Cultural Distance and Housing Prices: Evidence from the Australian Housing Market

Maggie HU
University of New South Wales
Adrian LEE
University of Technology Sydney

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Research Question

- Does cultural distance between a buyer's ethnicity and the neighbourhood affects a home's selling price.
  - +ve: Home buyers who are more culturally distant from the culture of a property's neighborhood are faced with higher search costs and greater information friction to access the local property market.
  - -ve: Home buyers prefer locations with greater cultural similarity, and are willing to pay more for homes in those locations (supported)

Main Finding

- Homebuyers are willingly to pay higher prices for homes in neighbourhoods which are closer to their culture of origin.

- If the cultural distance between a homebuyer and the suburb decreases by one point, housing price increases by 1.1% or AUD$7,509 (based on the sample mean sales price of AUD$682,650).

Motivation

1) To fill up a gap in literature

- Literature implies that culture is a **latent priced factor** in hedonic housing price models, although never directly tested empirically.

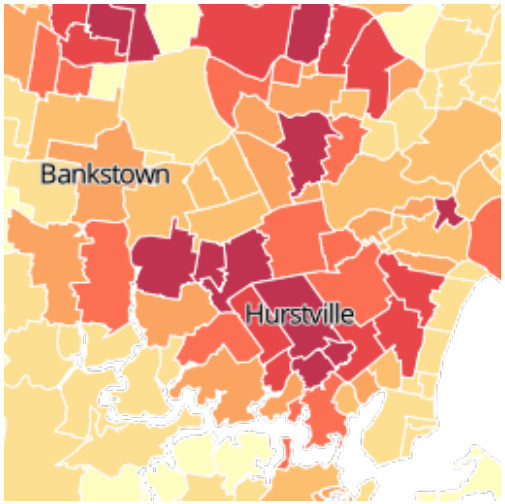
"As we have seen in the case of our hedonic housing price example ... . **Latent unobservable influences** related to **culture**, infrastructure, or recreational amenities can affect the dependent variable, but may not appear as explanatory variables in the model."

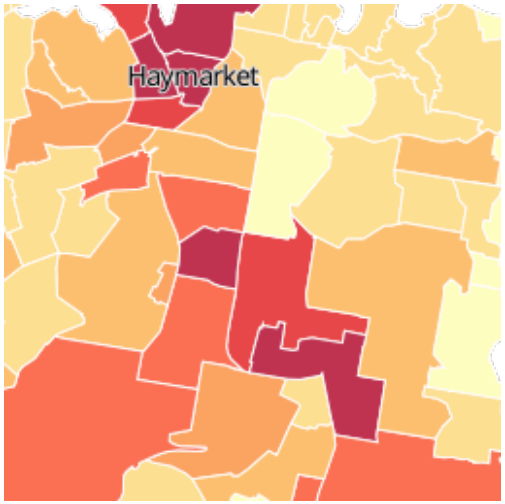
- Pace et al (2009) Spatial Econometrics

Motivation

2) My own observation: Sydney's Chinese population

- 52.5% of Hurstville's population reported their heritage as Chinese. Burwood (41%), Eastwood (36.5%), Haymarket (36%)
- Migrants of most nations congregate in cities as a way of finding support in a new land and as a means of preserving culture.
- Are home buyers willing to pay for cultural congregation?





NYmag.com, May 12th, 2015

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NYC Rental Market:

- One landlord in Brooklyn, NYC bribes the black tenants to move out, so that he can then rent to white people and double the rent.

- Many of his **white** tenants think paying high rent means they have a right to demand **housing segregation**.

Daily Intelligencer / GENTRIFICATION

'I Put in White Tenants': The Grim, Racist (and Likely Illegal) Methods of One Brooklyn Landlord

By DW Gibson

Williamsburg, Brooklyn. July 2014. Photo: Andrew Lichtenstein/Corbis

Related Literature

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- Home culture preference in the finance literature
  - International syndicated bank loan terms: Giannetti and Yafeh (MS 2012), more culturally distant lead banks offer borrowers smaller loans at a higher interest rate and are more likely to require third-party guarantees.
  - Cross-border mergers: Ahern et al (JFE 2015), culture proximity affect cross-border merger volume and synergy gains.
  - Cross-listings: Dodd et al (EFM 2013), firms cross-list in markets that have greater cultural similarities.

- Ethnicity preferences and house prices
  - Racial quotas: Wong (RES 2013), Wong (JPubE 2014), all 3 main ethnic groups in Singapore prefer to live with some own-ethnic-group neighbours but they also exhibit inverted U-shaped preferences
  - Ethnic diversity and house prices: Li (RUSE 2014), social interactions influence people's preference and behaviour for housing in Vancouver, Canada.

Two Competing Hypotheses

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- *Information Friction hypothesis*
  - Home buyers who are more culturally distant from the culture of a property's surrounding neighborhood are faced with higher search costs and greater information friction to access the local property market.
  - Cultural differences create barriers to the flow of information

  → Predicts house prices paid **positively** related to buyer-suburb cultural distance.

- *Home Culture Preference hypothesis*
  - Home buyers prefer locations with greater cultural similarity, and are willing to pay a premium price for houses in those locations.

  → Predicts house prices paid **negatively** related to buyer-suburb cultural distance.

Data

- Australian Property Monitors home sales transaction data for the Sydney Metropolitan Area
  - 2006 to 2013, with 386,803 observations.
  - Include: home address, buyer surname, prior owner's name, price paid, housing characteristics (housing type, beds, baths, parking, additional features), etc.
- Suburb ethnicity data from Australian Bureau of Statistics Census 2006 and 2011.
  - Population, ethnic composition by birthplace or by ancestry for each suburb in Sydney, etc.
- Hofstede (2001): six cultural dimensions
- Final sample removing company owners, multiple ethnicity surnames and unclassified surnames:
  - 6-dimension Hofstede, 208,878 obs
  - 4-dimension Hofstede, 210,269 (includes Israelis/Jewish and South Africans)

List of Housing Characteristics Variables

Variable	Description
Beds	Number of beds
Baths	Number of bathrooms
Multiple Parking	1 if home has two or more parking spots, 0 otherwise
Street type dummies	1 if a certain street type (e.g. avenue, highway, lane, street, road, etc.), 0 otherwise
Housing type dummies	1 if a certain housing type (e.g. apartment, house, semi, studio, townhouse, villa, etc.)
Has Air Conditioning	1 if home has air conditioning, 0 otherwise
Has Alarm	1 if home has alarm system, 0 otherwise
Has Balcony	1 if home has balcony, 0 otherwise
Has Barbeque	1 if home has barbeque, 0 otherwise
Has Been Renovated	1 if home has been renovated, 0 otherwise
Has Billiard Room	1 if home has billiard room, 0 otherwise
Has Courtyard	1 if home has courtyard, 0 otherwise
Has Ensuite	1 if home has ensuite, 0 otherwise
Has Family Room	1 if home has family room, 0 otherwise
Has Fireplace	1 if home has fire place, 0 otherwise
Has Garage	1 if home has garage, 0 otherwise
Has Heating	1 if home has heating, 0 otherwise
Has Internal Laundry	1 if home has internal laundry, 0 otherwise
Has LockUp Garage	1 if home has lock up garage, 0 otherwise
Has Polished Timber Floor	1 if home has polished timber floors, 0 otherwise
Has Pool	1 if home has swimming pool, 0 otherwise
Has Rumpus Room	1 if home has rumpus room, 0 otherwise
Has Sauna	1 if home has sauna, 0 otherwise
Has Separate Dining	1 if home has separate dining room, 0 otherwise
Has Spa	1 if home has spa, 0 otherwise
Has Study	1 if home has study room, 0 otherwise
Has Sun room	1 if home has sunroom, 0 otherwise
Has Tennis Court	1 if home has tennis court, 0 otherwise
Has Walk-In Wardrobe	1 if home has walk in wardrobe, 0 otherwise
View dummies	1 if home has a certain view (e.g. bush, city, district, harbour, ocean, park, river, etc.)

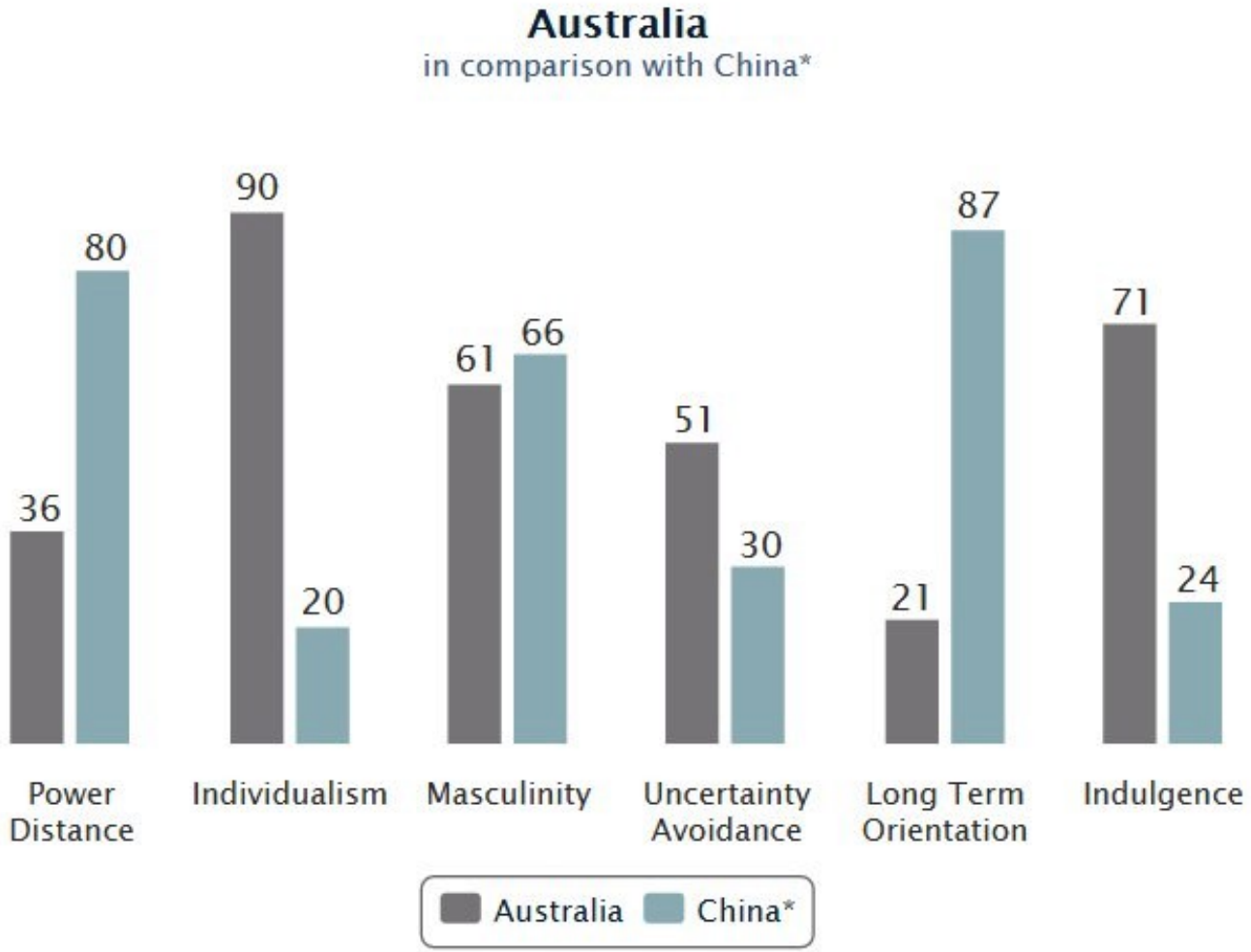
Sydney's Top 20 Ethnicity Groups Based on 2011 Census

Ethnicity	Region	% in 2006 Census	% in 2011 Census	Rank(2011 census)
Australian/British	Australia	45.16	42.97	1
Chinese	East Asia	7.84	8.99	2
Irish	Western Europe	4.47	4.56	3
Italian	Southern Europe	3.95	3.82	4
Arabic	Middle East	3.52	3.72	5
Indian	South Asia	2.2	3.1	6
Greek	Southern Europe	2.57	2.43	7
Vietnamese	South East Asia	1.65	1.9	8
Filipino	South East Asia	1.19	1.38	9
German	Western Europe	1.41	1.37	10
Korean	East Asia	1.04	1.26	11
Maltese	Southern Europe	0.75	0.71	12
Croatian	Eastern Europe	0.71	0.68	13
Polish	Eastern Europe	0.58	0.53	14
Serbian	Eastern Europe	0.63	0.52	15
Sri Lankan	South Asia	0.46	0.51	16
Turkish	Middle East	0.49	0.51	17
Dutch	Western Europe	0.49	0.47	18
Bangladeshi	South Asia	0.28	0.44	19
South African	Africa	0.41	0.43	20

Hofstede 6-Dimensions

1) **Power Distance**: the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally.
2) **Individualism**: the degree of interdependence a society maintains among its members.
3) **Masculinity**: the society will be driven by competition, achievement and success, with success being defined by the “winner” or “best-in-the-field.” A low score (Feminine) on the dimension means that the dominant values in society are caring for others and quality of life.
4) **Uncertainty Avoidance**: The extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these.
5) **Long Term Orientation**: prepare and save for the future. Normative societies (w low score) prefer to maintain time-honoured traditions and norms while viewing societal change with suspicion.
6) **Indulgence**: the extent to which people try to control their desires and impulses.

Hofstede Culture Scores: Australia VS China



Method: Calculating Cultural Distance

- CD_{ist} is the Euclidean distance between the Hofstede culture value of the buyer's ethnicity and the average person's culture value in the home's suburb:

$$CD_{i,s,t} = \sum_{j=1}^{J} w_{j,s,t} * \sqrt{\sum_{k=1}^{N} \left(C_{i,k} - C_{j,k,s}\right)^2 / V_k}$$

Where:

- $w_{j,s,t}$ is the percentage of ethnicity group j's population in suburb s in year t;
- $C_{i,k}$ is the buyer of sale i's ethnicity culture value along the k-th culture dimension;
- $C_{j,k,s}$ ethnicity group j's value on the k-th culture dimension in suburb s, j=1...J;
- V_k is the variance of the culture value of culture dimension k;
- We interpolate demographic value for years between 2006 and 2011 Census. 2012 and 2013 use 2011 values.

Method: Calculating Cultural Distance

- The higher the score on the cultural distance measure, the greater the cultural difference between the buyer *i* and suburb s at time t.
- CD may measured using ancestry of residents in the suburb or birthplace of residents in the suburb.
- We also measure CD using all 6 Hofstede dimension and using only the first 4 dimensions (remove long-term orientation and indulgence versus restraint)
- The reason to remove the last two is that two additional ethnicities are represented (Israelis and South Africans) and the last two dimensions are not used in other studies.
- Our results are robust to the type of CD we use.

Method: Ethnicity Classification

- We infer owner's ethnicity from buyers' surname.
- We build surnames/ethnicity database from various web sources (such as surnamedb.com, wikipedia).
- British and Scottish surnames are assumed to be Australian.
- Surnames with multiple ethnicities are removed:
  - E.g. Lee is both Anglo-Saxon, Chinese and Korean
- Mixed ethnicity multiple owners are removed.
- Ethnicities refer to those used in the Hofstede dimensions
  - Data availability for different culture dimension varies.
  - Some ethnicities cannot be classified in all 6 culture dimension

Method: Hedonic Regression Model

$$\ln(P_{ist}) = \alpha_t + \beta_k CD_{ist} + property\ char + \mu_s + \delta_i + \gamma_t + \tau_t + \varepsilon_{it}$$

Where:

- $ln(P_{ist})$ denotes logarithm of house prices paid by buyer of sale *i* at suburb s at time *t*;
- CD_{ist} is the cultural distance between buyer of sale *i* and suburb *s* at time *t*
- $property\ char$ are various property characteristics such as number of bedrooms, number of bathrooms, parking, property type and area size;
- μ_s is the suburb location specific fixed effect;
  is ethnicity of buyer of sale *i;*
- γ_t is the time specific fixed effect;
  is monthly linear time trend.

- Two potential concerns: Selection bias and omitted variable bias
- Robustness Check

Summary Statistics: Cultural Distance for the Top 20 Buyer Ethnicity Groups

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Ethnicity	Mean	Std	Q1	Median	Q3	Min	Max	N
Australian	1.34	0.47	1	1.25	1.6	0.59	3.3	73,114
Chinese	2.49	0.55	2.1	2.51	2.9	1.19	3.6	39,223
Arabic	2.28	0.48	1.9	2.28	2.7	1.35	3.25	20,145
Indian	2.14	0.33	2	2.18	2.4	0.81	2.71	17,945
Irish	1.62	0.4	1.3	1.52	1.8	0.87	3.03	14,476
Italian	2.03	0.25	1.9	1.98	2.2	1.17	3.14	12,056
Vietnamese	2.42	0.54	2.1	2.41	2.8	1.35	3.57	8,130
Greek	2.91	0.37	2.6	2.95	3.2	1.91	3.61	5,220
German	1.79	0.27	1.6	1.7	1.9	1.42	3	2,656
French	2.7	0.14	2.6	2.74	2.8	2.24	3.17	2,155
Korean	3.05	0.39	2.7	3.08	3.4	2.27	3.86	1,807
Spanish	2.6	0.2	2.5	2.65	2.8	2.05	2.94	1,767
Slovakian	3.67	0.18	3.5	3.68	3.8	3.16	4.1	1,405
Portuguese	3.46	0.37	3.2	3.49	3.8	2.59	4.17	1,352
Polish	2.73	0.17	2.6	2.77	2.9	2.2	3.12	1,171
Maltese	2.75	0.16	2.7	2.79	2.9	2.2	3.12	832
Indonesian	2.76	0.47	2.5	2.77	3.1	1.64	3.8	831
Dutch	3.08	0.19	2.9	3.04	3.2	2.8	3.74	669
Sri Lanka	2.76	0.38	2.5	2.83	3.1	1.81	3.42	539
Japanese	3.29	0.1	3.3	3.32	3.4	2.88	3.72	537
All	1.99	0.73	1.4	1.98	2.5	0.59	4.37	208,878

A Real Transaction Example: An Italian buying from Zetland

- Address: Unit XXX, XX Gadigal Ave, Zetland, NSW 2017
- Date of Transaction: Oct XX, 2013
- Price sold: $850,000
- Size: 101 sqm
- Buyer surname: Santucci (Italian)
- Previous owner surname: Zhang (Chinese)
- Property feature: has parking, 2 bedrooms, 2 baths, internal laundry, balcony, not new sale, not auction sale.
- Buyer Birth country: Italy, Southern Europe
- Buyer's culture distance (Italy) from the suburb based on the ancestry of the residents in this suburb: 2.97 (CD)
- Buyer's culture distance from the suburb based on the birth place of the residents in this suburb: 3.08 (BCD)

An Italian

Zetland

A Real Transaction Example: An Italian buying from Zetland

An Italian

Buyer	Dimension	Culture Score
Italy	Power Distance	50
	Individualism	76
	Masculinity	70
	Uncertainty Avoidance	75
	Long Term Orientation	61
	Indulgence	30

Zetland

Top 5 Ethnicity (by birth)	%Pop ($W_{j,s,t}$)	Culture scores (6D)
Australia	43.20%	X
China	12.22%	X
UK	3.57%	X
NZ	2.73%	X
Indonesia	2.73%	X

Zetland population in 2011: 3,812

$$CD_{i,s,t} = \sum_{j=1}^{J} w_{j,s,t} * \sqrt{\sum_{k=1}^{N} \left(C_{i,k} - C_{j,k,s}\right)^2 / V_k}$$

- Buyer's culture distance (Italy) from the suburb based on the ancestry of the residents in this suburb: 2.97 (CD)
- Buyer's culture distance from the suburb based on the birth place of the residents in this suburb: 3.08 (BCD)

Summary Statistics by Top 20 Ethnicities

Ethnicity	Price ($'000)	House dummy	House Size (1,000 sqf)	Bed	Bath	Parking	Auction	N
Australian	770.49	0.59	3.95	2.91	1.62	0.83	0.16	73,114
Chinese	674.48	0.47	3.2	2.89	1.7	0.89	0.15	39,223
Arabic	546.04	0.72	4.84	3.05	1.51	0.88	0.19	20,145
Indian	551.03	0.59	3.92	2.95	1.59	0.89	0.13	17,945
Irish	765.7	0.58	3.78	2.88	1.6	0.83	0.17	14,476
Italian	673.05	0.64	4.17	2.94	1.58	0.87	0.18	12,056
Vietnamese	486.87	0.71	4.5	3.05	1.48	0.86	0.15	8,130
Greek	725	0.65	4.01	2.93	1.55	0.85	0.24	5,220
German	790.29	0.57	3.8	2.9	1.64	0.82	0.18	2,656
French	705.1	0.61	4.03	2.92	1.61	0.83	0.17	2,155
Korean	661.89	0.56	4.07	3	1.73	0.91	0.15	1,807
Spanish	522.7	0.55	3.44	2.86	1.52	0.86	0.11	1,767
Slovakian	547.66	0.58	3.67	2.89	1.51	0.88	0.14	1,405
Portuguese	577.93	0.56	3.43	2.83	1.54	0.88	0.13	1,352
Polish	638.39	0.52	3.47	2.8	1.54	0.85	0.14	1,171
Maltese	548.95	0.7	5.01	3.04	1.52	0.88	0.11	832
Indonesian	594.11	0.49	2.93	2.77	1.64	0.88	0.13	831
Dutch	777.57	0.56	3.86	2.86	1.63	0.84	0.13	669
Sri Lanka	602.14	0.63	4.45	2.97	1.6	0.89	0.12	539
Japanese	678.74	0.5	3.17	2.62	1.53	0.84	0.11	537
All	**682.65**	**0.59**	**3.9**	**2.93**	**1.61**	**0.86**	**0.16**	**208,878**

Baseline Result

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Dependent variable: ln(price)	CD (ancestry)	CD (birthplace)
Intercept	7.176***	7.155***
	[7.63]	[7.61]
CD	-0.011***	-0.009**
	[-3.53]	[-2.06]
New Development	0.144***	0.144***
	[16.96]	[16.94]
Auction	0.058***	0.058***
	[20.24]	[20.28]
Number of Bedrooms	0.122***	0.122***
	[29.61]	[29.61]
Number of Bathrooms	0.126***	0.126***
	[39.57]	[39.59]
Has Parking	0.083***	0.083***
	[11.63]	[11.62]
Housing Characteristics	Yes	Yes
Additional Housing Characteristics	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb
Suburb Fixed Effects	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes
Monthly Time Trend	Yes	Yes
Adjusted R-square	0.8568	0.8568
Number of Observations	213,284	213,284

Robustness Check
Concern 1: Selection Bias

- We only observe completed transactions, i.e. when buyer's offer price is higher than the seller's reservation price.
- Use instrumental variable approach to address this concern.
- Run Heckman 2-step regression and instrument in 1st stage probit with dummy for prior year buying by ethnicity in suburb (*lagybuy*):
- Intuition: buyers are influenced to buy in suburb from observing buying by their own peer group (i.e. ethnic group).
  - E.g. in car purchases (Grinblatt, Keloharju and Ikäheimo (2008) , employment outcomes (Bayer, Ross and Topa (2008), Patacchini and Zenou (2012)), welfare participation (Bertrand, Luttmer and Mullainathan (2000), Betrand, Luttmer and Mullainathan (2000)) and worker productivity (Mas and Moretti (2009)).

Robustness Check
Concern 1: Selection Bias

$$\Pr(Buy_{jst} = 1|X) = F(\alpha_0 + \beta_1 CD_{jst} + \beta_2 lagybuy_{jst} + \mu_s + \delta_j + \gamma_t + \varepsilon_{jst})$$

- Probit at the suburb/ethnicity/quarter level.
- $Lagybuy_{jst}$ is a dummy of 1 if there is any sale by the buyer's ethnicity in the prior twelve months in suburb *s* and 0 otherwise.
- Obtain the inverse mills ratio from the Probit estimate and use it as an additional independent variable in main regression.

Robustness Check
Concern 2: Omitted Variable Bias

- CD may be correlated to an omitted variable in our hedonic regression.
  - Could be an omitted housing characteristics (e.g. build quality) or an omitted buyer characteristic (e.g. income).
- Use 2-stage least squares with genetic distance (GD) of buyer to suburb as instrument.
  - Also used by Guiso, Sapienza and Zingales (2009) and Ahern et al. (2012) as an instrument for CD.
- Genetic distance is 'a measure of the probability that two random alleles (DNA variations) from two populations will be different, based on the dominant population of a country'.
  - GD obtained from Spolaore and Wacziarg (2009) and Spolaore's website.
- Intuition for instrument: DNA similarity and cultural similarity both tend to be passed on. However as DNA changes takes many generations to spread amongst an ethnicity, it is unrelated to house prices.

Robustness Check
Address Concern 1 and 2 Together

- Follow Wooldridge (2010) section 19.6.2.
- First stage Probit uses GD instead of CD.
- Put the inverse mills function from the GD Probit estimates in the second stage regression of 2-stage least squares.
- We present 4 versions of result in the tables:
  1) ordinary least squares
  2) Heckman selection
  3) 2-stage least squares
  4) Heckman plus 2-stage least squares

Result Using Suburb Ethnicity based on Ancestry and Hofstede 6 Dimensions

Panel A. Cultural Distance (Ancestry 6 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.295***	7.29***	13.216***	13.203***
	(0.922)	(0.922)	(0.022)	(0.023)
CD	-0.011***	-0.015***	-0.027***	-0.019**
	(0.003)	(0.004)	(0.004)	(0.008)
New Development	0.145***	0.145***	0.146***	0.146***
	(0.008)	(0.008)	(0.008)	(0.008)
Auction	0.057***	0.057***	0.057***	0.057***
	(0.003)	(0.003)	(0.003)	(0.003)
Number of Bedrooms	0.12***	0.12***	0.12***	0.12***
	(0.004)	(0.004)	(0.004)	(0.004)
Number of Bathrooms	0.128***	0.128***	0.129***	0.129***
	(0.003)	(0.003)	(0.003)	(0.003)
Has Parking	0.084***	0.084***	0.086***	0.086***
	(0.007)	(0.007)	(0.007)	(0.007)
Inverse Mills Ratio		0.009		-0.010
		(0.006)		(0.009)
Housing Characteristics	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8597	0.8597	0.8584	0.8587
Number of Observations	208,878	208,878	208,878	208,878

Result Using Suburb Ethnicity based on Birthplace and Hofstede 6 Dimensions

Panel B. Cultural Distance (Birthplace 6 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.273***	7.265***	13.315***	13.179***
	(0.922)	(0.922)	(0.016)	(0.022)
CD	-0.009*	-0.012**	-0.014***	-0.010
	(0.005)	(0.005)	(0.003)	(0.007)
New Development	0.145***	0.145***	0.145***	0.146***
	(0.008)	(0.008)	(0.008)	(0.008)
Auction	0.057***	0.057***	0.057***	0.057***
	(0.003)	(0.003)	(0.003)	(0.003)
Number of Bedrooms	0.12***	0.12***	0.12***	0.12***
	(0.004)	(0.004)	(0.004)	(0.004)
Number of Bathrooms	0.128***	0.128***	0.129***	0.129***
	(0.003)	(0.003)	(0.003)	(0.003)
Has Parking	0.084***	0.084***	0.086***	0.086***
	(0.007)	(0.007)	(0.007)	(0.007)
Inverse Mills Ratio		0.008		-0.010
		(0.006)		(0.012)
Housing Characteristics	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8597	0.8597	0.8584	0.8587
Number of Observations	208,878	208,878	208,878	208,878

Result Using Suburb Ethnicity based on Ancestry and Hofstede 4 Dimensions

Panel C. Cultural Distance (Ancestry 4 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.29***	7.286***	13.213***	13.2***
	(0.924)	(0.924)	(0.022)	(0.022)
CD	-0.014***	-0.017***	-0.032***	-0.021**
	(0.003)	(0.005)	(0.004)	(0.009)
New Development	0.145***	0.145***	0.145***	0.145***
	(0.008)	(0.008)	(0.008)	(0.008)
Auction	0.056***	0.056***	0.057***	0.057***
	(0.003)	(0.003)	(0.003)	(0.003)
Number of Bedrooms	0.12***	0.12***	0.12***	0.12***
	(0.004)	(0.004)	(0.004)	(0.004)
Number of Bathrooms	0.128***	0.128***	0.129***	0.129***
	(0.003)	(0.003)	(0.003)	(0.003)
Has Parking	0.084***	0.084***	0.086***	0.086***
	(0.007)	(0.007)	(0.007)	(0.007)
Inverse Mills Ratio		0.007		-0.011
		(0.006)		(0.01)
Housing Characteristics	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8599	0.8599	0.8582	0.8588
Number of Observations	210,269	210,269	210,269	210,269

Result Using Suburb Ethnicity based on Birthplace and Hofstede 4 Dimensions

Panel D. Cultural Distance (Birthplace 4 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.274***	7.27***	13.319***	13.183***
	(0.925)	(0.925)	(0.016)	(0.022)
CD	-0.013**	-0.015**	-0.02***	-0.013
	(0.006)	(0.007)	(0.003)	(0.008)
New Development	0.145***	0.145***	0.145***	0.145***
	(0.008)	(0.008)	(0.008)	(0.008)
Auction	0.057***	0.057***	0.057***	0.057***
	(0.003)	(0.003)	(0.003)	(0.003)
Number of Bedrooms	0.12***	0.12***	0.12***	0.12***
	(0.004)	(0.004)	(0.004)	(0.004)
Number of Bathrooms	0.129***	0.129***	0.129***	0.129***
	(0.003)	(0.003)	(0.003)	(0.003)
Has Parking	0.084***	0.084***	0.086***	0.086***
	(0.007)	(0.007)	(0.007)	(0.007)
Inverse Mills Ratio		0.005		-0.011
		(0.006)		(0.013)
Housing Characteristics	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8598	0.8598	0.8584	0.8588
Number of Observations	210,269	210,269	210,269	210,269

Regional Ethnicity CD: Does CD affect ethnicities differently?

- Estimate the following hedonic model:

$$\ln(P_{ist}) = \alpha_t + \sum_{u=1}^{U} \beta_u \text{Region}_{iu} * CD_{ist} + property\ char + \mu_s + \delta_i + \gamma_t + \tau_t + \varepsilon_{it}$$

❖ Where $Region_{iu}$ is a dummy of 1 if buyer's ethnicity belongs to Region u (e.g. Australia, East Asia, Western Europe etc.) .

❖ Note: main effect CD_{ist} is not included in regression so we have Region specific β_u.

Regional Results Using Suburb Ethnicity based on Ancestry and Hofstede 6 Dimensions

Panel A. Cultural Distance (Ancestry 6 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.26***	7.246***	13.165***	13.162***
	(0.923)	(0.923)	(0.031)	(0.031)
CD*Africa	0.062	0.037	0.001	0.004
	(0.068)	(0.069)	(0.055)	(0.054)
CD*Australia	-0.004	-0.007	-0.007	-0.005
	(0.005)	(0.005)	(0.012)	(0.014)
CD*East Asia	-0.021***	-0.027***	-0.020***	-0.018**
	(0.005)	(0.006)	(0.007)	(0.009)
CD*South Asia	-0.024***	-0.032***	-0.013	-0.011
	(0.006)	(0.008)	(0.010)	(0.011)
CD*South East Asia	-0.033***	-0.044***	-0.015**	-0.013
	(0.006)	(0.008)	(0.007)	(0.010)
CD*Middle East	-0.001	-0.01	-0.01	-0.007
	(0.006)	(0.007)	(0.009)	(0.013)
CD*Eastern Europe	-0.011	-0.014	-0.004	-0.003
	(0.012)	(0.012)	(0.014)	(0.015)
CD*Northern Europe	-0.023	-0.026	-0.022	-0.02
	(0.029)	(0.029)	(0.025)	(0.025)
CD*Southern Europe	-0.017**	-0.027***	-0.007	-0.005
	(0.007)	(0.008)	(0.009)	(0.011)
CD*Western Europe	-0.007	-0.013*	-0.007	-0.005
	(0.006)	(0.007)	(0.012)	(0.014)
Inverse Mills Ratio		0.014**		-0.004
		(0.006)		(0.008)
Housing Characteristics	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8598	0.8598	0.859	0.859
Number of Observations	208,878	208,878	208,878	208,878

Regional Results Using Suburb Ethnicity based on Birthplace and Hofstede 6 Dimensions

Panel B. Cultural Distance (Birthplace 6 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.259***	7.245***	13.296***	13.158***
	(0.923)	(0.922)	(0.018)	(0.023)
CD*Africa	0.690	0.685	0.002	0.004
	(0.442)	(0.44)	(0.055)	(0.050)
CD*Australia	0.007	0.006	-0.009	-0.006
	(0.007)	(0.007)	(0.01)	(0.013)
CD*East Asia	-0.030***	-0.034***	-0.015**	-0.014*
	(0.006)	(0.007)	(0.006)	(0.008)
CD*South Asia	-0.032***	-0.039***	-0.01	-0.009
	(0.008)	(0.009)	(0.009)	(0.009)
CD*South East Asia	-0.034***	-0.042***	-0.011***	-0.010
	(0.006)	(0.008)	(0.004)	(0.007)
CD*Middle East	-0.033*	-0.043**	-0.007	-0.005
	(0.019)	(0.019)	(0.005)	(0.01)
CD*Eastern Europe	-0.018	-0.020	-0.002	-0.001
	(0.018)	(0.018)	(0.009)	(0.01)
CD*Northern Europe	-0.018	-0.019	-0.021	-0.02
	(0.041)	(0.041)	(0.017)	(0.018)
CD*Southern Europe	-0.016	-0.028*	-0.005	-0.004
	(0.015)	(0.016)	(0.006)	(0.008)
CD*Western Europe	0.007	0.003	-0.005	-0.004
	(0.012)	(0.012)	(0.008)	(0.011)
Inverse Mills Ratio		0.009*		-0.004
		(0.006)		(0.011)
Housing Characteristics	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8597	0.8597	0.859	0.859
Number of Observations	208,878	208,878	208,878	208,878

Regional Results Using Suburb Ethnicity based on Ancestry and Hofstede 4 Dimensions

Panel C. Cultural Distance (Ancestry 4 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.26***	7.251***	13.164***	13.161***
	(0.925)	(0.924)	(0.028)	(0.028)
CD*Africa	0.066	0.047	-0.192***	-0.181**
	(0.106)	(0.108)	(0.07)	(0.071)
CD*Australia	-0.003	-0.007	-0.008	-0.004
	(0.005)	(0.006)	(0.013)	(0.017)
CD*East Asia	-0.029***	-0.033***	-0.025***	-0.022**
	(0.006)	(0.007)	(0.007)	(0.010)
CD*South Asia	-0.031***	-0.037***	-0.015	-0.012
	(0.008)	(0.008)	(0.012)	(0.013)
CD*South East Asia	-0.034***	-0.042***	-0.016**	-0.012
	(0.006)	(0.007)	(0.007)	(0.011)
CD*Middle East	-0.008	-0.013**	-0.011	-0.007
	(0.006)	(0.006)	(0.009)	(0.015)
CD*Eastern Europe	-0.012	-0.014	-0.004	-0.002
	(0.015)	(0.015)	(0.015)	(0.017)
CD*Northern Europe	-0.074*	-0.079*	-0.025	-0.023
	(0.045)	(0.045)	(0.026)	(0.027)
CD*Southern Europe	-0.015***	-0.020***	-0.007	-0.005
	(0.006)	(0.006)	(0.009)	(0.013)
CD*Western Europe	-0.008	-0.013*	-0.008	-0.005
	(0.007)	(0.008)	(0.013)	(0.016)
Inverse Mills Ratio		0.011*		-0.005
		(0.006)		(0.01)
Housing Characteristics	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8599	0.8599	0.8591	0.8591
Number of Observations	210,269	210,269	210,269	210,269

Regional Results Using Suburb Ethnicity based on Birthplace and Hofstede 4 Dimensions

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Panel D. Cultural Distance (Birthplace 4 Dimensions)

Dependent variable: ln(price)	Ordinary Least Squares	Heckman	2-stage Least Squares	Heckman and 2-Stage Least Squares
Intercept	7.263***	7.257***	13.297***	13.16***
	(0.926)	(0.925)	(0.018)	(0.023)
CD*Africa	0.077	0.070	-0.203***	-0.196***
	(0.157)	(0.158)	(0.056)	(0.053)
CD*Australia	0.014	0.012	-0.010	-0.006
	(0.009)	(0.010)	(0.012)	(0.016)
CD*East Asia	-0.048***	-0.050***	-0.020***	-0.019**
	(0.008)	(0.009)	(0.007)	(0.009)
CD*South Asia	-0.052***	-0.055***	-0.012	-0.010
	(0.011)	(0.012)	(0.011)	(0.011)
CD*South East Asia	-0.043***	-0.046***	-0.013***	-0.010
	(0.007)	(0.008)	(0.004)	(0.009)
CD*Middle East	-0.048***	-0.05***	-0.008	-0.006
	(0.014)	(0.014)	(0.007)	(0.012)
CD*Eastern Europe	-0.001	-0.002	-0.003	-0.001
	(0.025)	(0.025)	(0.010)	(0.012)
CD*Northern Europe	-0.069	-0.071	-0.026	-0.024
	(0.059)	(0.059)	(0.020)	(0.021)
CD*Southern Europe	0.002	-0.001	-0.006	-0.004
	(0.009)	(0.01)	(0.007)	(0.010)
CD*Western Europe	0.016	0.013	-0.006	-0.005
	(0.015)	(0.017)	(0.010)	(0.014)
Inverse Mills Ratio		0.005		-0.005
		(0.006)		(0.012)
Housing Characteristics	Yes	Yes	Yes	Yes
Buyer Ethnicity Fixed Effects	Yes	Yes	Yes	Yes
Suburb Fixed Effects	Yes	Yes	Yes	Yes
Year/Quarter Fixed Effects	Yes	Yes	Yes	Yes
Monthly Time Trend	Yes	Yes	Yes	Yes
Clustered Standard Errors By ...	Suburb	Suburb	Suburb	Suburb
Adjusted R-square	0.8599	0.8599	0.8591	0.8591
Number of Observations	210,269	210,269	210,269	210,269

Conclusion

- We find home buyers have a preference for culturally proximate suburbs and are willing to pay higher prices for home located in those suburbs.
- The effect is strongest for buyers from East Asia, such as Chinese and Korean.
- Implications: culture is indeed an important priced factor on housing prices.