# The co-evolution of demand

(Struggles with data)

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#### **Evolving Demand – Change is normal**

To put it simply, most families in 1970 lived in homes that would be cold by modern standards in winter – as cool as 12°C on average (see Table 6o, Appendix 1). There may have been ice on the insides of the windows, and nearly everyone accepted the need to wear thick clothes at home in winter.

Few homes had central heating, and many families used coal for heating. Added to this, few families owned the household appliances everyone takes for granted today.

Source: DECC, 2013 (UK Housing Factfile)





# Evolving Demand – Change is normal

#### Chart 4: Electricity consumption by household domestic appliance, by broad type, UK, 1970 to 2011



Source: DECC, ECUK Table 3.10

#### **1970s**

Typical energy using products in the home 30 years ago (Box 1)



Owen. 2006. The rise of the *machines—a review of energy* using products in the home from the 1970s to today., Energy Saving Trust, London.



2000s

Typical energy using products in the home today (Box 2)

Televisions Video players DVD player/recorder Portable music players Mobile phones Hairdryers Hair irons Electric toothbrushes Wireless telephone/answering machine Slave portable phone handsets Electric kettle Smoothie maker Magimix ice-cream maker Digital radio Mini hi-fi systems Washing machine Tumble dryer Dishwasher PlayStation/games console Cappuccino maker Digital clock/radios Electric lawnmower Strimmer Microwave Electric oven Electric hob Extractor fan large fridge/freezer Drinks cooler Portable fan Vacuum deane PC computer Monitor Printer Scanner/fax Digital camera Set-top box Electric shaver Steam iron luicer Home security system Broadband connection Halogen bulb light fittings Personal care products Power tools Electric blanket





# The stability of 'peak'?









#### UK: Evolving Demand – Data to hand

- National Travel Survey (1960s ->)
  - Tells us about travel only!
- Expenditure Surveys (1960s ->)
  - Nothing about routines and timing
- Time Use Surveys (1970s ->)



• All 'activities', timings and (multiday diaries) routines

Anable, J., Anderson, B., Shove, E. and Torriti, J. (2014) *Categories, Concepts and Units: Representing energy demand in and through time*. Working Paper 3, Lancaster: DEMAND Centre: <u>http://bit.ly/1DhGodj</u>







# UK: Evolving Demand – Time Use Surveys

Survev	-	Sample	Sample si	Time interva	Notes	
1	1974	All 5+ in representative household sample	2,598	30 minutes	7 diary days, primary & secondary activities (73 codes), location known, co-presence unknown	
1	1983	Representative sample 14+	1,350	15 minutes	7 diary days, primary & secondary activities (188 codes), location known, co-presence of others known	
1	1987	Representative sample 14+	1,586	15 minutes	7 diary days, primary & secondary activities (190 codes), locate Data supplied as	
1	1995	Representative sample 16+	1,962	15 minutes	1 diary d'episodes' (start -location &end, activity)	
2	2000	All 8+ in representative household sample	8,688	10 minutes	2 diary days (week secondary actives of others known, co-p e of others known	
2	2005	Representative sample 16+	4,854	10 minutes	1 diary de primary & secondary activities (30 codes pocation known, co-presence of others up'nown	

Multinational Time Use Survey 1974-2005 (www.timeuse.org/mtus)







### Evolving Demand: Laundry as an example



# Problem 1: What *is* laundry?



#### **Problem 2: Timings**









# Analytic strategy

- Ignore duration
- Summarise to half hours:
  - 1. Count episodes that start in a half hour
  - 2. Sample every 10 minutes & record any laundry in the half hour

Distributions within years

Sequences of episodes -

DYNAMICS OF ENERGY, MOBILITY AND DEMAND

Ignore duration and timing To count 'short' activities

To harmonise

To catch 'long' activities

Assume similar reporting patterns in each survey



### Analytic strategy 1: Counting starts

	1974: 30 min	ute diary		
ID	Start time	Main	Sec	Duration
1974_1	07:30:00	Eating	Washing	30
1974_1	08:00:00	Laundry	Child care	30
1974_1	08:30:00	Travel	-	30
1974_1	09:00:00			



#### 2005: 10 minute diary

ID	Start time	Main	Sec	Duration
2005_1	07:30:00	Eating	Washing	20
2005_1	07:50:00	Laundry	Child care	20
2005_1	08:10:00	Laundry	Cleaning	30
2005_1	08:40:00	Travel	-	20



Longer duration activities 'vanish' when aggregated to half hours







#### Analytic strategy 2: Sampling & aggregation

	1974: 30 min			
ID	Start time	Main	Sec	Duration
1974_1	07:30:00	Eating	Washing	30
1974_1	08:00:00	Laundry	Child care	30
1974_1	08:30:00	Travel	-	30
1974_1	09:00:00			

2005: 10 minute diary

ID	Start time	Main	Sec	Duration
2005_1	07:30:00	Eating	Washing	20
2005_1	07:50:00	Laundry	Child care	20
2005_1	08:10:00	Laundry	Cleaning	30
2005_1	08:40:00	Travel	-	20

Properly represents longer duration activities when aggregated to half hours







#### **Comparisons: Measurement methods**



Bars show % of episodes/half hours which are or contain laundry as measured Source: Multinational Time Use Survey Dataset (UK, 1974-2005, all 18+)





# Comparisons: Laundry by year & day

Laundry started in a half hour (counted)

Any laundry in a half hour (sampled)







# Comparisons: Laundry by year & time

Laundry started in a half hour (counted)

Any laundry in a half hour (sampled)









### Comparisons: Laundry by year & time



Lines show % point difference between methods Source: Multinational Time Use Survey Dataset (UK, 1974-2005, all 18+)

















































#### The evolution of laundry: Summary



Source: Multinational Time Use Survey Dataset (UK, 1974-2005, all 18+)





















#### Seasonal laundry: across years









### ????



Lines show % of all laundry for age group Source: Multinational Time Use Survey Dataset (UK, 1974-2005, all 18+)







#### And a final word on sequences...



Source: Multinational Time Use Survey Dataset (UK, 1974-2005, all 18+)







# Things to remember:

- What people do changes over time
  - For all sorts of reasons
  - The current 'state' is (probably) not stable
- And...
  - People can be flexible
  - But they have constraints
- **BUT** are we making strong claims
  - From *very* weak data...?







# Thank you

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- https://github.com/dataknut/DEMAND-Theme-1





