

The Value of Urban Land: Tax Revenue and Beyond

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¹Results shown are from wuvt:

Outline

Introduction and Background

Land Values - Valuer General

Introduction

- ! A property is a bundled good composed of an appreciating asset, land, and a depreciating asset, structure.
- ! The importance of this distinction is increasingly recognised in the real estate literature (see Bostic et al. (2009), Malpezzi et al. (1987)) as well as in the price index construction literature (see European Commission et al. (2013), Chapter 13, Diewert et al. (2011), Diewert et al. (2015), Diewert and Shimizu (2013) and Färe et al. (2015)).

Introduction (cont.)

!

Land Values and Taxation

- ! Valuer General
 - ! The Valuer General is an independent statutory officer.
 - ! The role of the Valuer General's office is to provide land values and property advice to government.
 - ! State Administered System
- ! Rates are based on VG's land valuations
 - ! http://www.valuergeneral.nsw.gov.au/council_rates
 - ! <http://www.revenue.act.gov.au/duties-and-taxes/rates/rates-land-valuations>
 - ! <https://www0.landgate.wa.gov.au/property-reports/land-values/rating-and-taxing>
 - ! <http://www.sro.tas.gov.au/landtax/rates>
 - ! <http://www.dtpli.vic.gov.au/property-and-land-titles/valuation/council-valuations>
 - ! <https://www.brisbane.qld.gov.au/about-council/council-information-rates/rates-payments/how-rates-are-calculated>

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Simple Behavioural Model

Econometric Model

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Previous Econometric Approaches

- ! Let
- ! Let X^S hedonic characteristics intrinsic to the structure component, e.g. age, size of the structure
- ! Price Index for New Construction, Depreciation rate to account for age
 - ! Used to subtract value of structure and isolate land value (Diewert et al. (2015))
 - ! Used as an instrument to isolate value of land (FŠre et al. (2015))

Our Econometric Approach

! Let

Econometric Method

- ! Let $\hat{\theta}_{t|t}$ denote the estimate of θ_t . At time t given all past information up to and including the current period,

$$\hat{\theta}_{t|t} = \hat{\theta}_{t|t-1} + K_t v_t \quad (5)$$

- ! $\text{Var}(a_{t|t}) = P_{t|t}$ is the mean squared error variance
- ! K_t is an adjustment factor (known as Kalman gain) - function of the X_t data, $P_{t|t-1}$ and F_t^{-1}
- ! $v_t = y_t - \hat{y}_{t|t}$

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Model Estimates and Comparison to Valuer's Estimates

Bay Area - Monthly Data

Brisbane Suburb - Annual Data

Price Indices - Empirical Evidence

Town of A Data (Comparison with Other Methods)

Victoria LGA

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Empirical Evidence

1. Moreton Bay Area - Monthly Data, 1991-2010 (urban expansion)
 - ! Homogeneous urban area north of Brisbane, 40 KM from CBD

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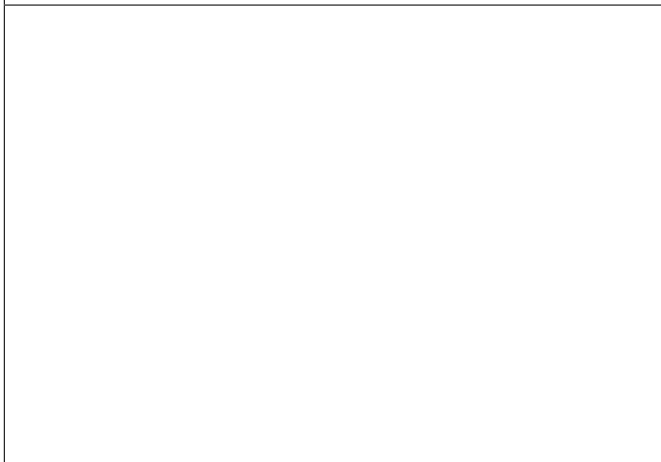
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Structure Component Characteristics

$$S_t = f(\text{Age}, \text{Age}^2, \text{Footprint})$$

PREDICTED LAND PROPORTION IN PROPERTY SALES



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Data

	Min	Max	Mean	Median	St.Dev
Sale Price (in 1000)	2.60	4710.00	305.22	215.00	269.48
Total number of Sales	3944				
Number of Years	41				
Sample Period	1970	2010			

Land Component Characteristics

	Min	Max	Mean	Median	St.Dev
Land area (hectares)	0.02	0.22	0.06	0.06	0.02
dist_waterway (Km)	0.01	1.62	0.57	0.53	0.38
dist_river (Km)	0.95	4.77	2.97	3.04	0.87
dist_industry (Km)	0.00	2.62	1.00	0.91	0.66
dist_park (Km)	0.01	0.56	0.18	0.16	0.12
dist_bikeway (Km)	0.01	1.51	0.57	0.56	0.35
dist_busstop (Km)	0.01	0.50	0.20	0.18	0.11
dist_TrainStn (Km)	0.01	3.17	1.38	1.40	0.82

Urban Land

└─ Decompositions - Empirical Estimates

└─ Brisbane Suburb - Annual Data

Urban Land

└─ Decompositions - Empirical Estimates

└─

Model vs Valuer - Properties sold in 2009

! $VE_i = \text{valuer's land valuation}_i / \text{property sale price}_i$

Month Sold	Median VE	# Properties
Jan-09	0.721	13
Feb-09	0.704	11
Mar-09	0.762	16
Apr-09	0.741	17
May-09	0.746	16
Jun-09	0.675	9
Jul-09	0.738	11
Aug-09	0.673	13
Sep-09	0.734	14
Oct-09	0.617	19
Nov-09	0.683	12
Dec-09	0.716	15
Median 2009	0.716	166

! Model Median for the 166 properties sold in 2009 = 0.669

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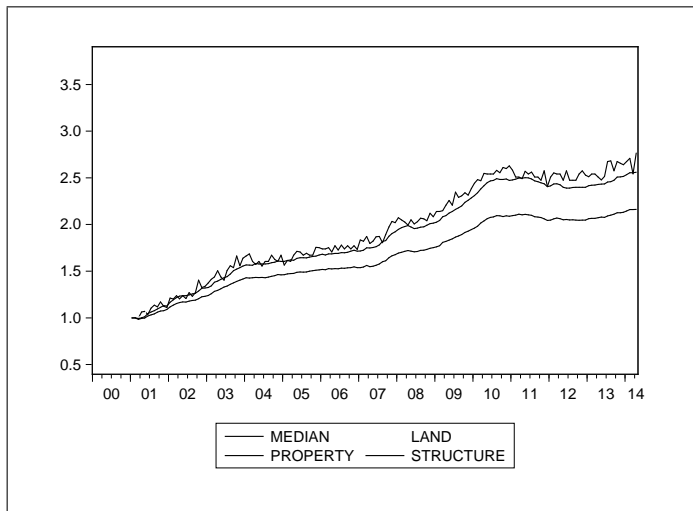
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Victoria Data (Outskirts of Melbourne)



Jan 2001=1

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Measuring GDP and Urban Planning

- ! New standard on the System of National Accounts -EuroStat-OECD (2015) "Compilation Guide On Land Estimation"
- ! Urban Planning and Zoning
 - ! **Land component proportion**
 - ! **Single structure no longer viable**
 - ! **Model counterfactuals**

- Bostic, R., Longhofer, S. D., and Redfearn, C. L. (2009). Land leverage: Decomposing home price dynamics. *Real Estate Economics*, 35(2):183-208.
- Diewert, W., de Haan, J., and Hendriks, R. (2011). The decomposition of a house price index into land and structures components: A hedonic regression approach. *The Valuation Journal*, 6:58-106.
- Diewert, W. E., de Haan, J., and Hendriks, R. (2015). Hedonic regressions and the decomposition of a house price index into land and structures components. *Econometric Reviews*, 34(1-2):106-126.
- Diewert, W. E. and Shimizu, C. (2013). Residential property price indexes for tokyo. In (2) 0.2.3 (t) -3tl Estate Markets, Financial Crisis, and Economic Growth Integrated Economic Approach. Working Paper No.3 Institute of Economic (2) 0.2.3 (t) -search, Hitotsubashi University.
- European Commission, Eurostat, OECD, and World Bank (2013). Handbook on (2) 0.2.3 (t) -sidential Property Price indices. **EU (2) 0.2.3 (t) -STAT**. Bert Balk project coordinator, 2013 edition.
- EuroStat-OECD (2015). Eurostat-OECD compilation guide on land estimation European Union / OECD, Luxemburg.
- FŠre, R., Grosskopf, S., Shang, C., and Sickles, (2) 0.2. (2015). Pricing characteristics: An application of shephard's dual lemma. manuscript.
- Harrison, P. J. (1965). Short-term sales forecasting. *Journal of the Royal Statistical Society. Series C (Applied Statistics)* 14(2/3):102-139.

- Knight, J. and Sirmans, C. (1996). Depreciation, maintenance, and housing prices. *Journal of Housing Economics* 5:369–389.
- Malpezzi, S., Ozanne, L., and Thibodeau, T. (1987). Microeconomic estimates of housing depreciation. *Land Economics* 6:372–385.
- Rambaldi, A. N., McAllister, R. R. J., and Fletcher, C. S. (2015). Decoupling land values in residential property prices: smoothing methods for hedonic imputed price indices. Technical report, Discussion Papers Series 549, School of Economics, The University of Queensland, Australia.