

Rebound reconsidered

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Different types of rebound

- Direct – categorical error
- Direct – consumer behaviour
- Indirect – consumer spending
- Economy-wide
- Direct – access to energy conversion technologies
- The thorny issue of wants and needs
- Summary

Direct: not just efficiency but new services

- There are a number of papers discussing the categorical error in how gains in energy efficiency have been conflated with the development of new products.
 - *The wider range of applications for a new product (e.g., steel vis-à-vis wrought iron) transcends the issue of whether it is produced more or less energy efficiently*

Direct: consumer behaviour

- The argument has been made that greater efficiency is leading to behavioural change.
 - *This is only “bad” if there is a prior notion of the desirable level of consumption of this particular energy service.*

Indirect: consumer spending

- That in the event of greater efficiency – and falling marginal costs – for a particular energy service, we may increase our expenditures on an even more energy extravagant service.
 - *This is only “bad” if there is a prior notion of the desirable level of consumption of any and all energy services.*

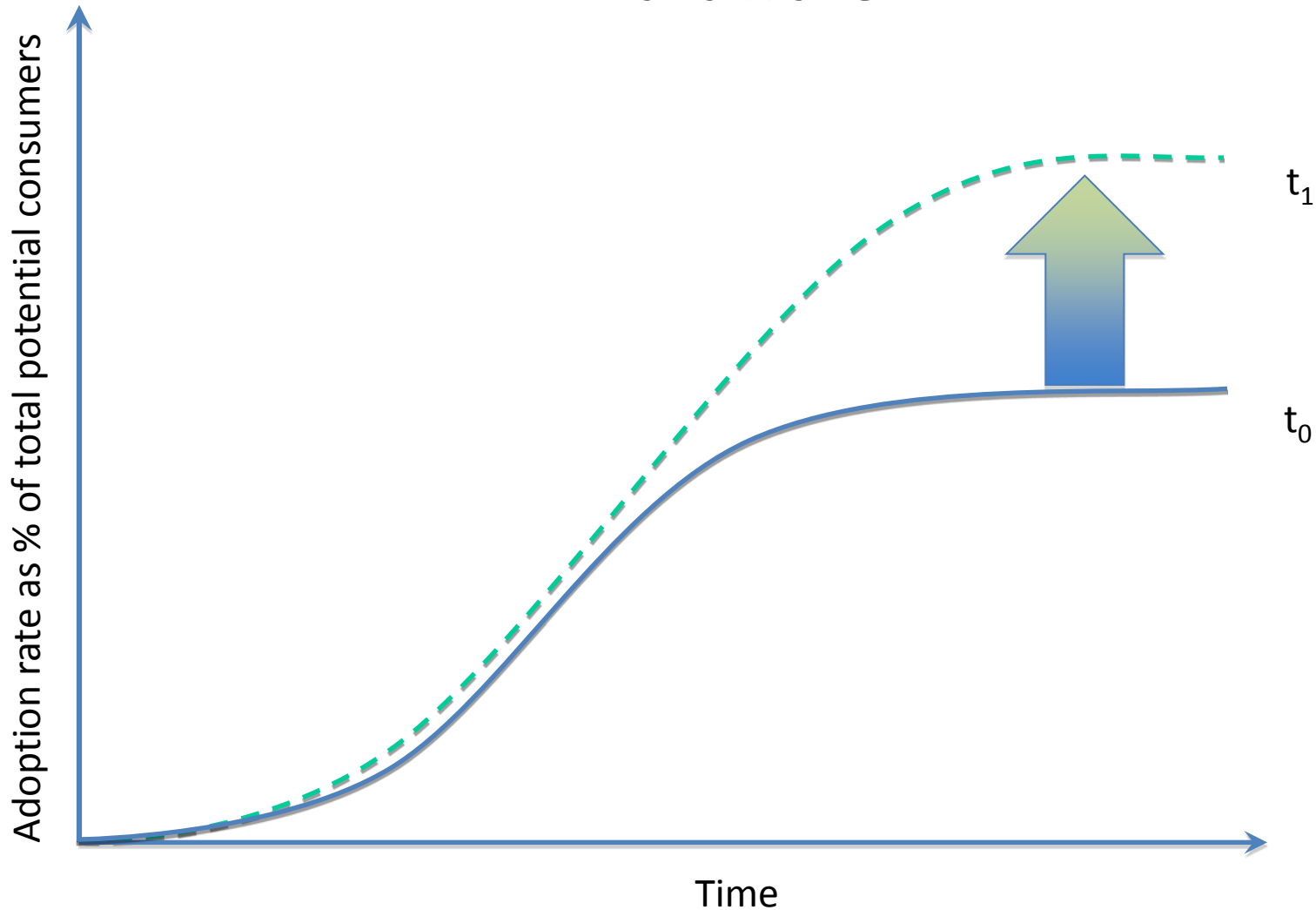
Indirect: economy wide

- That in the event of greater efficiency – and falling marginal costs – for a particular energy service, the whole economy may be more energized.
 - *Presumably, this is considered a loss from a prior notion of what level of economic growth is optimal.*

Direct: technical progress & capital affordability

- Marginal energy costs are NOT the key determinant of use patterns.
- The key barrier to entry is capital costs of appliances converting energy to desired services.
- Technical change (often simultaneous with energy efficiency) drives down the price of infra-marginal products making them affordable to a larger population.
 - *The increase in overall demand is because the appliance (often of lower than frontier efficiency) is now within reach of a much larger segment of the population.*

Progress raises the asymptote of technology adoption by dropping the price of infra-marginal hardware



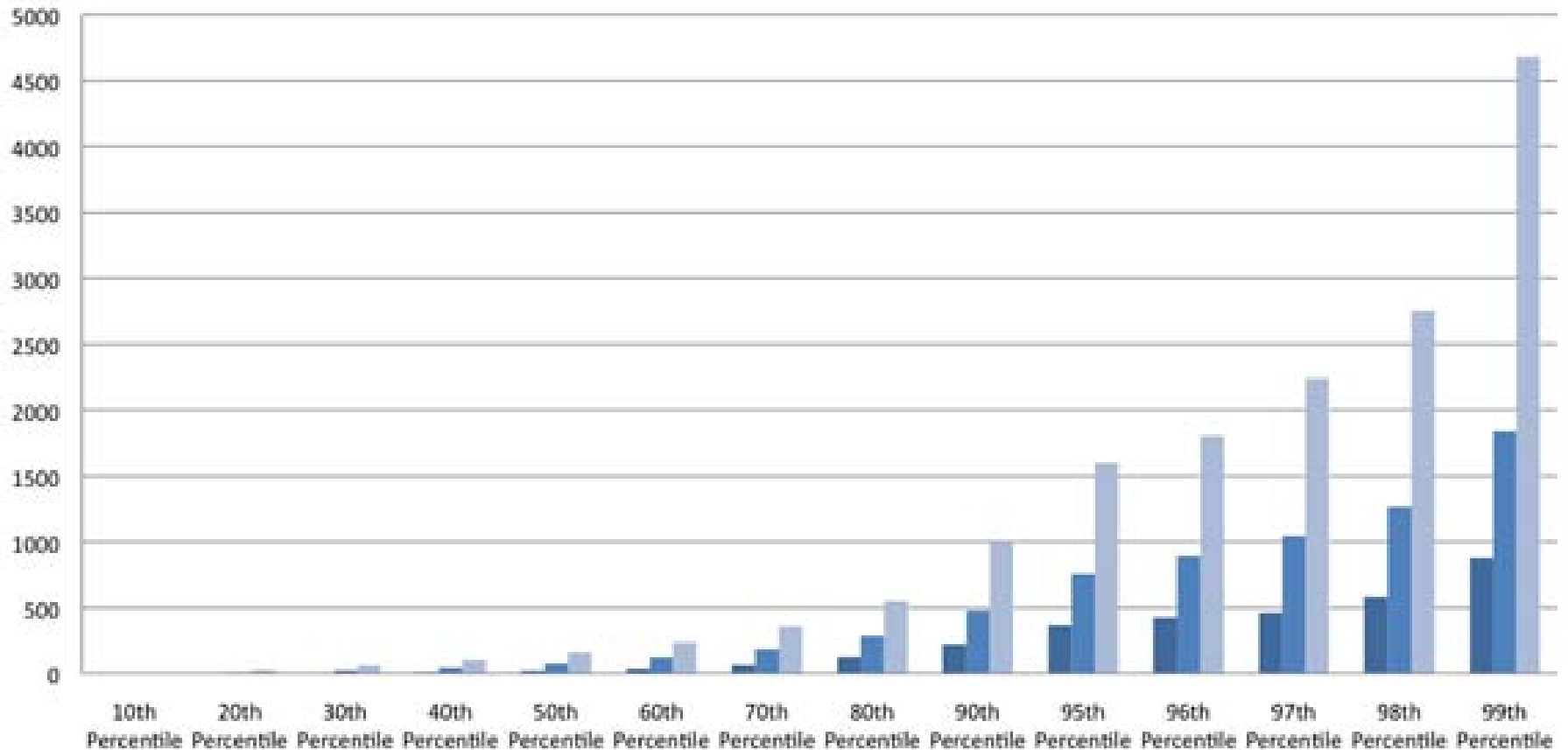
Need or Want?

- 1980-99: 68 Cases of Dengue in Texas, 62,000 in neighbouring Mexican counties.
 - Key determinant: a lifestyle predicated on pervasive use of air conditioning. A/C costs \$1500/y, affordable on the US income of 22k but not the Mexican income of 5k.
- Cellphone data usage...

US Smartphone Data Usage

Industry MB Usage by Percentile - Smartphone Only

■ Q1 '09 Industry (n=4474) ■ Q1 '10 Industry (n=6487) ■ Q1 '11 Industry (n=8807)



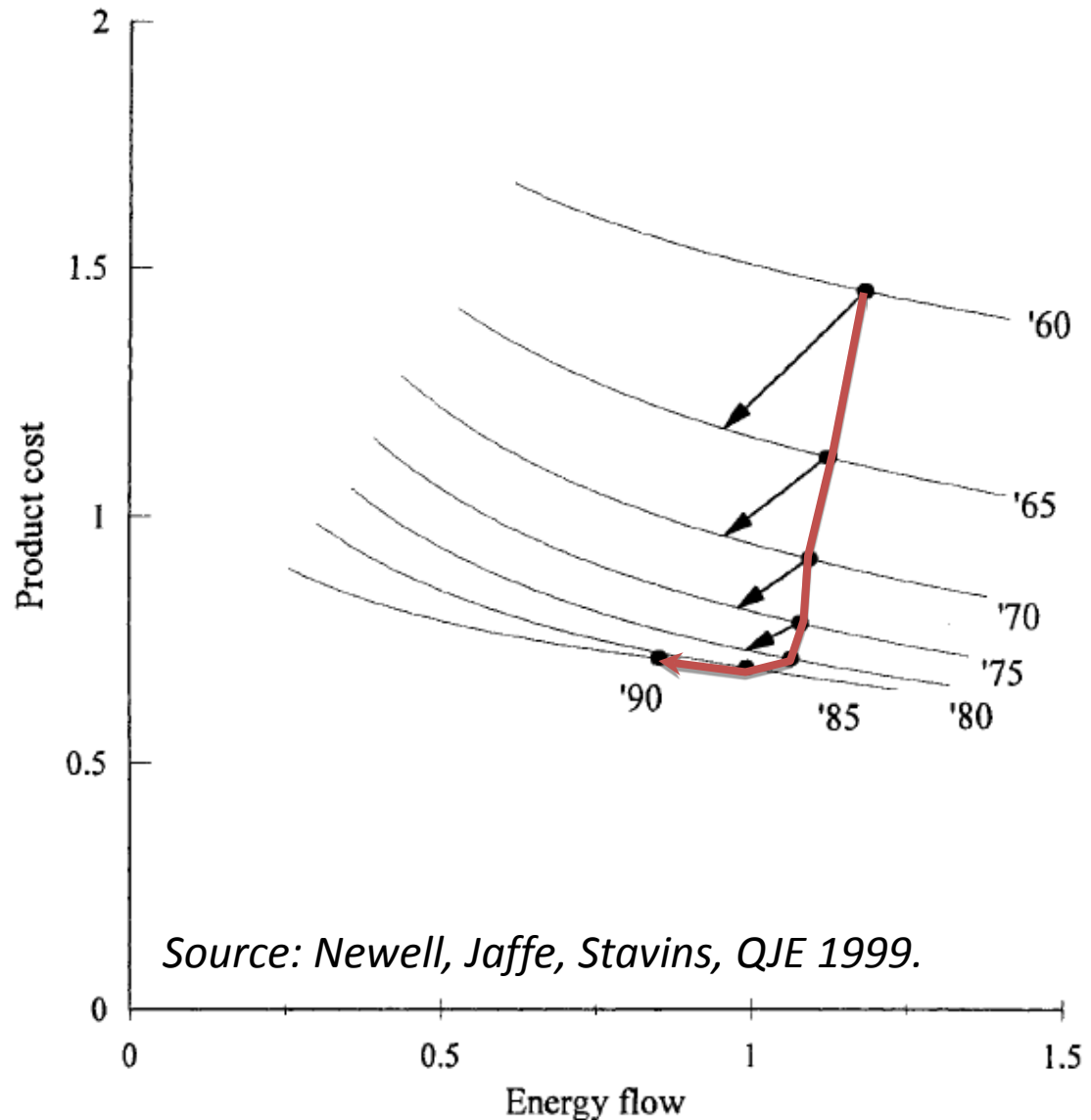
Source: Nielsen

Refrigerator: Performance vs. Price

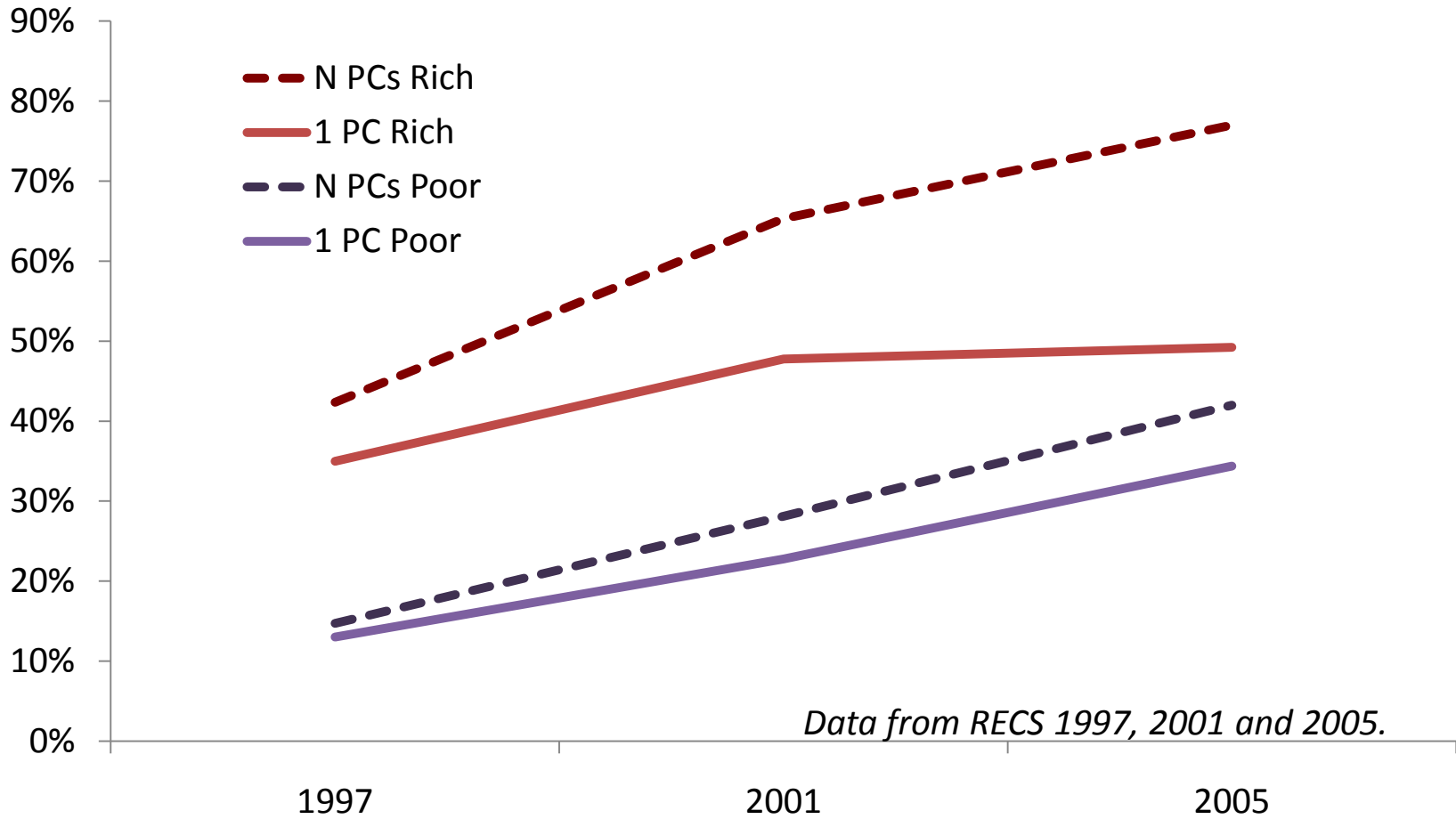
The price (y-axis) of each cohort of refrigerators is plotted against energy use (x-axis).

“Progress” shifts the supply of the suite of air conditioners towards the origin.

Only after 1985 was the lower end of supply disallowed – moving the median of units sold towards lower energy consumption.



PCs in homes



Needs vs. Wants

- We may be quick to dismiss *wants*, but can their role in driving an economy be dismissed?
- Don't we need motivation to:
 - form goals?
 - learn skills?
 - work?
- Do these have to be wants or needs?
- Prior to achieving a need? Isn't it a want?

Consumer need help in both efficiency & fuel choice



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Water Heaters

Cash in on an electric water heater.

Did you know that your home's second largest energy user is the hot water heater? Take control of your energy use by choosing an electric water heater and see how economical and efficient it can be.

Electric water heating is matchless

With an electric water heater, there is no pilot light to worry about. An electric water heater is low maintenance and has a long life expectancy. It's also economical. With an electric water heater, you can save on your water heating costs.

Free electric water heater or \$200 cash back

Switch to electric water heating today and get a FREE 40- or 50-gallon Rheem electric water heater or \$200 cash back if you purchase your own water heater. Take advantage of this **matchless offer** today!

Free information for you

Want tips on how you can save energy around your home? Visit [Saving Power](#).

Want to learn more about your electric company? Visit [Learning Power](#).

Want to learn more about energy and the environment? Visit [Planet Power](#).

Accessed on line at: <http://www.alabamapower.com/residential/waterheater.asp> on June 20th 2011

Energy efficiency in context

- Assure energy services are delivered with high LCA efficiency.
- Keeping in mind:
 - Needs are met
 - While meeting a range of associated concerns (e.g., Toxics, CACs, Land use, GHGs, ...)

Some examples?

Energy Service	Tech Rate of Change	Tech life (yrs)	Ownership Model	Instrument?
Space heating	Slow	10+	Attached to building	Building codes as energy density and HDD
Lighting	Fast	<1->10	Attached to building	Set standards at efficiency asymptote
Electronics	Fast	3-5	Mixed: lease & own	Set efficiency standards and mandate take back [†]
Transport	Medium	15	Owned	Use efficiency excise tax make revenue neutral with fuel tax.*
Industry	Varies	20+	Owned	Capital subsidy where frontier is far from current stock [†]

[†] Don't forget the fate of the retired equipment.

* Issues: fuel taxes are usually regressive but track usage.

Summary

- Unless
 - there is a prescribed level of energy services that is presumed optimal, and
 - this level of service is within reach of all ...
- *We are not sure how one can argue that a new equilibrium serving energy service needs of a greater population should be avoided.*