

Trust, Inequality and Ethnic Heterogeneity

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Using a large Australian social survey, combined with precise data on neighbourhood characteristics, I explore the factors that affect trust at a local level ('localised trust') and at a national level ('generalised trust'). Trust is positively associated with the respondent's education, and negatively associated with the amount of time spent commuting. At a neighbourhood level, trust is higher in affluent areas, and lower in ethnically and linguistically heterogeneous communities, with the effect being stronger for linguistic heterogeneity than ethnic heterogeneity. Linguistic heterogeneity reduces localised trust for both natives and immigrants, and reduces generalised trust only for immigrants. Instrumental variables specifications show similar results. In contrast to the USA, there is no apparent relationship between trust and inequality across neighbourhoods in Australia.

I Introduction

In places where people trust one another, institutions, markets and societies seem to work better. Because complete contracts will often be infeasible, high trust societies can potentially

overcome a costly market failure. Empirically, trust has been found to be associated with less corruption and more effective bureaucracies (La Porta *et al.*, 1997), higher rates of economic growth (Knack & Keefer, 1997; Hjerpe, 1998), financial development (Guiso *et al.*, 2004), and better education systems (Alesina *et al.*, 1999). At the very least, trust appears to be a useful proxy variable for a variety of outcomes that are important to economists.

*The 1997–1998 Australian Community Survey, conducted by researchers from Edith Cowan University and NCLS Research, was made possible by a grant from the Australian Research Council, together with the support of ANGLICARE (Diocese of Sydney) and the Board of Mission of the Uniting Church (New South Wales). The research was jointly supervised by Alan Black and Peter Kaldor. The research team included John Bellamy, Keith Castle and Philip Hughes. I am grateful to these researchers for sharing their dataset with me and commenting on earlier drafts, as well as to Alberto Alesina, Iwan Barankay, Chris Barrett, Bruce Chapman, Macgregor Duncan, Paul Frijters, Dan Hopkins, Robert Putnam, Geoff Woolcock and Michael Woolcock for valuable feedback on previous versions.

JEL classification: D31, D71, J15, Z13

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An emerging literature on the determinants of trust has examined variation across countries (Knack & Keefer, 1997; Uslander, 2002; Leigh, 2006), and across cities within the USA (Alesina & La Ferrara, 2002). This paper makes three new contributions to that literature. First, it estimates the effect of income, inequality, ethnic heterogeneity and linguistic heterogeneity at a neighbourhood level, in contrast to earlier studies conducted at the country or city level. Second, it focuses on two distinct types of trust: trust in those who live in the same neighbourhood ('localised trust'), and trust in those who live in the same country ('generalised trust'). Third, it analyses trust within Australia, expanding the scope of a literature that has been focused primarily on the USA.

The remainder of this paper is organised as follows. Section II discusses the theoretical and empirical literature on determinants of trust. Section III outlines the data and presents descriptive statistics. Section IV estimates the impact on trust of individual-level and neighbourhood-level factors. As a robustness check, Section V shows results from an instrumental variable specification in which mobility is taken to be endogenous at a neighbourhood level, but constrained at a regional level. The final section concludes.

II What Factors Might Affect Trust?

Several theories have been propounded to explain trust at an individual level. Trust may be driven by morals and culture, which are likely to be correlated with individual characteristics such as income, education, employment and age.¹ Those who are vulnerable to discrimination on the basis of their gender or race could be less trusting. And trust might be higher for those who have lived for longer in an area, and are hence more socially and culturally integrated.²

At a community level, a rise in mean income could be expected to be associated with increased trust, either because richer communities tip towards the high-trust equilibrium, or because they spend more on local public goods. Inequality may also affect trust by creating a perception of injustice (Brockner & Siegel, 1996), or because individuals feel more comfortable interacting with others who have similar levels of income or wealth.

Ethnic diversity might also be associated with lower levels of trust. This could occur because those in homogenous communities have similar tastes, because members of the majority group have an aversion to heterogeneity, or because diverse communities find it more difficult to enforce a system of social sanctions. Another possibility is that what matters most is not heterogeneity in physical appearance, but the ability to communicate. Linguistic heterogeneity has the potential to create what game theorists have called

'garbling', in which the equilibrium pay-offs fall as the quality of information declines (Blackwell & Girshik, 1954; Kandori, 1988; Cook & Cooper, 2003).

Assessing the community-level hypotheses across US cities, Alesina and La Ferrara (2002) found that average income is positively associated with trust, while inequality and racial heterogeneity are negatively associated with trust.³ When inequality and racial heterogeneity are both included in the model, only race is significant, with a one standard deviation increase in racial heterogeneity associated with a 3 percentage point fall in trust. Across countries, Leigh (2006) found that while both inequality and ethnic heterogeneity are negatively associated with trust, it is inequality that dominates when both are included in the model, a finding that holds true even after instrumenting for inequality.

Several studies have observed a negative relationship between racial/ethnic heterogeneity and the provision of public goods. Some of these studies have focused on developed countries. In fruit-picking teams on a UK farm, Bandiera *et al.* (2005) found that ethnic heterogeneity lowers productivity. Across US counties, Vigdor (2004) found that higher ethnic fractionalisation is associated with a lower rate of completing and returning the 2000 Census questionnaire, an action that secures significant federal grants for the community. Investigating the factors that lead to the creation of US political jurisdictions such as school districts, Alesina *et al.* (2004) found that racially heterogeneous counties are more willing to forego the economies of scale that come from consolidation. Analysing companies that served in the US Civil War, Costa and Kahn (2003a) found that ethnic diversity was correlated with higher desertion rates.

Other studies on the relationship between diversity and public goods have looked at developing nations. Across Indian regions, Banerjee *et al.* (2005) found that more caste or religious fractionalisation is associated with lower levels of public goods provision. Across communities in northern Pakistan, Khwaja (2002) found that infrastructure projects are better maintained where there is less heterogeneity in terms of clan, religion and political division. Across Kenyan school districts, Miguel and Gugerty (2005) found that ethno-linguistic

¹ Another approach is that of Boone *et al.* (1999) who found that particular personality types are strongly related to an individual's behaviour in Prisoner's Dilemma games. For an extensive discussion of trust games, see Camerer (2003).

² Experimental evidence supports the 'folk theorem' result – that the probability of maintaining a high-trust equilibrium falls when a high fraction of one's partners are changed after each round (Cohen *et al.*, 2001).

³ Similarly, Costa and Kahn (2003b) found that the fall in volunteering and group membership in the USA between the 1950s and the 1990s was primarily attributable to rising inequality and ethnic heterogeneity.

fractionalisation is associated with worse school facilities and less voluntary fundraising. And across countries, Easterly and Levine (1997) found a negative correlation between ethnic fractionalisation and growth, which they attribute to ethnic diversity making it more difficult for communities to agree on the provision of public goods and pro-growth policies.

III Data and Descriptive Statistics

To measure trust, I used data from the Australian Community Survey (ACS), conducted in 1997–1998. The survey asked two questions about trust. All 6500 respondents were asked whether they agreed or disagreed with the statement ‘Generally speaking, you can’t be too careful in dealing with most Australians,’ and one-quarter of the sample (1580 respondents) were asked whether they agreed with the statement ‘Generally speaking, most Australians can be trusted.’ For respondents who were asked both questions, the correlation is 0.4. Given that the former question has a larger sample size, I therefore opt to use it instead. Replicating the analysis with the latter question does not materially affect the results, although statistical significance decreases somewhat.

Respondents are coded as trusting if they disagreed with the statement ‘Generally speaking, you can’t be too careful in dealing with most Australians.’⁴ The ACS also asked a parallel question with reference to ‘people in my local area’. Results for localised trust and generalised trust are presented separately. Although the literature has tended to focus on generalised trust, localised trust is likely to be more important for certain outcomes, such as local funding decisions, and the efficacy of non-profit organisations.

What is the ‘Generally speaking, you can’t be too careful in dealing with . . .’ question really measuring? Glaeser *et al.* (2000) surveyed a group of Harvard undergraduates, and then asked them

to play a trust game. They found that the question used in the General Social Survey (‘Generally speaking, would you say that most people can be trusted, or that you can’t be too careful in dealing with people?’) actually measures how trustworthy the respondent is, rather than how trusting of others they are. Similarly, Karlan (2005) finds that Peruvian respondents who agree that most people can be trusted are less likely to default on their microcredit loans. It is likewise possible that the question used in this paper is actually measuring how trustworthy rather than how trusting the respondent is. Readers who wish to interpret the results in this paper as such should feel free to do so, although it makes little difference when interpreting the effect of neighbourhood-level factors.

The ACS also includes a number of measures of individual characteristics, including sex, age, education, birthplace, hours of work and commuting time. While the ACS does not include a measure of income (except for a very small subsample of respondents), it does include an indicator for the respondent’s occupation, at approximately the one-digit level.⁵ The survey also has a precise geographical identifier – the respondent’s postal code, which generally corresponds to their suburb. The average ACS respondent lives in a postal area of approximately 20 000 people. For ease of explication, I will refer to these areas as ‘neighbourhoods’.

Using the 1996 Australian census (the closest census to the ACS survey), it is possible to determine characteristics of the respondent’s neighbourhood. For the 1996 census, the Australian Bureau of Statistics published a full tabulation of income, birthplace and language spoken at home by postal code (ABS, 1997).⁶ Using these data, it is possible to create measures of income, inequality, ethnic heterogeneity and linguistic heterogeneity for small geographic areas, unaffected by sampling problems.

Income is the log mean weekly income among individuals in the respondent’s neighbourhood, based on gross personal income from all sources

⁴ In international surveys of interpersonal trust, Australia’s ranking is about average for a rich nation. For example, in the European and World Values Surveys Integrated Data File (1995–2000), people in 81 countries were asked: ‘Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?’ Australia ranked 16th, with 40 per cent agreeing that most people could be trusted, above Britain (30 per cent), Canada (39 per cent) and the USA (36 per cent), but below Japan (43 per cent), New Zealand (49 per cent) and Denmark (67 per cent). The unweighted country average was 28 per cent.

⁵ The 13 occupations are manager – 10 employees or more; manager – less than 10 employees; professional working with people; professional working with technology; office/business/shop – supervising others; office/business/shop – not supervising; foreman/supervisor; skilled trades; semiskilled manual worker; other manual worker; farmer; agricultural worker; and never had a job.

⁶ Whether respondents had moved in the previous 5 years was asked in the census, but is not tabulated at a postal code level.

(including pensions and allowances). Inequality is measured using the Gini coefficient. The Gini is particularly appropriate in this instance, because it can be interpreted as half the income gap between any two randomly selected individuals in an area (e.g. if the Gini is 0.3, the expected gap between any two individuals is 60 per cent of mean income). Ethnic heterogeneity and linguistic heterogeneity are measured using a Herfindahl-type fractionalisation index. Where s_{ej} is the share of ethnic group e in neighbourhood j , $FRACT_j = 1 - \sum_{e=1}^N s_{ej}^2$. The fractionalisation index in a given neighbourhood measures the chance that two randomly selected individuals are in a different ethnic or linguistic group, and is hence analogous to the Gini coefficient.⁷

Two measures of ethno-linguistic heterogeneity are used. First, I calculated a measure of ethnic fractionalisation based on country of birth. The census classifies respondents as born in Australia, or in 22 broad regions of the world (e.g. North America, South Asia). Second, I formed a measure of linguistic fractionalisation based on whether the respondent speaks a language other than English at home. Those who speak only English at home are classified as one subgroup, 24 other languages are separately identified, and a final category identifies 'other' languages. Summary statistics are presented in Table 1. Notably, the standard deviation of inequality and ethnic fractionalisation across Australian neighbourhoods is similar to the standard deviation of these measures across US cities (Alesina & La Ferrara, 2002; Appendix A).

Figures 1 to 4 show the neighbourhood-level associations between trust and income, inequality, ethnic fractionalisation and linguistic fractionalisation. Despite the large sample size, there are some neighbourhoods for which all the ACS respondents report the same level of trust, so the average level of trust is either 0 or 1.

These scatterplots provide some sense of the patterns in the data. Figure 1 shows that across neighbourhoods, trust is positively correlated with average income, while Figure 2 suggests a slight

⁷ For more detail on the fractionalisation index, see Alesina *et al.* (2003). An alternative would be to use a polarisation index, which reaches its maximum when there are two groups of equal size (see for example the discussion of religious polarisation in Montalvo & Reynal-Querol, 2003). Replicating the analysis in this paper with such a measure does not materially affect the results.

TABLE 1
Summary Statistics

	Mean	SD
Individual-level variables		
Trust in people in the local area	0.499	0.500
Trust in most Australians	0.576	0.494
Female	0.514	0.500
Age	53.059	16.807
Born overseas	0.222	0.415
Years of education	12.725	2.308
Unemployed	0.025	0.157
Moved in the past 10 years	0.648	0.478
Hours of travelling per week	6.396	5.013
Hours of work per week	25.908	20.912
Neighbourhood-level variables		
Mean weekly income	397.905	78.813
Inequality (Gini)	0.446	0.022
Ethnic fractionalisation	0.370	0.161
Linguistic fractionalisation	0.233	0.201
Population of neighbourhood	19 962	14 765
Region-level variables		
Mean weekly income	394.597	54.257
Inequality (Gini)	0.453	0.012
Ethnic fractionalisation	0.376	0.144
Linguistic fractionalisation	0.248	0.176
Population of region	463 331	415 922

Notes:

- All statistics are weighted using person-weights in the ACS.
 - Sample size is 6500 individuals, spread across 692 neighbourhoods and 52 regions.
- SD, standard deviation.
Sources: 1997–1998 Australian Community Survey (ACS) and 1996 Australian Census.

positive relationship between trust and inequality. Both the fractionalisation measures are negatively correlated with trust, with the relationship appearing to be somewhat weaker for ethnic fractionalisation (Fig. 3) than for linguistic fractionalisation (Fig. 4).

IV Who Trusts?

Although the graphs in this paper provide suggestive evidence of the relationship between neighbourhood characteristics and trust, it is preferable to hold constant the individual's own characteristics when estimating the impact of regional characteristics. Where $P(\text{Trust})$ is the probability that individual i in neighbourhood j agrees that most people can be trusted, X is a vector of individual characteristics (gender, education, age, whether born overseas, occupation, whether unemployed, mobility, travel time, work hours), and Y is a vector of neighbourhood-level characteristics (various combinations of average income,

FIGURE 1
Income and Trust across Neighbourhoods

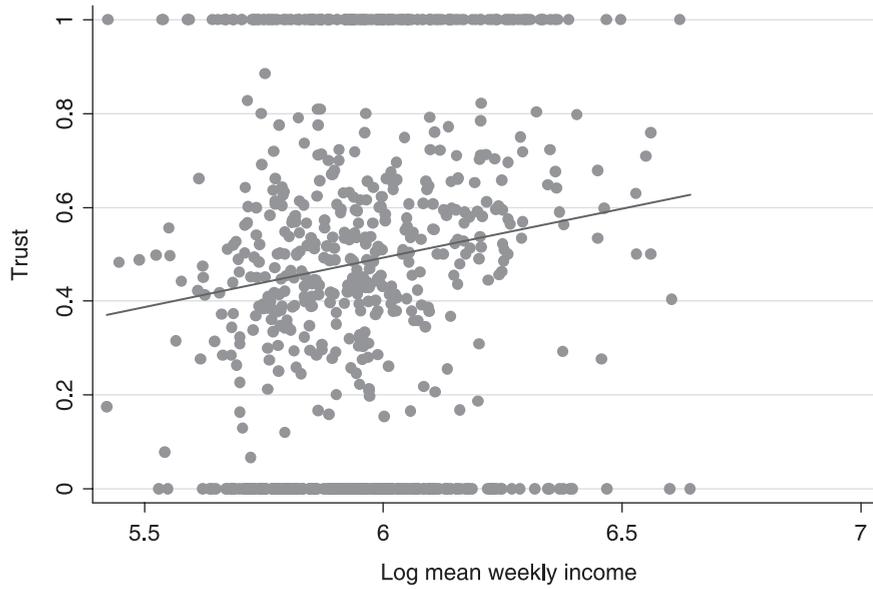


FIGURE 2
Inequality and Trust across Neighbourhoods

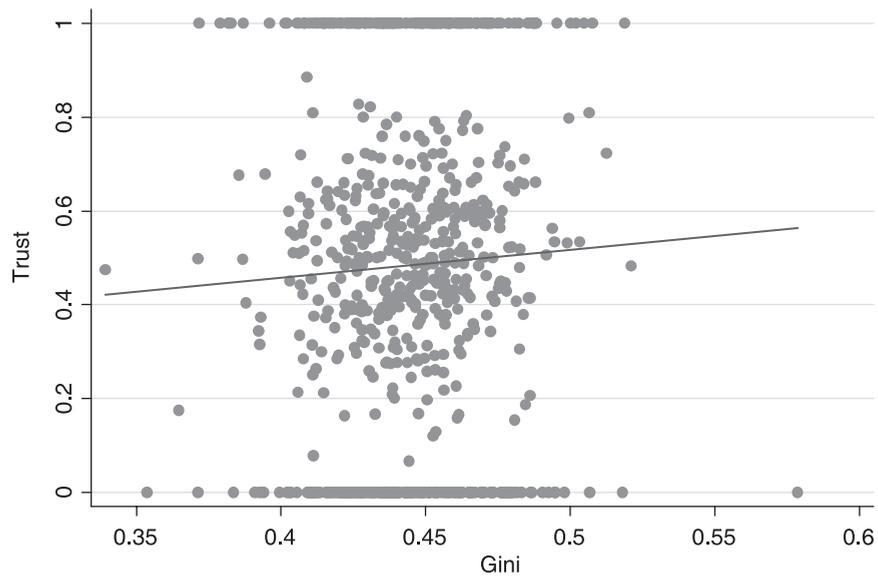


FIGURE 3
Ethnic Fractionalisation and Trust across Neighbourhoods

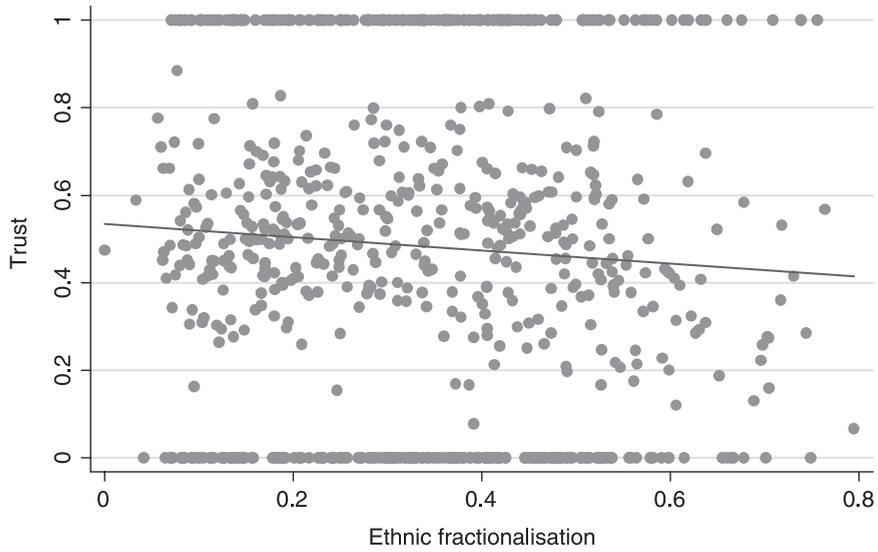


FIGURE 4
Linguistic Fractionalisation and Trust across Neighbourhoods

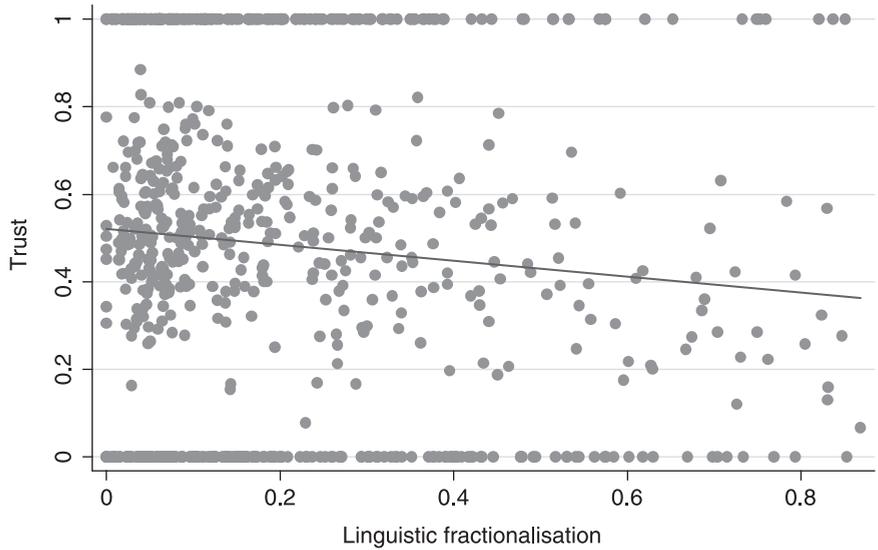


TABLE 2
Localised Trust (Probit)

Dependent Variable: 0 if Agrees that 'Generally Speaking, You can't be too Careful in Dealing with Most People in my Local Area'; 1 if Disagrees

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.025 (0.017)	0.025 (0.017)	0.026 (0.017)	0.026 (0.017)	0.026 (0.017)	0.027 (0.017)
Age	0.003 (0.002)	0.003 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)
Age ² /1000	-0.051** (0.025)	-0.051** (0.025)	-0.041* (0.024)	-0.039 (0.024)	-0.039 (0.024)	-0.042* (0.024)
Born overseas	-0.054*** (0.019)	-0.054*** (0.019)	-0.027 (0.019)	-0.03 (0.019)	-0.029 (0.019)	0.023 (0.028)
Years of education	0.019*** (0.004)	0.019*** (0.004)	0.021*** (0.004)	0.022*** (0.004)	0.022*** (0.004)	0.021*** (0.004)
Unemployed	-0.045 (0.056)	-0.045 (0.056)	-0.049 (0.056)	-0.046 (0.056)	-0.046 (0.056)	-0.044 (0.057)
Moved in last 10 years	-0.003 (0.015)	-0.004 (0.015)	-0.005 (0.015)	-0.009 (0.015)	-0.009 (0.015)	-0.009 (0.015)
Hours travelling per week	-0.004*** (0.002)	-0.004*** (0.002)	-0.003** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.004** (0.002)
Hours working per week	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Neighbourhood income	0.259*** (0.046)	0.265*** (0.050)	0.330*** (0.044)	0.278*** (0.045)	0.274*** (0.048)	0.268*** (0.044)
Inequality		-0.003 (0.009)			0.004 (0.009)	
Ethnic fractionalisation			-0.052*** (0.009)		-0.003 (0.016)	
Linguistic fractionalisation				-0.059*** (0.009)	-0.056*** (0.015)	-0.047*** (0.011)
Linguistic fractionalisation *Born overseas						-0.040** (0.017)
Occupation indicators?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6500	6500	6500	6500	6500	6500
Pseudo R ²	0.04	0.04	0.04	0.04	0.04	0.04

Notes:

1. ***, ** and * denote significance at the 1 per cent, 5 per cent and 10 per cent levels, respectively. Coefficients are marginal probabilities from a probit model. Robust standard errors, clustered at the neighbourhood level, in parentheses.

2. Inequality, ethnic fractionalisation and linguistic fractionalisation are normed so that their coefficients represent the marginal effect of a one standard deviation increase.

3. Occupation indicators cover the 13 occupational categories listed in the ACS.

Sources: 1997–1998 Australian Community Survey (ACS) and 1996 Australian Census.

ethno-linguistic fractionalisation and inequality) the equation to be estimated is:

$$P(\text{Trust})_{ij} = \alpha + \beta X_{ij} + \delta Y_j + \varepsilon_{ij} \quad (1)$$

Because a primary focus of this paper is on neighbourhood-level characteristics, standard errors are clustered at a neighbourhood level.

(i) Individual Characteristics

Tables 2 and 3 present results from a probit model of the factors associated with localised

trust and generalised trust.⁸ At an individual level, an extra year of education is associated with a 1½ to 2 percentage point increase in both types of trust. An additional 10 hours of commuting per week is associated with a 4–5 percentage point fall in trust – a finding consistent with Putnam's

⁸ In their univariate analyses of the ACS dataset, Hughes *et al.* (1999, 2000) discuss several variables that are correlated with trust. Their findings are broadly consistent with those presented here.

TABLE 3
Generalised Trust (Probit)

Dependent Variable: 0 if Agrees that 'Generally Speaking, You can't be too Careful in Dealing with Most Australians';
1 if Disagrees

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.003 (0.018)	0.003 (0.018)	0.003 (0.018)	0.003 (0.018)	0.003 (0.018)	0.004 (0.018)
Age	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
Age ² /1000	0.002 (0.024)	0.002 (0.024)	0.003 (0.024)	0.005 (0.024)	0.005 (0.024)	0.002 (0.024)
Born overseas	-0.025 (0.017)	-0.025 (0.017)	-0.021 (0.017)	-0.017 (0.017)	-0.022 (0.017)	0.041* (0.025)
Years of education	0.016*** (0.004)	0.016*** (0.004)	0.017*** (0.004)	0.017*** (0.004)	0.017*** (0.004)	0.017*** (0.004)
Unemployed	-0.132** (0.054)	-0.132** (0.054)	-0.132** (0.054)	-0.132** (0.054)	-0.130** (0.054)	-0.130** (0.055)
Moved in last 10 years	0.025 (0.016)	0.025 (0.016)	0.025 (0.016)	0.023 (0.016)	0.022 (0.016)	0.024 (0.016)
Hours travelling per week	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)
Hours working per week	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Neighbourhood income	0.181*** (0.043)	0.189*** (0.046)	0.190*** (0.043)	0.184*** (0.043)	0.160*** (0.047)	0.172*** (0.043)
Inequality		-0.004 (0.009)			-0.001 (0.008)	
Ethnic fractionalisation			-0.007 (0.008)		0.025* (0.014)	
Linguistic fractionalisation				-0.016** (0.008)	-0.036*** (0.014)	-0.003 (0.009)
Linguistic fractionalisation *Born overseas						-0.043*** (0.016)
Occupation indicators?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6500	6500	6500	6500	6500	6500
Pseudo R ²	0.03	0.03	0.03	0.03	0.03	0.03

Notes:

1. ***, ** and * denote significance at the 1 per cent, 5 per cent and 10 per cent levels, respectively. Coefficients are marginal probabilities from a probit model. Robust standard errors, clustered at the neighbourhood level, in parentheses.

2. Inequality, ethnic fractionalisation and linguistic fractionalisation are normed so that their coefficients represent the marginal effect of a one standard deviation increase.

3. Occupation indicators cover the 13 occupational categories listed in the ACS.

Sources: 1997–1998 Australian Community Survey (ACS) and 1996 Australian Census.

theory that commuting has an adverse impact on social capital (Putnam, 2000). An additional 10 hours of work per week is associated with a 2 percentage point increase in trust.⁹

Some individual-level factors appear to affect generalised and localised trust differently. Being

⁹ However, since the regression controls for occupation but not income, the coefficient on working hours may also be capturing an intra-occupational income effect.

unemployed is associated with a 13 percentage point fall in generalised trust, but has no statistically significant effect on localised trust. This may reflect two offsetting effects of being jobless: frustration at society at large, but also the fact that the unemployed tend to spend more time in their local area. The reverse is true of those born overseas, who are no less trusting of Australians in general, but tend to be 5 per cent less trusting of those in their local area (although this is no longer statistically significant once neighbourhood-level

characteristics are controlled for). Perhaps immigrants have a tendency to feel grateful to the population at large for permitting them to enter the country, but suffer discrimination at a local level, or have difficulty adapting into unfamiliar surroundings and building trust with their neighbours.

There is no statistically significant association between trust and gender, suggesting that gender disparities in Australia are not sufficient to create significant gaps in trust levels between men and women. The relationship between trust and age is also approximately zero (although the age² term is statistically significant in some specifications in Table 2, the magnitude of the coefficient is tiny). Lastly, I found no evidence that those who have moved house in the past decade tend to be less trusting. If the experimental findings on population mobility and trust are borne out in reality, it is therefore more likely that they operate through the overall stability of the community rather than through an 'untrusting mover' effect. Unfortunately, it was not possible to obtain precise neighbourhood-level population mobility data from the 1996 census.

(ii) Neighbourhood Income, Inequality and Ethnic Diversity

Tables 2 and 3 show the results for generalised and localised trust. At a neighbourhood level, mean income is positively associated with trust: a 10 per cent increase in mean income is associated with a 3 percentage point increase in localised trust, and a 2 percentage point increase in generalised trust. However, extra care should be taken in interpreting the coefficient on neighbourhood income here, as the specification controls only for individual occupation, and not for individual income. It is therefore possible that part of the observed 'neighbourhood income effect' is merely an aggregation of (intraoccupational) individual-level income effects.

For inequality, I find no evidence that people in more unequal neighbourhoods in Australia tend to be less trusting. In most estimates in Tables 2 and 3, the standard error of the coefficient on inequality is sufficiently small as to make it possible to rule out effects larger than ± 1 percentage point when inequality increases by one standard deviation.

There is a strong negative relationship between localised trust and ethno-linguistic fractionalisation (Table 2). A one standard deviation increase in ethnic fractionalisation is associated with a 5 percentage point fall in localised trust, while a one standard deviation increase in linguistic fractionalisation is associated with a 6 percentage point fall

in localised trust. Both are significant at the 1 per cent level. When inequality and the two measures of ethno-linguistic fractionalisation are included in the regression, linguistic fractionalisation remains highly significant, with the coefficient virtually unchanged, while the coefficients on inequality and ethnic fractionalisation become small and insignificant. This suggests that sharing a common ethnic heritage may be less important for localised trust than the ability to communicate effectively.

The relationship between generalised trust and ethno-linguistic fractionalisation is more modest than for localised trust. Table 3 shows no significant association between generalised trust and ethnic fractionalisation, and a one standard deviation increase in linguistic fractionalisation is associated with only a 1.5 percentage point fall in generalised trust. If inequality and the two measures of ethno-linguistic fractionalisation are included together, linguistic fractionalisation is again negative and statistically significant, while ethnic fractionalisation is (surprisingly) positive and marginally statistically significant.

Does linguistic fractionalisation reduce the level of trust among both natives and non-natives? To test this, linguistic fractionalisation is interacted with a dummy variable for whether the respondent is born overseas. For localised trust, a one standard deviation increase in linguistic fractionalisation is associated with a 5 percentage point fall in trust for those born in Australia, and a 9 percentage point fall in trust for those born overseas (Table 2, column 6). Both findings are significant at the 5 per cent level or better. However, for generalised trust, the effect appears to operate exclusively through those born overseas (Table 3, column 6). Taking these results together, it seems that immigrants in linguistically diverse neighbourhoods tend to be less trusting than non-immigrants in those communities. There are two possible explanations for this effect. It could be that the main mechanism is a selection process through which those immigrants who move into diverse neighbourhoods tend themselves to be less trusting. Alternatively, it could be that interactions within geographical areas tend to cause neighbourhoods to tip towards either a high-trust or a low-trust equilibrium.

How do the coefficients on neighbourhood income, inequality and diversity in the generalised trust regressions compare with those found by Alesina and La Ferrara (2002) for the USA? For neighbourhood income, respondents in richer parts of both countries tend to be more trusting, but the

magnitude of the effect is larger in the USA (a 10 per cent rise in average city income is associated with an 8 percentage point rise in trust) than in Australia (a 10 per cent rise in neighbourhood income is associated with a 2 percentage point rise in trust).¹⁰ For inequality, Alesina and La Ferrara found a significant negative relationship between trust and inequality, which disappears once they control for racial diversity, while I found no significant relationship between trust and inequality in Australia. This would be consistent with the explanation that the apparent inequality/trust correlation in the USA is an artefact of the fact that inequality and racial diversity are strongly related to one another in the USA.

For diversity, Alesina and La Ferrara found that what matters most for the USA is racial fragmentation, while I found that for Australia, linguistic fragmentation is most important. However, the coefficients are similar: a one standard deviation increase in racial fractionalisation is associated with a 3 percentage point fall in generalised trust in the USA, while a one standard deviation increase in linguistic fractionalisation in Australia is associated with a 2–4 percentage point fall in generalised trust. However, the causes appear to differ: while the US results seem to be driven primarily by the native-born population's aversion to heterogeneity, the negative relationship between generalised trust and linguistic diversity in Australia appears to operate exclusively through those born overseas.

V What if Locational Choice is Endogenous?

In the above analysis, I have assumed that neighbourhood characteristics affect levels of trust, rather than the reverse. However, it is possible that locality choices are endogenous to individuals' willingness to trust others (for example, less trusting people might prefer to live in more heterogeneous neighbourhoods). Failing to take account of this possibility could lead to biased estimates of the true neighbourhood effects.

In a paper on ethnic diversity and attitudes towards ethnic minorities, Dustmann and Preston (2001) proposed a possible solution to the problem of identifying the causal effect of ethnic diversity. They posited that families choose where to live at a very local level, but are constrained at a regional level by factors such as a desire to be near their

place of work, or to be within a reasonable proximity of family and friends. Using data from the UK, Dustmann and Preston instrument for racial composition in a ward (average size: 5000 people) with racial composition in the surrounding district (average size: 125 000 people) or county (average size: 1 million people).

A similar approach can be applied in the present case. So far, neighbourhood effects have been estimated using neighbourhood units of approximately 20 000 people. I now calculate measures of income and ethnic composition at the regional level, where regions are areas of approximately 460 000 people. Regions are either part of a major city, an entire minor city, part of a large state, or an entire small state or territory. For example, Parramatta, Tasmania, North Queensland and the Gold Coast are all distinct regions. Respondents in the sample are spread across 692 neighbourhoods and 52 regions.

Assuming an individual's neighbourhood (j) may be endogenous, but their region (k) is exogenous, I now estimate a two-stage model, in which Y_k is a given characteristic of region k .

$$\text{Stage 1: } Y_k = \lambda + \rho X_{ijk} + Y_k + v_{ijk} \quad (2)$$

$$\text{Stage 2: } P(\text{Trust})_{ijk} = \alpha + \beta X_{ijk} + \hat{Y}_{jk} + \epsilon_{ijk} \quad (3)$$

Given certain limitations with probit IV models, I estimate the equation using two-stage least squares, clustering standard errors at the neighbourhood level.¹¹

The results from these specifications are shown in Table 4. For localised trust (Panel A), the results of the IV specification are similar to the results of the probit regressions in Table 2. The income coefficient remains around 0.2–0.3, and the linguistic heterogeneity coefficient remains around –0.05. Both are statistically significant at the 1 per cent level. When linguistic heterogeneity is interacted with the respondent's own birthplace, the interaction between linguistic heterogeneity and overseas born remains negative, but is no longer statistically significant.

¹¹ Using the *ivprobit* command in Stata, it is possible to estimate some of the specifications, but the command does not allow the use of analytic weights, and most specifications do not converge. For those that do converge, the results are qualitatively similar to the 2SLS results shown in Table 4. Likewise, estimating the specifications shown in Tables 2 and 3, but using regional characteristics in place of neighbourhood characteristics, produces similar results to the 2SLS specification.

¹⁰ Since Alesina and La Ferrara (2002) include both log median income and log median income² in their model, the effect of a 10 per cent increase in a city's median income is estimated at the sample mean.

TABLE 4
Instrumental Variables Specifications

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Localised Trust						
<i>Dependent variable: 0 if agrees that 'Generally speaking, you can't be too careful in dealing with most people in my local area'; 1 if disagrees</i>						
Neighbourhood income	0.193*** (0.065)	0.233*** (0.077)	0.344*** (0.073)	0.284*** (0.068)	0.309*** (0.087)	0.272*** (0.070)
Inequality		-0.018 (0.020)			-0.013 (0.020)	
Ethnic fractionalisation			-0.045*** (0.012)		0.001 (0.019)	
Linguistic fractionalisation				-0.051*** (0.011)	-0.051*** (0.018)	-0.043*** (0.015)
Linguistic fractionalisation *Born overseas						-0.026 (0.022)
Individual-level controls?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6500	6500	6500	6500	6500	6500
R ²	0.05	0.05	0.06	0.06	0.06	0.06
Panel B: Generalised Trust						
<i>Dependent variable: 0 if agrees that 'Generally speaking, you can't be too careful in dealing with most Australians'; 1 if disagrees</i>						
Neighbourhood income	0.170*** (0.060)	0.159** (0.067)	0.178*** (0.068)	0.185*** (0.061)	0.141* (0.073)	0.172*** (0.063)
Inequality		0.005 (0.017)			0.006 (0.017)	
Ethnic fractionalisation			-0.003 (0.011)		0.016 (0.018)	
Linguistic fractionalisation				-0.009 (0.010)	-0.022 (0.017)	0.000 (0.013)
Linguistic fractionalisation *Born overseas						-0.028 (0.021)
Individual-level controls?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6500	6500	6500	6500	6500	6500
R ²	0.04	0.04	0.04	0.04	0.04	0.04

Notes:

1. ***, ** and * denote significance at the 1 per cent, 5 per cent and 10 per cent levels, respectively. Coefficients are from a linear probability IV model, with region-level characteristics used to instrument for neighbourhood-level characteristics. Robust standard errors, clustered at the neighbourhood level, in parentheses.

2. Inequality, ethnic fractionalisation and linguistic fractionalisation are normed so that their coefficients represent the effect of a one standard deviation increase.

3. All regressions include the full set of individual-level controls shown in Tables 2 and 3: sex, age, age², whether born overseas, years of education, whether unemployed, whether moved in past 10 years, travel time, work time, and indicator variables for the 13 occupational categories listed in the ACS.

Sources: 1997–1998 Australian Community Survey (ACS) and 1996 Australian Census.

For generalised trust (Panel B of Table 4), the coefficients for income are similar to those in the probit model. However, the coefficients in ethno-linguistic heterogeneity tend to be smaller in magnitude, and none are statistically significant. Taken together, the results from Table 4 indicate that while localised trust is generally exogenous to locational decisions, generalised trust may be

endogenous to the neighbourhood in which an individual chooses to live.

VI Conclusion

This paper has explored the determinants of localised trust and generalised trust across Australia. At an individual level, education and working hours are positively associated with trust,

while commuting time is negatively associated with trust. Immigrants tend to show less localised trust, while the unemployed exhibit less generalised trust. At a neighbourhood level, trust is higher in richer neighbourhoods, and lower in ethnically or linguistically heterogeneous neighbourhoods. The effect of linguistic heterogeneity is stronger on immigrants than on the native-born population. There is no apparent relationship between inequality and trust across Australian neighbourhoods. On the assumption that mobility decisions are constrained at a regional level, I instrument for neighbourhood characteristics with regional characteristics. This IV specification supports most of the findings relating to localised trust, but in the generalised trust IV specification the coefficients on ethnic and linguistic heterogeneity are statistically insignificant.

Given that Australia and the USA are both 'settler societies' that experienced high levels of immigration in the postwar era (Freeman & Jupp, 1992), it is perhaps not surprising that there is a negative relationship between ethno-linguistic heterogeneity and trust in both countries. Yet given the substantial benefits of immigration, reducing ethnic heterogeneity would most likely have a net detrimental effect. Instead, policymakers should focus attention on the problem itself – building local-level trust in diverse communities. To the extent that the marginal returns from community-building programs are higher in neighbourhoods with lower levels of trust, these programs should be targeted towards communities that are less affluent and more linguistically diverse.

REFERENCES

- Alesina, A., Baqir, R. and Easterly, W. (1999), 'Public Goods and Ethnic Divisions', *Quarterly Journal of Economics*, **114**, 1243–84.
- Alesina, A., Baqir, R. and Hoxby, C. (2004), 'Political Jurisdictions in Heterogeneous Communities', *Journal of Political Economy*, **112**, 348–96.
- Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S. and Wacziarg, R. (2003), 'Fractionalization', *Journal of Economic Growth*, **8**, 155–94.
- Alesina, A. and La Ferrara, E. (2002), 'Who Trusts Others?' *Journal of Public Economics*, **85**, 207–34.
- Australian Bureau of Statistics. (1997), *CDATA 1996* (CD ROM), ABS, Canberra, ACT.
- Bandiera, O., Barankay, I. and Rasul, I. (2005), 'Cooperation in Collective Action', *Economics of Transition*, **13**, 473–98.
- Banerjee, A., Iyer, L. and Somanathan, R. (2005), 'History, Social Divisions, and Public Goods in Rural India', *Journal of the European Economic Association*, **3**, 639–47.
- Blackwell, D. and Girshik, M. (1954), *Theory of Games and Statistical Decisions*, Wiley, New York.
- Boone, C., De Brabander, B. and van Witteloostuijn, A. (1999), 'The Impact of Personality on Behavior in Five Prisoner's Dilemma Games', *Journal of Economic Psychology*, **20**, 343–77.
- Brockner, J. and Siegel, P. (1996), 'Understanding the Interaction Between Procedural and Distributive Justice', in Kramer, R.M. and Tyler, T.R. (eds), *Trust in Organizations*, Sage Publications, Thousand Oaks, CA; 390–413.
- Camerer, C.F. (2003), *Behavioral Game Theory, Experiments in Strategic Interaction*, Princeton University Press, Princeton, NJ.
- Cohen, M.D., Riolo, R.L. and Axelrod, R. (2001), 'The Role of Social Structure in the Maintenance of Cooperative Regimes', *Rationality and Society*, **13**, 5–32.
- Cook, K. and Cooper, R. (2003), 'Experimental Studies of Cooperation, Trust, and Social Exchange', in Ostrom, E. and Walker, J. (eds), *Trust and Reciprocity, Interdisciplinary Lessons from Experimental Research*, Russell Sage Foundation, New York; 209–44.
- Costa, D.L. and Kahn, M.E. (2003a), 'Cowards and Heroes, Group Loyalty in the American Civil War', *Quarterly Journal of Economics*, **118**, 519–48.
- Costa, D. and Kahn, M. (2003b), 'Civic Engagement and Community Heterogeneity, An Economist's Perspective', *Perspectives on Politics*, **1**, 103–11.
- Dustmann, C. and Preston, I. (2001), 'Attitudes to Ethnic Minorities, Ethnic Context and Location Decisions', *Economic Journal*, **111**, 353–73.
- Easterly, W. and Levine, R. (1997), 'Africa's Growth Tragedy, Policies and Ethnic Divisions', *Quarterly Journal of Economics*, **112**, 1203–50.
- Freeman, G. and Jupp, J. eds. (1992), *Nations of Immigrants, Australia, the United States and International Migration*, Oxford University Press, New York and Melbourne.
- Glaeser, E., Laibson, D., Scheinkman, J. and Soutter, C. (2000), 'Measuring Trust', *Quarterly Journal of Economics*, **65**, 811–46.
- Guiso, L., Sapienza, P. and Zingales, L. (2004), 'The Role of Social Capital in Financial Development', *American Economic Review*, **94**, 526–56.
- Hjerppe, R. (1998), *Social Capital and Economic Growth*, Discussion Paper No. 183, Government Institute for Economic Research (VATT), Helsinki.
- Hughes, P., Bellamy, J. and Black, A. (1999), 'Social Trust, Locally and Across Australia', *Third Sector Review*, **5**, 5–24.
- Hughes, P., Bellamy, J. and Black, A. (2000), 'Building Social Trust Through Education', in Winter, I. (ed.), *Social Capital and Public Policy in Australia*, Australian Institute of Family Studies, Melbourne, Vic.; 225–49.
- Kandori, M. (1988), 'Monotonicity of Equilibrium Payoff Sets with Respect to Observability in Repeated Games with Imperfect Monitoring', Institute for Mathematical Studies in the Social Sciences (IMSSS) Technical Report No. 523, Stanford University, Stanford, CA.

- Karlan, D. (2005), 'Using Experimental Economics to Measure Social Capital and Predict Financial Decisions', *American Economic Review*, **95**(5), 1688–99.
- Khwaja, A. (2002), 'Can Good Projects Succeed in Bad Communities? Collective Action in Public Good Provision', Mimeo, Harvard University, Cambridge, MA.
- Knack, S. and Keefer, P. (1997), 'Does Social Capital Have an Economic Payoff? A Cross-Country Investigation', *Quarterly Journal of Economics*, **112**, 1251–88.
- La Porta, R., Lopez-De-Silanes, F., Shleifer, A. and Vishny, R.W. (1997), 'Trust in Large Organizations', *American Economic Review, Papers and Proceedings*, **87**, 333–8.
- Leigh, A. (2006), 'Does Equality Lead to Fraternity?' *Economics Letters*, forthcoming.
- Miguel, E. and Gugerty, M. (2005), 'Ethnic Diversity, Social Sanctions, and Public Goods in Kenya', *Journal of Public Economics*, **89**, 2325–68.
- Montalvo, J. G. and Reynal-Querol, M. (2003), 'Religious Polarization and Economic Development', *Economics Letters*, **80**, 201–10.
- Putnam, R. (2000), *Bowling Alone, The Collapse and Revival of American Community*, Simon and Schuster, New York.
- Uslaner, E.M. (2002), *The Moral Foundations of Trust*, Cambridge University Press, Cambridge.
- Vigdor, J.L. (2004), 'Community Composition and Collective Action: Analyzing Initial Mail Response to the 2000 Census', *Review of Economics and Statistics*, **86**, 303–12.