
The Economics of Free Innovation

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Our argument

- ◆ For a long time (1750-1990) it appeared to most people that producer innovation was the only economic way to realize large, complex designs
- ◆ Collaborative user innovation is a new way to realize large, complex designs ... but ...
 - Collaborative user innovators need to communicate about the design
 - *Free, open broadcast* is the lowest-cost way for designers to communicate (post-Internet)
 - Hence this is “free innovation”

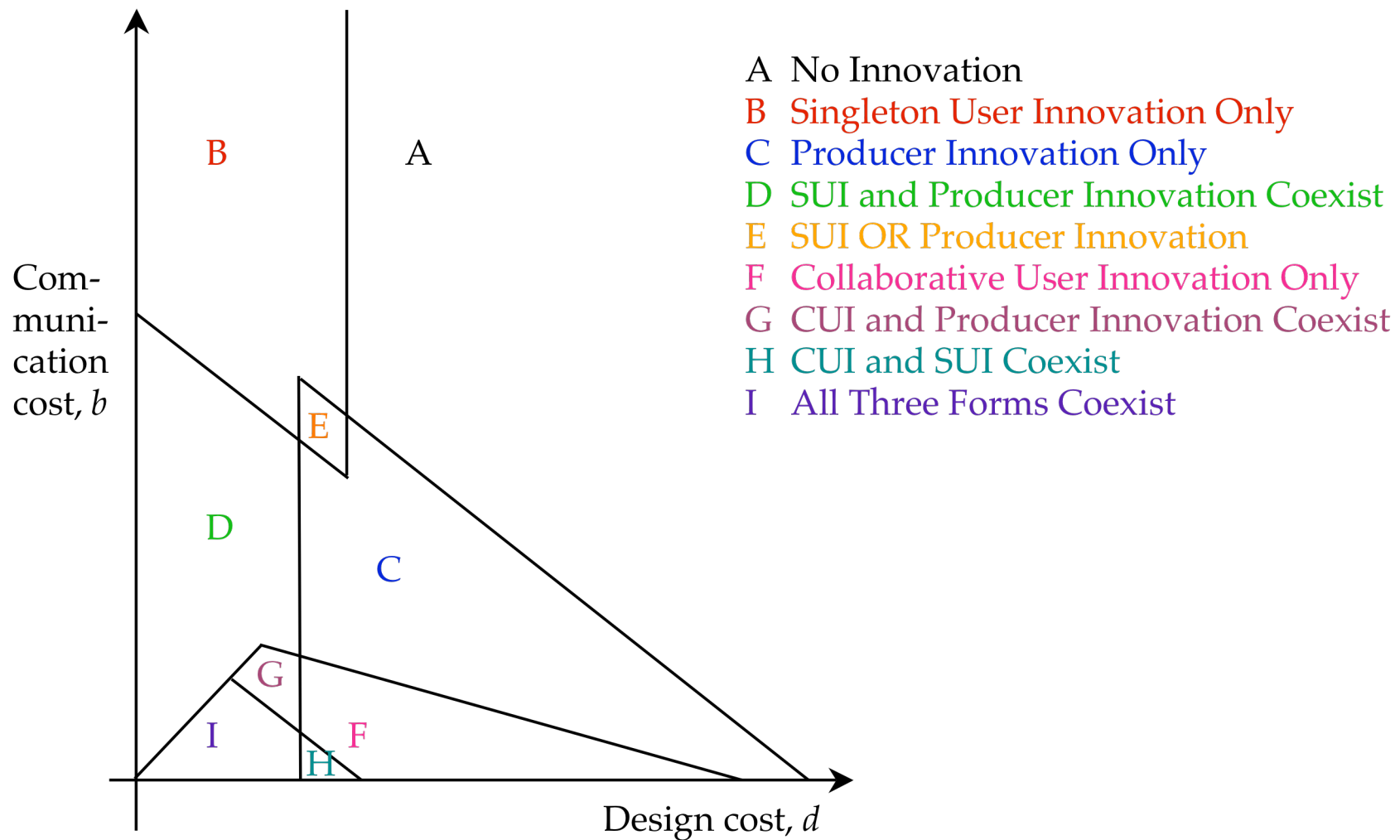
Our argument (cont.)

- ◆ Producer innovation was enabled by technologies that supported the aggregation of demand
 - Cheaper transportation (canals, railroads)
 - Lower production costs (interchangeable parts, mass production)
 - Lower transaction costs
 - Lower communication cost (for marketing)
- ◆ Collaborative user innovation is being enabled by technologies that support distributed design
 - Separation of design from production
 - Generic production of customized designs
 - Cheap, all-to-all communication of text, pictures, data
 - Modular design architectures

Which mode of innovation will
succeed, when and where?

What we find...

Innovation Regimes for different technology combinations



Important definitions

- ◆ In what follows, we focus on “designs” – not on the physical products or services that embody them.
 - Designs = “the instructions based on knowledge that turn resources into things people use and value”
 - » Herbert Simon (1967), Nam Suh (1990), Baldwin and Clark (2000)
 - Designs are not “the thing itself,” they are the instructions for making it: Designs are information
- ◆ *Every innovation requires a new design*

Costs of realizing a new design

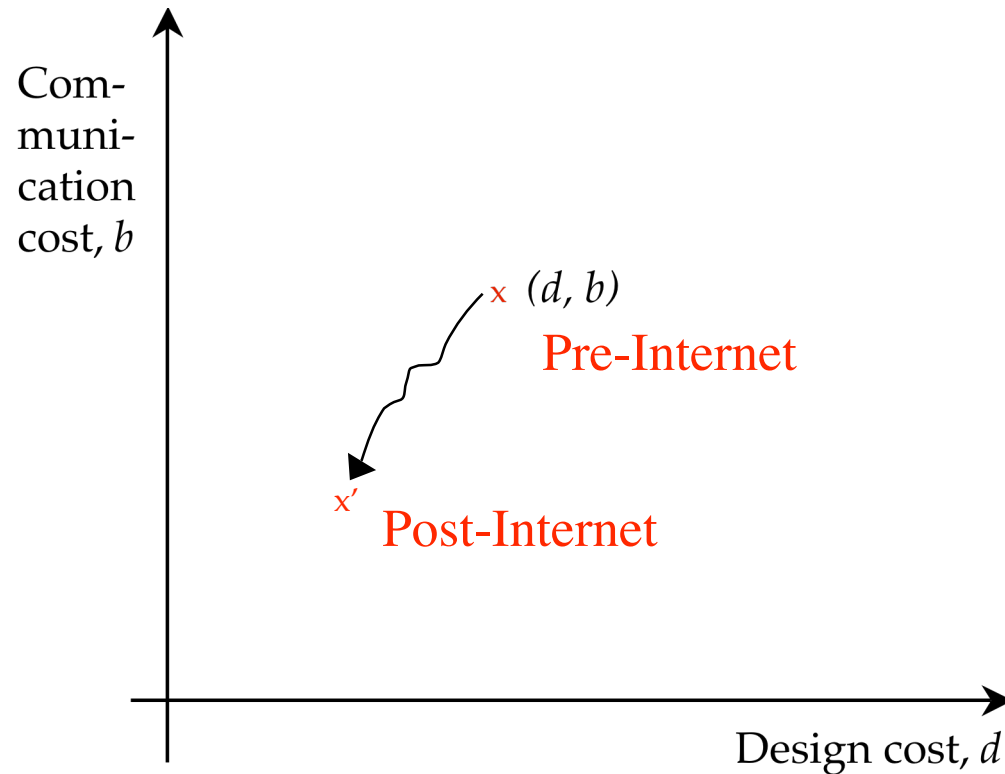
- ◆ Design
 - Creating the instructions
- ◆ Production
 - Carrying out the instructions
- ◆ Communication
 - Marketing, advertisement (producers to users)
 - Collaboration among users
- ◆ Transactions
 - Transfers across economic boundaries

Focus on design and communication costs, for simplicity

Three Organizational Forms can generate new designs

- ◆ Singleton user innovators
 - Design for own use
 - No transaction or communication cost
- ◆ Producer innovators
 - Design for profit, no use value
 - Anticipated revenue must cover all costs
- ◆ Collaborative user innovators
 - Obtain use value
 - Split up work of design
 - High communication costs
 - Transactions optional

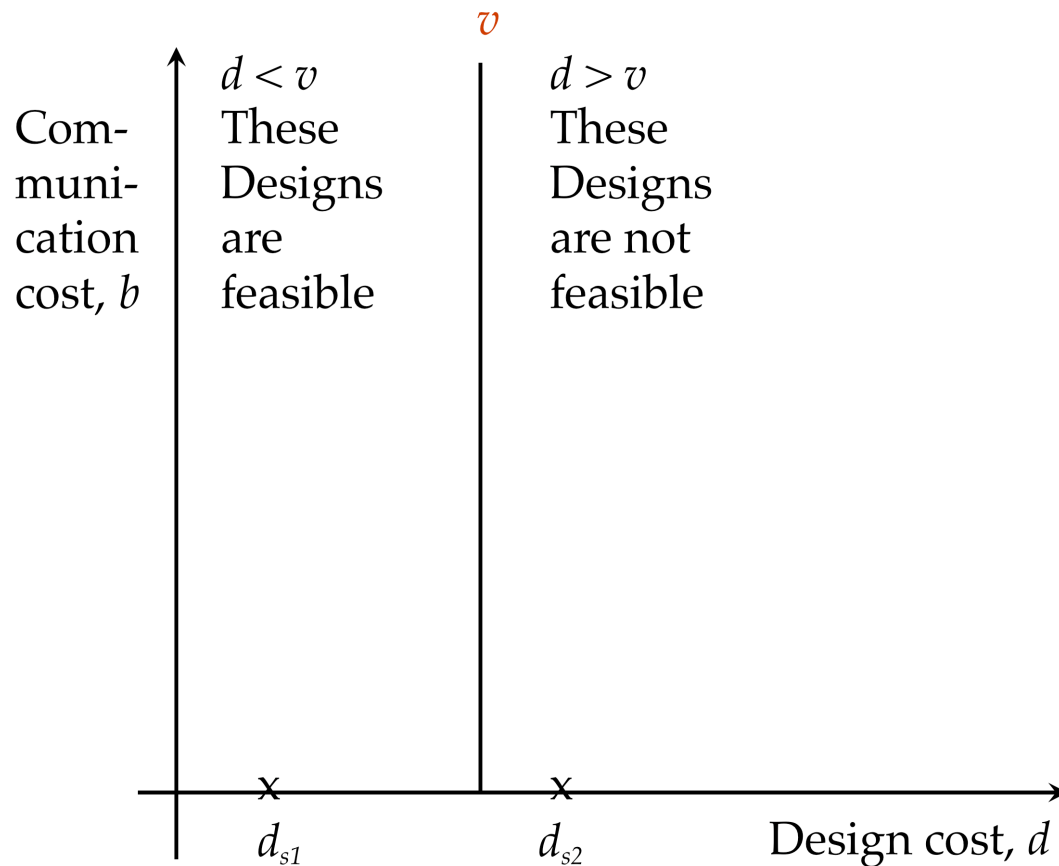
Focus on combinations of design cost (d) and communication cost (b)



For a given category of designs, we can associate points in the space with a design cost and a communication cost

Over time, (d, b) will change as technology improves

For Singleton User Innovators

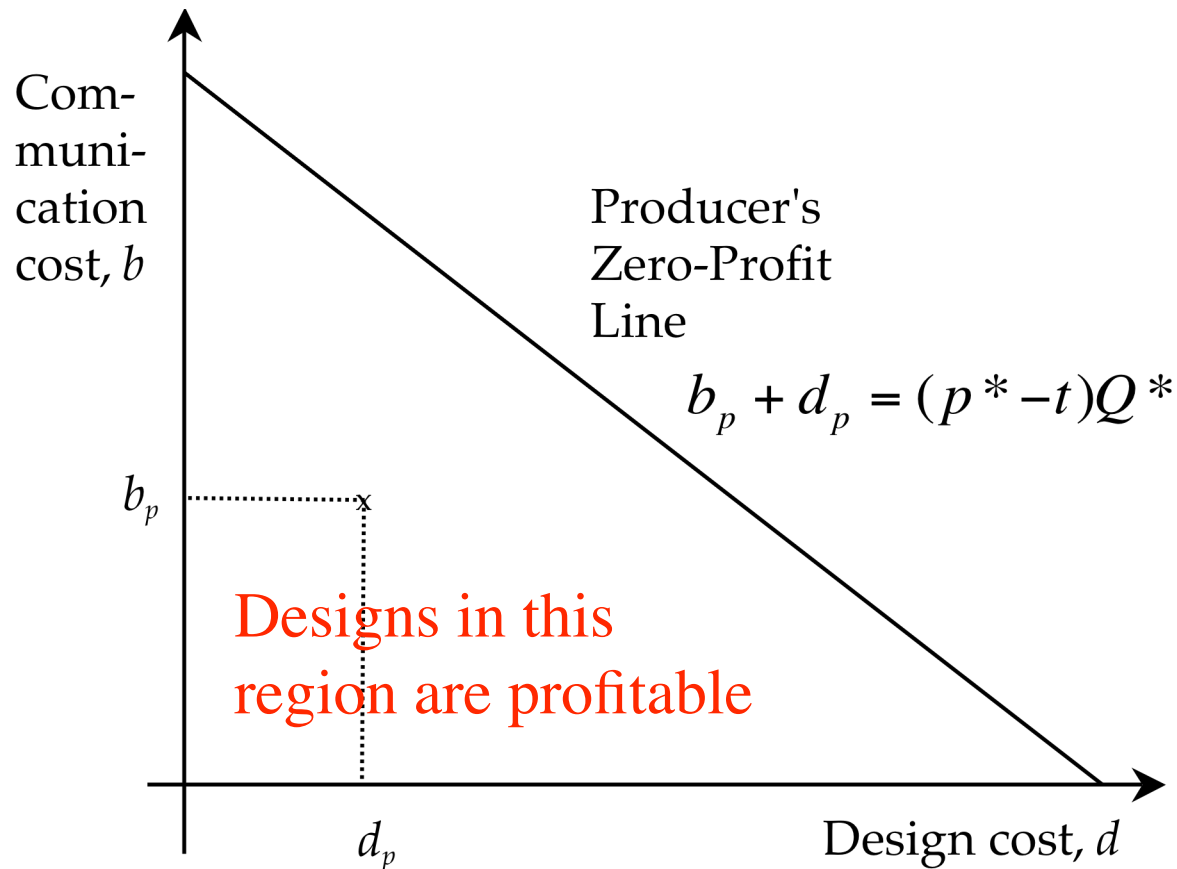


Design cost must be less than design value to induce singletons to innovate

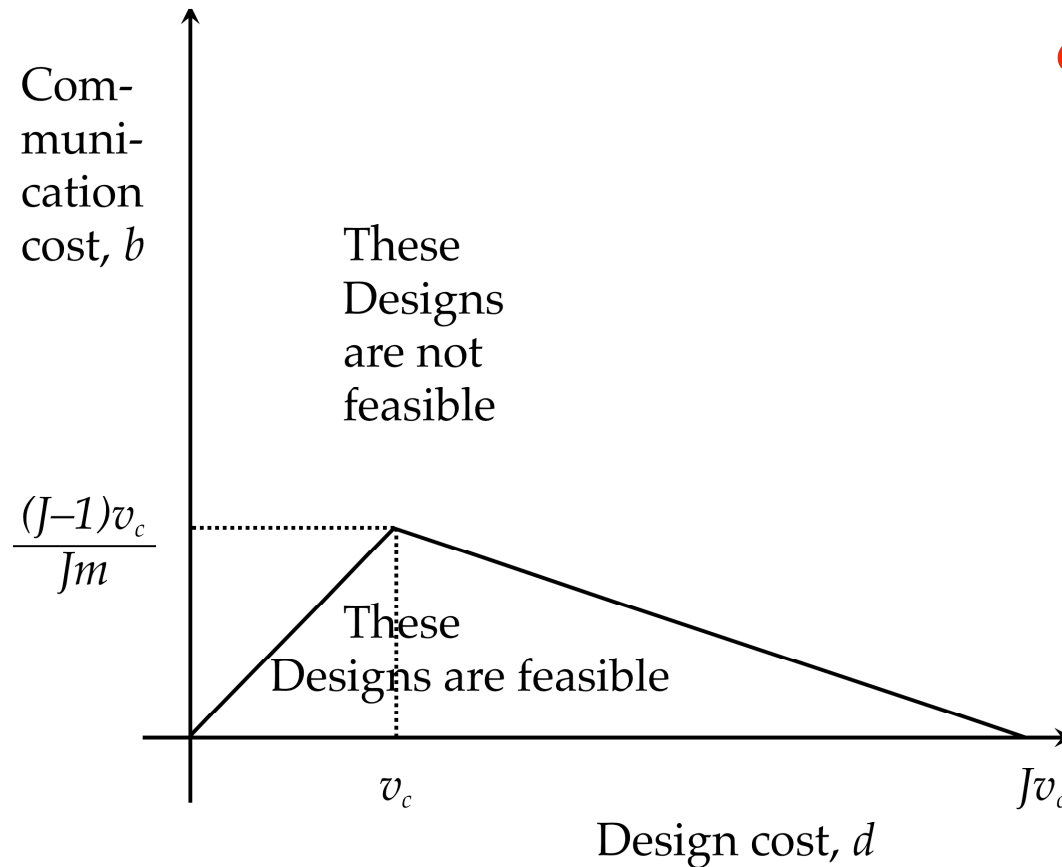
Design S1 is feasible, S2 is not

Communication cost irrelevant!

For Producer Innovators



For Collaborative User Innovators



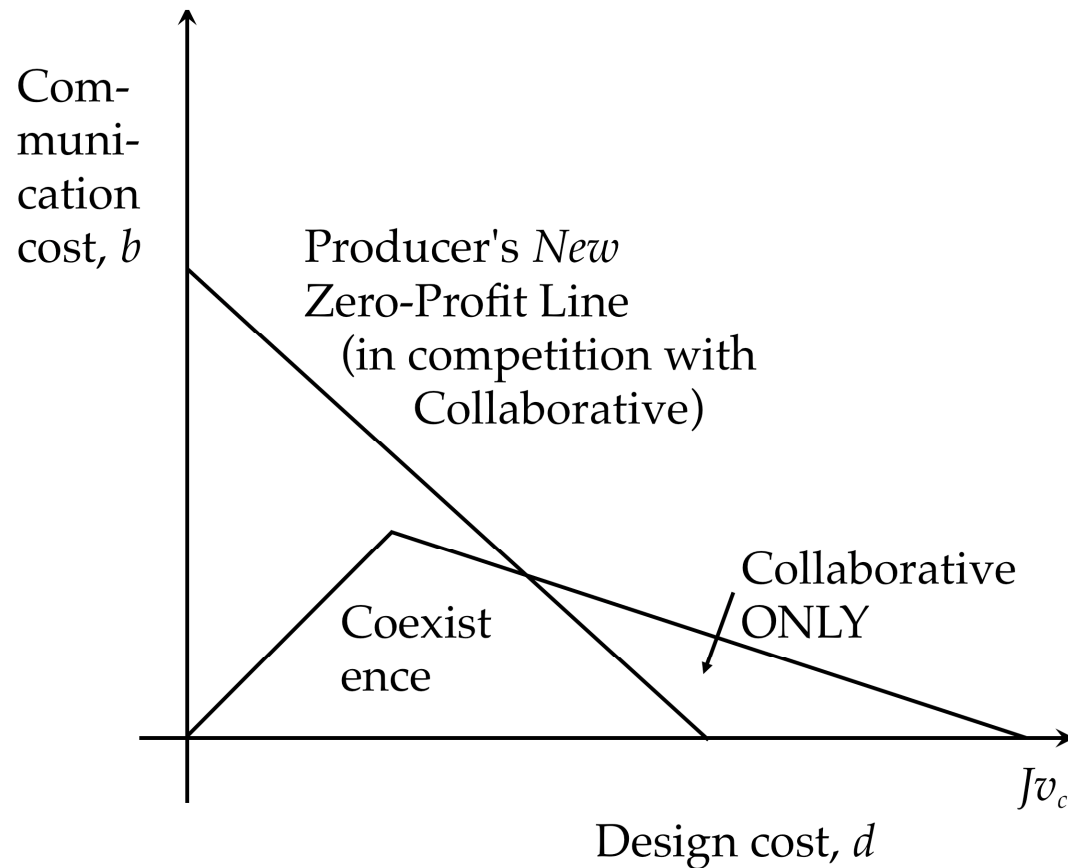
Need very low all-to-all communication costs

Obtained through

(1) co-location, e.g., conferences, meets, shows, courses; or

(2) Internet (post-1990)

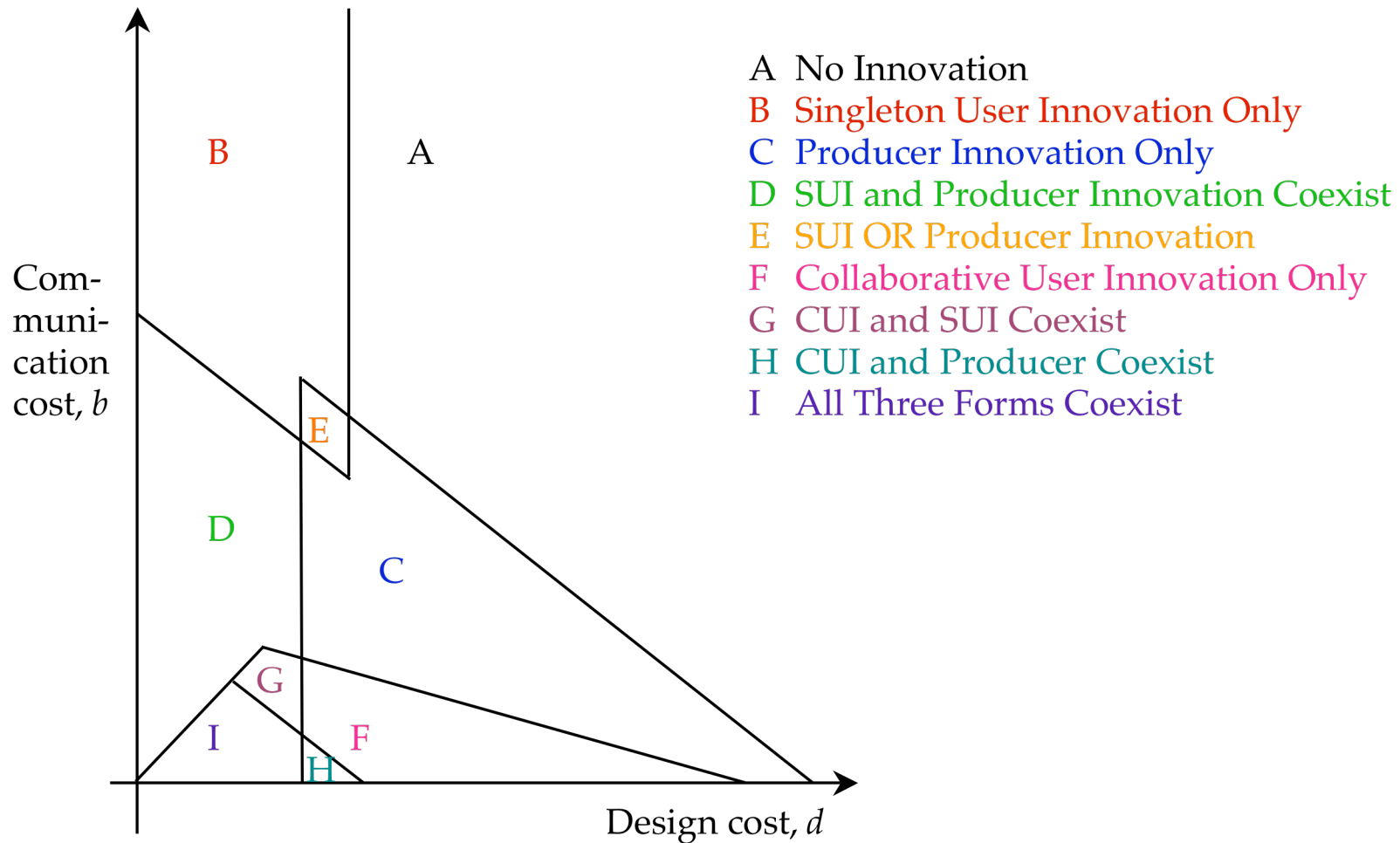
Collaborative vs. Producer in competition



Putting it all together ...

(At risk of putting too much on one graph!)

Innovation Regimes for different combinations of design and communication cost



Recapping our argument

- ◆ Producer innovation was enabled by technologies that supported the aggregation of demand
 - Cheaper transportation (canals, railroads)
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Our Argument (cont.)

- ◆ For a long time (1750-1990) it appeared to most people that producer innovation was the only economic way to realize large, complex designs
 - Only producer innovators could afford to co-locate large teams and still recoup their costs
- ◆ Collaborative user innovation is a new way to realize large, complex designs
 - Spread out the work of design among users
 - Replace co-location with the Internet (two-way, cheap, open broadcasts)
 - Modularize designs into a platform and customized add-ons
 - Rely on customized production technologies to produce designs in small lot sizes
- ◆ *The enabling technologies are here*

Impact of Collaborative User Innovators on the Producer Innovator

- ◆ Singleton User Innovators do not broadcast their designs. Collaboratives do.
- ◆ Collaboratives tolerate free riders (Baldwin and Clark, 2006)
- ◆ They welcome inspection of the design, because viewers may become contributors
- ◆ Transaction costs diminish v_c , hence collaborative users would like transaction costs to be as low as possible
- ◆ Collaborative design will be customizable, whereas producer's design may not be

Result: collaborative designs will be easy to view/access/copy/customize

Thus...

- ◆ In the presence of the collaborative design, some purchasers of the producer's design may switch to the collaborative's design
- ◆ Producer's equilibrium price and profit will decline
 - We don't know by how much!

Let the competition begin!

Thank you!

Three Organizational Forms can generate new designs

- ◆ Singleton user innovators
 - Von Hippel, *Sources of Innovation*
- ◆ Producer innovators
 - Schumpeter Mark 1, Entrepreneurs, “wild spirits”
 - Schumpeter Mark 2, Large corporations, R&D
- ◆ Collaborative user innovators
 - Raymond, *Cathedral and the Bazaar*
 - Von Hippel, *Democratizing Innovation*

Singleton User Innovators

- ◆ Obtain use value from new designs
- ◆ Anticipated use value must pay their costs of design and production
 - No communication costs (innovator = user)
 - No transaction costs (user owns design, does not have to purchase it)

Producer Innovators

- ◆ Design for profit
- ◆ Obtain no use value
- ◆ Anticipated profit must pay costs of
 - Design
 - Production
 - Marketing
 - Transactions

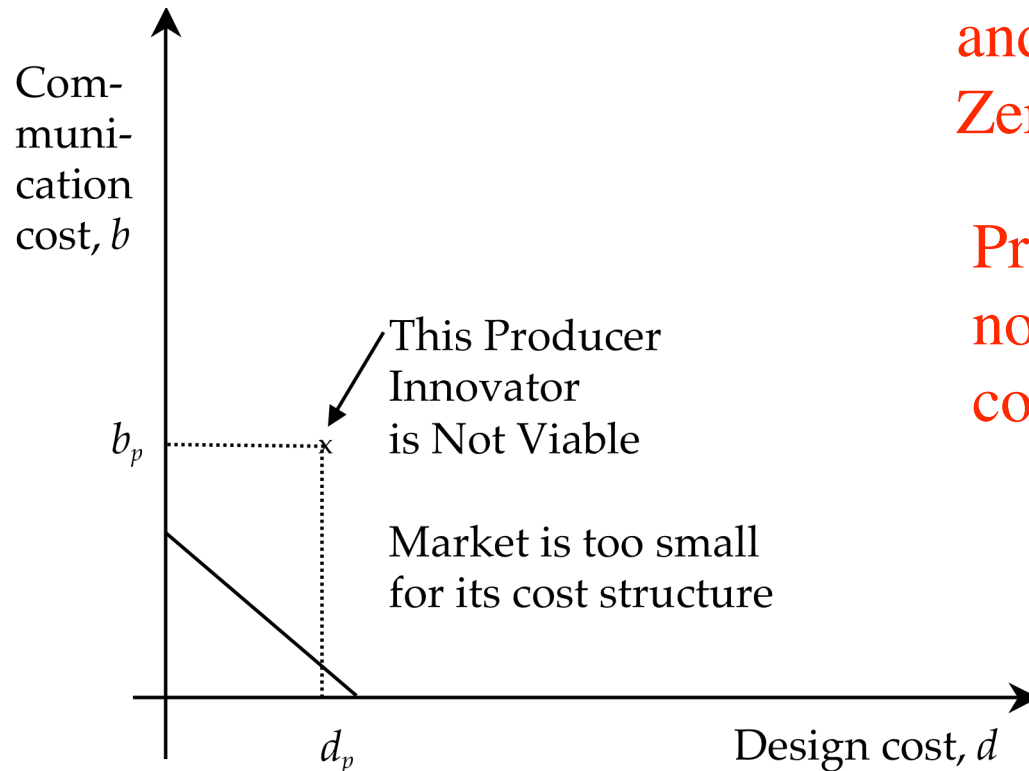
Collaborative User Innovators

- ◆ Obtain use value
- ◆ Split up the work of design
- ◆ Anticipated use value must pay the costs of
 - Design
 - Production
 - Communication between collaborators
- ◆ Transactions are optional
 - We will show they are undesirable

Producer Innovator—Assumptions

- ◆ Assume the producer-innovator is a monopolist
 - Through property rights on its design (IPR)
- ◆ Creates only one design, cost d_p
- ◆ Must communicate with users/purchasers
 - Cost = b_p
- ◆ Profit: $\Pi^* = (p^* - t)Q^* - b_p - d_p$
 - p^* , Q^* = price and quantity sold in equilibrium
 - t = variable transaction cost (excluding production)
 - b_p = producer's communication cost
 - d_p = producer's design cost

In small or new markets...

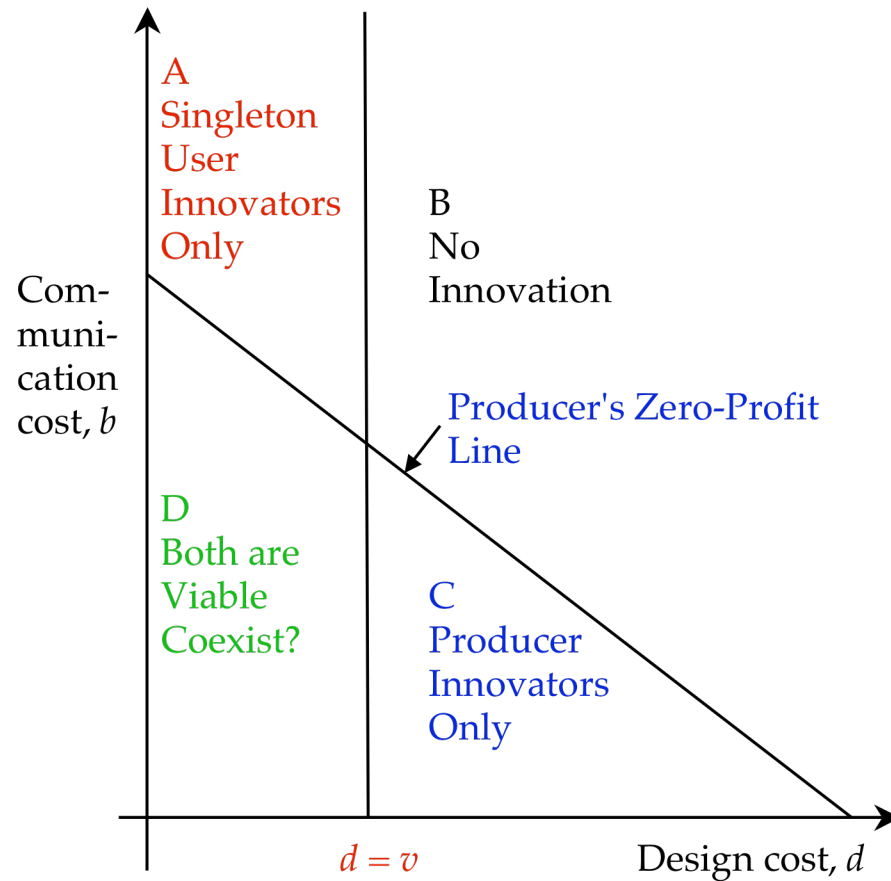


Most combinations of d_p and b_p will be above the Zero-Profit line

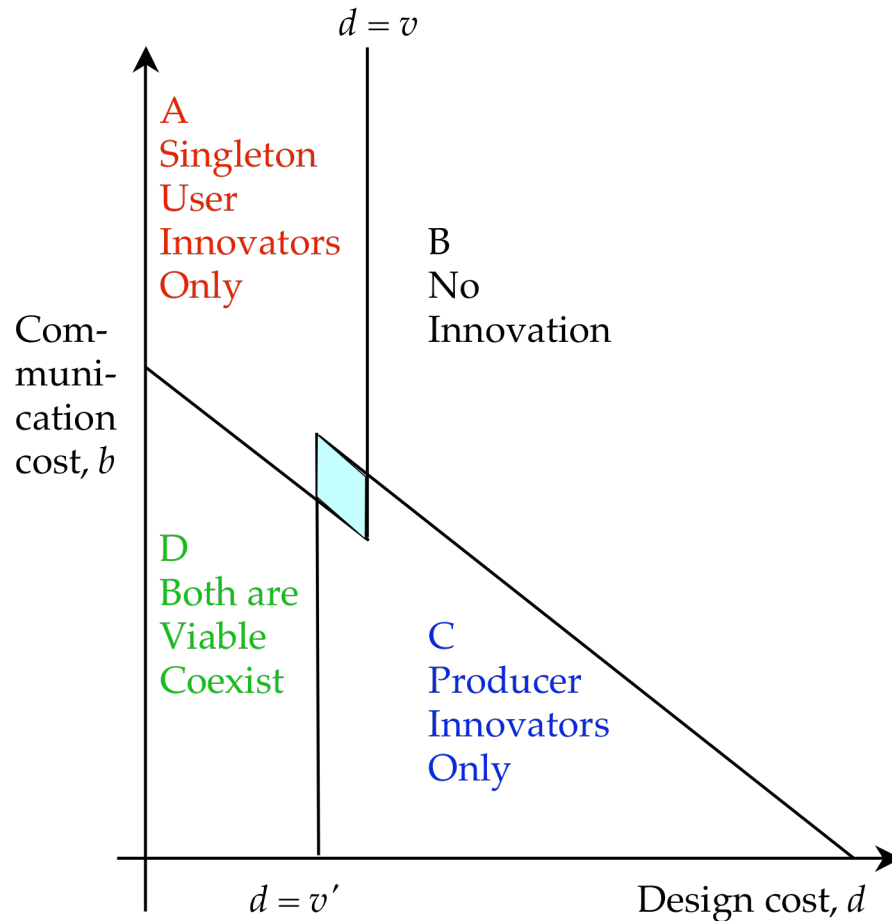
Producer innovators are not viable (unless their costs are VERY low!)

Singleton user innovators may succeed because they have no communication cost!

Putting the two graphs together



Modified graph



Shift in original lines is caused by competition between producer and singleton user innovators.

Blue diamond region has two possible equilibria—

(1) Producer innovator alone

(2) Singleton user innovator alone

Requirements for collaborative user innovation

- ◆ *Timely* communication
 - While design process is underway
- ◆ Design must be *partitioned*
 - Parts common to all (the “platform”)
 - Parts specialized to individual users
- ◆ *Platform design tasks must be divisible*
 - Modularity of the large design
 - Transparency within modules

Collaborative User Innovator—Assumptions

- ◆ There are J users capable of contributing to the collaborative design
- ◆ Each places the same value on it, v_c
- ◆ v_c is independent of the price charged by the producer
 - collaborators will not purchase the producer's design at any price
- ◆ Aggregate value = Jv_c
- ◆ Each collaborator sends m broadcast messages to the group
- ◆ Aggregate cost = Jmb
- ◆ Collaborators have the alternative of being singleton user innovators