

How do crime rates affect property prices?

→ Melek Cigdem-Bayram (RMIT)

→ David Prentice (Infrastructure Victoria)

Overview

- For investments in justice infrastructure there is an extensive set of parameters capturing the impacts of crime on the victims and their immediate associates.
- However, crime can affect peoples behaviour even if they aren't victims. In effect crime has negative externalities on others i.e. wider impacts.
- Extensive international literature that estimates the wider impacts of crime through their effects on property prices. But not for Victoria.
 1. Compile dataset of house prices, characteristics, distance to nearest amenities and crime rates for three years for residential properties in Victoria.
 2. Run hedonic regression to generate elasticities of house prices with respect to crime rates so to capture the wider effects of crime – if they exist.

Conclusions

- An increase in the per capita rate of crimes against persons reduces property prices in regional Victoria but not in metropolitan Melbourne.
- An increase in the per capita rate of crimes against property has no effect on property prices in regional Victoria or metropolitan Melbourne
- When investing in justice infrastructure to deliver services in regional Victoria the broader impacts should be considered in a CBA.
- When combined with an estimate of the effects of infrastructure on crime rates, these estimates can be drawn on to construct an estimate of the benefits of a particular investment.

Policy Context

- In Victoria, cost benefit analysis is performed for investments in justice infrastructure but in an inconsistent and not always complete way.
- While there is an extensive set of parameters that can be applied to capture individual impacts of crime this is not the case for wider impacts of crime
- Justice infrastructure that reduces crime benefits not only those who would have been the victims of crime but also those who adjust their behaviour in response to their being less crime.
- The widespread interest in crime and response to crimes suggests there is a potential for these benefits to be material.

Previous Literature and Gaps

- Substantial international empirical literature distinguishes between effects of crimes against the person and crime against property.
- Crimes against the person regularly found to have negative effects on house prices e.g. Miami, England and Wales, Sydney (two studies)
- Crimes against property results mixed.

Gaps

- Only one study specifically outside of largish cities
- No studies for Victoria
- Note – literature highlights endogeneity of crime needs to be dealt with.

Building Blocks: Specification (1)

- We use a standard specification for a hedonic model to be estimated with individual house prices:

$$\ln(Y_{it}) = \alpha + \beta_S s_{it} + \delta \ln(L_{it}) + \gamma P_{ik} + \varphi C_{ikjt} + \rho Q_{it} + \varepsilon_{it}$$

Where:

Y_{it} is the price of property i sold in period t

S_{it} are potentially time varying structural attributes of the house

L_{it} are potentially time varying locational attributes of the house

P_{ik} are the postcode (k) dummies

Q_{it} are the quarterly dummies

C_{ikjt} are the crime rates of type j per capita by postcode (k)

Building Blocks: Specification (2)

- Concerned that effects of average crime rates on house prices are captured by the Postcode fixed effects.
- To determine long run effects of crime, regress postcode fixed effects from previous regression on average crime rates and income:

$$\gamma_k = \alpha_\gamma + \phi_\gamma C_k + \psi I_k + \varepsilon_k$$

Where:

γ_k is the estimated fixed effect from specification (1)

C_k is the average crime rate

I_k is the average income

- Instrument for crime and bootstrap standard errors.

Building Blocks: Specification (3)

- Kuminoff and Pope (IER, 2014) highlight how theory predicts coefficients differ by demographics.
- Run different regressions for regional Victoria and metropolitan Melbourne.
- Endogeneity of crime rates (crime tends to be in areas with valuable property to steal and entertainment, crime also tends to be inversely correlated with income).
- Resolved by using Instrumental Variables
- **Crimes against property and person (regional)** contemporaneous crime rates in neighbouring postcode
- **Crimes against person (metropolitan)** average of contemporaneous crime rates in three neighbouring postcodes.

Building Blocks: Data

- House and units price and characteristics from CoreLogic for three years from 2013 to 2016.
- Removed other property types and observations with missing/implausible geographic and characteristics data except for garage/car space (missing imputed to be 0).
- Distance to (dis) amenities calculated based on GIS information from state government (primarily):
- Crime rates obtained by dividing number of offences by postcode (Victorian Crime Statistics Agency) by population (Census data)
- **Distinguish between crimes against the person and against property**

Building Blocks: Variables in hedonic regression

- House characteristics: land size; number of bedrooms and bathrooms; garage; car space; property type.
- Amenities:
- Transport: train station, train line, freeway, major road, bike path, tram stop
- Services: shops, hospital, police station, educational facility
- Several types of parks
- Disamenities: dumping grounds: excavation sites; industrial facilities; power facilities.
- Distance to coast; CBD.

Descriptive Statistics

Variable	Metropolitan		Regional	
	Median	Std. Dev.	Median	Std. Dev.
Price ('000\$)	632	683	359	282
Crime rate (Person)	8.8	5.3	13	9.3
Crime rate (Property)	29	16	32	17
Observations	169841		122706	

Specification (1) - Regression Results – Other results

- Instrumental variables are statistically significant in the first stage IV regressions
- Coefficients on structural characteristics (land size, bathrooms, bedrooms, parking) have expected signs and significance.
- Most coefficients on locational attributes also have expected signs and significance (railway stations, train lines, freeways, major roads)
- Being near the coast increases house prices.
- Being near the CBD only in metropolitan Melbourne.

Specification (1) - Regression Results – Semi-Elasticities

Type of Crime	Metropolitan	Regional
Against the person	-0.005	-0.00969***
Against property	0.00035	0.00388
Type of Amenity		
Distance to Police Station	-0.017***	-0.031***

Interpretation

- An increase in the rate of crimes against the person by 1 per 1000 people causes a 1 per cent decrease in property prices in regional Victoria.
- No significant effects of crimes against the person in Melbourne
- No effects of crime on property prices
- Possible explanations
- Greater variation in crime rates in regional Victoria and crime is more geographically separated there.
- Harder to prevent effects of crimes against the person once in a location.

Specification (2) - Regression Results

- Rates of crime are not significant determinants of the postcode fixed effects.
- Income is positively correlated with the postcode fixed effects for regional Victoria but not metropolitan Melbourne.



Limitations and Applicability

1. Omits valuation by people who do not live nearby the amenity – may need to be considered for tourist destinations, areas with shopping or entertainment districts.
2. Does not account for equity
3. Primarily accounts for impacts of short-run fluctuations of crime – it would be interesting to analyse the results from using a longer time period.
4. Would be interesting to evaluate the effects of justice infrastructure directly.

INFRASTRUCTURE
VICTORIA