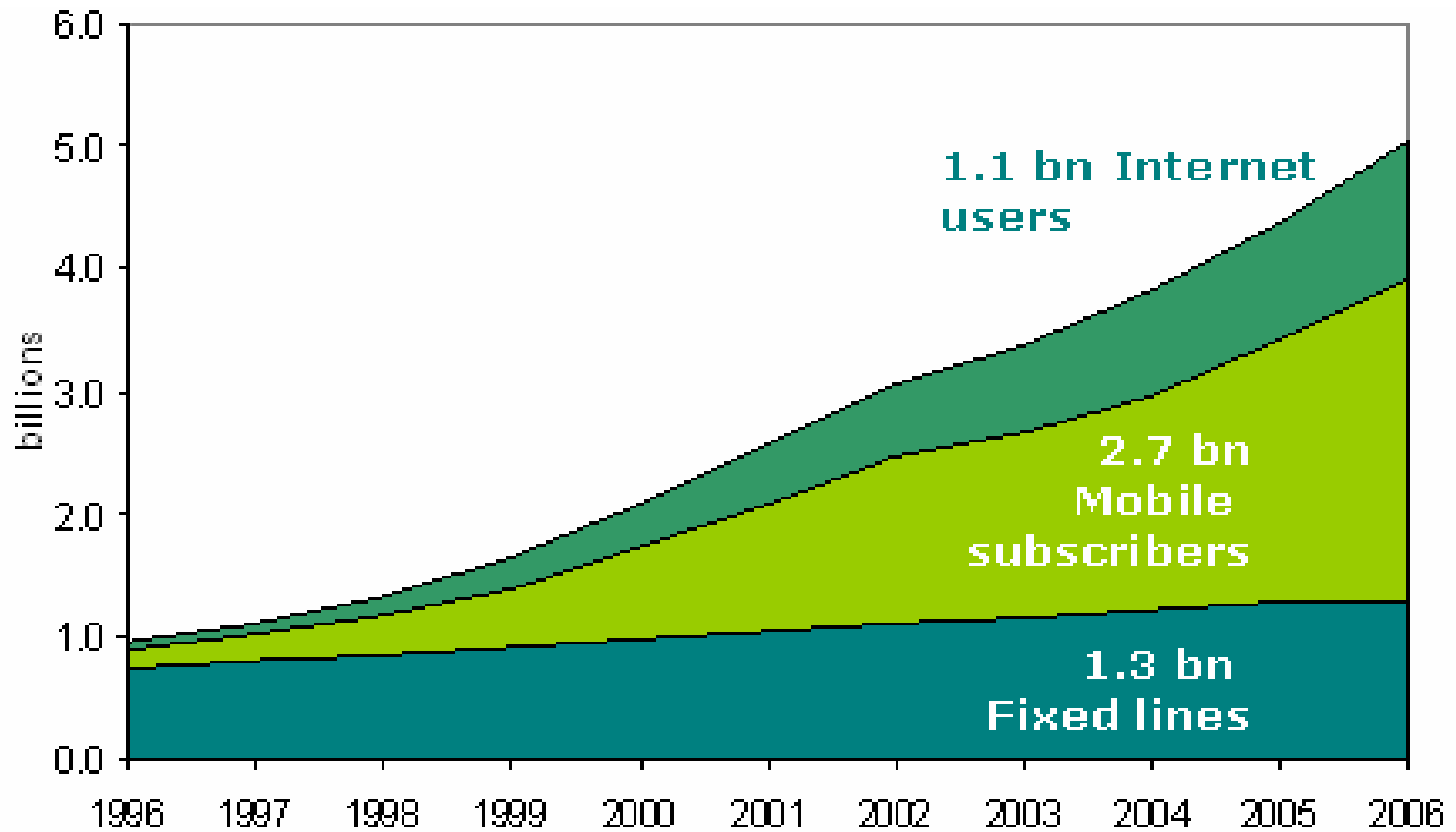
# Overview

- Yes
- It will take Liberal Licenses
  - broad, exclusive spectrum rights productive
  - more bandwidth
  - overlays for reallocations
- mobile voice now dominating
- What Really Matters in Spectrum Allocation
  - Hazlett-Muñoz (2008)

# Can Wireless Compete in UBB?

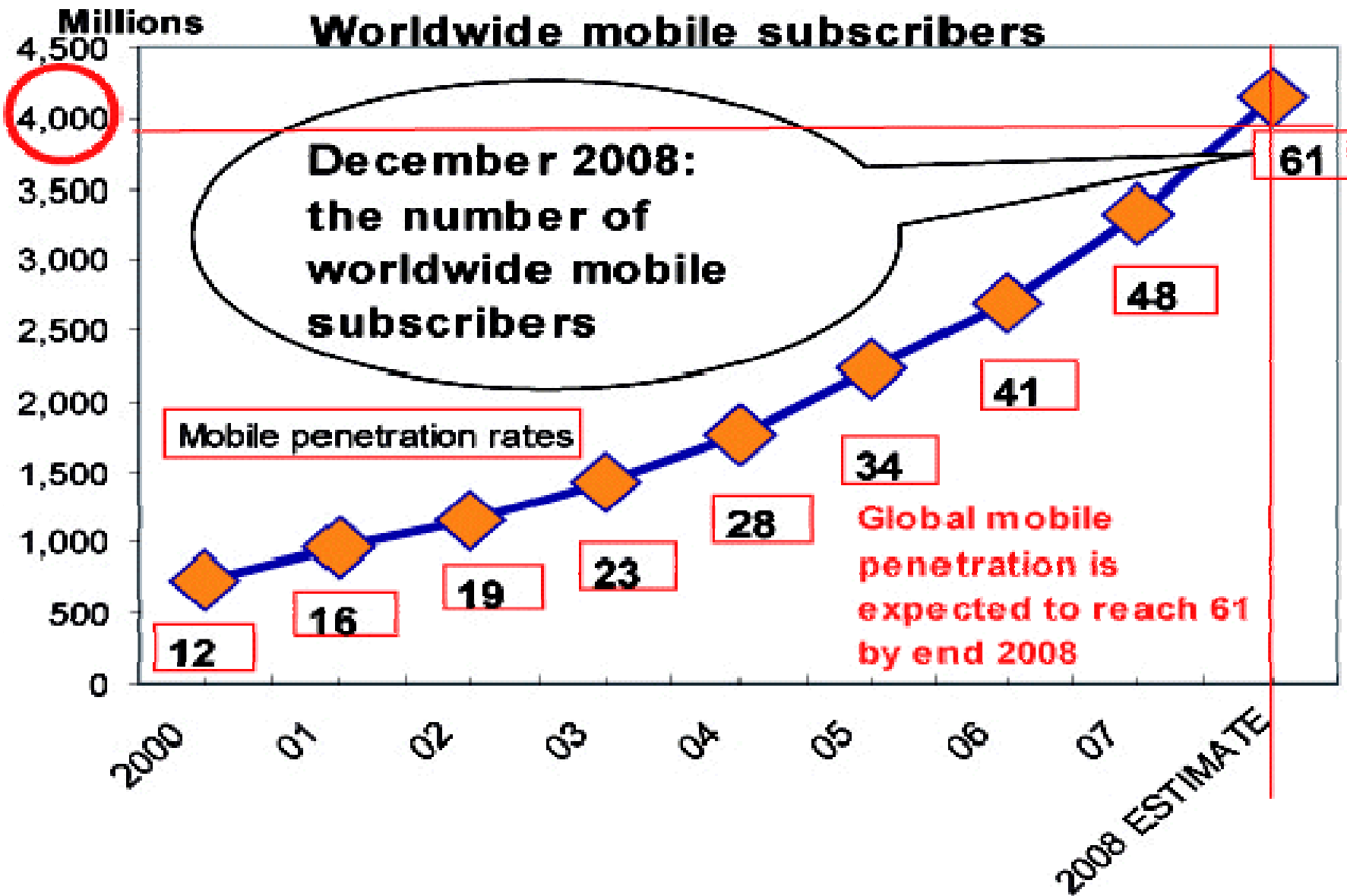
- Yes
- Underestimated in uni-dimensional tech view
- Mobility highly valuable
- Competitive networks → robust markets
  - iPhone v. Blackberry v. Android
- WiMAX via Clearwire (\$30/mo, 4mbps/2mbps)
- Substitutes for lots of fixed

# Global Voice & Data Subscribers



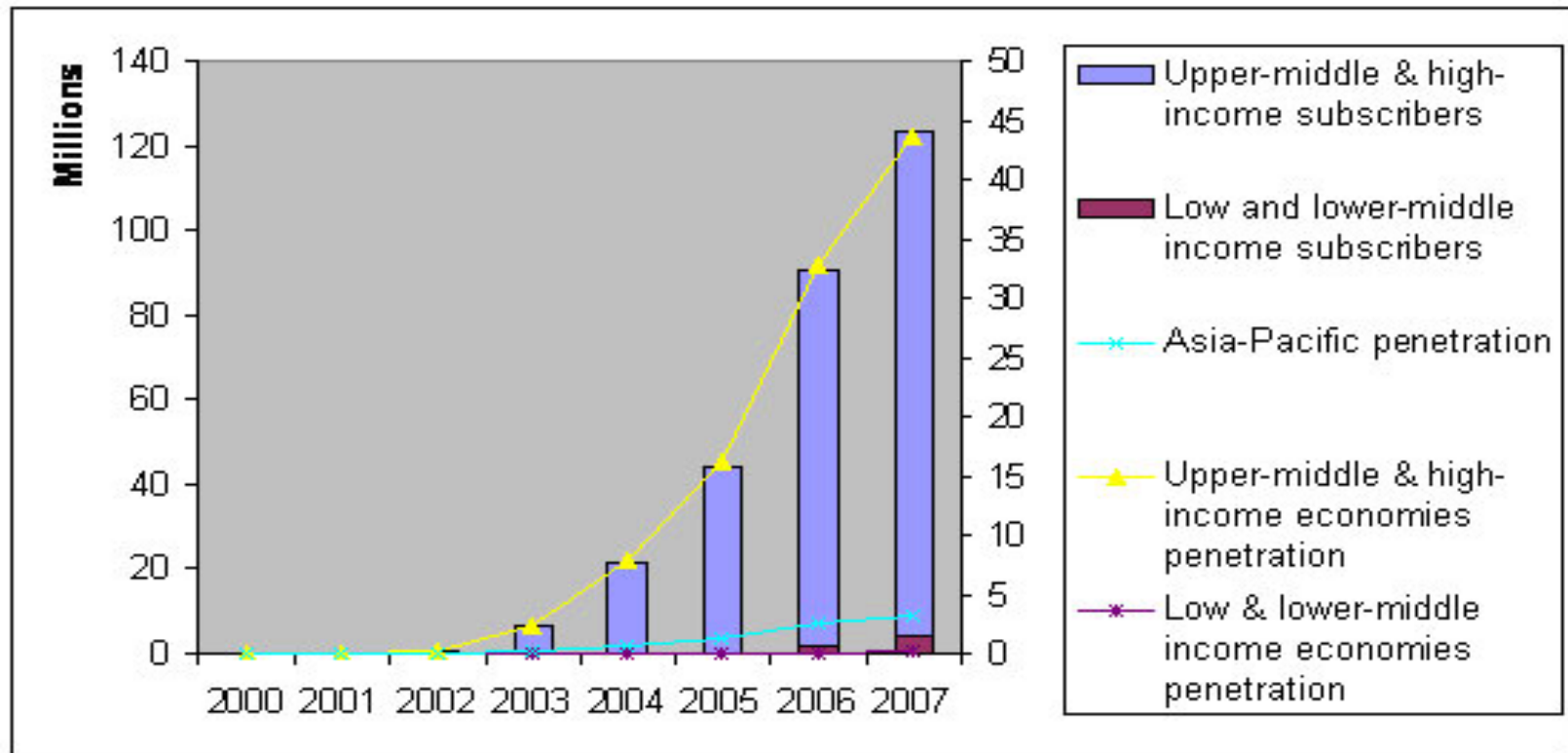
- "By the end of 2006, there were a total of nearly 4 billion mobile and fixed-line subscribers and over 1 billion Internet users. This includes 1.27 billion fixed-line subscribers and 2.68 billion mobile subscribers (61 per cent of which are located in developing countries) as well as some 1.13 billion Internet users." (ITU)

# Update!



Source: ITU World Telecommunication/ICT Indicators (WTI) database.

# Mobile cellular broadband subscribers in Asia-Pacific



**Source:** ITU World Telecommunication/ICT Indicators database

**Note:** Mobile broadband refers to CDMA1X EVDO, WCDMA and HSDPA.

# U.S.A. Wireless BB Subs

2004	2005		2006		2007
Jun	Jun	Dec	Jun	Dec	Jun
11,398,199	16,316,309	19,515,483	22,584,255	25,412,883	27,516,171
1,407,121	898,468	878,973	948,134	1,030,698	1,028,654
-	411,731	368,782	337,412	344,759	319,932
-	486,737	510,191	610,722	685,939	708,722
18,592,636	24,017,442	26,558,206	29,174,494	31,981,705	34,408,553
130,928	315,651	448,257	685,823	1,035,677	1,402,652
421,690	965,068	3,812,655	11,872,998	23,344,106	36,560,197
-	376,837	426,928	495,365	571,980	668,803
-	208,695	257,431	361,113	484,277	586,141
-	379,536	3,128,296	11,016,520	22,287,849	35,305,253
-	4,872	4,571	5,208	4,776	5,420
31,950,574	42,517,810	51,218,145	65,270,912	82,809,845	100,921,647

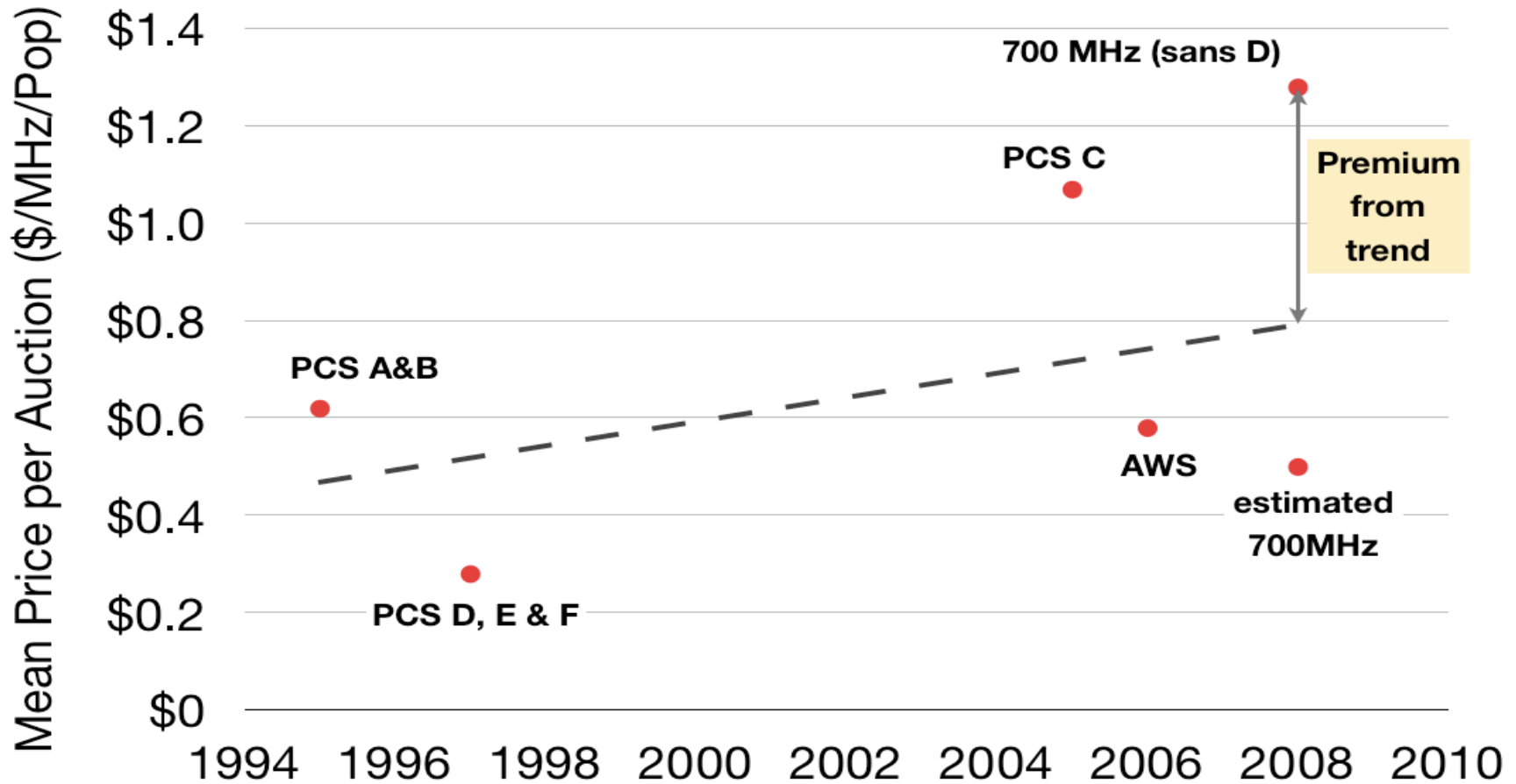
# Two Policy Impediments

- policies to inefficiently increase license auction revenues
- case-by-case spectrum allocations

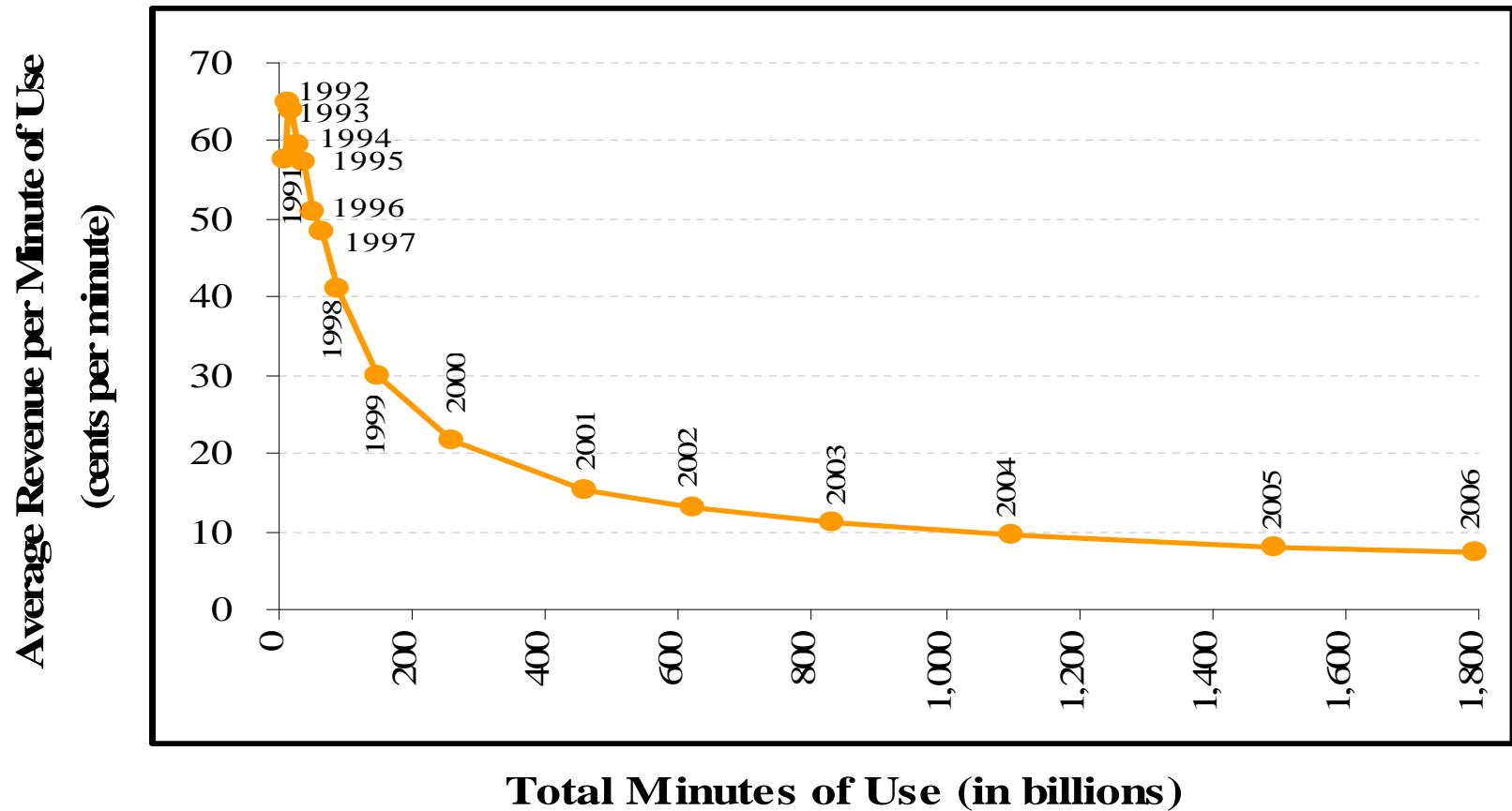
# License Values: Tip of the Iceberg

- 1994-2005: \$14 billion
- 2006-2008: \$33 billion
  - AWS (2006), 90 MHz (1.7/2.1 GHz): \$13.7 B.
  - 700 MHz (2008), 52 MHz (UHF TV): \$19.4 B.

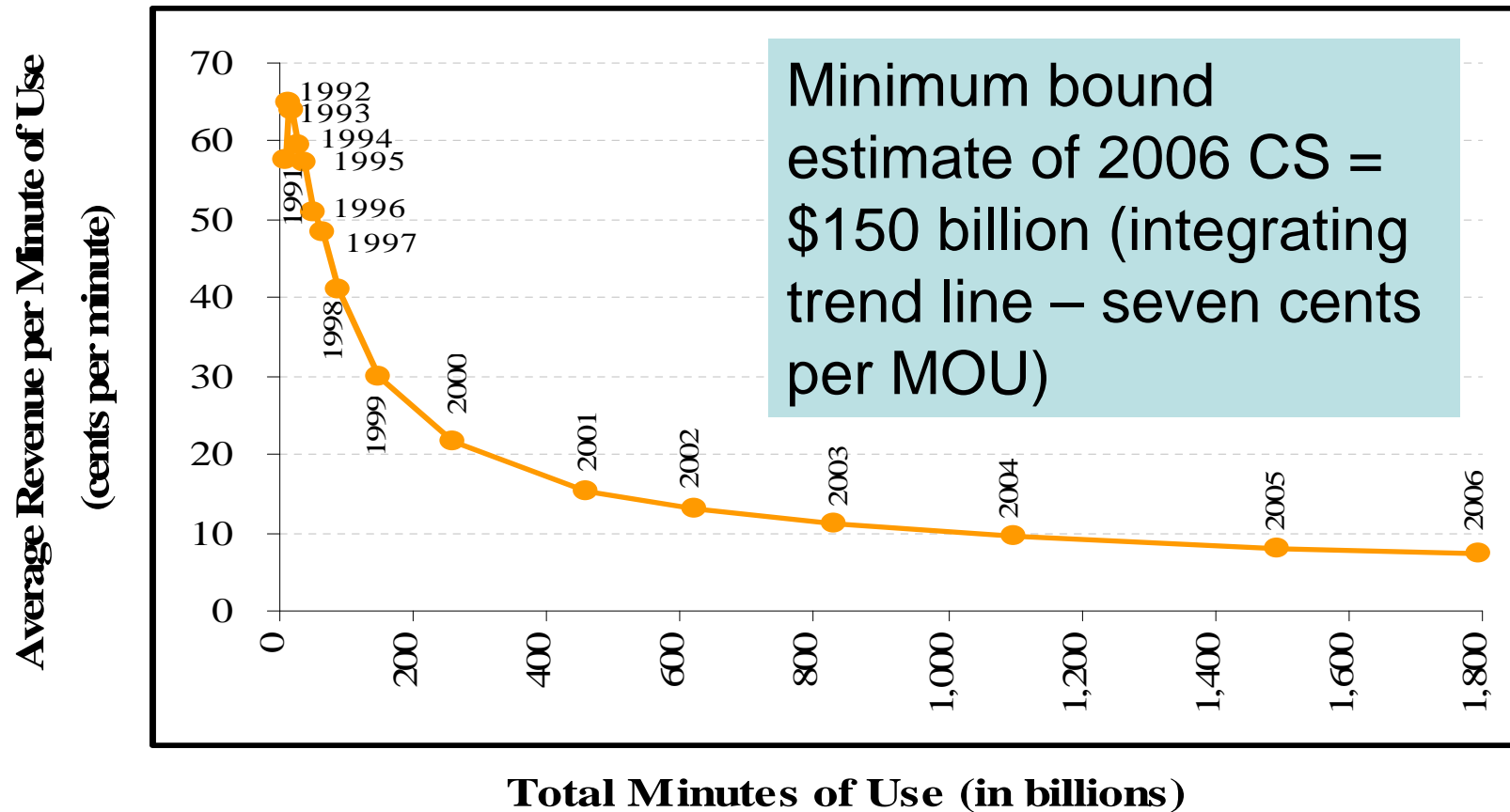
# U.S. Auction Prices (\$/MHz/pop)



# Social Value of Cellular (USA) at least \$150 billion annually



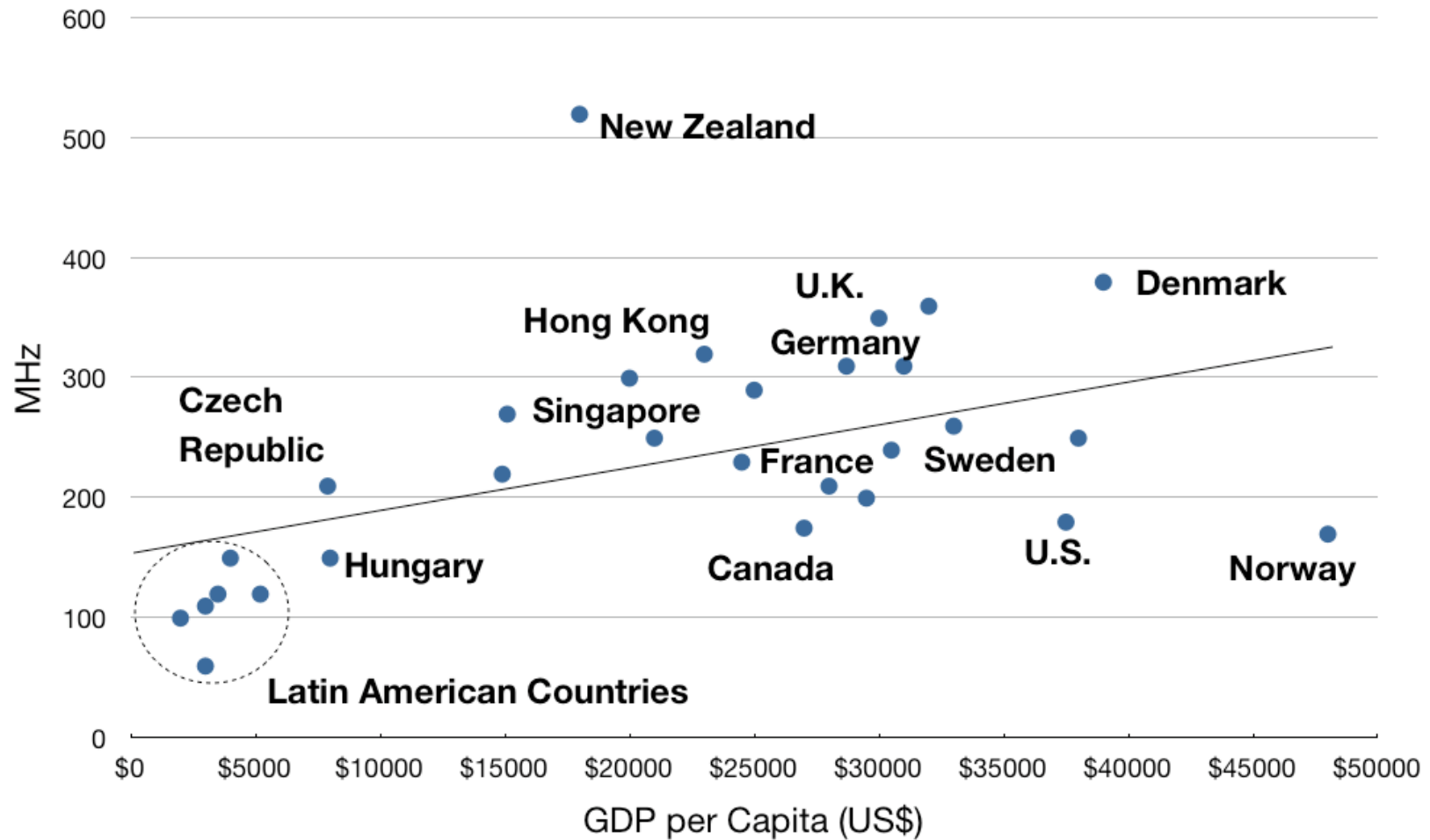
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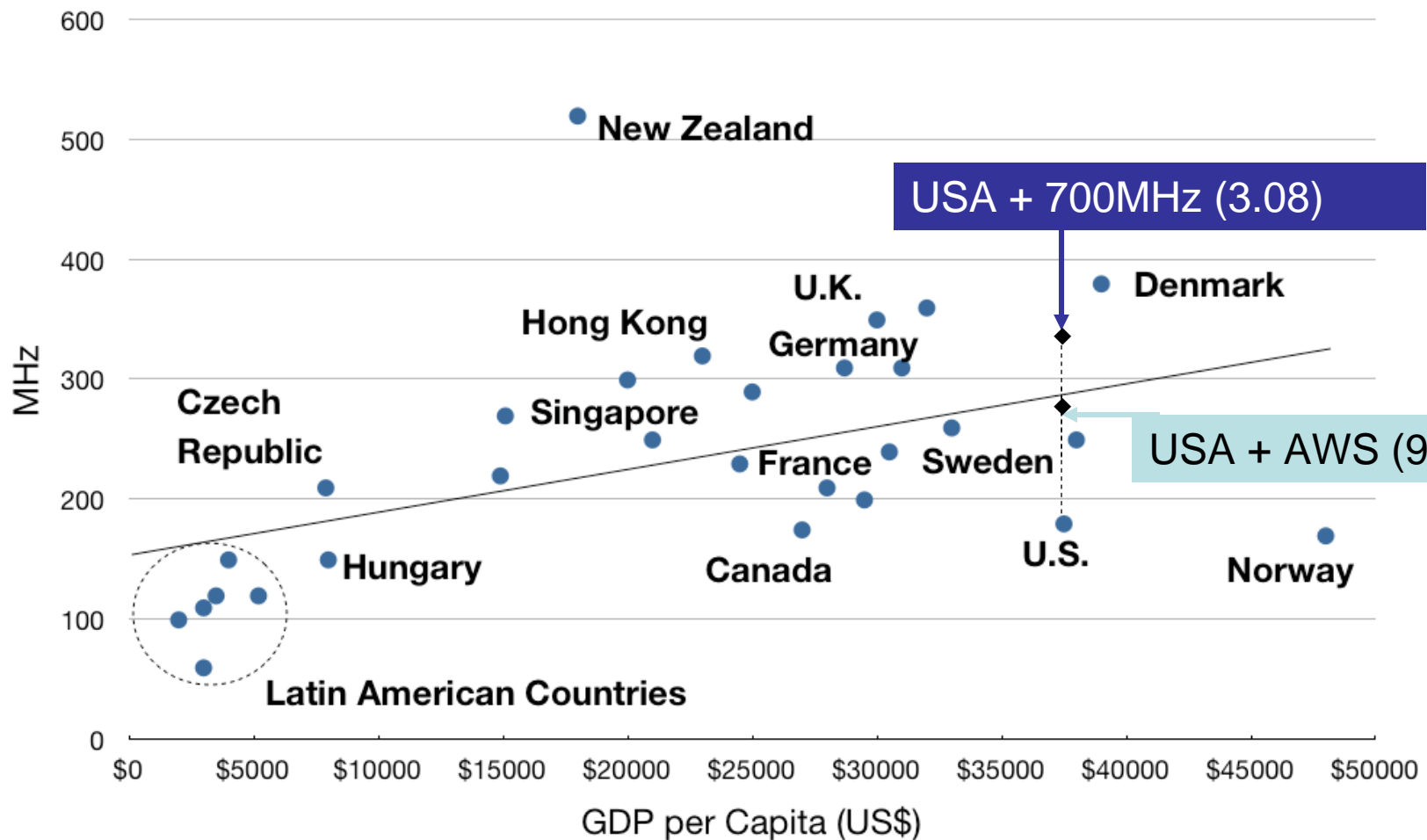
# Intense Use of Cellular/PCS

- But only 190 MHz allocated
- Far below other developed countries
- Recent auctions help remedy
  - 90 MHz (AWS – Sept. 2006)
  - 52 MHz (700 MHz – March 2008)

# Spectrum vs. GDP per Capita (2003)



# MHz against GDP per Capita – U.S.A. Adds AWS (2006) and 700 MHz (2008)



# Summing Up a Bit

- U.S.A. under 'spectrum-ed'
- constraints mitigated by
  - liberal rules (1G = 2G = 3G)
  - mergers
  - AWS, 700 MHz
- no reason not to liberalize further

# Two Pronged USA Delay Mode

- Attempt to ‘maximize’ auction receipts
  - Bush Administration’s “win win” to delay 2001 license auctions to 2004 – and beyond (not yet held)
- Confusion over Unlicensed
  - unlicensed not unregulated
  - unlicensed allocations unnecessary for “unlicensed apps”
  - pre-empts residual claimants necessary for successful reallocations (as DTV white space)

# Hazlett-Muñoz (2008)

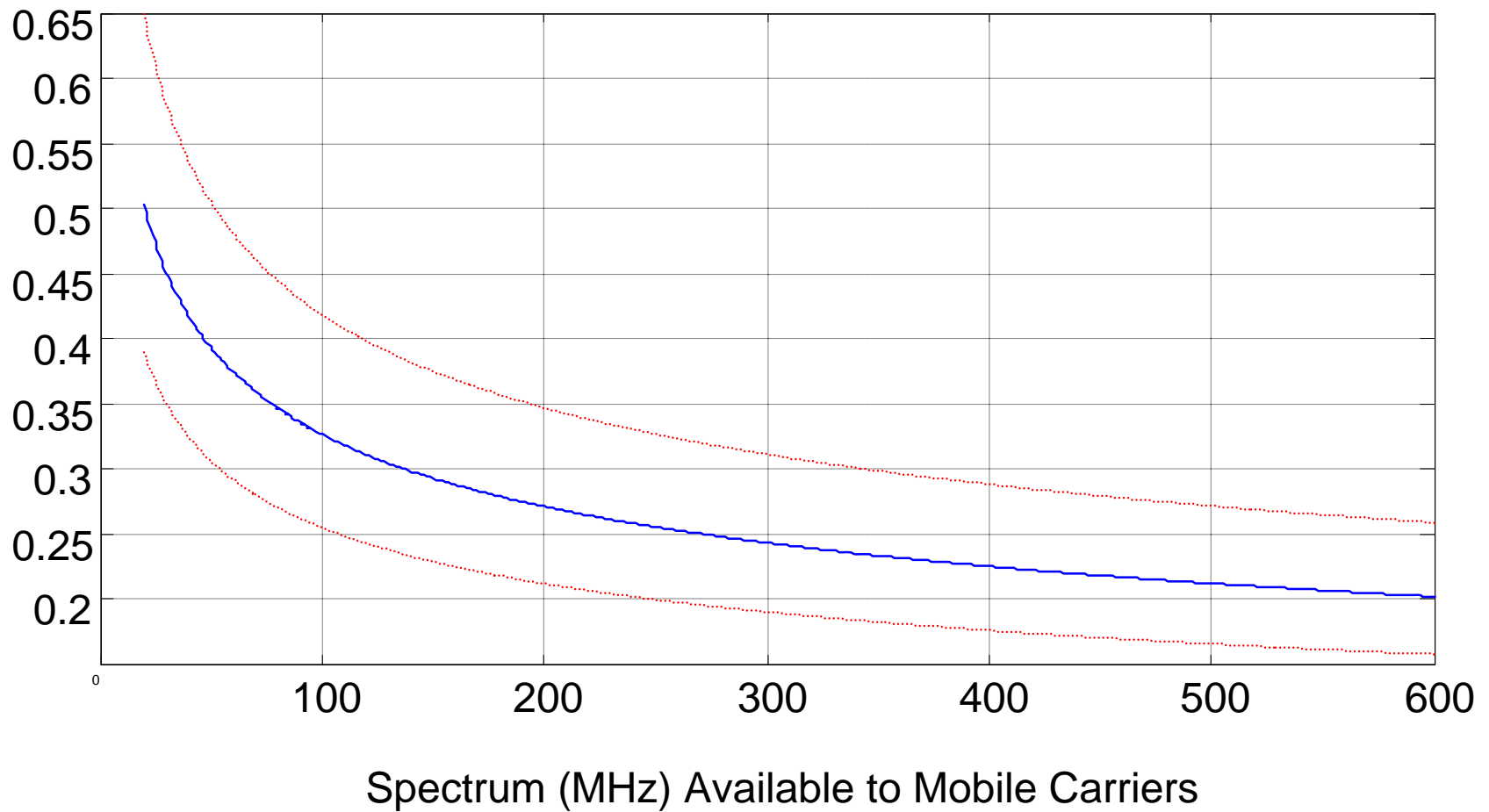
## A Welfare Analysis of Spectrum Allocation

- Arguments to extract maximal revenue in license auctions
- Efficiency from saving \$0.33 per dollar raised → avoiding tax distortions
- Devices like: reserve prices, bidding credits, delays, reducing licenses
  - PCS C block DE's in 1996
  - Bush Adm. 2001: 'win win'
  - Reserve prices in Belgium, Greece (3G, 2001)

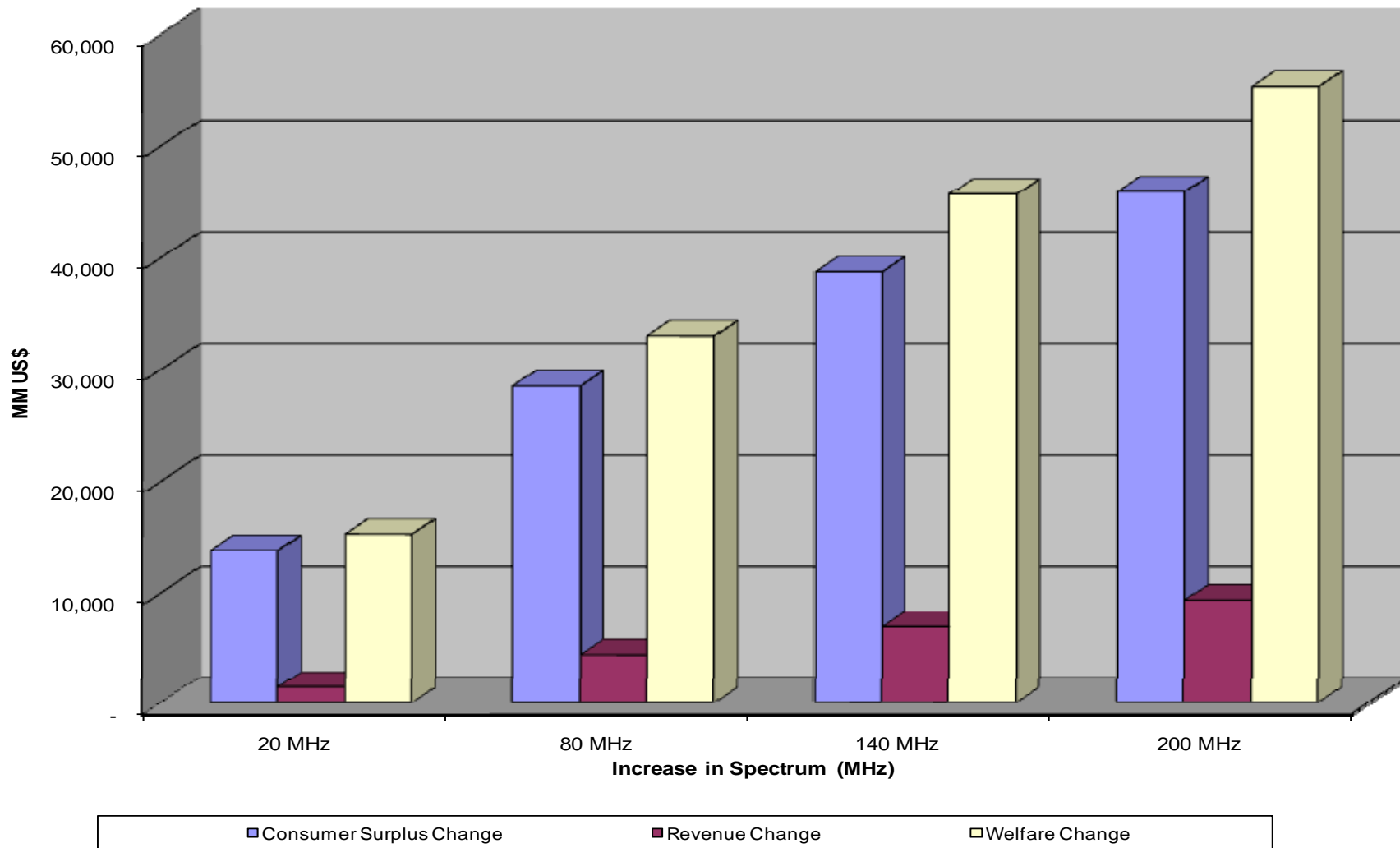
# At what cost to retail customer?

- 29 countries
- mobile sector quarterly data 1999-2004
- Prices (average revenue per minute)
- Quantities (minutes of use)

# U.K. MHz-Price Simulations



# Strong MHz-Price effects → large costs from revenue extraction schemes



# Message: Don't do it.

- Liberalize spectrum allocations.
- Allow markets to access more bandwidth.
- Competition policy backstop.

THANK YOU.