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Understanding Consumer Behaviour in Information and Communication Technologies (ICTs)

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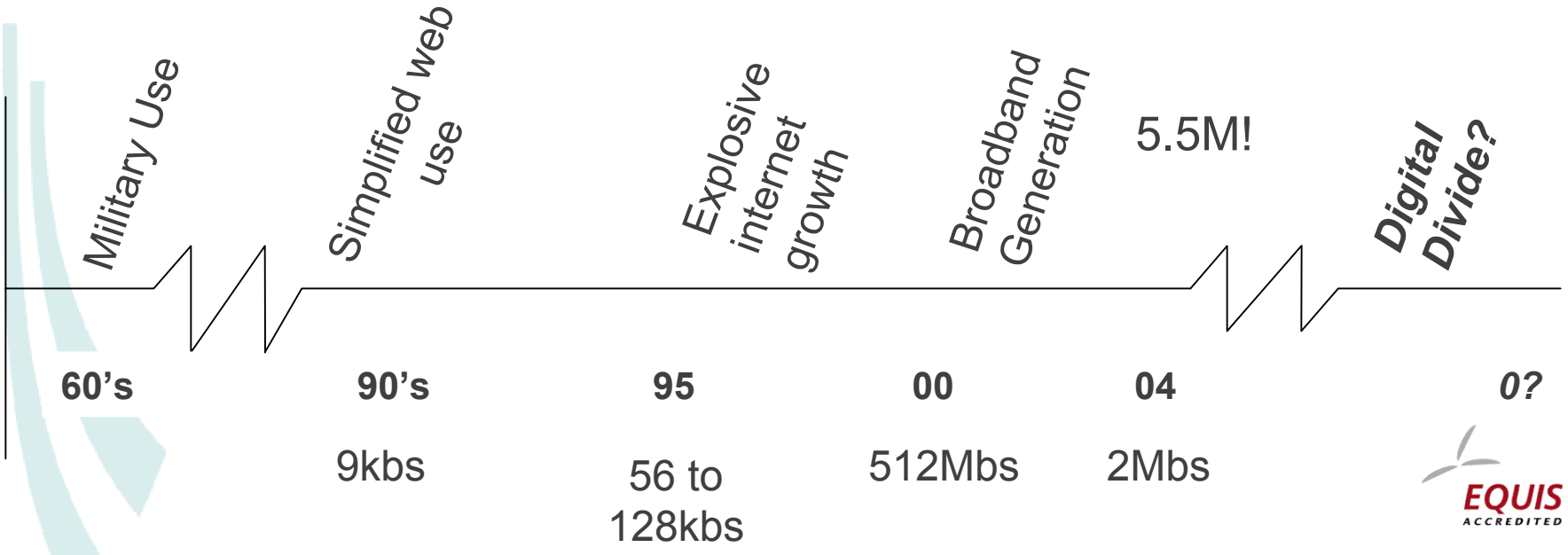
What are ICTs?

- ICTs are ‘gadgets’ that people can use to connect to information and to communicate with one another.
  - e.g. Computers and PDA’s.
  - Focus here is limited to internet adoption.

- *But why has research into ICT adoption become so important?*



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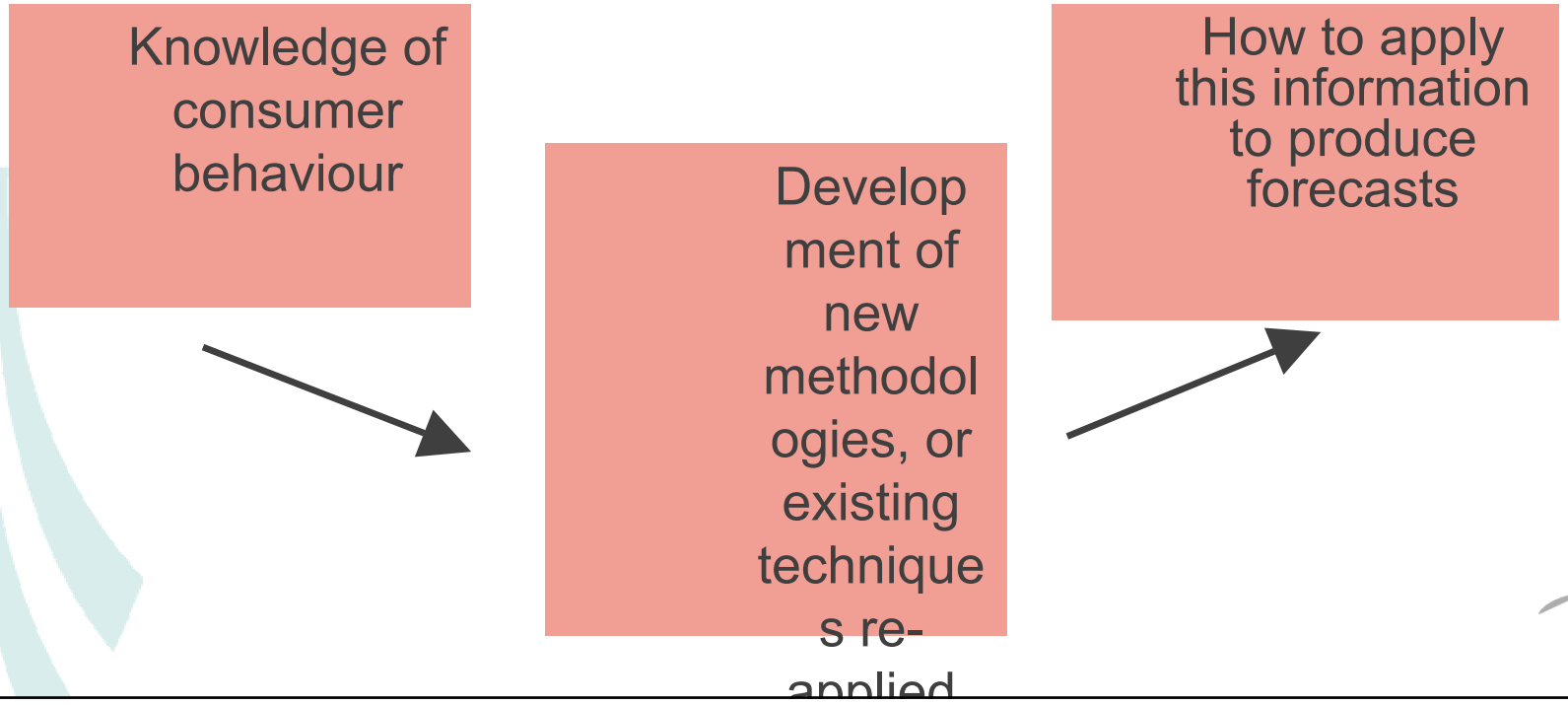
Discussion highlights a fast changing market

- *What do market stakeholders need to know to be able to forecast the market better?*
  - Why and Which consumers adopt technologies!



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The stakeholder positions

- *Digital divide highlights missed revenue or missed development opportunities and cost saving.*

  - Marketers and Business Planners;
    - ***Missed revenue:*** Untapped market
  - Government and Regulators;
    - ***Missed development opportunities:*** Countries with less ICT *may* grow less.
    - ***Missed cost saving:*** Those on 'wrong' side of divide use government services more frequently.

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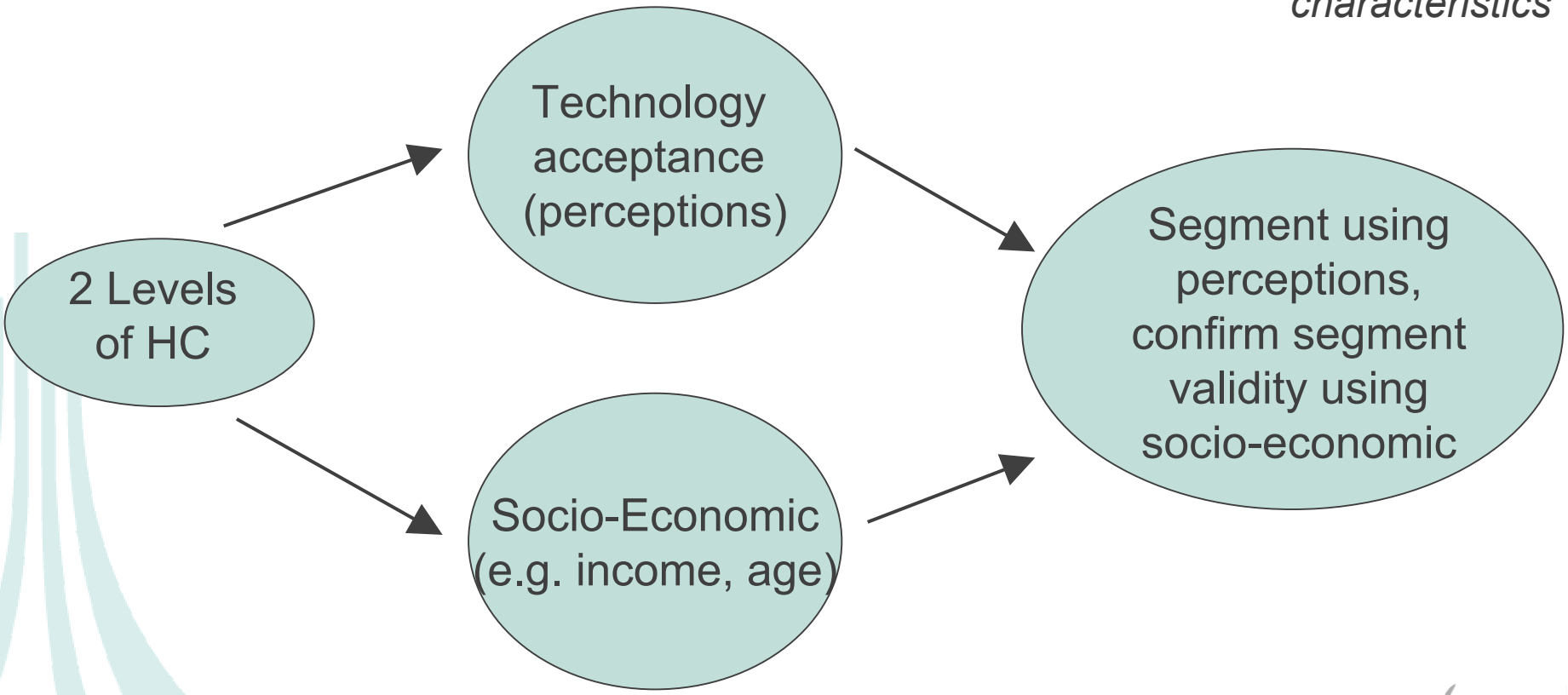
Focus of the Research

- *Human characteristics and ICT*

Combine to produce consumer groups with unique ICT characteristics



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Application of Human Characteristics

- Segmentation;
  - measure of the digital divide?
- Model estimation;
  - Application of choice modelling.
  - confirmation of what drives the digital divide.
- Experimentally, applied to the diffusion modelling process;
  - Introduces idea that that segmental diffusion curves can be estimated.
  - Estimate of how digital divide may evolve over time.

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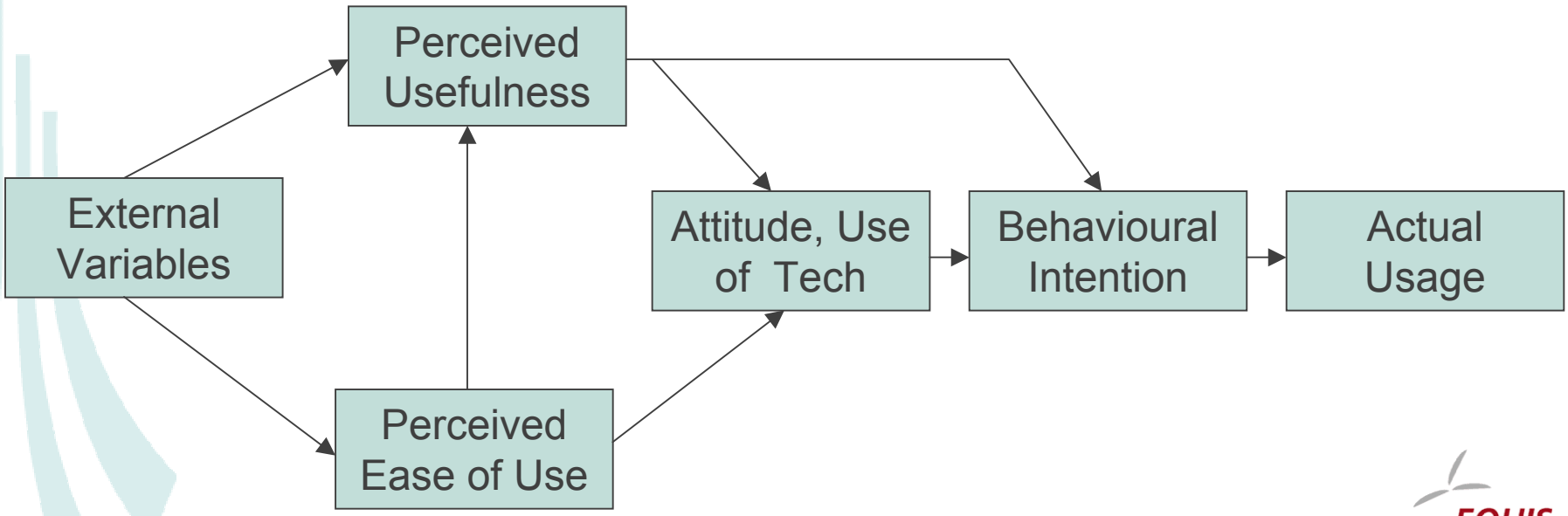
Social Psychological Factors

- *Massive literature on TAM;*
  - *Google 'technology acceptance model'*
  - A large number of test applications.

Fred Davis (1989);



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- Adams (1992): Usefulness and Ease of Use perceptions
  - Applicable to diagnosis of user acceptance in technologies in general
  - Especially applicable when adoption is voluntary
- Igbaria et al (1996): TAM research justified due to extensive expansion into ICTs by businesses, but *low final use*
  - Similar to residential ICT adoption?

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Enjoyment and ICT adoption

- *An obvious point,*
  - If computers become more enjoyable to use, their adoption and usage will increase, Igbaria (1996)
  - Perceived enjoyment distinct from U and EoU
  - Three perceptions are measurable at the consumer level
    - EoU, U and E

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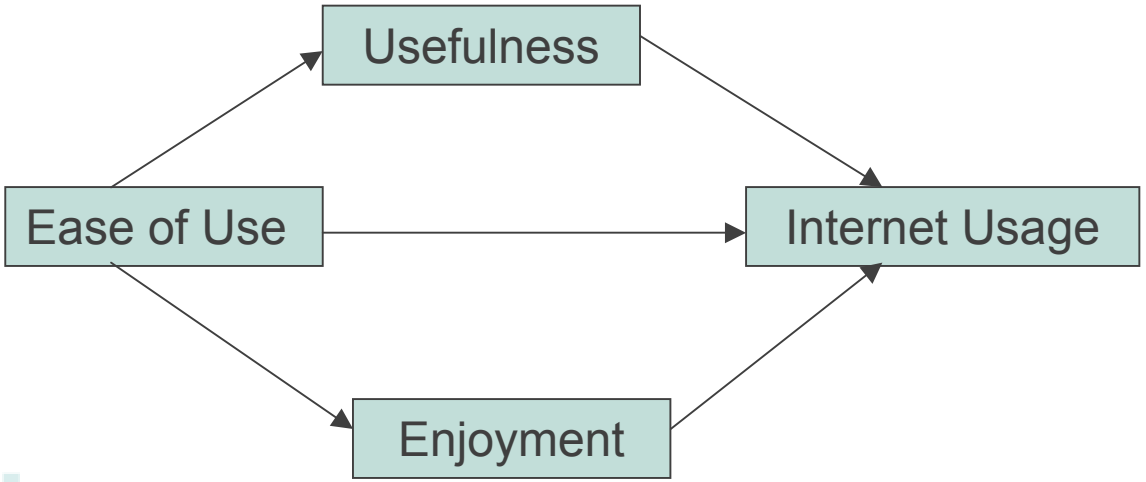
First internet test of TAM, Teo (1999)



All perceptions important, but usefulness more so….

- *Where next?*
  - New application of the TAM perceptions…

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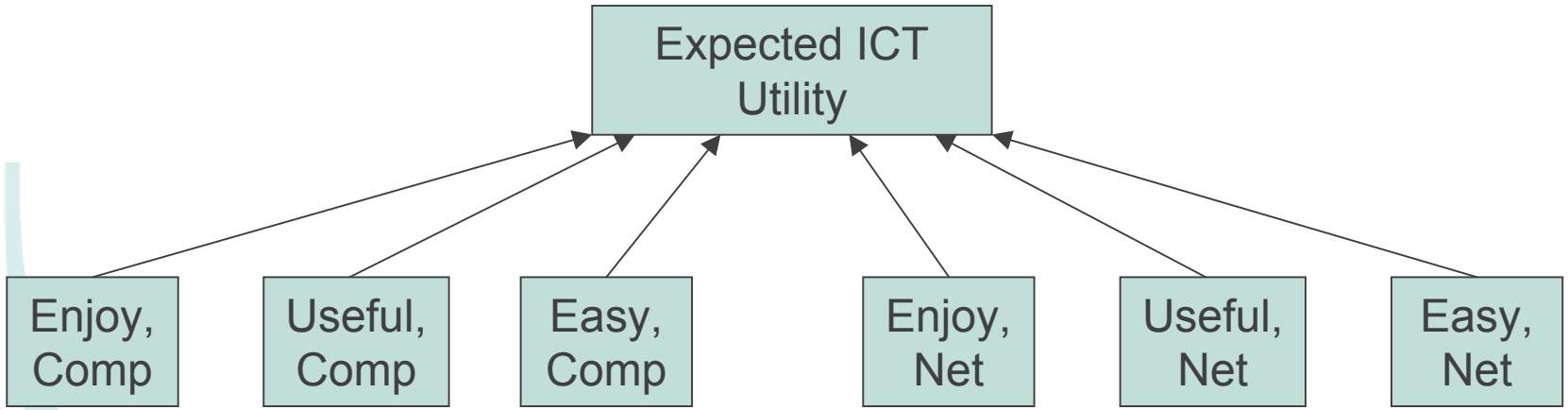
An application of TAM, Survey of UK Households

- Extensive data collected from 1286 HHs.
- Data was weighted to minimise non-response bias.



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Simple Application of Expected ICT Utility

Divide up the measure into arbitrary segments.

↓

Merge ‘similar’ segments i.e. if demographically similar.

↓

Measure known characteristics for each segment.

↓

For each segment, measure their proportion in the data;

This is an estimate of the proportion of consumers in the UK of this utility level.

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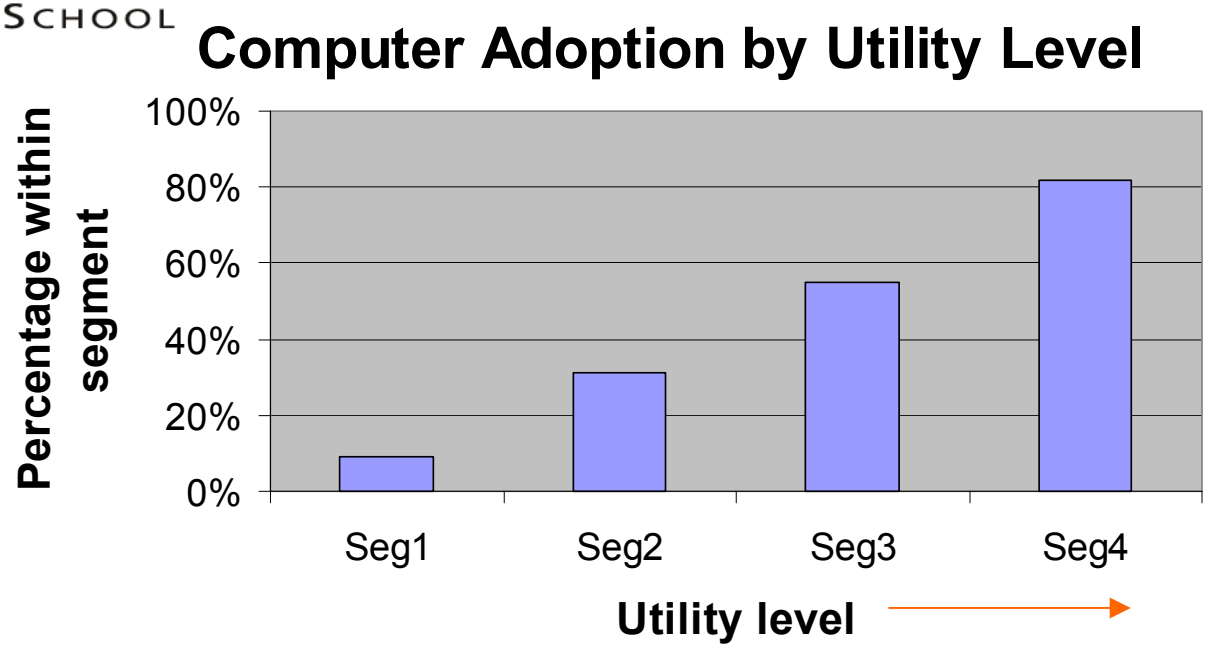
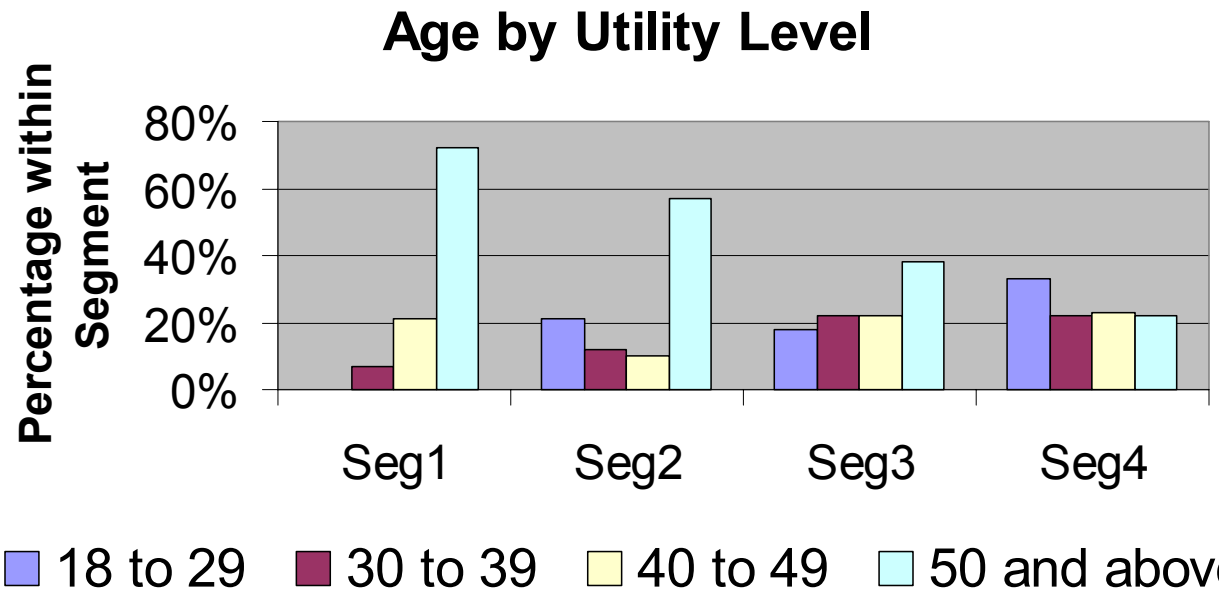
NB: No difference in gender…





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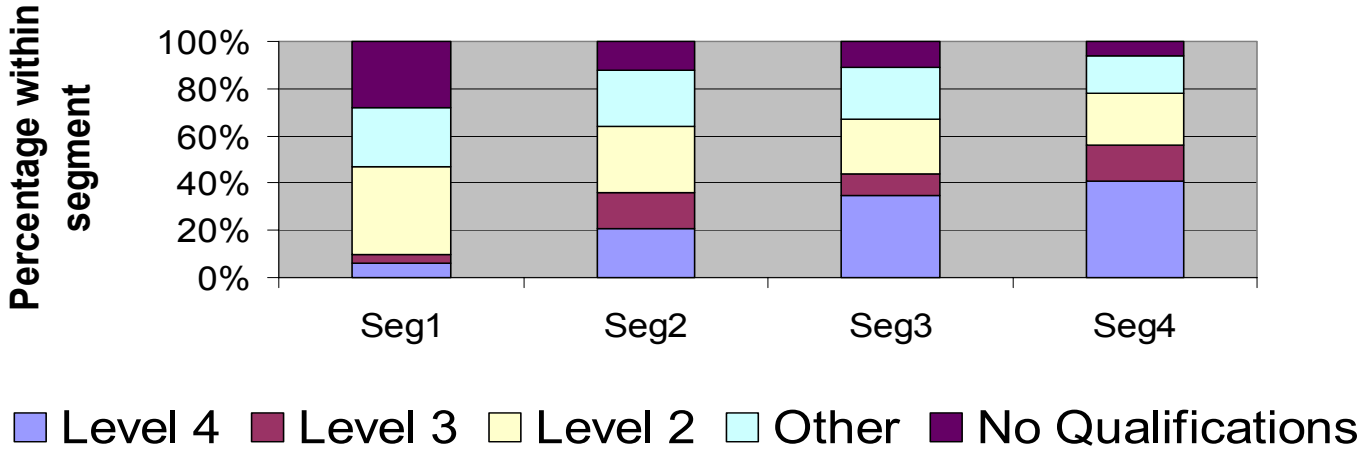
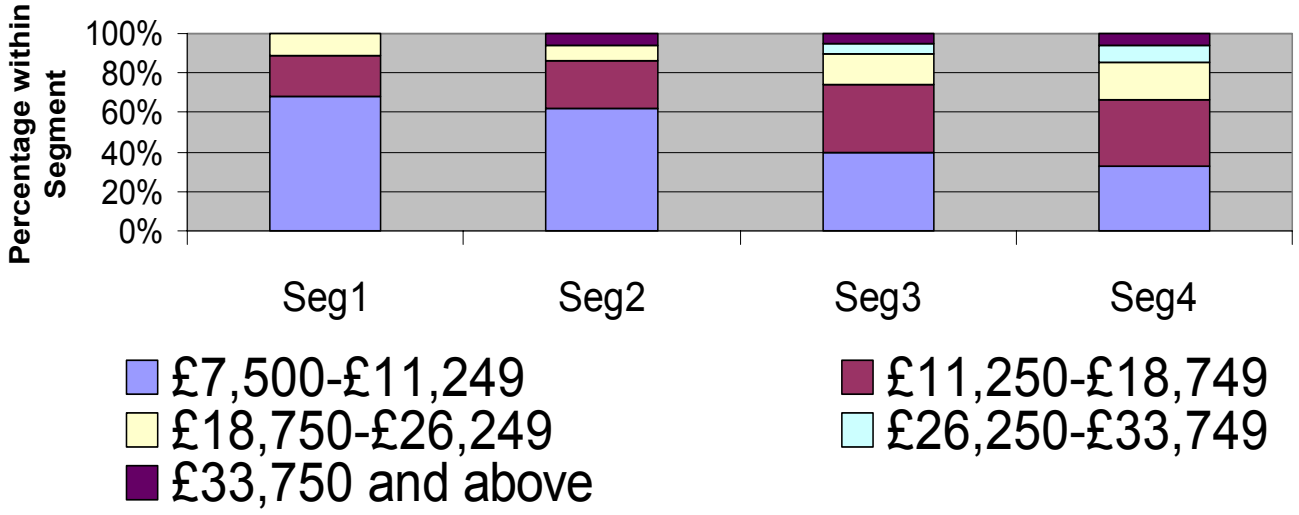
Educational Attainment by Utility Level



Individual Disposable Income by Utility Level



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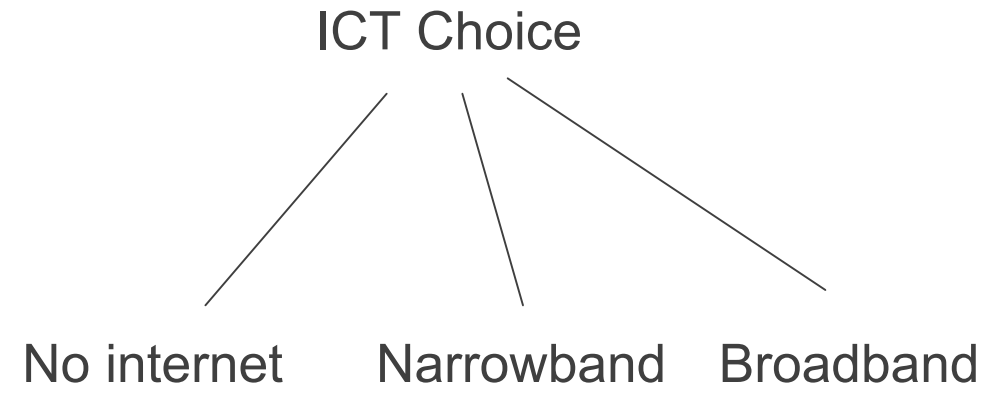
- Complex approach
  - Incorporate expected ICT Utility with other strategies

→Stage 1, fairly common procedure

- *Estimate consumer choice model*
  - *e.g. logit*



Factors drive the choices…

- *Use the model to define segments via expected ICT utility*
  - *Estimate segmental price sensitivities*

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How is logit output interpreted?

Logit estimates ICT adoption probabilities given a set of inputs, much like regression;

$$\Pr_i(j) = \frac{\exp^{(\beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_k x_{ik})}}{\sum_{j=1}^{n} \exp^{(\beta_1 x_{i1} + \beta_2 x_{i2} + \ldots + \beta_k x_{ik})}}$$

Where $\Pr_i(j)$ = Probability individual i purchases product j given xs

Factor effects facing consumer β

Factor effects facing consumer x_i

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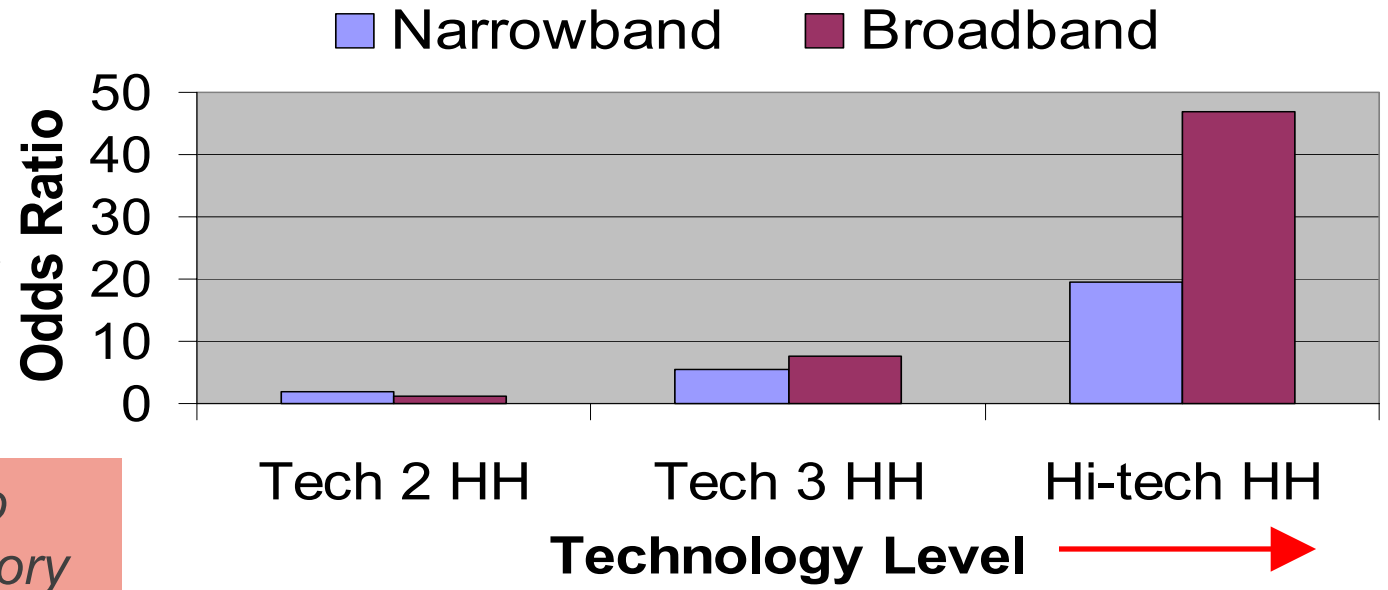
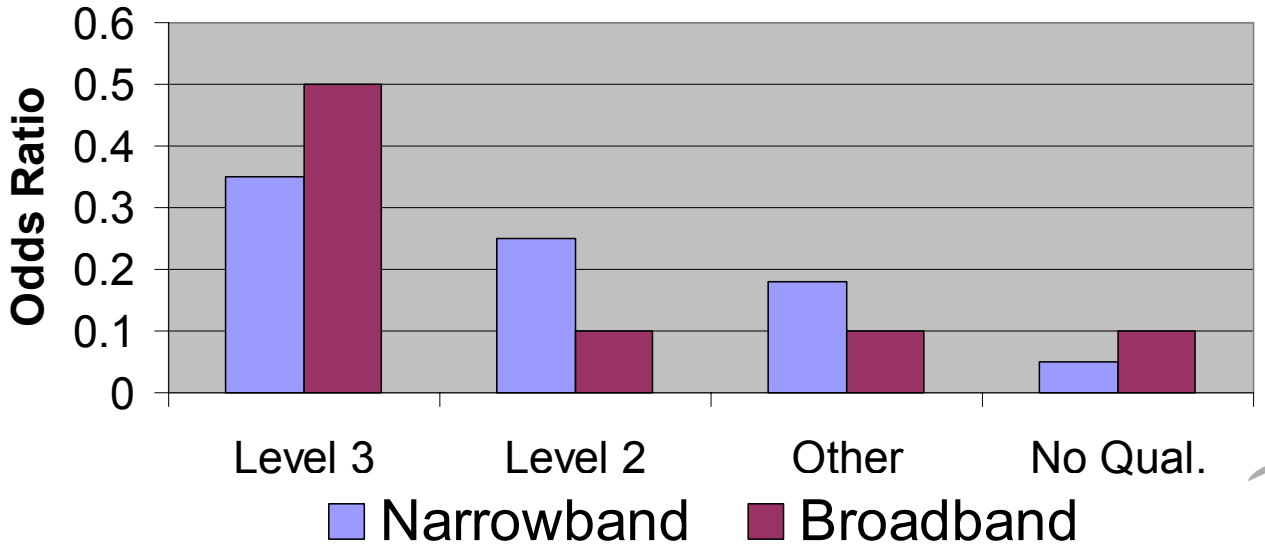
Technology Levels in the Home



Compare to missing category

Household Educational Attainment



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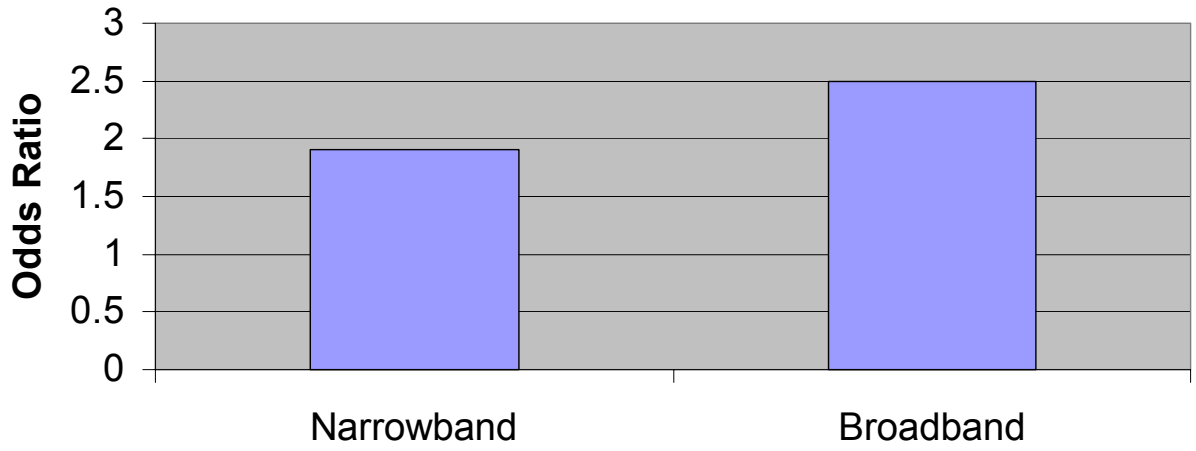
Presence of Children



Internet Choice Elasticity: +0.2

Point: Overall effects stronger for broadband than for narrowband

Insight: Demographic effects dissipate over time…

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Segmentation Results

Table 2: ICT utility segments			
ICT Utility Level	Household Description	Broadband Price Elasticity	Computer Adoption
Low (2.2%)	Low income and educ., retired, unemployed.	-1.77	8%
Low to Mid (13%)	Moderately better income, slightly better educ. Blue collar.	-1.51	21%
Mid to High (22.7%)	Good income and educ., white collar, possibly kids.	-1.42	65%
High (62.1%)	High income and educ., 25% with kids, love technology.	-1.28	83%

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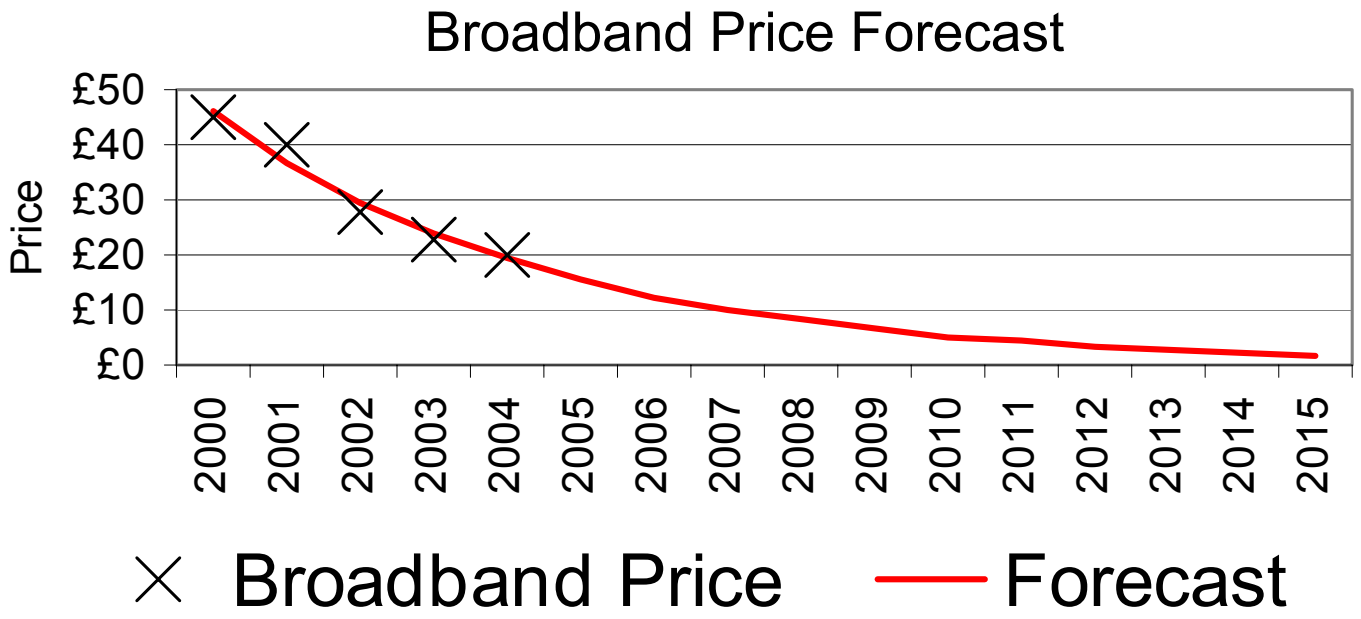
→Stage 2, new and experimental procedure

- *Apply price forecast to the model for each segment*



$$P_t = \exp^{(4.04-0.22t)}$$

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Work resulting segmental adoption probabilities to the diffusion process.

Segmental Adoption Probability

$$N_s(t) = MProb(s \mid Pr)_t \left[\frac{1 - e^{-(p_s + q_s).t}}{1 + \frac{q_s}{p_s} e^{-(p_s + q_s).t}} \right]$$

'Moving' Social System Size N

Segmental Innovation and Imitation Parameters

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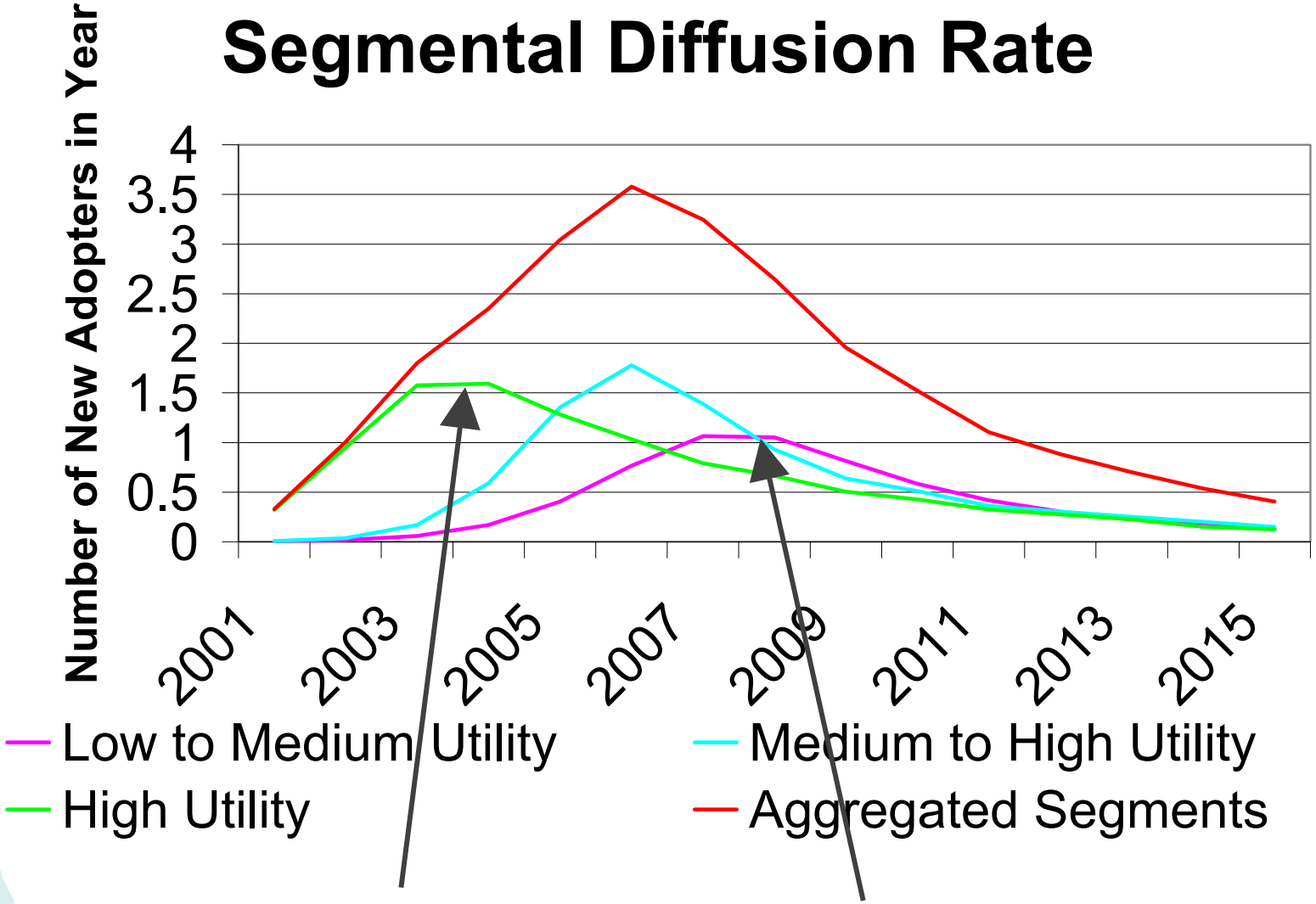
Segmental Diffusion Rate



High Utility Adopt First: *Innovators*

Low Utility are the *Laggards*

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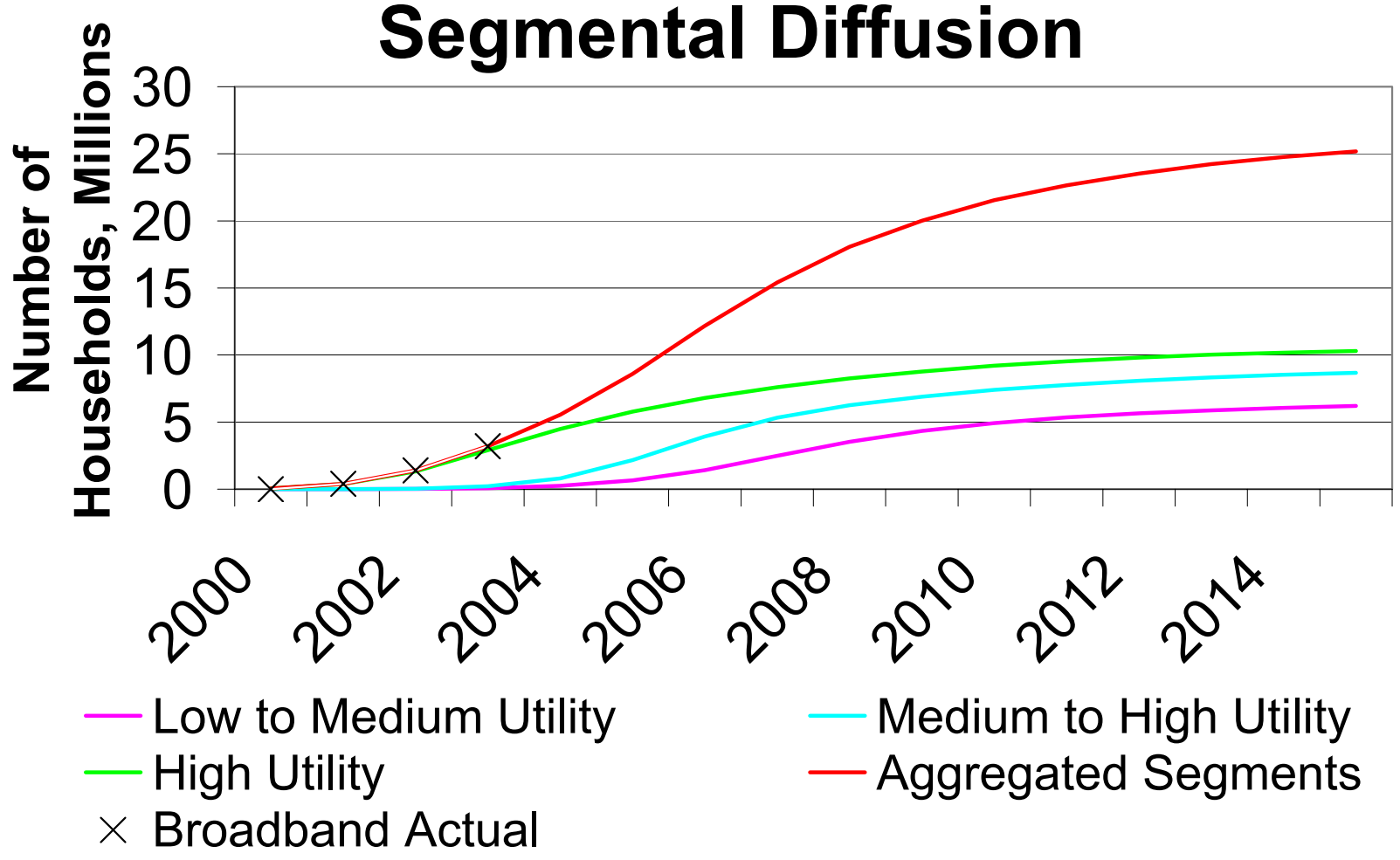
Segmental Diffusion



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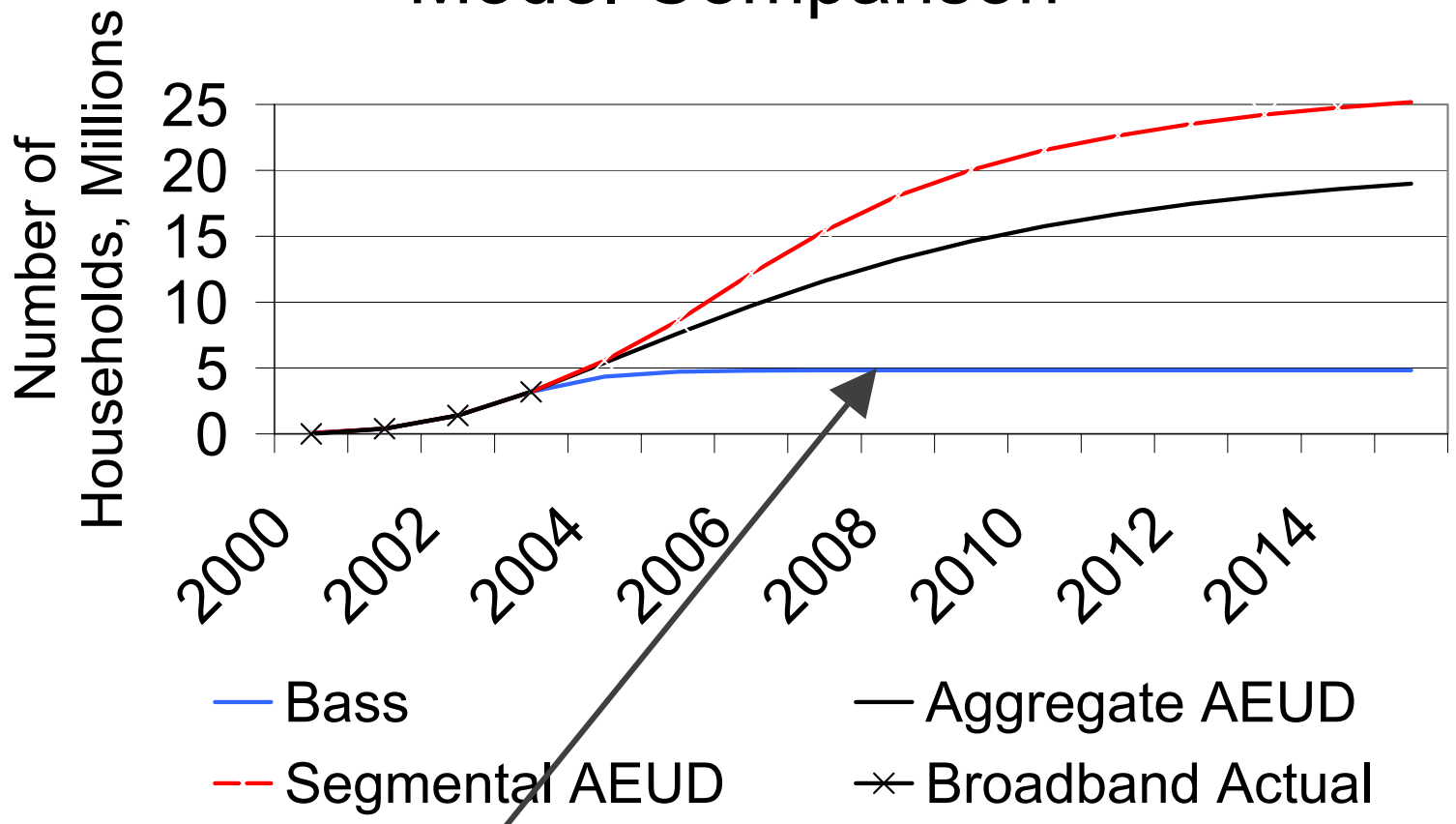
Model Comparison



Bass tends to under perform in presence of limited data

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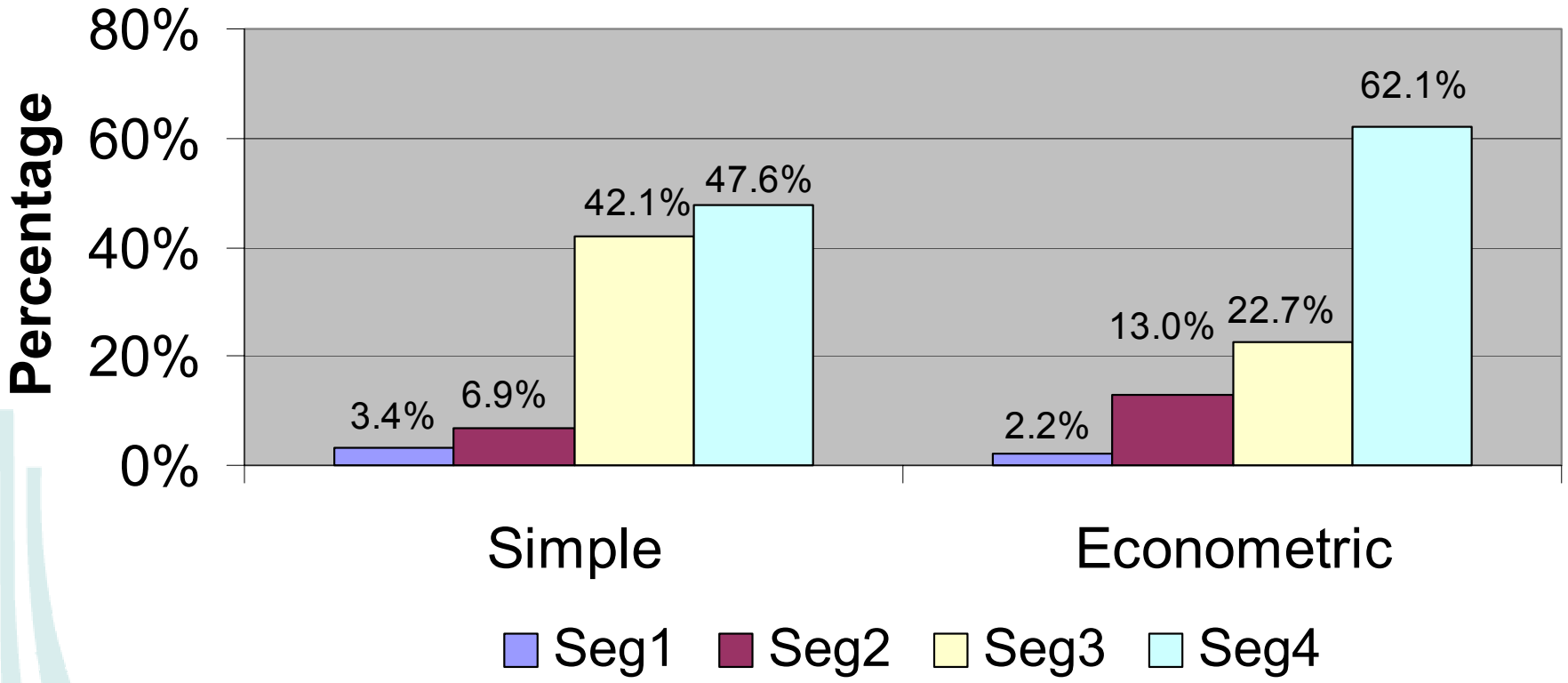
Segmentation approaches: *Simple versus Econometric*



Which to choose?

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Recap.

- The presentation has introduced expected ICT utility as a segmentation variable for residential ICTs;
  - Created from a sound theoretical foundation.
  - Applications go some way to confirm validity of the measure.

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Issues

- More testing needed to confirm validity;
  - New survey is proposed for next year.
  - Same HHs, two year interval.
  - Track segmental shifts.

- Wider tests required;
  - Different applications (e.g. wireless apps.).
  - Different countries.

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Future Possibilities

- Other applications may exist for this variable also, especially if captured regularly in time;
  - Comparable measures across countries.

$$Expected\ ICT\ Utility_{it} = f\left(Socio\text{-}economic\ \ factors, regulatory\ \ framework\right)_{it}$$

Where i could be individual or country…

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