



The Energy Cost of Preservation

Prof. Christian Hilber
London School of Economics

Urban Land Institute UK's Research Insights

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AECOM, Aldgate Tower, 2 Leaman Street, London E1 8FA

Overview

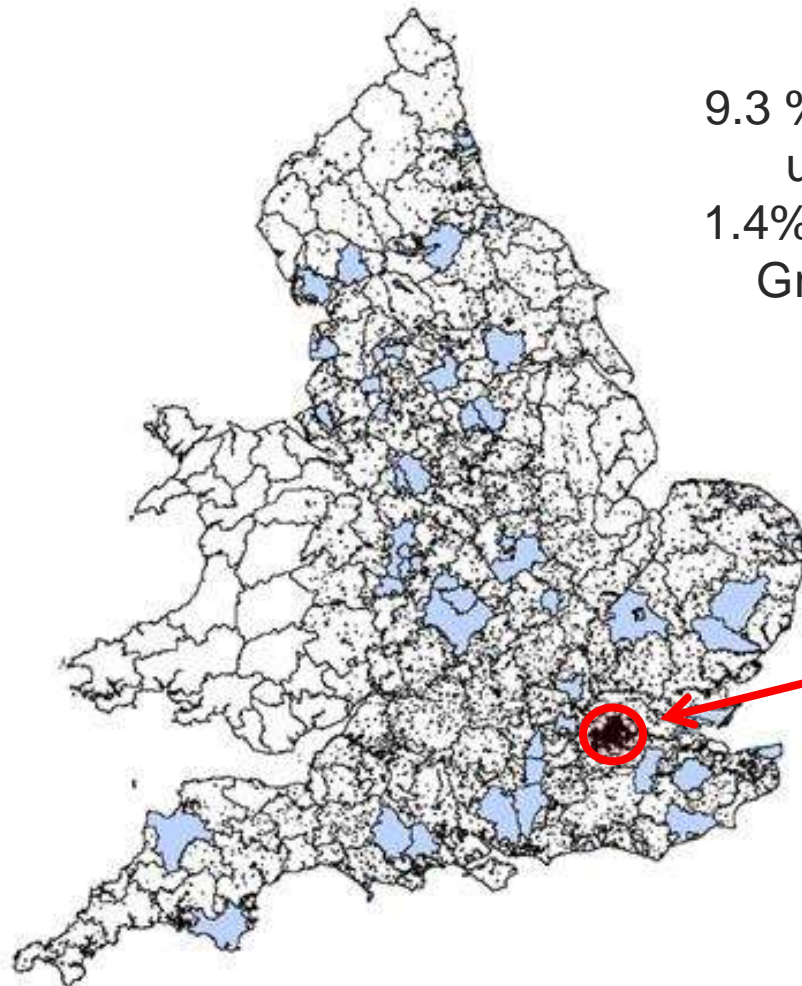
1. Some stylised facts on historic preservation
2. Quantifying external benefits
3. What about costs?
4. Energy costs of preservation [our study!]
 - Approach to estimation
 - Quantifying (internal & external) costs
5. Implications & policy recommendations

Some stylised facts ...

Stylised fact #1:

Historic preservation is very widespread

Conservation Areas (=black dots) Listed buildings (=green dots)

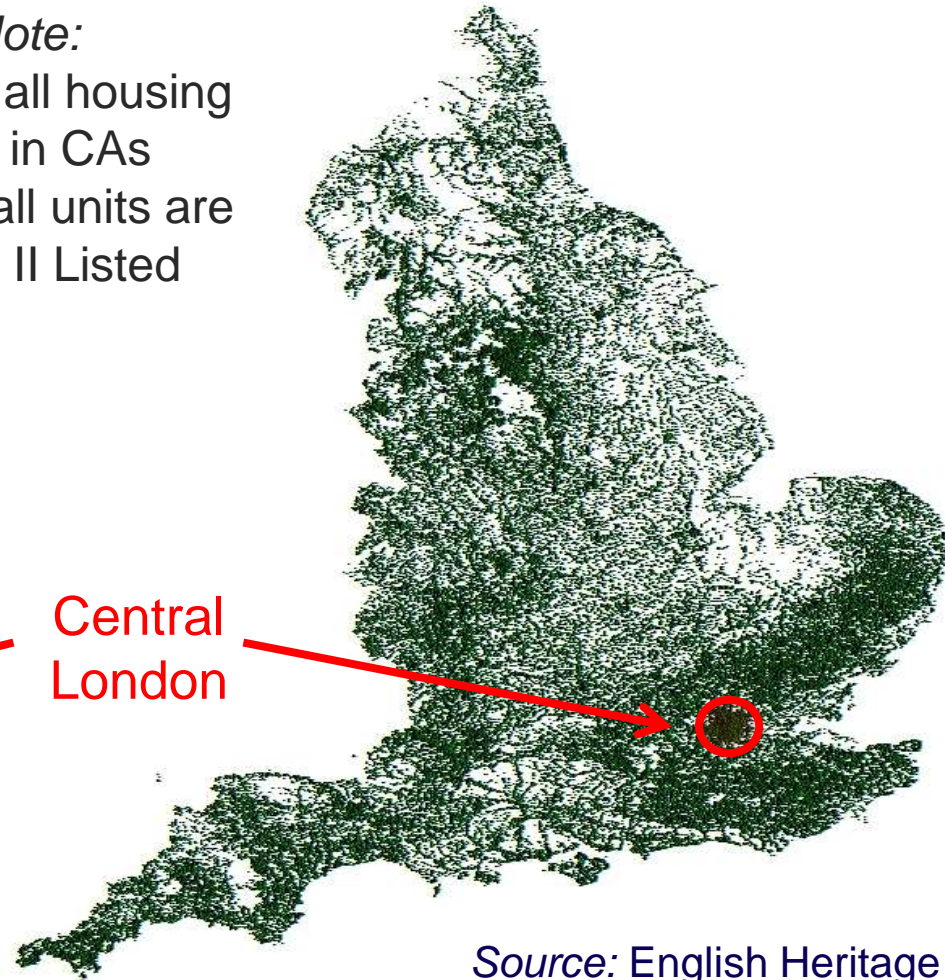


Note:

9.3 % of all housing
units in CAs

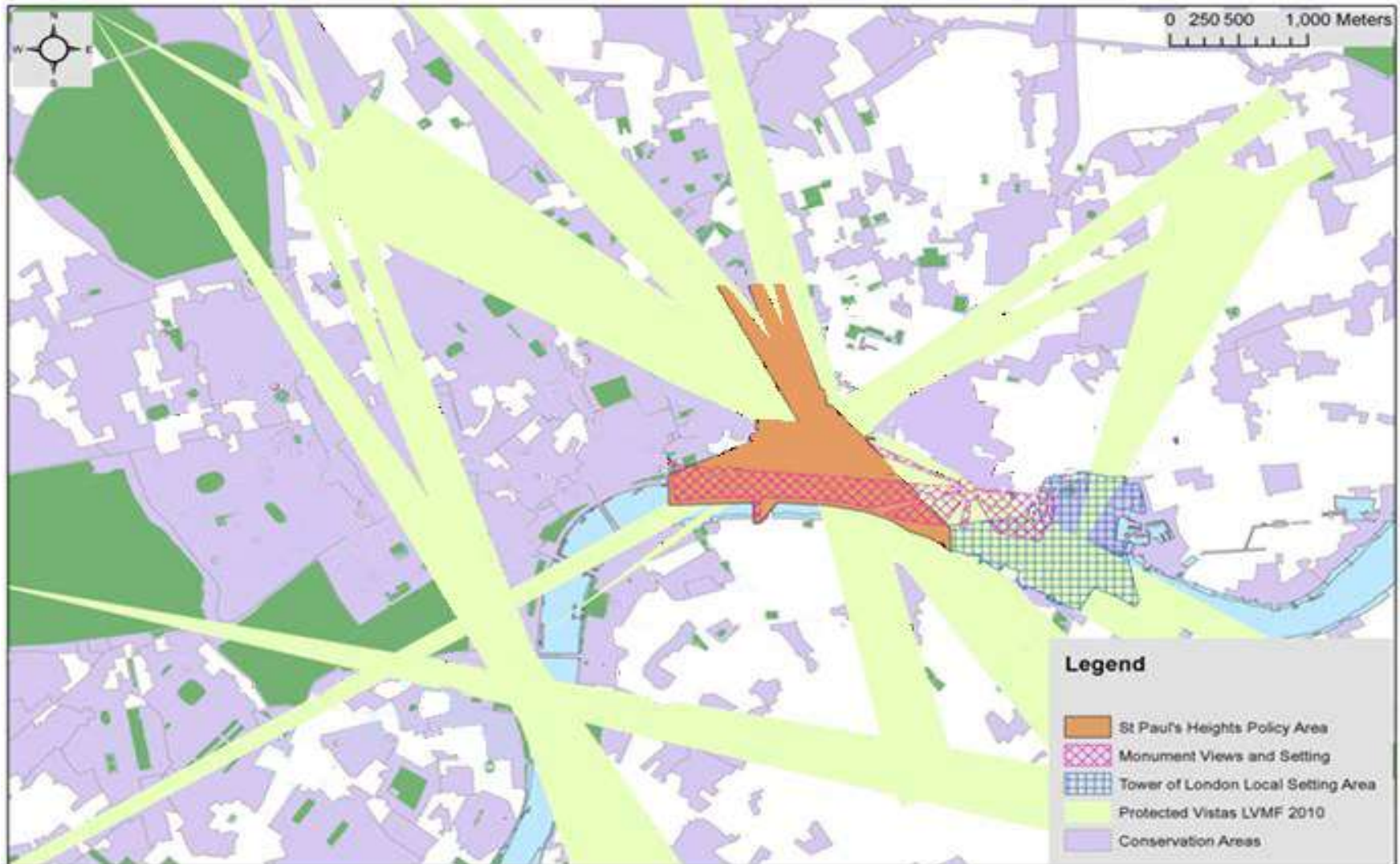
1.4% of all units are
Grade II Listed

Central
London



Source: English Heritage
Data on CAs missing for 50 LPAs (light blue)

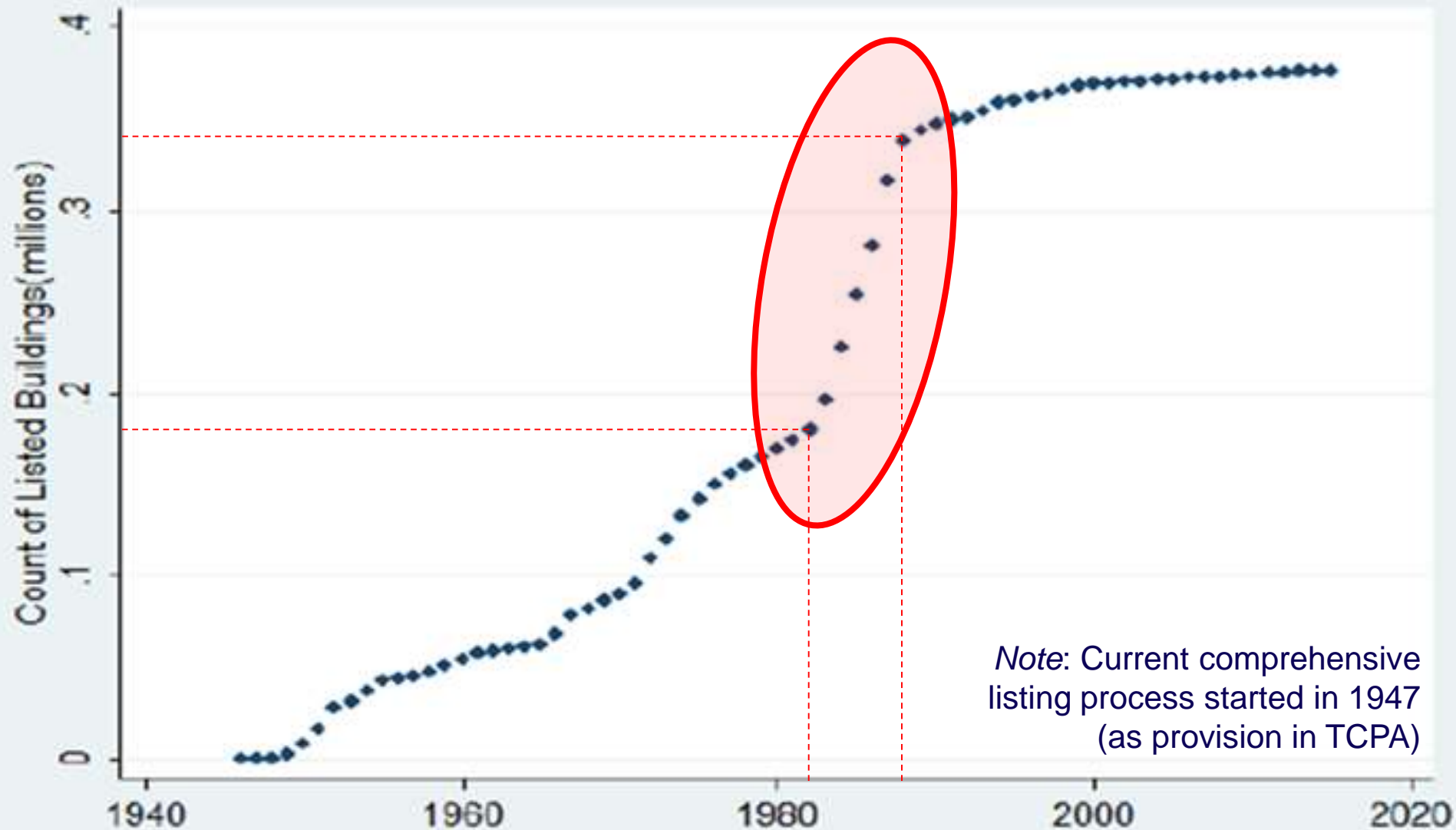
Historic preservation (and other planning restrictions) in Central London



Source: Cheshire and Derricks (2014)

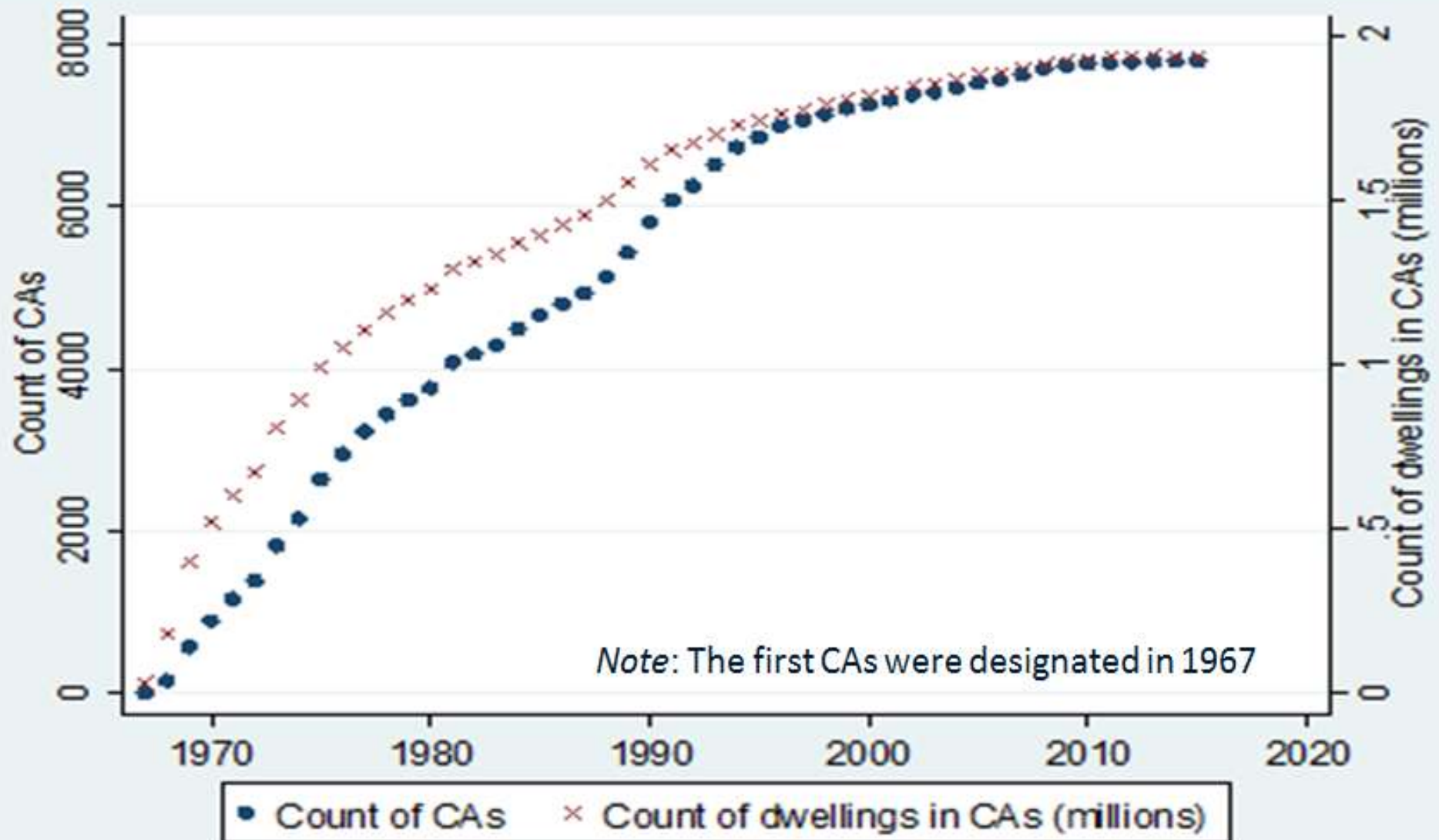
Stylised fact #2: Historic preservation has spread significantly since around 1980

Listed Buildings by Year of Listing



Stylised fact #2 (cont.)

Conservation Areas by Year of Designation



Stylised fact #3: Preservation has “external benefits”

- Historic preservation benefits not only those living in “protected” areas but also...
 - ▶ Neighbours who enjoy nice views (which increase rents & house values!)
 - ▶ Commuters on way to work
 - ▶ Tourists

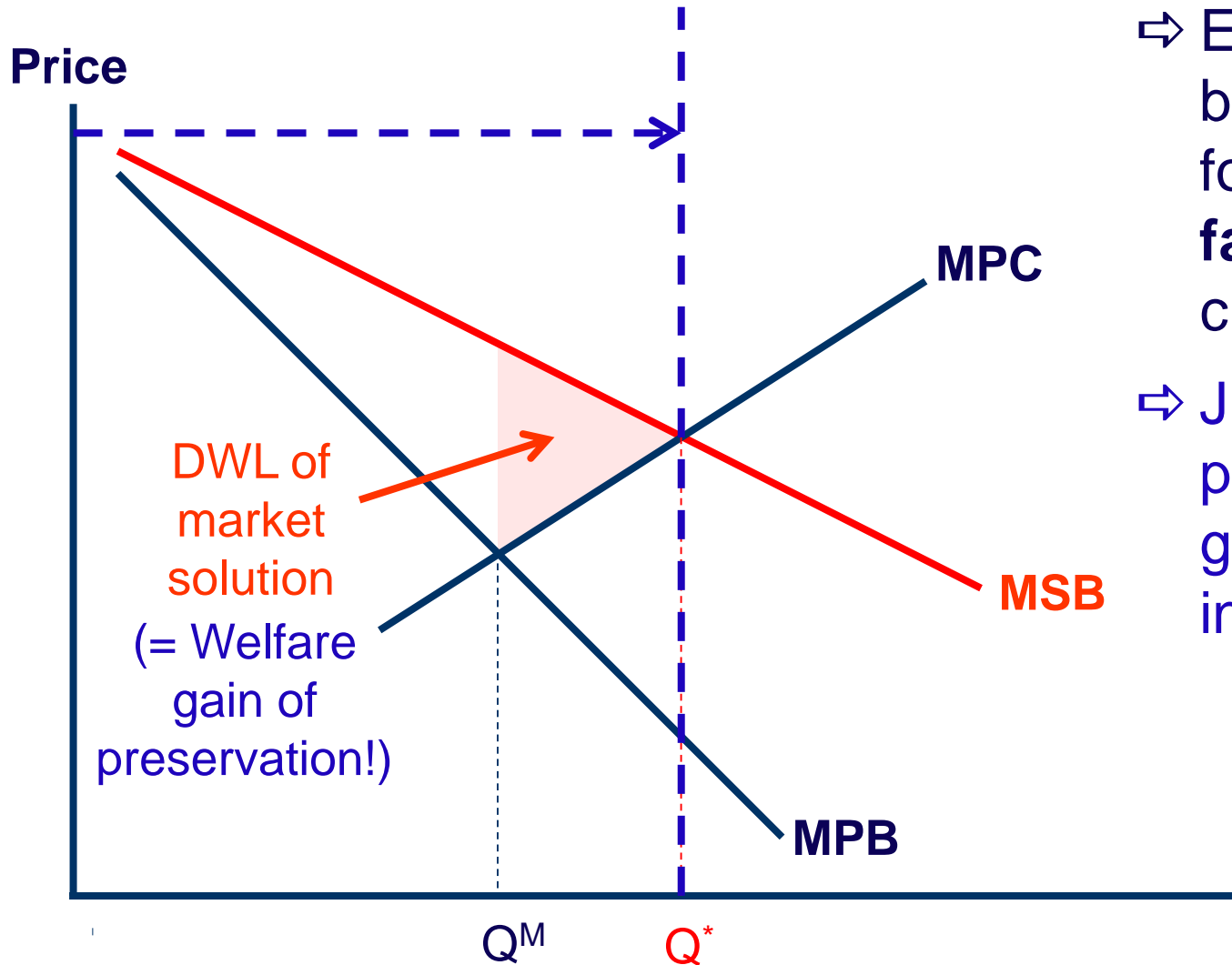


Stylised fact #3 (cont.)

- Some historic buildings also have **option value** and **existence value**



Implications? (Microeconomics 101)



- ⇒ External benefits are a form of **market failure** that creates DWL
- ⇒ Justifies in principle government intervention!

How important are these
external benefits?

Some insights from the
academic literature...

Some attempts to quantify...

- Koster *et al.* (2016) – for Netherlands
 - ▶ Premium for houses with views on *designated* buildings around 3.5% (but not clear how much due to designation)
 - ▶ Controlling for external effects, designated buildings themselves do not trade at premium (internal costs and benefits offset each other)
- Ahlfeldt *et al.* (2012) – for England
 - ▶ Houses just *inside* CAs and just *outside* CAs trade at 8.5% and 5% premium respectively (but not clear how much due to *designation*)
 - ▶ **Designation** itself has **only weak positive effect** on house values just outside CAs (pos. and neg. effects offset)
 - Buildings designated before 1981 trade at premium compared to those designated after!

Quantifying external benefits (*cont.*)

- Been et al. (2016) – for New York
 - ▶ **Designation boosts value of properties outside historic districts by 12%**
 - ▶ Same properties sell at 5% discount prior to designation (i.e., there are unobserved differences)
- ⇒ Historic buildings trade at significant premium
- ⇒ But in England at least, process of *designation* itself may have only weak positive effect on HVs
- ⇒ **STUDIES ALL FOCUS ON BENEFITS, NOT ON POLICY-INDUCED COSTS!**

What about the costs of preservation policies?

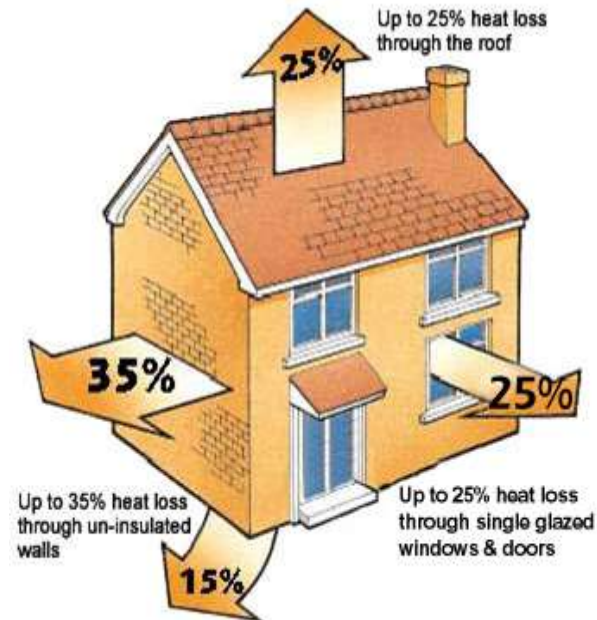
Starting point: 'Heritage costs' vs. costs induced by preservation policies

- Historic buildings
 - ▶ Maintenance
 - ▶ Costs associated with preservation
- Preservation policies
 - ▶ Costs of preservation
 - ▶ Possibly higher density (in central locations) = (need to control)
 - ▶ Aggregating costs, possibly leading to higher density (in central locations) =
 - ▶ Increases (private) costs of installing efficiency improvements – or prevention
 - Additional greenhouse gas emissions



Preservation policies & home energy efficiency installations

Energy efficiency installation	Not Listed or CA	CA	Listed Building
	<i>Planning permission needed?</i>		
Replacement boiler/heating			Consult LPA
New boiler/heating			Consult
New doors and windows	Flats	Yes	Yes
Loft insulation			Consult
External wall insulation	Consult (since 2013)	Yes	Yes
Cavity wall insulation			Yes
Wind turbine	Flats	Yes	Yes
Solar panels		Yes	Yes
Ground & Air source heat pumps		Consult	Yes



Space heating makes up ~70% of domestic energy consumption

What are the **energy costs** of
preservation?

(Hilber, Palmer & Pinchbeck
2017, SERC DP No. 217)

Starting point: Why should preservation policies increase energy costs?

■ Mechanism

- ▶ Preservation policies **drive up cost** of energy efficiency installations **or forbid them** altogether
- ▶ Discourages investment and **reduces sensitivity of household responses** to energy price increases
- ▶ All else equal, over time, would expect policies to **increase energy consumption** and **GHG-emissions**

⇒ **HOW CAN WE TEST?**



Empirical approach

- First estimate impact of increasing national energy prices on energy consumption at neighbourhood level
 - ▶ H_0 : Price \uparrow reduces energy consumption
- Then let impact vary by % dwellings in Conservation Areas and by % Listed Buildings
 - ▶ H_0 : Price \uparrow reduces energy consumption less in CAs and LBs
- Controlling carefully for other drivers of energy consumption ('confounding factors')

Data

- Use panel data at fine geographical scale (MSOA 2-6k) + fixed effects + various linear time trends
 - ▶ Energy price & domestic energy use data for England from *DECC*, 2005-2013
 - ▶ Spatial data on preservation policies from *Heritage England*

Main findings (1/2)

- Energy price \uparrow indeed reduces local energy consumption 
- **Energy price \uparrow reduces local energy consumption much less in neighbourhoods with high % of buildings in CAs and high % of Listed Buildings** 
- Effects are **quantitatively important**: Preservation policies increase...
 - ▶ **Private energy costs** per designated dwelling by around £8,000 (~3.3% of HV) (or £240 p.a.)
 - ▶ **Social cost of carbon** per designated dwelling by around £2,550 (or £77 p.a.)
- Results survive numerous robustness checks

Results (2/2)

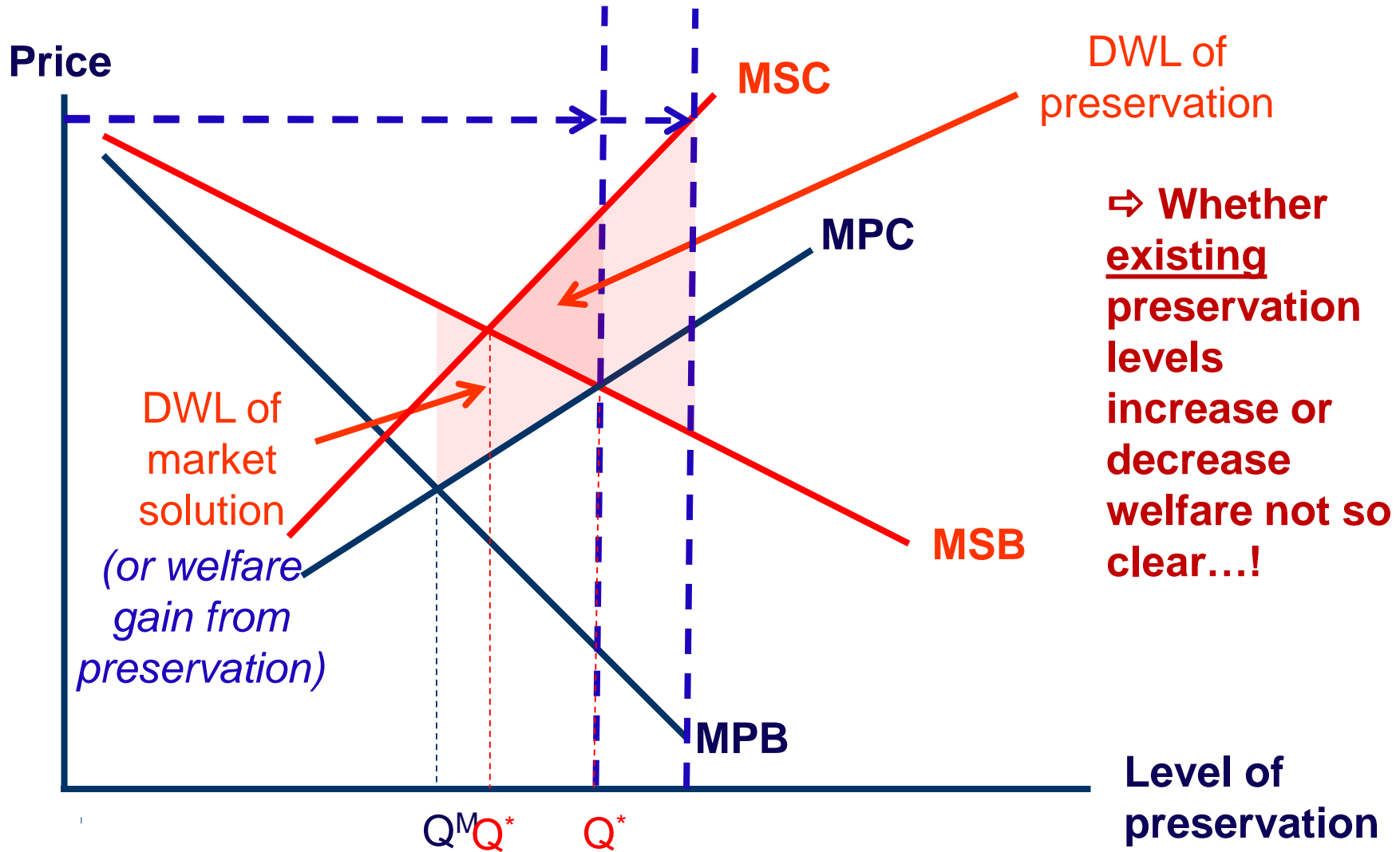
- Supporting evidence for underlying mechanism
 - ▶ Energy price ↑ increases # energy efficiency installations (wall insulation, loft insulation, double glazing, heating, new boiler) much less in areas with high share of CAs & LBs
 - ▶ Energy efficiency installations indeed reduce energy consumption

Counterfactual analysis

	Energy saving compared to baseline		Energy saving per design. dwelling p.a.		Carbon footprint per dw. p.a.
	Difference in billion £ (2006-13)	Difference in %	In £	PV as % of HV	In £
Remove all...					
Conservation Areas	-2.3	-1.7%			
Listed Buildings	-1.7	-1.3%			
CAs + Listed Buildings	-3.8	-3.0%	-240	-3.3%	-77*
Reduce to 1980 design. levels...					
Conservation Areas	-0.84	-0.6%			
Listed Buildings	-0.88	-0.7%			
CAs + Listed Buildings	-1.71	-1.3%			

*Note: Using government figures of marginal abatement costs (non-traded, 'central range' price for 2013)

Implications?



Conclusions

1. Preservation policies **reduce investments in home energy efficiency installations** and thus **increase energy consumption & carbon footprint**
2. Preservation policies in England thus **have significant internal + external energy costs, ignored to date by policy makers**
 - ▶ Put differently: Their ambitious GHG-emission targets may not be achievable, in part as consequence of preservation policies!
3. Not all designations may be welfare improving: Assuming government designated buildings with highest heritage value first, **'marginal designations' may often decrease rather than increase aggregate welfare**

Derived policy recommendations

- **Consider** not only benefits but **also economic and environmental costs** imposed by designation decisions (and more broadly: by planning decisions) ⇒ **Designate only if benefit > cost!**
- Review guidelines on heritage preservation and consider changes to explicitly **take into account impact on energy efficiency**
 - ▶ Ask question: Are restrictions that impede energy efficiency installations really necessary from 'heritage point of view'?

Q & A

Thank you!

Presentation available:

Email: c.hilber@lse.ac.uk

Paper available as SERC Discussion Paper No. 217:

<http://www.spatialeconomics.ac.uk>

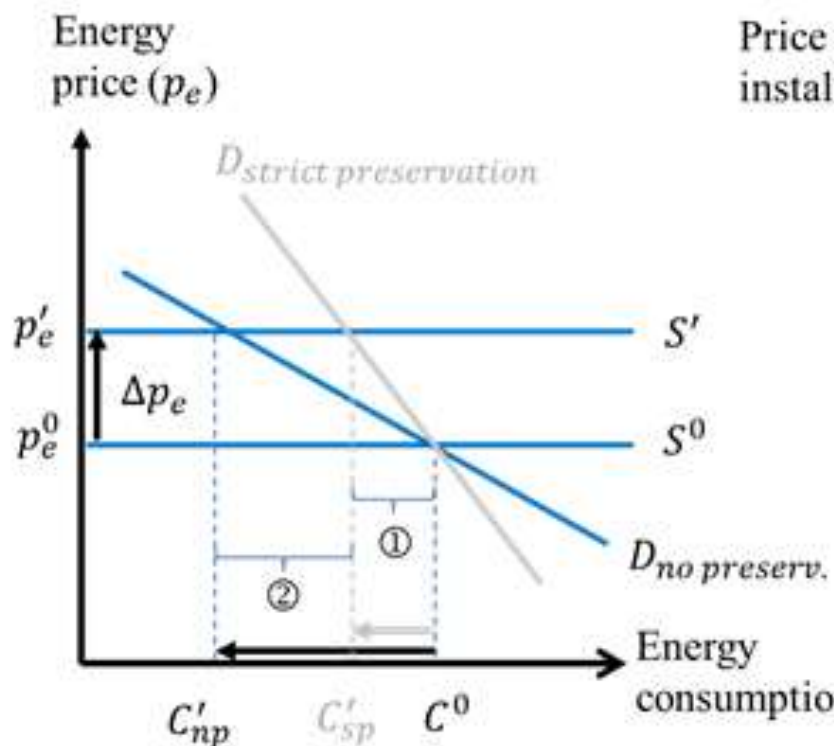
<http://www.spatialeconomics.ac.uk/textonly/SERC/publications/download/sercdp0217.pdf>

Backup slides

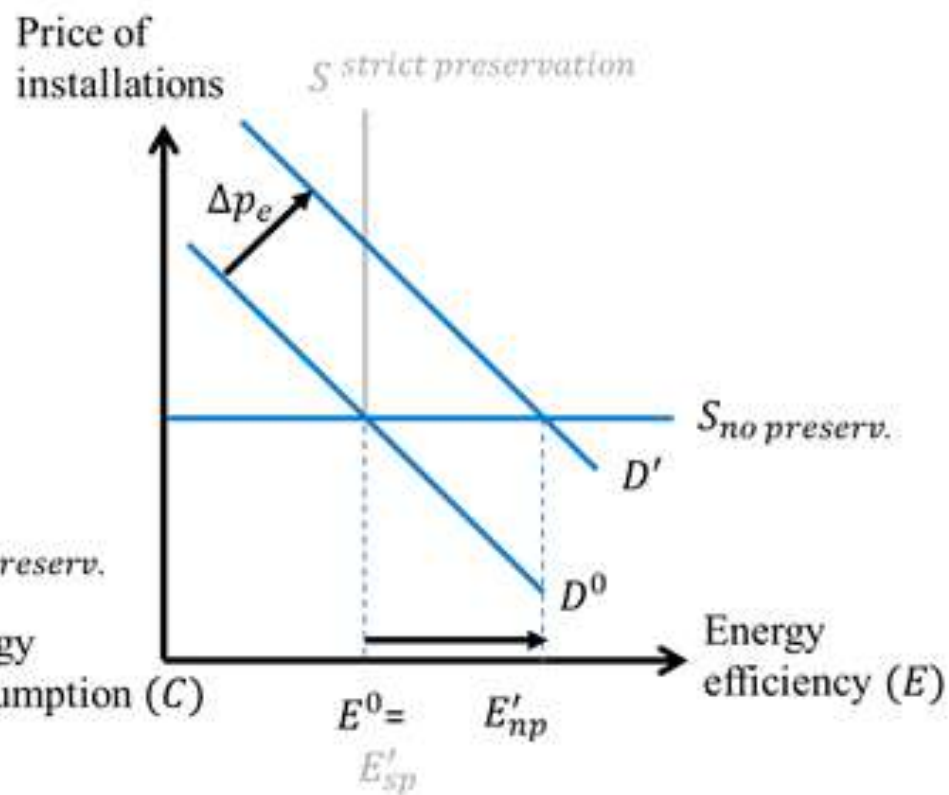
Energy market & market for home energy efficiency installations

Impact of Strict Preservation Policy on Investments in Home Energy Efficiency Investments and Energy Consumption

Panel A: Energy market

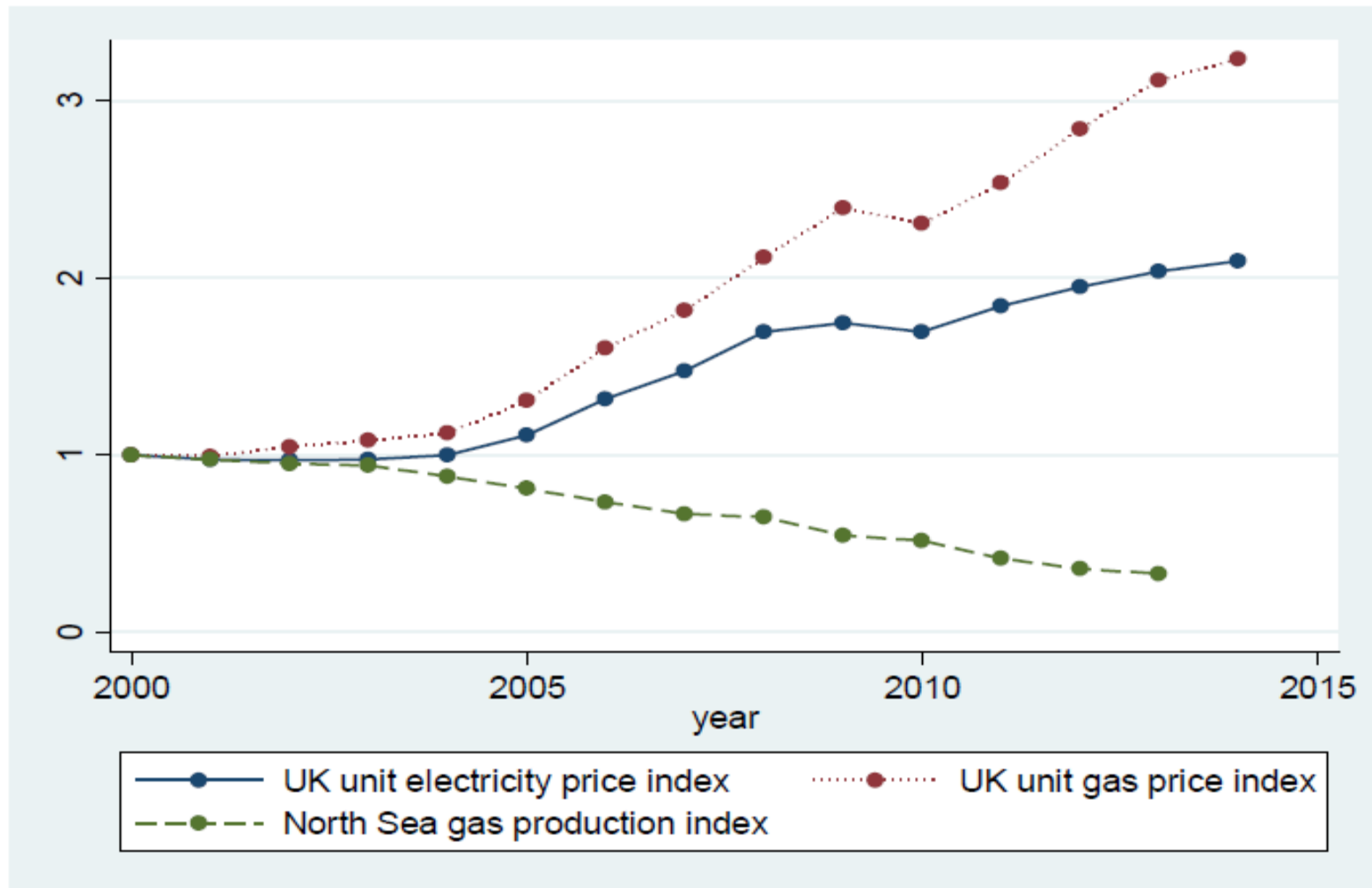


Panel B: Market for home energy efficiency installations



Energy prices over time

Fig. 5
UK Energy Price and Production Indices 2000- 2014



Empirical strategy I

- Estimate benchmark price elasticity of domestic energy consumption

Prediction: $\beta_1 < 0$

$$e_{it} = \beta_1 p_{t-1} + \alpha_1 w_{jt} + \alpha_2 hdd_t + \gamma_i + \varepsilon_{it}$$

- ▶ e_{it} ... log domestic energy (gas + electricity) consumption per capita in MSOA i in year t
- ▶ p_t ... log one year lagged weighted energy price (demand shifter)
- ▶ w_{jt} ... log local median wage (at LA level)
- ▶ hdd_t ... log heating degree days
- ▶ γ_i ... MSOA FEs (no year FEs – otherwise could not estimate effect of p_t)

Empirical strategy II (baseline)

- Estimate effect of preservation policies on price elasticity of domestic energy consumption

$$e_{it} = \beta_2 p_{t-1} \times \overline{\text{List}_i} + \beta_3 p_{t-1} \times \overline{\text{CA}_i} + \alpha_1 w_{jt} + \gamma_i + \text{Census trends} \\ + \text{Inc trends} + \text{Building trends} + \gamma_{kt} + \text{rur/urb trend} + \varepsilon_{it}$$

Predict:

- $\beta_2 > 0$ $\overline{\text{List}_i}$ & $\overline{\text{CA}_i}$... (standardized) time invariant measures of policies
- $\beta_3 > 0$ $\text{Census/income trends}$ = linear time trends \times various 2001 Census variables & income 2004 variable ... address concern that interaction terms might pick up local trends in energy consumption that might be correlated with preservation policies, e.g. due to income sorting
- (Policies should reduce price elasticity of demand for energy) Building trends ... address concern that interaction terms might pick up building-type specific trends
- Year FEs ... address concern that unobserved factors at national level determining energy consumption are correlated with p_{t-1} or
- γ_{kt} (TTWA year FEs) ... partials out patterns in energy consumption common to labour markets
- Drop most rural areas & allow for differential rural/urban trend

Robustness checks

1. Alternative panel frequency (long-run) ✓
2. Alternative lag structure of energy prices ✓
3. Stacked regression ✓
4. Do not drop outlier MSOAs with very large changes in energy consumption ✓
5. Use alternative trends (2011 instead of 2001; $\Delta 2001-2011$) ✓
6. Alternative policy measures ✓
7. IV for energy price interactions using north-sea gas production ✓
8. Weight prices with national energy split in 2005 ✓
9. Placebo using Green Belt preservation policy measure ✓

Some views absolutely worth protecting...

View from Assessment Point
13A.1 Millennium Bridge



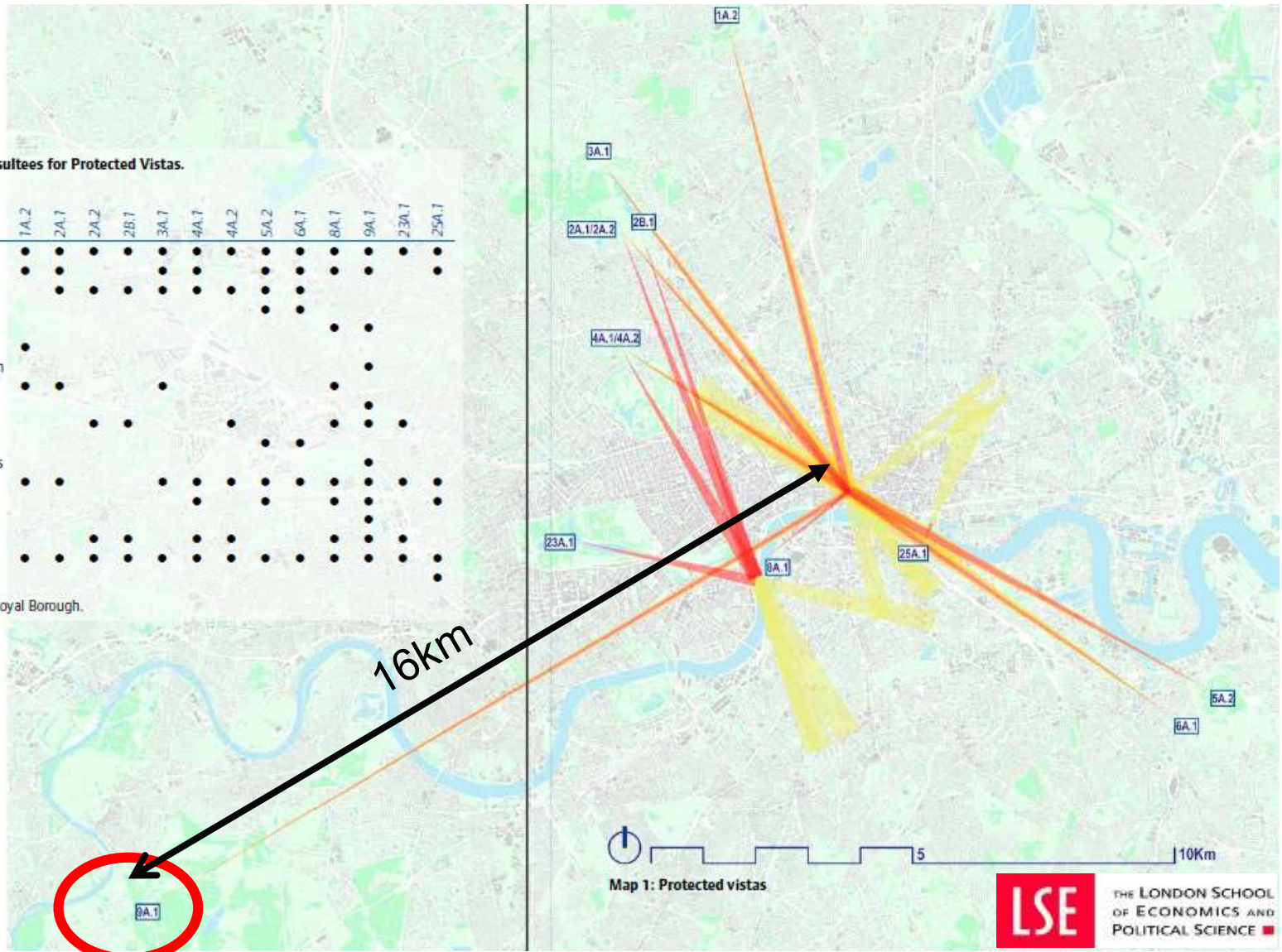
⇒ Huge benefits of view and (opportunity) costs are not very high...

Protected view from King Henry VIII' Mound (Richmond Park)

Table 2 – Statutory Consultees for Protected Vistas.

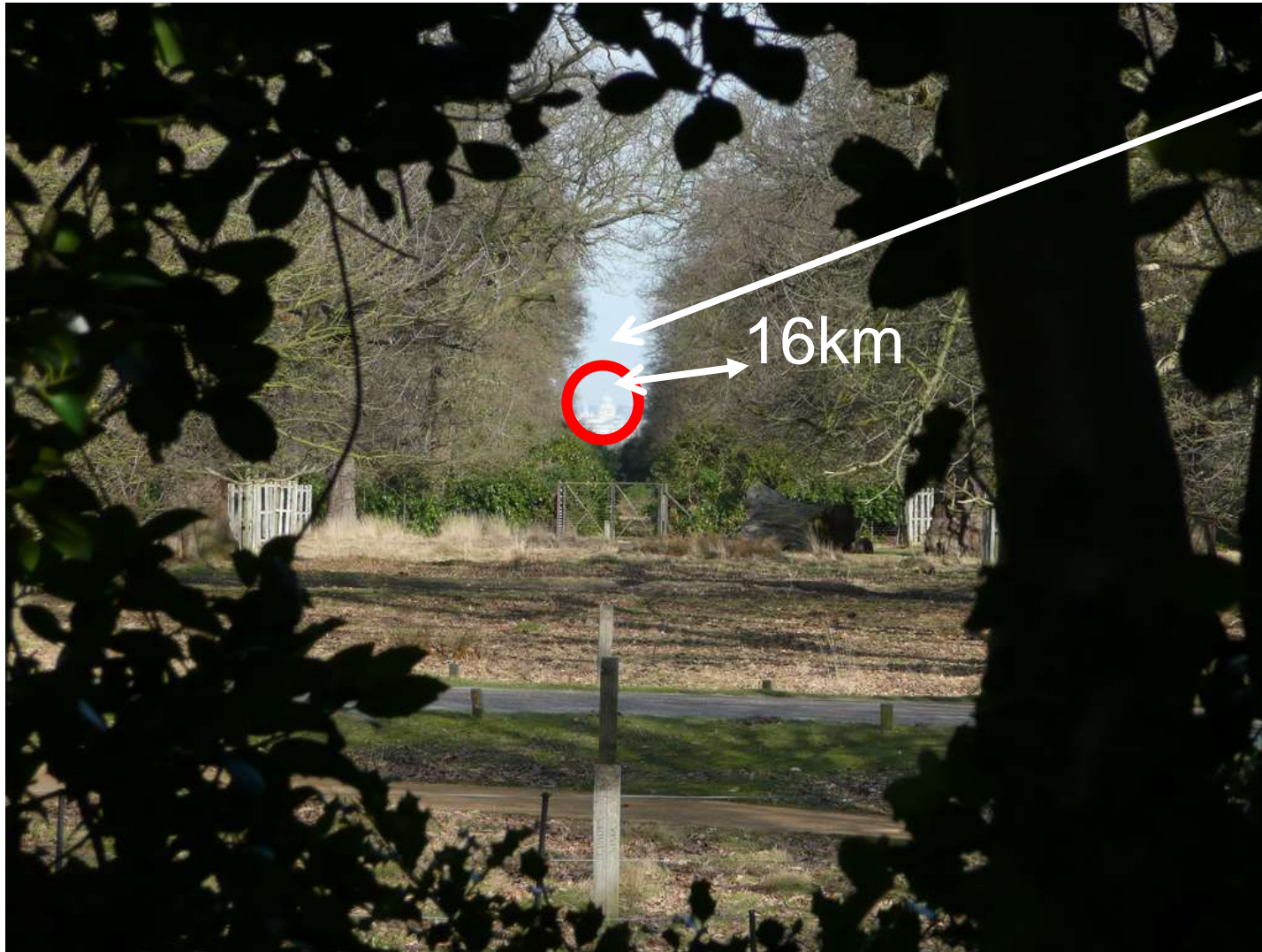
Viewing Location	1A.2	2A.1	2A.2	2B.1	3A.1	4A.1	4A.2	5A.2	6A.1	8A.1	9A.1	23A.1	25A.1
GLA	•	•	•	•	•	•	•	•	•	•	•	•	•
City of London	•	•	•	•	•	•	•	•	•	•	•	•	•
LB Camden		•	•	•	•	•	•	•	•				
LB Greenwich								•	•				
LB Hackney										•	•		
LB Haringey	•												
LB Hammersmith & Fulham											•		
LB Islington	•	•			•					•			
RB Kensington & Chelsea											•		
LB Lambeth			•	•			•		•	•		•	
LB Lewisham								•	•				
LB Richmond upon Thames											•		
LB Southwark	•	•			•	•	•	•	•	•	•	•	•
LB Tower Hamlets						•							•
LB Wandsworth											•	•	•
City of Westminster			•	•		•	•		•	•			
English Heritage	•	•	•	•	•	•	•	•	•	•	•	•	•
Historic Royal Palaces													•

LB London Borough; RB Royal Borough.



Source:
London View
Management
Framework
(2012)

Protected view from King Henry VIII' Mound (Richmond Park)



Also 'protects' backdrop:

- Liverpool St. Station area
- Stratford

⇒ Huge (opportunity) costs, benefiting few...