

A Model of Smart Technologies

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Impact of Smart Tech

- Number 1 tech trend predicted by [Forbes](#) to dominate 2017
- A big driver of Internet of Things
 - [IDC forecasts](#) that the worldwide market for IoT solutions will grow from \$1.9 trillion in 2013 to \$7.1 trillion in 2020.
- Smart [home market](#) predicted to be worth 121 billion by 2022

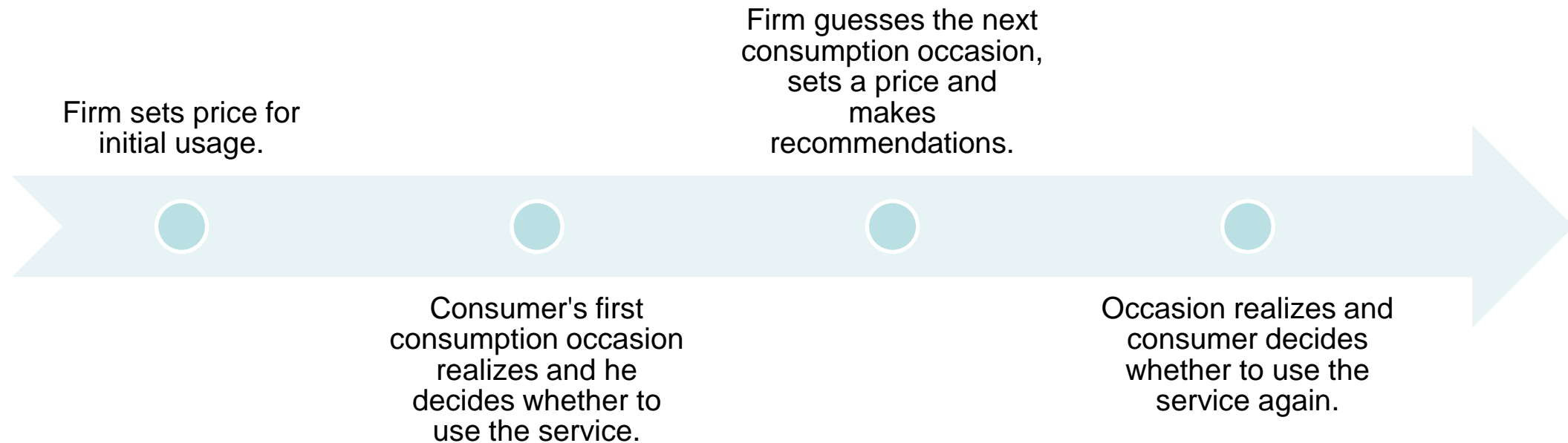
What is a Smart Technology?

- **Situated: recognition and processing of situational and community contexts**
- Personalized: tailoring to buyer's and consumer's needs and affects
- **Adaptive: change according to buyer's and consumer's responses and tasks**
- **Pro-active: attempt to anticipate buyer's and consumer's plans and intentions**
- Business aware, location aware, network capable

Research Questions

- Is “smartness” always good?
 - How could smart technologies change consumers’ behavior?
 - What are the implications of this change on firm profit and pricing?

Model: Timeline of Events



Consumer learns the occasion and his search cost prior to accepting the price.

Smart Technology: Definition

- Predicts the next consumption occasion after initial usage
 - $.5 \leq r \leq 1$: probability the firm correctly guesses second occasion
- Reduces search cost for the best option if the consumer has used the service under the same occasion before
 - $0 \leq k \leq 1$: reduction multiplier of search cost for the better alternative
- Conventional product: $r=0.5$ and $k=1$.

Second Period: Information Structure

- Firm observes whether the consumer has used the service before and if so, under which occasion; second period price depends on previous usage and firm's guess of next occasion.
- Five relevant prices: $p_h^L, p_l^L, p_h^H, p_l^H, p^N$.

Second Period: Pricing

- If first occasion is H and firm guesses H for next occasion
 - With prob r , consumer gets $H - kc - p_h^H$, otherwise, he gets $L - c - p_h^H$.

$$p_h^H = \begin{cases} H - kc, & \text{if } r(H - kc) \geq L - c; \\ L - c, & \text{if } r(H - kc) < L - c. \end{cases}$$

- When r is higher and k is lower, firm is more likely to bet on H.
- Calculations for other prices are similar. **Smarter technologies lead to higher second-period prices.**

Impact of Smartness on First Period Pricing

- Suppose the first occasion is H and product is very smart.
 - If use in period 1, consumer expects $(1-r)(H-L)/2$ from period 2.
 - He gets a positive utility if occasion is H and firm guesses L
 - If no use in period 1, consumer expects $(H-L)/2$ from period 2
 - Assume $H-c < 2(L-c)$ so firm charges $L-c$ in second period
- Consumer expects a loss in period 2 when using the service in period 1 → firm lowers price for initial usage
 - Firm extracts all surplus when making the correct guess
 - Reduction of first period price is greater as r increases

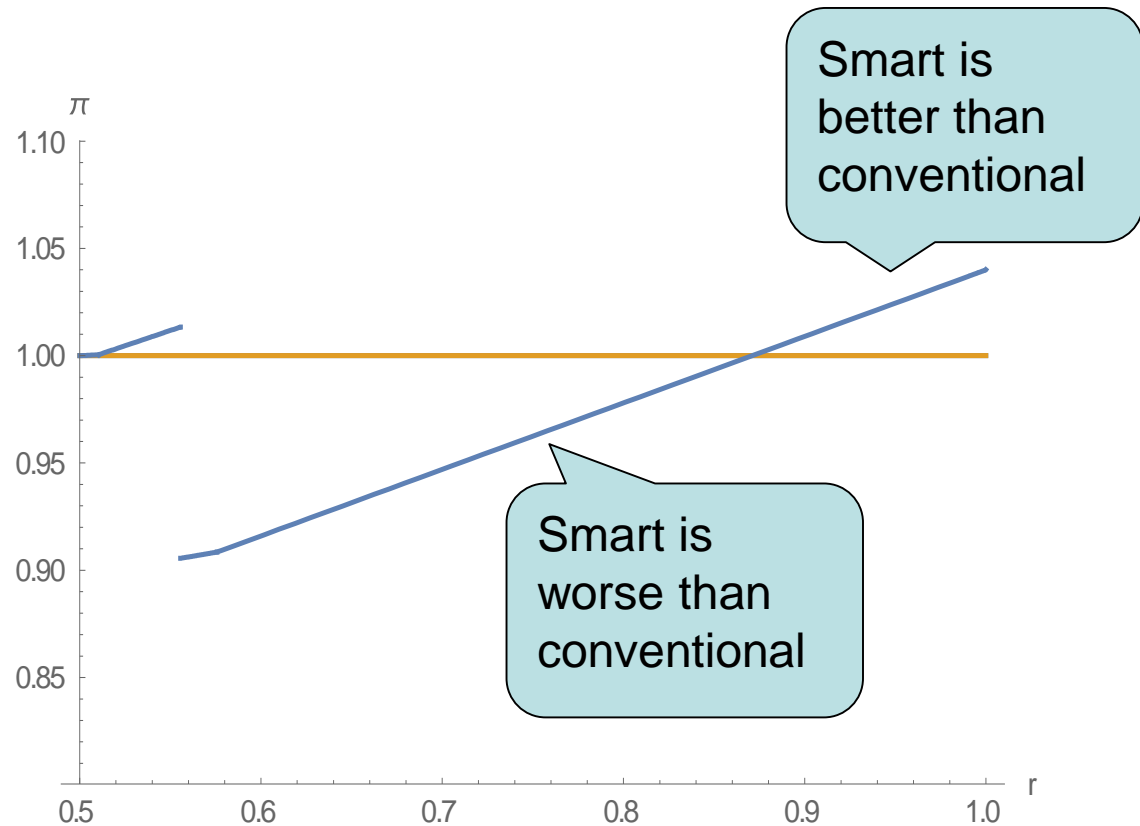
What About Not-So-Smart Technologies?

- Suppose the first occasion is H and product is not very smart.
 - No prior usage gives consumer $(H-L)/2$ in period 2
 - Prior usage gives consumer $(1-r)(H-L)/2 + r(H-kc-L+c)/2$
 - When the firm guesses H, it charges $L-c$ to be safe
 - The two terms: firm guesses L incorrectly; it guesses H correctly
 - Consumer benefits from initial usage and benefit increases with r
 - Firm is less aggressive in pricing and consumer saves search cost
- Firm enjoys a surplus in period 1 from being not very smart!

As Technology Becomes Smarter

- At first, the firm always plays safe by charging a low price and consumers benefit from initial usage. Firm charges a higher first period price as r increases
- At a certain point, the firm starts charge more when guessing H . Consumer expects a loss in the second period and firm lowers the first period price.
- Eventually, the firm's gain in second period outweighs its loss in the first period.

An Example



- As r increases, profit first increases, then jumps to a level lower than conventional tech, and then increases again
- Reduced matching cost always benefits the firm

Concluding Remarks

- When technology becomes smarter, future prices are higher.
- When smartness reaches a certain threshold, firm profit drops below non-smart.
- Being super smart helps, but fairness concerns and mismatch costs may again dampen the reward.

Thank you!

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