

EVALUATING LAND PRICES UNDER ENVIRONMENTAL REGULATION

IFMA 22 - 2019

Launceston - Australia

Jakob Vesterlund Olsen, Toke Emil Panduro,
Cathrine Ulla Jensen, Jesper S. Schou, Jens-
Martin Roikjer Bramsen, Marie Lautrup, and
Michael Friis Pedersen

Department of Food and Resource Economics

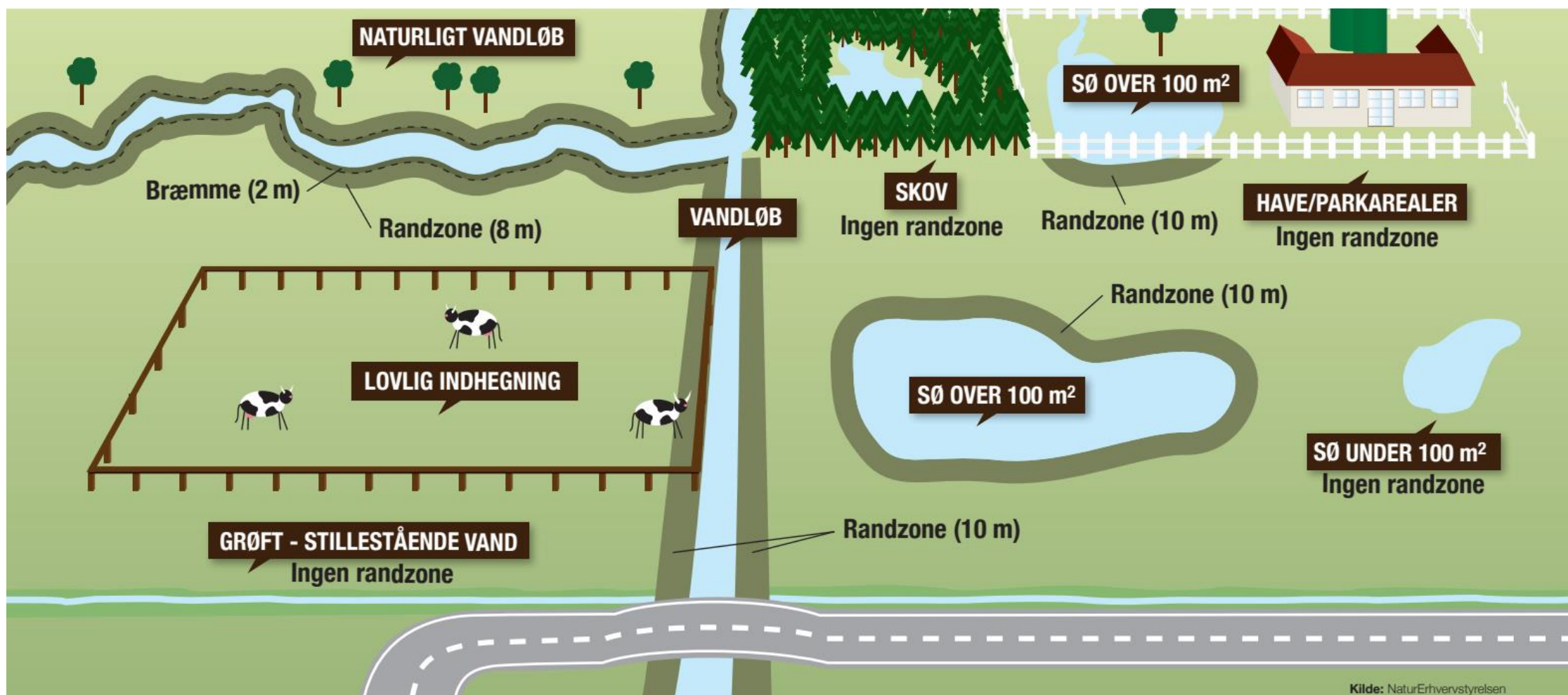
UNIVERSITY OF COPENHAGEN



Capitalization of framework conditions

- Framework conditions are capitalised into land prices
- If future cash flows are affected by a regulation the current land price is lower
- A buffer strip regulation was introduced in 2012 where 10 meters closest to the natural streams and lakes above 100 sq. meters
- How is this regulation affecting land prices?

Buffer zone regulation in Denmark from 2012



Estimation problems in analyses – influence of regulation on land price

- Error in variables problem (Goodwin 2003) – expectations are unobservable
- Change in land price from period 1 to period 2 can be affected by numerous factors
 - Macroeconomic changes
 - Changes in investment climate and/or expectations
- Analysed case:
 - All traded properties in Jutland (part of Denmark) from 2010 to 2015
 - Buffer zone regulation chosen
 - The regulation was compensated though

Identification strategy

- Hedonic model (house price method)
 - A property consists of a range of characteristics
 - Model is based on supply and demand for different characteristics (Eg. area, soil type, production facilities, house etc.)
 - Each Characteristic is priced in the market (Rosen, 1974)
 - With many observations and with varying composition of characteristics can the price of each characteristic be estimated
- Difference-in-difference method.
 - Treated and control group
 - between group expectations are assumed to be identical
 - Macroeconomic conditions are equal between groups



Descriptive statistics of a subset of variables

Description	Unit	Mean	Max
Property size	hectare	19.05	271.1
Primary pig farm	0/1	0.032	1
Primary cattle farm	0/1	0.068	1
Primary other animals	0/1	0.026	1
Forest	Hectare	1.506	89.12
Wetland	Hectare	0.459	40.39
Lake	Hectare	0.101	20.82
Good soil quality	Hectare	2.98	220
No building	0/1	0.096	1
Number of cattle	Number	4.5	525.7
Number of pigs	Number	5.55	856.1
Number of other animals	Number	0.56	300
Production building	m ²	1,273	54,387
Farm house	m ²	183.8	1,652

Descriptive statistics of a buffer zone variables

Description	Unit	Mean	Max
Stream	m/hectare	18.94	332.3
Lakes	m/hectare	7.41	492.9
Streams with buffer zone requirement	m/hectare	8.82	283.6
Lakes with buffer zone requirement	m/hectare	6.29	228.0

Result from estimation

Model	Unit	Properties; > 10 ha	Std. dev
Hectare	DKK/ hectare	134,261***	-8,441
Hectare, supplement 2011	DKK/hectare	17,553	-16,950
Hectare, supplement 2012	DKK/hectare	14,994	-11,496
Hectare, supplement 2013	DKK/hectare	20,312*	-10,526
Hectare, supplement 2014	DKK/hectare	14,120	-8,821
Hectare, supplement 2015	DKK/hectare	32,594***	-11,094
Hectare, North Jutland	DKK/hectare	9,204	-7,577
Hectare, South Jutland	DKK/hectare	-19,572***	-6,010
Hectare, East Jutland	DKK/hectare	34,973***	-11,157
Hectare,	DKK/hectare	-52,156***	-17,764
Hectare,	DKK/hectare	45,603***	-10,059
Primary pig production	DKK/AU ¹	-4,317	-8,137
Primary cattle production	DKK/AU ¹	17,505***	-4,345
Primary other animal production	DKK/AU ¹	53,564***	-12,329
Production building	DKK/m ²	368***	62.8
Animal concentration * production building, Pig production	AU ¹ *m ²	5,115***	-1,966
Animal concentration * production building, cattle production	AU ¹ *m ²	-2.0***	-1.0
Animal concentration * production building, other animal	AU ¹ *m ²	-9.16***	-1.83

Result from estimation II

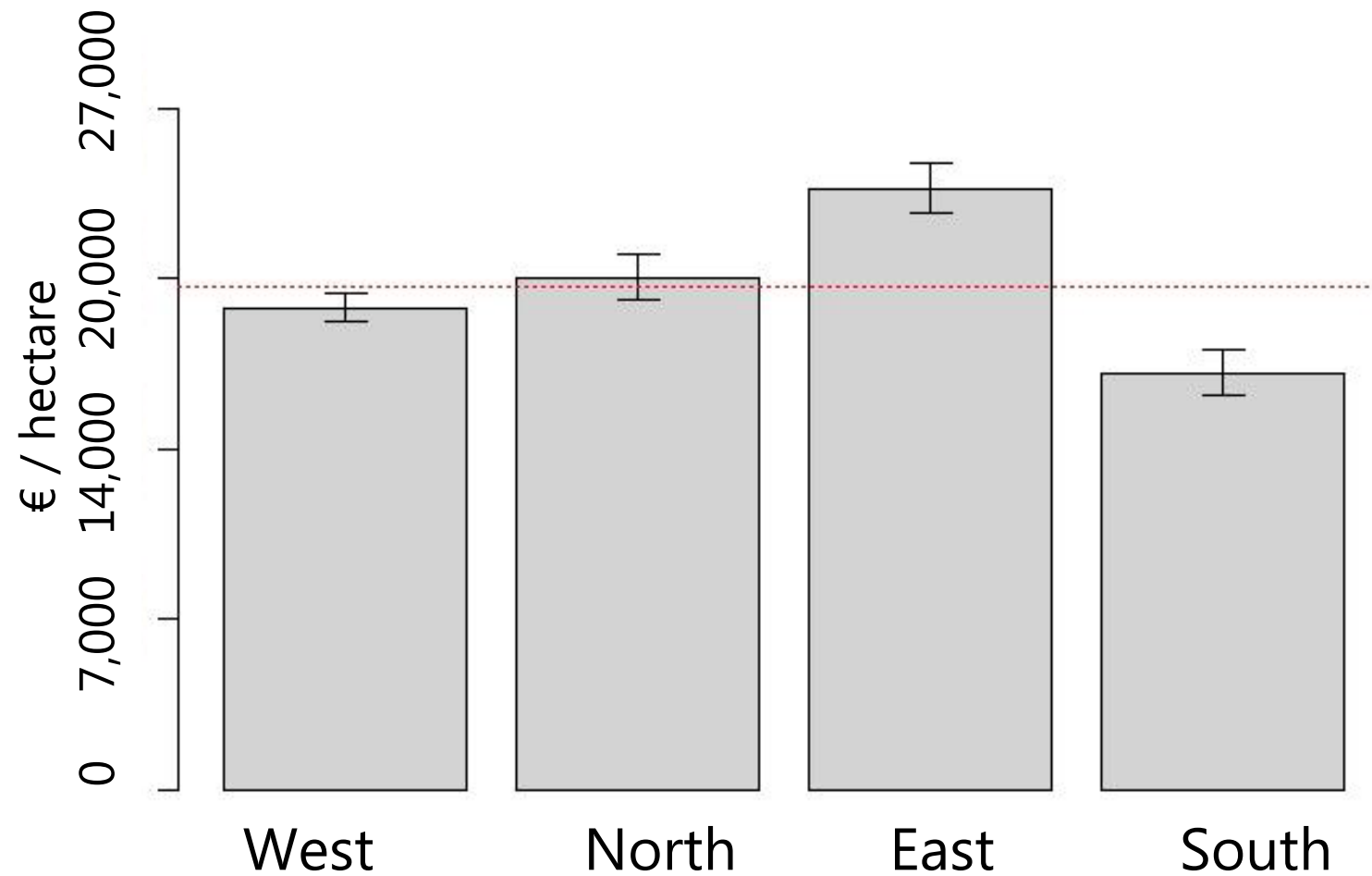
Model	Unit	Properties; > 10 ha	Std. dev
Animal concentration * production building, Pig production	(AU ¹ *m ²) ²	-0.0000004 ^{***}	-0.0000002
Animal concentration * production building, cattle production	(AU ¹ *m ²) ²	0.0000001 ^{***}	-0.00000003
Animal concentration * production building, other animal	(AU ¹ *m ²) ²	0.000001 ^{***}	-0.0000003
Farmhouse size	DKK/m ²	4,681 ^{***}	-1,168
Farmhouse size	DKK/m ² ²	-3.46 ^{**}	1.42
Size supplement for no buildings	DKK/hectare	45,718 [*]	-23,791
No buildings	DKK	578,345 [*]	-298,717
Stream (buffer zone required)	DKK/m/hectare	-4,503	-3,108
Lake (buffer zone required)	DKK/m/hectare	-28,795 ^{**}	-12,983
Stream (buffer zone required after policy implementation)	DKK/m/hectare	-507	-19,196
Lake (buffer zone required after policy implementation)	DKK/m/hectare	-2,907	-4,151
2011	DKK	-807,058 ^{***}	-299,927
2012	DKK	-487,425 ^{**}	-207,876
2013	DKK	-463,935 ^{**}	-204,962
2014	DKK	-482,159 ^{***}	-165,550
2015	DKK	-1,096,770 ^{***}	-220,816
Constant	DKK	-90,486	-199,584
Observations		3,114	
McFadden R ²		0.73	

No changes found...

- Properties with buffer zones traded after 2012 was not traded with a discount
- The Buffer zones was compensated
- The Buffer zones does not make up a big share of the total property
- Huge variation in the property prices

- Hedonic models yields useable results
- Difference-in-difference method is an interesting method to overcome some identification problems in other land price models

Land prices depending on region





Questions?

UNIVERSITY OF COPENHAGEN

