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Implications of BER policy targets in the Climate Action Plan

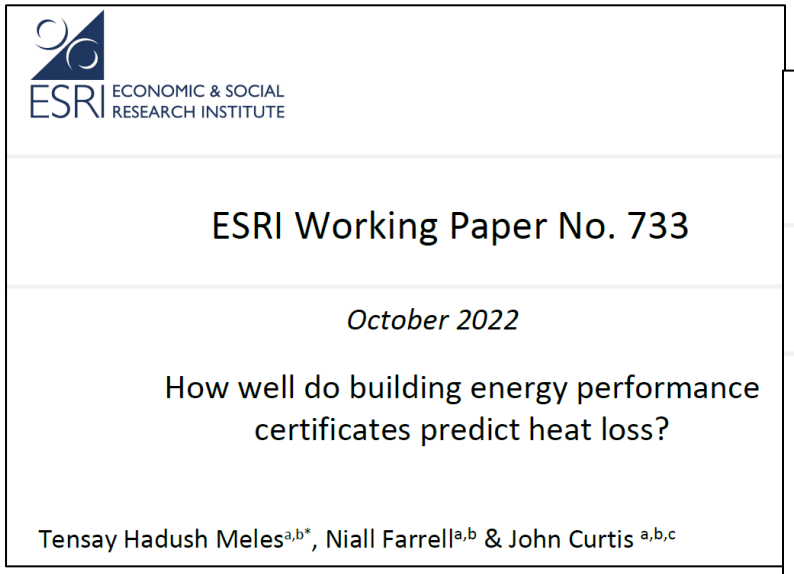
Tensay Meles, Niall Farrell, John Curtis

Climate Action Plan

- Retrofitting 500,000 homes to a BER B2 by 2030
  - 120k by 2025
  - 2025 Abatement Potential: 0.9MtCO2 (incl. HPs)
- €8 billion NDP funding

Is B2 the best policy target?

Results of two papers



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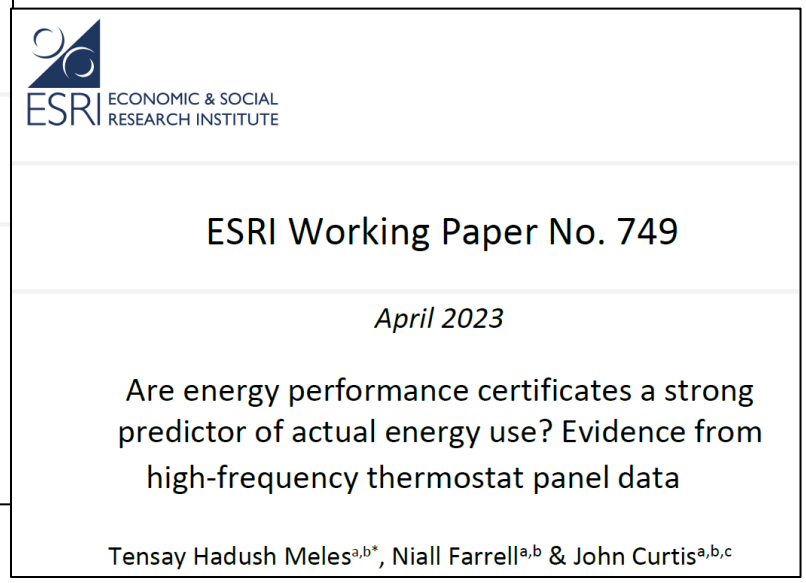
ESRI Working Paper No. 733

October 2022

How well do building energy performance certificates predict heat loss?

Tensay Hadush Meles[a,b*], Niall Farrell[a,b] & John Curtis [a,b,c]



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ESRI Working Paper No. 749

April 2023

Are energy performance certificates a strong predictor of actual energy use? Evidence from high-frequency thermostat panel data

Tensay Hadush Meles[a,b*], Niall Farrell[a,b] & John Curtis[a,b,c]

HubController®

https://thehubcontroller.com/

Research question

Isolating from occupant behaviour, how does:

1. Heat loss in early morning hours
2. Boiler minutes per hour to maintain set-point

Vary by BER rating, weather, etc.?

What we do

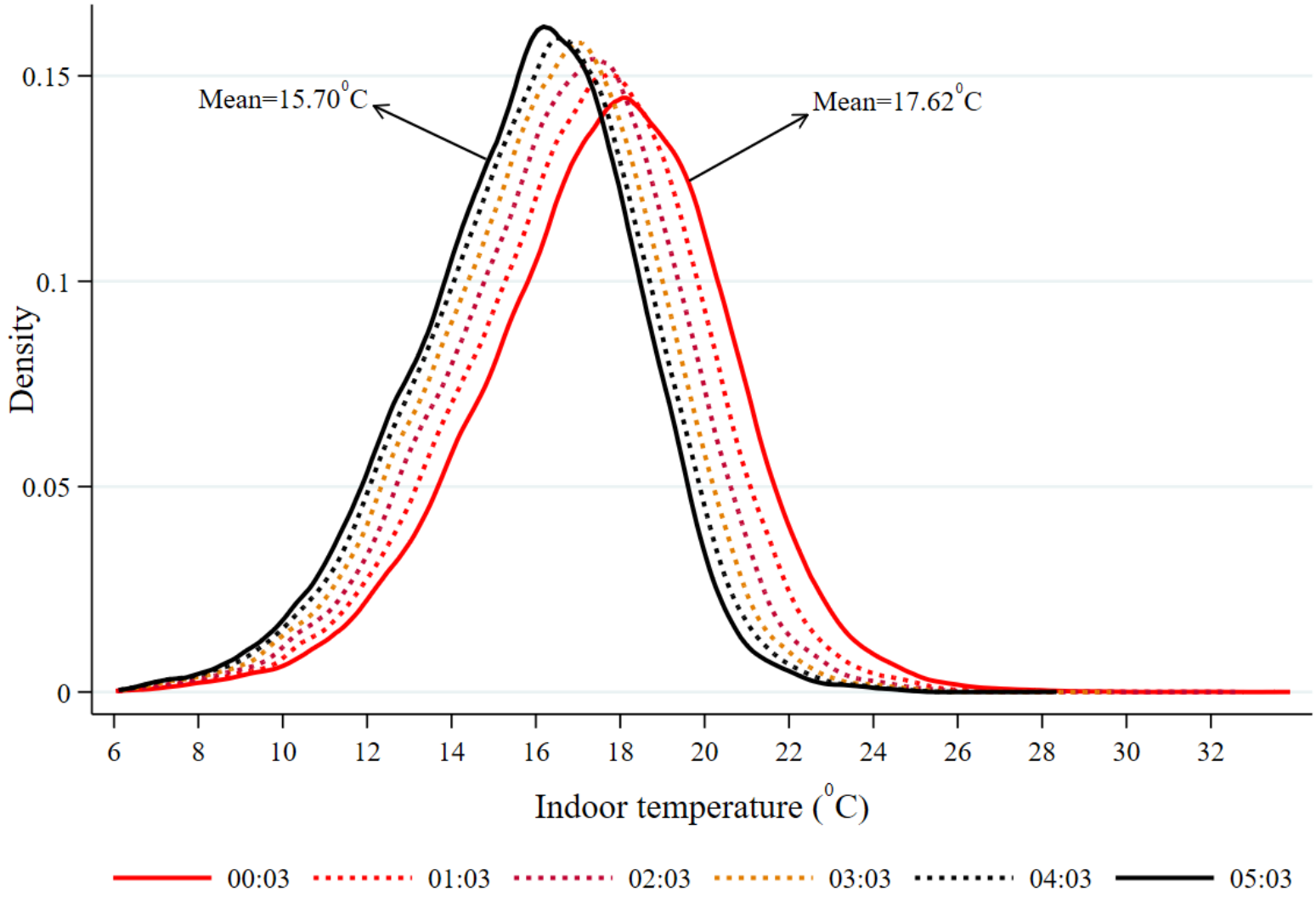
Temperature (proxy for heat loss)

$$T_t = \alpha + \beta\, T_{t-1} + \gamma\, BER + \delta\, weather_t + \varepsilon$$

Boiler operation per hour to maintain setpoint temp

$$M_i = \mu + \lambda\, BER + \varphi\, setpoint + \delta\, weather + \upsilon$$

Data: temperatures 00:00-05:00



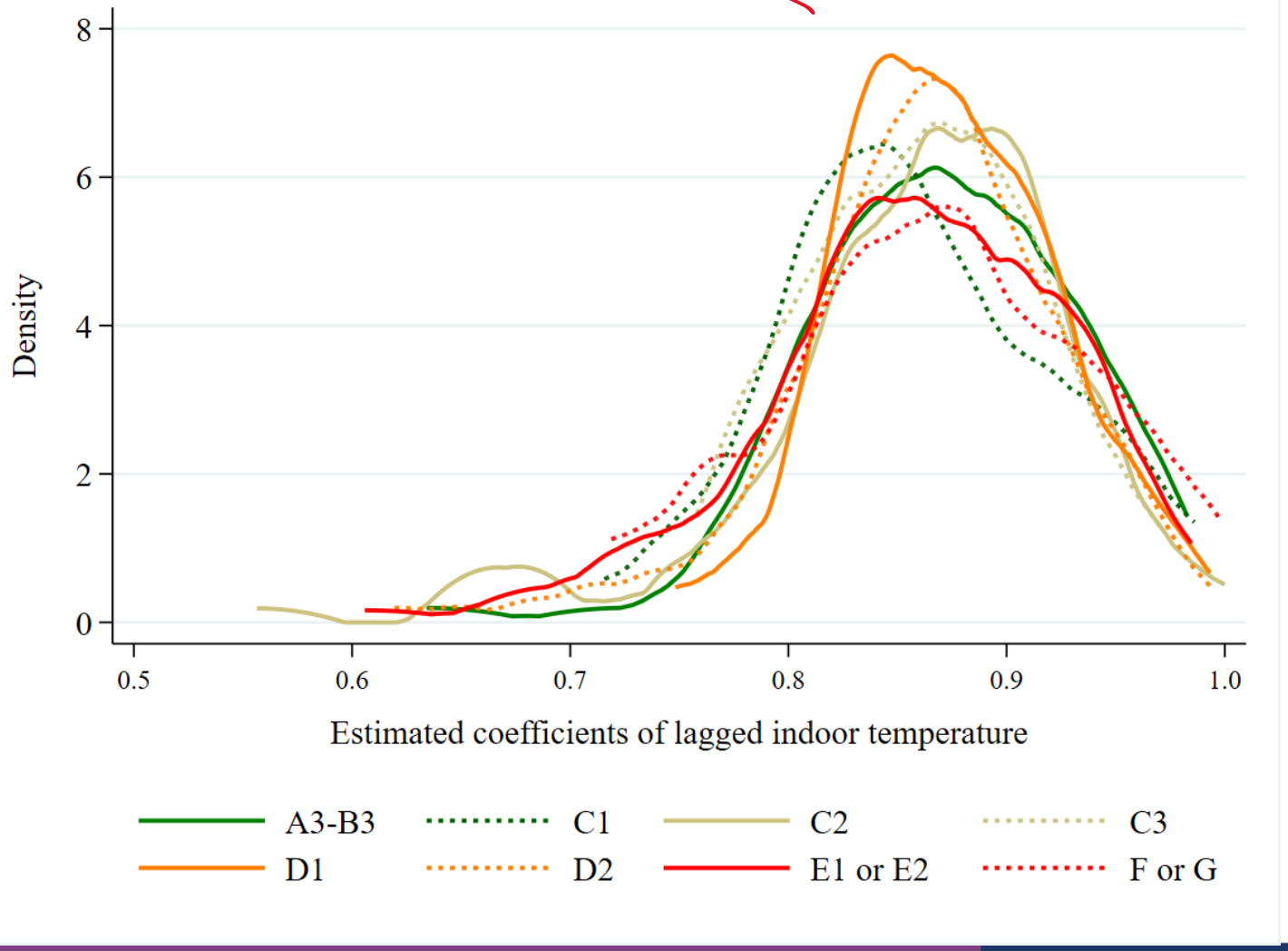
Heat loss: 3 estimation methods

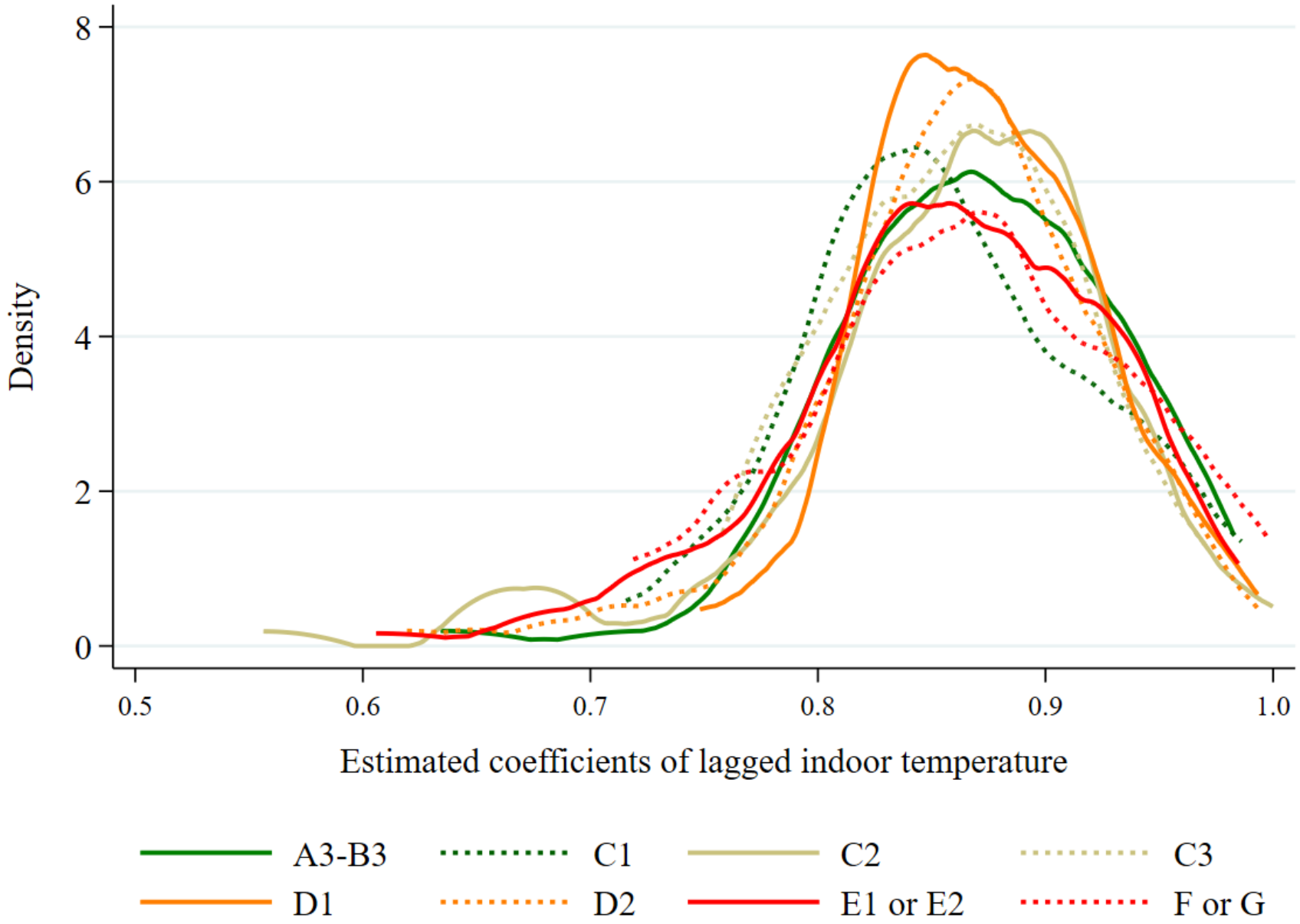
$$T_t = \alpha + \beta\, T_{t-1} + \gamma\, BER + \delta\, weather_t + \varepsilon$$

BER scales (Reference: A3–B3):		
C1	-0.057	-0.113
C2	-0.146***	-0.314*
C3	-0.137**	-0.276**
D1	-0.215***	-0.443***
D2	-0.200***	-0.410***
E1-E2	-0.246***	-0.619***
F-G	-0.217***	-0.406***
Indoor temperature t – 1	0.915***	0.73***
Average outdoor temperature	0.035***	0.167***

Heat loss: 3 estimation methods

$$T_t = \alpha + \beta\, T_{t-1} + \gamma\, BER + \delta\, weather_t + \varepsilon$$




Density
8
6
4
2
0
0.5
0.6
0.7
0.8
0.9
1.0
Estimated coefficients of lagged indoor temperature
A3-B3
C1
C2
C3
D1
D2
E1 or E2
F or G

Boiler operation

Minutes per hour boiler operation to maintain setpoint temperature

$$M_i = \mu + \lambda\, BER + \varphi\, setpoint + \delta\, weather + \upsilon$$

Calculated hourly energy & emissions

	Hourly energy use in kWh for boiler size of:		**Hourly** CO2 in kg for boiler size of:	
	18kW	**24kW**	**18kW**	**24kW**
BER scales (Ref: B)				
C	1.01	1.35	0.21	0.28
D	1.35	1.80	0.28	0.38
E-G	2.26	3.01	0.47	0.63
Set point temperature at hour h (Reference: $\leq 17^0$C):				
(18^0C, 19^0C]	1.80	2.40	0.38	0.50
(20^0C, 21^0C]	4.05	5.40	0.85	1.13
$> 22^0$C	6.22	8.29	1.31	1.74
Outdoor temperature at hour h (Reference: $\geq 10^0$C):				
$\leq 0^0$C	3.89	5.19	0.82	1.09
[4^0C, 6^0C)	2.03	2.71	0.43	0.57
[8^0C, 10^0C)	0.74	0.98	0.15	0.21

Conclusions

- More variability within BER categories than across BER categories
- BER not good predictor of energy use
- Anticipated CAP emissions savings questionable
- Better measurement of building performance
  - €8 billion on retrofit grants
  - Guiding best value for money