

Appendix

A: Methodology - Land sale price

We have: $Land\ price_i = Gross\ price_i - Dwelling\ price_i$

i is an individual property transaction. However, we do not observe the dwelling sale price for each transaction. We estimate the $Dwelling\ price_i$ variable using Quotable Value (QV) rated value for each property. The QV is the assessed value of the property that is then used for assessing property taxes, and is frequently used as an indicator of possible price during house sales; it is provided separately for the value of the land and the dwelling. It is computed as follow:

$$Dwelling\ price_{it} = QV_Dwelling\ value_{ir} \frac{Coefficient_i^{sale_year(t)}}{Coefficient_i^{rate_year(r)}} \quad (X1)$$

The sale year (t) is frequently different from the year in which the property was assessed (QV property assessments are usually done every three years). We therefore convert the dwelling price to year (t) using the coefficients of the sale year (t) and QV rated year (r) dummies from our hedonic regression model.

B: Methodology - Spatial regression

We implement three different spatial regression models including Spatial Autoregressive Model (SAR), Spatial Error Model (SEM) and Spatial Autocorrelation Model (SAC). We employ spatial panel Maximum Likelihood estimation for the set of regression models with robust-standard error as described below.

$$(SAR) \quad Y_i = \alpha + \rho WY_i + \beta X_i + \varepsilon_i \quad (X2)$$

$$(SEM) \quad Y_i = \alpha + \beta X_i + \vartheta_i \quad \text{where} \quad \vartheta_i = \lambda W\vartheta_i + \varepsilon_i \quad (X3)$$

$$(SAC) \quad Y_i = \alpha + \rho WY_i + \beta X_i + \vartheta_{i,t} \quad \text{where} \quad \vartheta_{i,t} = \lambda W\vartheta_{i,t} + \varepsilon_{i,t} \quad (X4)$$

In these models, there are two possible types of interaction effects among units: endogenous spatial interaction effects among the dependent variable (WY_i) and spatial interaction effects among the error terms ($W\vartheta_i$). The parameter ρ is the spatial autoregressive coefficient and λ are the spatial-response coefficients. W is the non-negative spatial weighting matrix ($N \times N$). It describes the spatial structure of the dependence between property locations in the sample. Here, we employ the inverse distance weighted matrix which is row-standardized. The elements ω_{ij} of matrix W show whether the properties i and j are spatially connected. We have $\omega_{ij} = 1/d_{ij}$ for neighbouring properties given d_{ij} is the distance between properties i and j , otherwise $\omega_{ij} = 0$. When the distance is beyond a pre-determined level, we assume that there are no spatial effects.

Table A1

Log price per squared-meter - Affected Period 2012 – 2017

	(1) 100 yr natural	(2) 100 yr managed	(3) 50 yr natural	(4) 50 yr managed
Affected	0.109*** (0.0189)	0.123*** (0.0207)	0.147*** (0.0253)	0.259*** (0.0445)
Post	0.0138 (0.0200)	0.0144 (0.0202)	0.0119 (0.0205)	0.0133 (0.0203)
Post*Affected	0.0207 (0.0243)	0.00898 (0.0259)	0.0201 (0.0318)	-0.0645 (0.0497)
Building floor area	-0.00833*** (0.000232)	-0.00834*** (0.000232)	-0.00842*** (0.000233)	-0.00840*** (0.000235)
Site area	0.000215*** (0.0000455)	0.000211*** (0.0000453)	0.000202*** (0.0000451)	0.000188*** (0.0000452)
Good interior quality	0.0291*** (0.00719)	0.0296*** (0.00718)	0.0291*** (0.00718)	0.0284*** (0.00714)
Poor interior quality	0.0251 (0.0174)	0.0257 (0.0176)	0.0163 (0.0179)	0.0160 (0.0183)
Good exterior quality	0.0487*** (0.00729)	0.0493*** (0.00733)	0.0482*** (0.00739)	0.0521*** (0.00740)
Poor exterior quality	-0.151*** (0.0324)	-0.150*** (0.0326)	-0.143*** (0.0332)	-0.136*** (0.0329)
Cross lease (2 shares)	-0.0168* (0.00944)	-0.0159* (0.00947)	-0.0195** (0.00955)	-0.0202** (0.00959)
Cross lease (3+)	-0.0876*** (0.0166)	-0.0886*** (0.0166)	-0.0927*** (0.0168)	-0.0994*** (0.0178)
Slight sea view	0.380*** (0.0656)	0.367*** (0.0656)	0.434*** (0.0702)	0.363*** (0.0719)
Moderate sea view	0.627*** (0.0557)	0.618*** (0.0569)	0.607*** (0.0607)	0.466*** (0.0692)
Wide sea view	0.794*** (0.0588)	0.779*** (0.0604)	0.749*** (0.0667)	0.516*** (0.0863)
Slight View*Distance	-0.0514*** (0.00983)	-0.0495*** (0.00984)	-0.0584*** (0.0105)	-0.0476*** (0.0106)
Moderate View*Distance	-0.0799*** (0.00860)	-0.0788*** (0.00874)	-0.0765*** (0.00917)	-0.0550*** (0.0102)
Wide View*Distance	-0.102*** (0.00929)	-0.100*** (0.00947)	-0.0954*** (0.0101)	-0.0640*** (0.0123)
Constant	8.722*** (0.145)	8.722*** (0.144)	8.710*** (0.0511)	8.734*** (0.0517)
Observations	8436	8380	8206	7989
Adjusted R-squared	0.596	0.597	0.595	0.591

***/**/* Indicating the significance levels of respectively 1%, 5% and 10%. Robust standard errors are shown in parentheses.

Table A2

Log gross sale price - Affected Period 2012 - 2014

	(1) 100 yr natural	(2) 100 yr managed	(3) 50 yr natural	(4) 50 yr managed
Affected	0.118*** (0.0132)	0.136*** (0.0142)	0.150*** (0.0173)	0.239*** (0.0291)
Post	0.0156 (0.0143)	0.0158 (0.0144)	0.0142 (0.0145)	0.0106 (0.0144)
Post*Affected	0.00731 (0.0233)	-0.00234 (0.0255)	0.0218 (0.0358)	-0.109* (0.0623)
Building floor area	0.00395*** (0.000170)	0.00392*** (0.000170)	0.00387*** (0.000172)	0.00388*** (0.000173)
Site area	0.000206*** (0.0000346)	0.000207*** (0.0000346)	0.000202*** (0.0000349)	0.000184*** (0.0000351)
Good interior quality	0.0317*** (0.00614)	0.0317*** (0.00614)	0.0325*** (0.00608)	0.0318*** (0.00597)
Poor interior quality	-0.0350*** (0.0113)	-0.0335*** (0.0114)	-0.0329*** (0.0115)	-0.0298** (0.0118)
Good exterior quality	0.0456*** (0.00544)	0.0461*** (0.00547)	0.0450*** (0.00553)	0.0486*** (0.00550)
Poor exterior quality	-0.132*** (0.0219)	-0.132*** (0.0221)	-0.135*** (0.0229)	-0.137*** (0.0230)
Cross lease (2 shares)	-0.0564*** (0.00839)	-0.0563*** (0.00844)	-0.0578*** (0.00854)	-0.0594*** (0.00866)
Cross lease (3+)	-0.114*** (0.0167)	-0.115*** (0.0167)	-0.116*** (0.0169)	-0.123*** (0.0180)
Slight sea view	0.388*** (0.0488)	0.368*** (0.0490)	0.409*** (0.0532)	0.338*** (0.0556)
Moderate sea view	0.623*** (0.0486)	0.607*** (0.0491)	0.615*** (0.0514)	0.464*** (0.0550)
Wide sea view	0.636*** (0.0496)	0.611*** (0.0506)	0.585*** (0.0560)	0.323*** (0.0751)
Slight View*Distance	-0.0542*** (0.00775)	-0.0514*** (0.00777)	-0.0570*** (0.00829)	-0.0460*** (0.00857)
Moderate View*Distance	-0.0817*** (0.00811)	-0.0794*** (0.00817)	-0.0799*** (0.00842)	-0.0567*** (0.00883)
Wide View*Distance	-0.0782*** (0.00726)	-0.0749*** (0.00737)	-0.0705*** (0.00791)	-0.0347*** (0.0101)
Constant	12.21*** (0.147)	12.21*** (0.146)	12.21*** (0.0469)	12.24*** (0.0478)
Observations	8436	8380	8206	7989
Adjusted R-squared	0.774	0.774	0.774	0.774

***/**/* Indicating the significance levels of respectively 1%, 5% and 10%. Robust standard errors are shown in parentheses.

Table A3

Log land price - Affected Period 2012 – 2017

	(1) 100 yr natural	(2) 100 yr managed	(3) 50 yr natural	(4) 50 yr managed
Affected	0.255*** (0.0250)	0.296*** (0.0264)	0.290*** (0.0310)	0.406*** (0.0464)
Post	0.0156 (0.0242)	0.0141 (0.0243)	0.0120 (0.0247)	0.0181 (0.0247)
Post*Affected	-0.0387 (0.0325)	-0.0540 (0.0346)	-0.0367 (0.0431)	-0.0858 (0.0553)
Building floor area	0.00156*** (0.000371)	0.00150*** (0.000370)	0.00145*** (0.000379)	0.00146*** (0.000386)
Site area	0.000916*** (0.0000791)	0.000924*** (0.0000794)	0.000933*** (0.0000804)	0.000896*** (0.0000819)
Good interior quality	0.0239* (0.0132)	0.0231* (0.0132)	0.0221 (0.0134)	0.0205 (0.0135)
Poor interior quality	-0.0515* (0.0298)	-0.0485 (0.0301)	-0.0510 (0.0313)	-0.0457 (0.0325)
Good exterior quality	0.0202* (0.0109)	0.0208* (0.0109)	0.0190* (0.0111)	0.0278** (0.0112)
Poor exterior quality	-0.0799** (0.0384)	-0.0786** (0.0386)	-0.0771* (0.0397)	-0.0798** (0.0399)
Cross lease (2 shares)	-0.111*** (0.0205)	-0.109*** (0.0206)	-0.109*** (0.0208)	-0.114*** (0.0213)
Cross lease (3+)	-0.236*** (0.0437)	-0.240*** (0.0435)	-0.228*** (0.0429)	-0.262*** (0.0449)
Slight sea view	0.625*** (0.101)	0.578*** (0.102)	0.664*** (0.110)	0.574*** (0.119)
Moderate sea view	0.877*** (0.0719)	0.839*** (0.0731)	0.835*** (0.0782)	0.586*** (0.0893)
Wide sea view	1.138*** (0.0806)	1.072*** (0.0827)	1.084*** (0.0895)	0.721*** (0.115)
Slight View*Distance	-0.0821*** (0.0173)	-0.0752*** (0.0175)	-0.0869*** (0.0184)	-0.0726*** (0.0195)
Moderate View*Distance	-0.0930*** (0.0117)	-0.0875*** (0.0118)	-0.0854*** (0.0124)	-0.0483*** (0.0137)
Wide View*Distance	-0.130*** (0.0137)	-0.121*** (0.0139)	-0.121*** (0.0146)	-0.0713*** (0.0172)
Constant	10.51*** (0.520)	10.51*** (0.519)	10.52*** (0.514)	10.53*** (0.511)
Observations	7975	7922	7758	7552
Adjusted R-squared	0.473	0.474	0.460	0.436

***/**/* Indicating the significance levels of respectively 1%, 5% and 10%. Robust standard errors are shown in parentheses.

Table A4

LHS variable- Log gross sale price - Affected Period 2012 – 2017

	(1) 100 yr natural	(2) 100 yr managed	(3) 50 yr natural	(4) 50 yr managed
Affected	0.121*** (0.0139)	0.140*** (0.0148)	0.135*** (0.0176)	0.101*** (0.0283)
Post disclosure	-0.0139 (0.0157)	-0.0145 (0.0157)	-0.0161 (0.0156)	-0.0155 (0.0157)
Post*Affected	-0.00183 (0.0206)	-0.0145 (0.0223)	-0.00660 (0.0294)	-0.0594 (0.0527)
Floor area	0.00395*** (0.000170)	0.00394*** (0.000170)	0.00395*** (0.000171)	0.00398*** (0.000173)
Site area	0.000206*** (0.0000346)	0.000209*** (0.0000346)	0.000201*** (0.0000346)	0.000202*** (0.0000348)
Good interior	0.0317*** (0.00614)	0.0316*** (0.00614)	0.0318*** (0.00612)	0.0307*** (0.00614)
Poor interior	-0.0352*** (0.0113)	-0.0344*** (0.0113)	-0.0340*** (0.0113)	-0.0305*** (0.0114)
Good exterior	0.0459*** (0.00544)	0.0468*** (0.00542)	0.0476*** (0.00543)	0.0501*** (0.00542)
Poor exterior	-0.133*** (0.0219)	-0.132*** (0.0219)	-0.132*** (0.0219)	-0.135*** (0.0220)
Cross lease (2 shares)	-0.0563*** (0.00838)	-0.0558*** (0.00838)	-0.0574*** (0.00840)	-0.0557*** (0.00845)
Cross lease (3+)	-0.114*** (0.0167)	-0.116*** (0.0167)	-0.117*** (0.0166)	-0.110*** (0.0170)
Slight sea view	0.387*** (0.0487)	0.366*** (0.0489)	0.435*** (0.0468)	0.489*** (0.0481)
Moderate sea view	0.623*** (0.0487)	0.602*** (0.0487)	0.663*** (0.0490)	0.757*** (0.0520)
Wide sea view	0.637*** (0.0496)	0.607*** (0.0501)	0.647*** (0.0495)	0.775*** (0.0501)
Slight view *Distance	-0.0542*** (0.00773)	-0.0510*** (0.00775)	-0.0609*** (0.00752)	-0.0688*** (0.00769)
Moderate view *Distance	-0.0817*** (0.00812)	-0.0787*** (0.00813)	-0.0865*** (0.00817)	-0.0995*** (0.00856)
Wide view *Distance	-0.0784*** (0.00727)	-0.0743*** (0.00733)	-0.0789*** (0.00730)	-0.0961*** (0.00746)
Constant	12.22*** (0.145)	12.21*** (0.145)	12.22*** (0.144)	12.21*** (0.147)
Observations	8,436	8,436	8,436	8,436
Adjusted R ²	0.774	0.774	0.773	0.771

***/**/* Indicating the significance levels of respectively 1%, 5% and 10%. Robust standard errors are shown in parentheses.

Table A5

Log gross sale price – For all time periods

	(1) 100 yr natural	(2) 100 yr managed	(3) 50 yr natural	(4) 50 yr managed
Affected	0.120*** (0.0118)	0.135*** (0.0129)	0.154*** (0.0161)	0.219*** (0.0273)
Building floor area	0.00395*** (0.000171)	0.00392*** (0.000170)	0.00387*** (0.000172)	0.00389*** (0.000173)
Site area	0.000206*** (0.0000346)	0.000207*** (0.0000346)	0.000203*** (0.0000349)	0.000182*** (0.0000351)
Good interior quality	0.0317*** (0.00614)	0.0316*** (0.00615)	0.0326*** (0.00609)	0.0314*** (0.00603)
Poor interior quality	-0.0351*** (0.0113)	-0.0336*** (0.0114)	-0.0331*** (0.0115)	-0.0293** (0.0118)
Good exterior quality	0.0458*** (0.00544)	0.0463*** (0.00546)	0.0451*** (0.00553)	0.0490*** (0.00550)
Poor exterior quality	-0.132*** (0.0219)	-0.132*** (0.0221)	-0.135*** (0.0229)	-0.136*** (0.0230)
Cross lease (2 shares)	-0.0563*** (0.00838)	-0.0563*** (0.00844)	-0.0577*** (0.00854)	-0.0600*** (0.00864)
Cross lease (3+)	-0.114*** (0.0167)	-0.115*** (0.0167)	-0.116*** (0.0169)	-0.123*** (0.0179)
Slight sea view	0.387*** (0.0487)	0.368*** (0.0490)	0.409*** (0.0531)	0.338*** (0.0555)
Moderate sea view	0.623*** (0.0486)	0.606*** (0.0491)	0.617*** (0.0514)	0.465*** (0.0551)
Wide sea view	0.637*** (0.0493)	0.612*** (0.0503)	0.586*** (0.0560)	0.330*** (0.0748)
Slight View*Distance	-0.0541*** (0.00774)	-0.0514*** (0.00777)	-0.0570*** (0.00828)	-0.0460*** (0.00856)
Moderate View*Distance	-0.0817*** (0.00812)	-0.0794*** (0.00818)	-0.0802*** (0.00842)	-0.0569*** (0.00885)
Wide View*Distance	-0.0784*** (0.00723)	-0.0751*** (0.00735)	-0.0708*** (0.00792)	-0.0358*** (0.0101)
Constant	12.21*** (0.146)	12.21*** (0.145)	12.21*** (0.0469)	12.24*** (0.0477)
Observations	8436	8380	8206	7989
Adjusted R-squared	0.774	0.774	0.774	0.774

***/**/* Indicating the significance levels of respectively 1%, 5% and 10%. Robust standard errors are shown in parentheses.

Table A6

Log gross sale price - Affected Period 2012 – 2017 - Repeated sale sample

	(1)	(2)	(3)	(4)	(5)
	100 yr natural	100 yr managed	50 yr natural	50 yr managed	First sale before Aug. 2012
Affected	0.127*** (0.0212)	0.139*** (0.0229)	0.167*** (0.0282)	0.196*** (0.0538)	0.257*** (0.0519)
Post	-0.0252 (0.0283)	-0.0232 (0.0285)	-0.0327 (0.0282)	-0.0332 (0.0283)	-0.0381 (0.0287)
Post*Affected	-0.0352 (0.0362)	-0.0417 (0.0384)	-0.0555 (0.0498)	-0.0635 (0.0872)	-0.149 (0.122)
Building floor area	0.0041*** (0.0003)	0.0040*** (0.0003)	0.0040*** (0.0003)	0.0041*** (0.0003)	0.0042*** (0.0003)
Site area	0.0002*** (0.0000)	0.0002*** (0.0000)	0.0002*** (0.0000)	0.0002*** (0.0000)	0.0003*** (0.0000)
Good interior quality	0.0108 (0.0110)	0.0107 (0.0110)	0.0145 (0.0106)	0.0103 (0.0107)	-5.11e-08 (4.23e-08)
Poor interior quality	-0.0493** (0.0201)	-0.0509** (0.0202)	-0.0473** (0.0203)	-0.0420** (0.0209)	-0.00698 (0.0137)
Good exterior quality	0.0499*** (0.00848)	0.0502*** (0.00852)	0.0484*** (0.0086)	0.0541*** (0.008)	-0.0202 (0.0251)
Poor exterior quality	-0.179*** (0.0357)	-0.178*** (0.0357)	-0.174*** (0.0369)	-0.172*** (0.0372)	0.0447*** (0.0105)
Cross lease (2 shares)	-0.0641*** (0.0152)	-0.0621*** (0.0153)	-0.0650*** (0.0155)	-0.0642*** (0.0160)	-0.0691*** (0.0238)
Cross lease (3+)	-0.147*** (0.0324)	-0.148*** (0.0322)	-0.151*** (0.0328)	-0.168*** (0.0361)	-0.0659 (0.0407)
Slight sea view	0.362*** (0.0668)	0.345*** (0.0678)	0.415*** (0.0757)	0.354*** (0.0829)	0.314*** (0.0998)
Moderate sea view	0.658*** (0.0981)	0.637*** (0.0997)	0.727*** (0.100)	0.559*** (0.101)	0.529*** (0.116)
Wide sea view	0.605*** (0.0863)	0.586*** (0.0872)	0.555*** (0.0916)	0.391*** (0.126)	0.374** (0.150)
Slight View*Distance	-0.0504*** (0.0105)	-0.0480*** (0.0106)	-0.0574*** (0.0115)	-0.0484*** (0.0124)	-0.0441*** (0.0154)
Moderate View*Distance	-0.0882*** (0.0163)	-0.0852*** (0.0165)	-0.0969*** (0.0166)	-0.0716*** (0.0167)	-0.0632*** (0.0183)
Wide View*Distance	-0.0785*** (0.0129)	-0.0757*** (0.0130)	-0.0711*** (0.0134)	-0.0480*** (0.0175)	-0.0419** (0.0208)
Constant	12.21*** (0.166)	11.99*** (0.0616)	12.24*** (0.162)	12.05*** (0.0610)	11.93*** (0.0818)
Observations	3317	3298	3223	3139	1912
Adjusted R-squared	0.760	0.760	0.765	0.763	0.769

Land Economics 96 (2), May 2020

“Who Cares? Future Sea Level Rise and House Prices,”

by Olga Filippova, Cuong Nguyen, Ilan Noy, and Michael Rehm

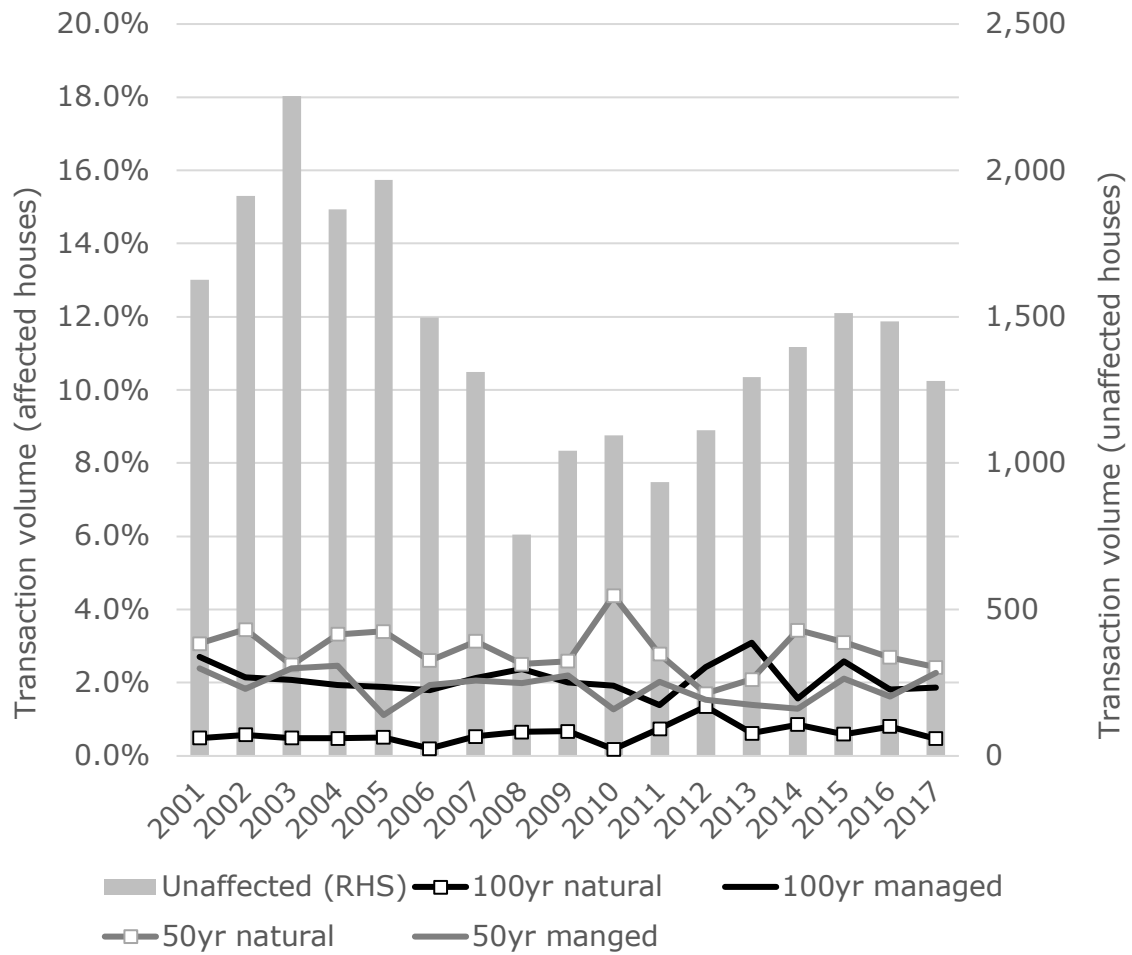
***/**/* Indicating the significance levels of respectively 1%, 5% and 10%. Robust standard errors are shown in parentheses.

Table A7

	100 year natural		100 year managed		50 year natural		50 year managed	
Power	90%	80%	90%	80%	90%	80%	90%	80%
Alpha	5%	5%	5%	5%	5%	5%	5%	5%
Mean of control group	12.82	12.82	12.82	12.82	12.82	12.82	12.82	12.82
Mean of post-treated group	13.24	13.24	13.28	13.28	13.29	13.29	13.46	13.46
St.dev of control group	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345
St.dev of post-treated group	0.411	0.411	0.396	0.396	0.415	0.415	0.357	0.357
Sample size of control group	7859	7859	7859	7859	7859	7859	7859	7859
Estimated sample size of post-treated group	13	10	9	7	11	9	6	5

Figure A1

Property transactions in Kapiti Coast



Note: The y-axis (LHS) represents the transaction volume of affected houses as percentage of total transaction.

Figure A2

Mean Gross Sale Price Over Time (NZ\$)

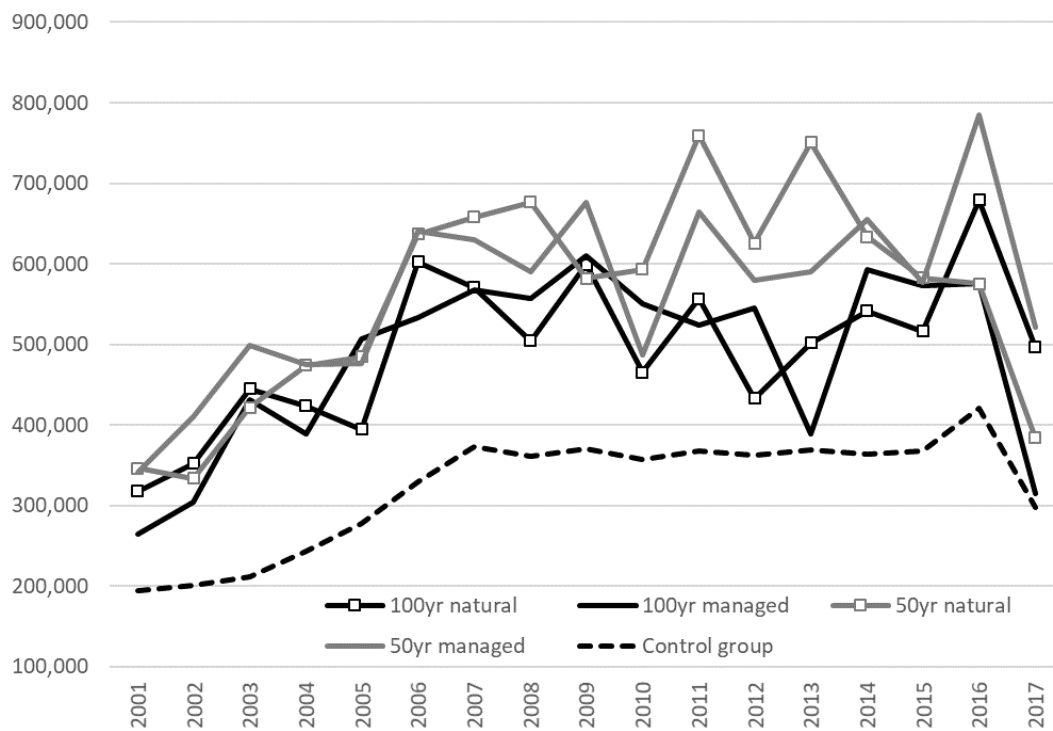


Figure A3

Average regression residuals - For all time periods

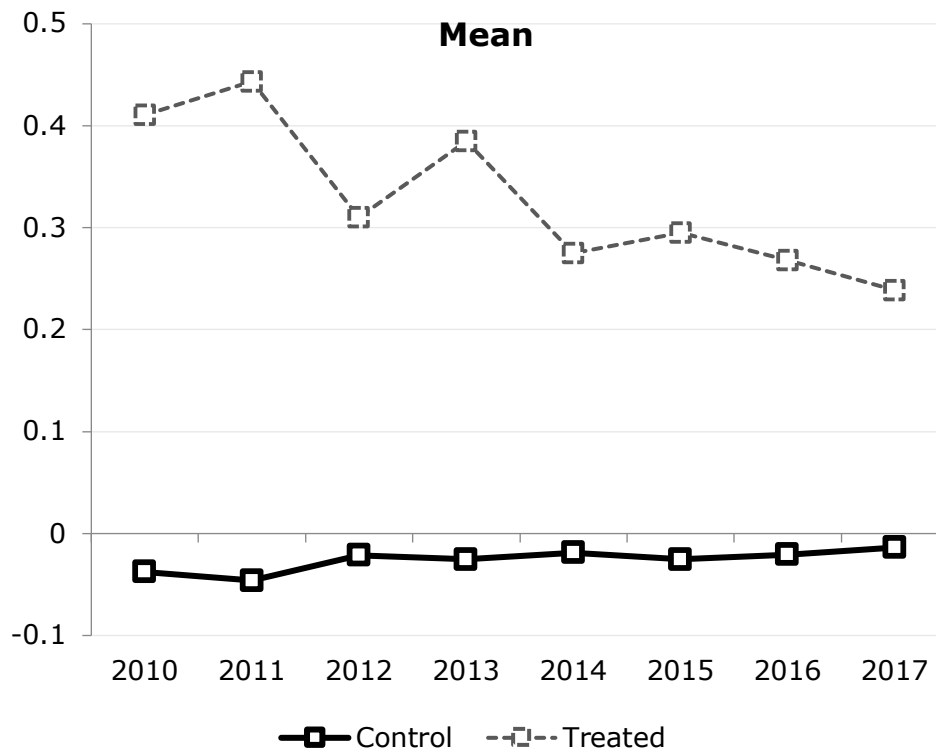
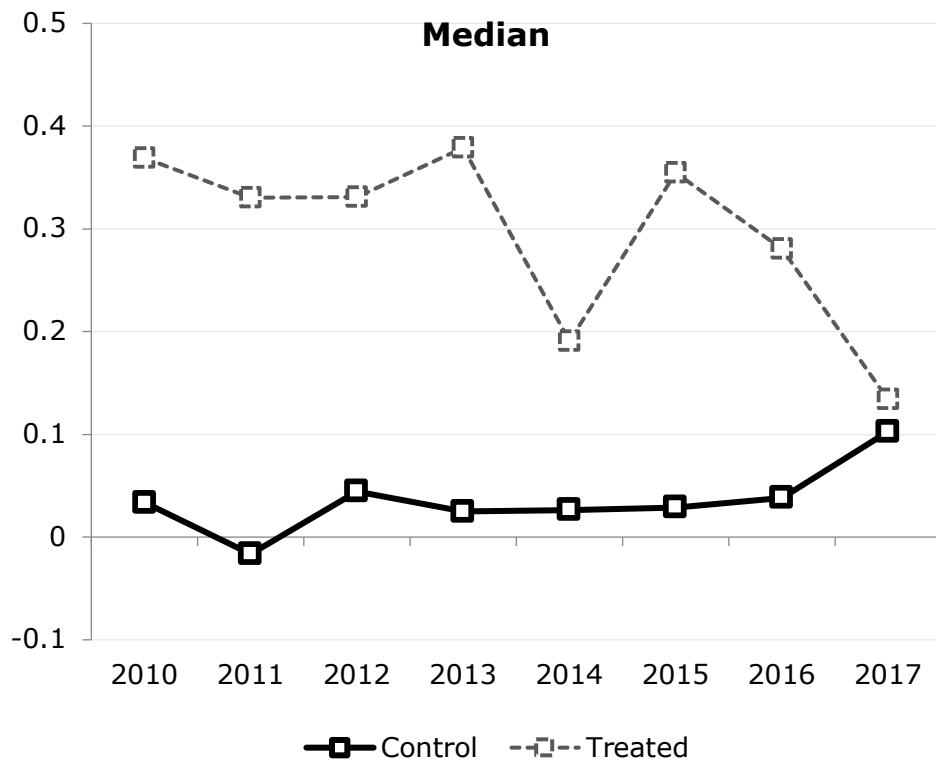


Figure A4

Average regression residual – Pre-event sample

