1. Introduction

Common to virtually all Western countries, New Zealand is becoming a more diverse society. Driven in part by changes to tax and immigration policy as well as differential fertility rates, New Zealand is growing more heterogeneous in dimensions such as household income, languages spoken, ethnicity, and religious affiliation.[1] Growing evidence, particularly from studies using United States data, suggest that rising social heterogeneity may reduce the "thickness," or volume of voluntary interaction of participants in society ("social capital").   Social capital indicators that have been studied include membership in organisations (Alesina and La Ferrara 2000), registering to vote (Putnam 2007), volunteering (Costa and Kahn 2003a, 2003 b, Putnam 2007), returning census forms (Vigdor 2004), and voluntarily contributing to public or charitable goods (Putnam 2007).   Social diversity may affect social capital indicators such as people's contributions to public goods by increasing the likelihood that their preferences are not aligned, which may reduce the ability of "generalist" organisations to raise funds from the community (Alesina, Baqir and Easterly (1999), Liberman (1993)).   Social diversity may also reduce the ability of communities to impose negative social sanctions for "free riding" across group lines (Miguel and Gugerty 2005).   Alternatively, people who are less inclined to contribute to social interactions may simply be attracted to live in more heterogeneous areas, making diversity wrongly appear responsible for social withdrawal.

The effect of social diversity on community financial support for schools in particular has received little attention to date. One exception in a developing country context is Miguel and Gugerty (2005), who study the effects of ethnic heterogeneity on contributions to support local schools in rural Kenya. These authors find that area ethnic diversity significantly reduces funds people contribute, which in turn reduces school quality in more heterogeneous areas. Our study provides the first attempt we know of in a developed economy context to test whether neighbourhood heterogeneity (by various dimensions) has an effect on voluntary funding for schools. More broadly, we attempt to estimate the neighbourhood determinants of three categories of local funding for schools: quasi-compulsory 'parental contributions', fundraising, and cash donations. This information may enable schools to more effectively raise funds, either locally, or from other sources such as targeted government grants or international enrolments.

We use data from the New Zealand Ministry of Education and Census for 2001 and 2006 to estimate how social diversity affects a school's ability to raise local funds via parental contributions, fundraising, or cash donations. Revenue data reported by individual primary and secondary schools is matched with measures of the heterogeneity of the geographic area unit in which the school is located. We consider neighbourhood heterogeneity by language, ethnicity, religion, and personal or household income, and conduct cross-section, pooled cross section, and school fixed effects analysis.

We find that when other factors that could explain local funds are controlled for, there is surprisingly little evidence that neighbourhood heterogeneity affects the three kinds of local funds schools receive, either positively or negatively. We do find evidence that household income inequality reduces the revenues schools receive from fundraising. In particular, a one percentage point increase in a school's neighbourhood Gini coefficient of household income inequality is associated on average with a $1,398 decrease in its fundraising revenues, all else equal. Other than that, we find no robust evidence that ethnic or language heterogeneity affect the local funds schools receive, and mixed evidence regarding religious heterogeneity. The latter appears to lower parental contributions or fundraising revenues in some cross section specifications, but to raise them in fixed effects specifications that control for unobserved school and neighbourhood characteristics.

The remainder of the paper is organised as follows. Section 2 reviews the literature linking social heterogeneity and voluntary contributions towards public goods as well as the literature on the determinants of fund raising. Section 3 sets out a simple model of how different sources of school funding revenue interact. Section 4 sets out the data we use and our empirical estimation strategy. Section 5 provides our results, while Section 6 concludes with a discussion of our findings.

2. Literature Review

There has been little research on the connection between social heterogeneity and the ability of New Zealand schools to raise local funds. The closest New Zealand-based work of which we are aware are papers by Clark and Kim (2012) and Thornton and Clark (2010), which look at whether social diversity affects New Zealanders' likelihood of volunteering time to public goods in general. Internationally, however, there has been a rapidly expanding literature on the effects of

heterogeneity on various "social capital" indicators, particularly in the United States, and particularly regarding the effects of heterogeneity by ethnicity or race. In surveying this literature, one should keep in mind that there could be material differences in the social and government structures of many of the areas studied.

2.1 Social Capital

Social capital is a concept that seeks to define the strength of, and positive outcomes from, interactions between individuals in a society. The concept can be traced back to 1916, when it was used in a context similar to our own (Hanifan, 1916). Lyda Hanifan was the state supervisor of rural schools in Charleston, West Virginia. In stressing the importance of community involvement for prosperous schooling, Hanifan referred to social capital as being

> tangible substances [that] count for most in the daily lives of a people, namely, good-will, fellowship, mutual sympathy and social intercourse among a group of individuals and families who make up a social unit... [T]he individual is helpless socially, if left entirely to himself... [I]f he may come into contact with his neighbor, and they with other neighbors, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement of living conditions in the whole community. The community as a whole will benefit by the cooperation of all its parts, while the individual will find in his associations the advantages of the help, the sympathy, and the fellowship of his neighbors.[2]

Modern definitions are more succinct. Putnam (2007) describes social capital as "social networks and the associated norms of reciprocity and trustworthiness"[3]. This is the definition we adopt here. Many studies have looked for factors that influence a society's social capital, using as indicators people's involvement in networks or contributions to public goods as listed earlier, or their trust in others (Alesina and la Ferrara 2002, Leigh 2006, Putnam 2007, Letki 2008, Gustavsson and Jordahl 2008). In this study, we take local funds contributed to schools in New Zealand as an indicator of the country's social capital. On the "demand" side, to raise funds effectively, a given school will likely try to develop relationships within a community. For example, it may approach certain businesses to sponsor a school's cultural or sporting activities, or request help from a parent association to raise money through community fundraising events. On the "supply" side, there may be a correlation between a community's general social attitudes and the willingness of its members to contribute funds to a local school.

2.2 Heterogeneity and Social Capital

Social heterogeneity can become relevant to the supply side of school fundraising for various reasons. Simple "own-group" bias would predict that in a school's neighbourhood, members of group X may be less enthusiastic to contribute funds (or less embarrassed to withhold them) the more they perceive that the funds will benefit school children not of group X. Miguel and Gugerty (2005) provide an example of this in their study of ethnic diversity and fundraising by schools in rural Kenya. School boards reported that it was more difficult for local schools to enforce payment of compulsory school fees if a student's family belong to an ethnic minority. In addition, schools in more ethnically diverse areas raised less support via voluntary fundraising events that relied on significant social pressure for parents to make donations.

Alternatively, heterogeneity might affect the supply of local funds if it increases the variance of people's preferences regarding school-related public goods. Alesina, Baqir and Easterly (1999) find that heterogeneity has an effect of this kind on the provision of public goods by local governments. Using U.S. census data, Alesina et al. find that an area's ethnic diversity is negatively linked to the share of spending by that area's local authority on core public goods such as roads, public education, sewerage and rubbish collection, while there is a positive relationship with the proportion spent on healthcare. Alesina et al. hypothesise that diversity lowers spending on core public goods because it increases the median distance of people's most preferred quantity of a specific public good from that of the median voter, which makes them prefer a smaller scale of funding in a two-stage budgeting and provision process. Lieberman (1993) echoes this view for public education, noting "ethnic groups must reach an accommodation on various issues. As the accommodations become more distasteful to one or more groups, the disaffected parties become more supportive of alternatives to public education."[4]

2.3 Contrary Evidence

Given the tone of these findings, one could be forgiven for thinking that increased heterogeneity poses unrelenting problems for social capital in general, and community support for schools in particular. But there are several reasons to question this. Methodologically, all empirical studies attempting to test whether neighbourhood heterogeneity causes deterioration in social capital confront problems of endogeneity. For example, people who are less community-minded (an unobserved characteristic) may be more likely to select to live in more heterogeneous areas,

making heterogeneity appear wrongly responsible for social withdrawal. In her study of heterogeneity and indicators of social capital in the United Kingdom, for example, Letki (2008) finds that racial diversity has a significant negative effect on people's reported trust towards their neighbours, but no effect on other social capital indicators such as sociability, volunteering, or organisational involvement. Letki suggests that the differences in her findings from earlier work might result from better controlling for the effect of low socioeconomic neighbourhood indicators before considering the effect of heterogeneity *per se* on social capital.

Econometric difficulties aside, sociologists theorize not only of a 'conflict hypothesis', but also of a 'contact hypothesis', which suggests that over time different ethnicities learn to accept each other the more they interact (Putnam, 2007). Working together helps strengthen relationships, forge new common identities, and increase peoples' understanding of the differences in the lives of people from other ethnicities. Evidence of this can be seen in a much-cited study by Stouffer (1949) which looked at the attitudes of white American soldiers towards desegregation within the army after World War Two. Stouffer found that the more contact white troops had with their black counterparts during the war, the smaller was the proportion opposed to desegregation. Putnam has linked the 'contact hypothesis' with the concept of 'bridging' social capital (Putnam 2000), or of bonds being struck between members of socially heterogeneous groups. For our application, the compulsory nature of education in New Zealand means that schools are the ideal setting for bridging social capital to develop, not only between students of different groups, but also between their parents and communities. Thus while own-group bias or preference heterogeneity may cause social diversity to decrease the funds schools receive from their neighbourhoods, bridging social capital that schools generate may offset this.

2.4 Determinants of Local Funding for Schools

Common to other developed countries, New Zealand's public ("state") schools receive the bulk of their funds from the government. However, schools are also free to pursue or receive additional local funds. Both demand and supply side factors are likely to have an effect on the amount of local funds a school receives. The literature on fund raising for pre-tertiary schools is scarce, but insight can be gained by looking at other charitable institutions. Okten and Weisbrod (2000) consider a range of institutions such as hospitals, scientific research labs and higher education facilities, to look at factors that influence donations. They find that demand side factors such as expenditures on advertising and information dissemination have a positive and

significant effect on donations. They also use the age of the organisation as a proxy for reputational stock, and find surprisingly, that this is negatively associated with donations for all but two of seven types of institution. They posit that age may also act as a proxy for wealth, so that donors may view older institutions as being less needy.

A study more closely related to schools is that by Okunade and Berl (1997), who consider the propensity for alumni of U.S. business schools to donate to their college. On the supply side, donations are positively related to the age of the alumni member as they "have higher net worth and a higher capacity for charitable giving"[5]. Gender, race and marital status are found to be insignificant, but donations are negatively related to whether alumni members have children. While the expense of children may hinder graduates' donations to their *alma mater*, children may act as a spur to their donations to nearby primary and secondary schools. Parents of enrolled children and even others who make donations to a local school may also in part be getting material benefits for themselves or their children. Either way, the number of school age children in a household should be relevant to the funds supplied to local schools.

On the demand side, schools with more competent or business-savvy boards of trustees may seek more funds from governments, international student enrolments, and local initiatives, than schools with less competent boards, and be able to do so at less administrative cost. But given the abilities of a school's board of trustees, it likely faces a trade-off between expending effort on attracting different sources of revenue. Luksetich (2008) considers how fundraising by non-profit organisations (like schools) affects government funding. He finds that fundraising revenue has a significant positive impact on the amount of government grants that organisations receive. Investigating the reverse pathway, Okten and Weisbrod (2000) similarly conclude that increases in government grants do not crowd out private donations, but rather increase them for most industries. This may be because increased government grants are a signal from the government that a particular service has value within the community. But among local funding sources, schools must still decide how to allocate effort between them. We consider this next.

3. Funding Source Interactions

For simplicity, suppose that a school takes its level of government revenues as fixed, and is considering two non-governmental sources from which it could pursue funds. Each school is

endowed with a total amount of effort, $\overline{\mathrm{E}}$, that it can put towards gaining funds from the alternative sources i=1,2. Thus each school faces a constraint:

$$\mathrm{E}_1 + \mathrm{E}_2 \leq \overline{\mathrm{E}} \tag{1}$$

Assume that effort comes at some per unit cost, c_i, that can differ by source pursued. Finally, we assume that revenue generated from either non-governmental source is an increasing function of effort, multiplied by a parameter reflecting the generosity of the those targeted by that source, θ_i. We allow the generosity of those targeted to be a function of their local heterogeneity, or $\theta_i(h_i)$. A school with the objective to maximise net revenues from non-government sources faces the objective function:

$$\max_{\mathrm{E}_1, \mathrm{E}_2} \quad \pi = f_1(\theta_i(h_i)\mathrm{E}_1) + f_2(\theta_i(h_i)\mathrm{E}_2) - c_1\mathrm{E}_1 - c_2\mathrm{E}_2 \tag{2}$$

We assume that each $f_i(.)$ is a concave function of effort. Assuming that it is optimal to expend some effort on both sources, and that the total effort constraint is binding, the first order conditions of the Lagrangian formed from (2) and (1) are:

$$\frac{\partial L}{\partial \mathrm{E}_i} = \theta_i(h_i)\frac{\partial f_i(\theta_i(h_i)\mathrm{E}_i)}{\partial \mathrm{E}_i} - c_i - \lambda = 0 \qquad i = 1,2 \tag{3}$$

$$\frac{\partial L}{\partial \lambda} = \overline{\mathrm{E}} - \mathrm{E}_1 - \mathrm{E}_2 = 0 \tag{4}$$

The Lagrange multiplier λ can be thought of as the dollar amount that net revenues would increase if the school's fundraising "effort budget" were to increase by one unit. Let us now consider how a school will respond to an exogenous change in either c_i or θ_i. Changes to c_i might result from changes in the wages of school staff or to school board expertise. Changes to θ_i might result from changes in neighbourhood heterogeneity h_i.

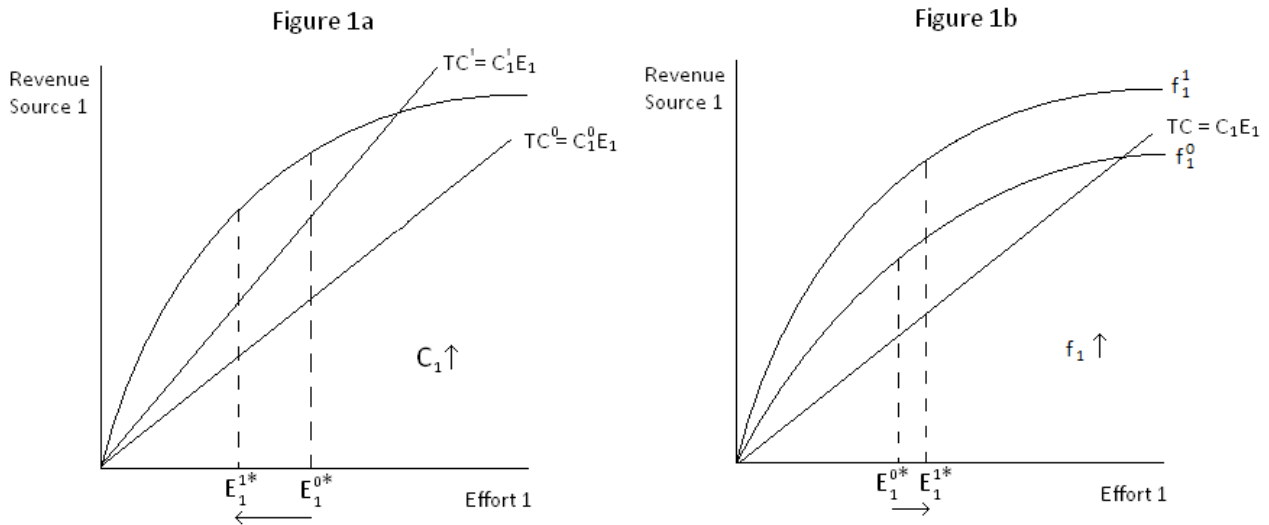From the two equations making up (3), a school will expend effort on both funding sources to the point that:

$$\theta_1(h_1)\frac{\partial f_1(\theta_1(h_1)\mathrm{E}_1)}{\partial \mathrm{E}_1} - c_1 = \theta_2(h_2)\frac{\partial f_2(\theta_2(h_2)\mathrm{E}_2)}{\partial \mathrm{E}_2} - c_2 \tag{5}$$

If the cost of pursuing funding source one, c_1, increases, then (4) and (5) will be maintained if the school decreases effort on this source and increases effort on the other. Total effort remains the same but the school will substitute effort toward the relatively cheaper funding source. This is illustrated in Figure 1(a). This increase in c_1 is represented by a steepening of the total cost curve from TC^0 to TC^1. Net funds raised (total funds raised less the cost of raising them) is represented by the vertical distance between the revenue curve and the cost curve. A school will choose the source one effort level E_1^* which maximises this distance. This effort will decrease from E_1^{0*} to E_1^{1*} as its costs increase, representing a substitution of effort to the alternative funding source.

Conversely, if funding source one (e.g. the school's neighbourhood) becomes more generous, or $\theta_1(h_1)$ rises, a school's revenue function from source 1 will steepen from f_1^0 to f_1^1. That is, marginal revenue from this source will rise for any given amount of effort directed to it. To maintain equality in (5) and (4), E_1 will increase from E_1^{0*} to E_1^{1*} (and E_2^* will decrease). This is illustrated in Figure 1(b). This simple funding-source model suggests that local funding sources will serve as substitutes for one another. Thus schools who receive more local funds from, say, parental contributions, could be expected to expend less effort on neighbourhood fundraising, and receive fewer revenues from this latter source.

4. Data and Empirical Methods

The New Zealand Ministry of Education has kindly made available for this project data on the governmental and non-governmental revenues reported by each state and state-integrated school in 2001 and 2006. Revenue data were provided under the broad categories of 'government grants,' 'local funds,' and 'investments.' Local funds are then further broken down into major categories such as 'parental contributions', 'donations' and 'fundraising', but also 'overseas students,' 'trading sales', 'house rents' etc. Unfortunately, among the schools reporting funding, the categorisation of local funds was not fully standardised until 2007.[6] This has particular relevance for the distinction between 'parental contributions' and 'donations.' Schools could reasonably report quasi-compulsory fees under either category, as some use the term 'donation' on the bills they send to parents (Waikato Times, 2008). We address this measurement problem by analyzing parental contributions and donations separately, but also in aggregate. To control for the funds received by schools from government, we aggregate together investment interest and important "non community" local funds such as from overseas

Figure 1a

Revenue Source 1

$TC' = C_1^1 E_1$

$TC^0 = C_1^0 E_1$

$C_1 \uparrow$

E_1^{1*} E_1^{0*}

Effort 1

Figure 1b

Revenue Source 1

f_1^1

$TC = C_1 E_1$

f_1^0

$f_1 \uparrow$

E_1^{0*} E_1^{1*}

Effort 1

students and trading sales into a "school income" variable. Other than revenue data, the Ministry of Education also provided data on each school's roll size, socio-economic decile classification, and the census boundary in which the school is located. Socio-economic decile rankings for schools are calculated by the Ministry of Education for the purposes of government funding, and are based on an index of the socio-economic characteristics *of the parents who send children to a school*. This is distinct from census data to which we have access, which provides the characteristics of the people in the census area unit in which a school is located. It seems likely, however, that the two approaches will be highly correlated for public schools who enrol most of their students from local enrolment zones.[7]

We start with the population of all 2725 (2001) and 2598 (2006) public and integrated schools in New Zealand. From this we exclude 167 (2001) and 189 (2006) schools who report zero revenues from the five main sources.[8] We further omit the Correspondence School of New Zealand, and the 4 schools located on the Chatham Islands, bringing our usable sample of schools to 2553 in 2001, and 2405 in 2006.

Census data reported by Statistics New Zealand is also used for 2001 and 2006 to create neighbourhood heterogeneity measures, as well as controls for other factors which may influence local funds received by schools. Table 1 provides summary statistics for our three main categories of local funds, as well as our four neighbourhood heterogeneity measures. Summary statistics for all variables are provided in Appendix B. We use census data released at the area unit level, which contain an average of about 2,000 people (Statistics New Zealand, 2006).

Table 1: Summary Statistics For Non Governmental Funds and Heterogeneity Measures

	2001			2006		
	Mean	St. Dev	Obs	Mean	St. Dev	Obs
Dependant Variable						
Parental Contributions	50447	138168	2553	64790	142366	2405
Fundraising	24334	49742	2553	33312	65583	2405
Donations	16661	54900	2553	23132	61835	2405
Ethnicity						
Fragmentation	0.334	0.165	2326	0.357	0.164	2243
Language						
Fragmentation	0.233	0.118	2326	0.246	0.119	2243
Religion						
Fragmentation	0.523	0.043	2326	0.538	0.038	2243
Household Income						
Gini	0.371	0.032	2323	0.355	0.036	2243
Individual Income						
Gini	0.440	0.031	2326	0.423	0.028	2239

Heterogeneity measures are based on the census area units containing schools rather than all area units. The dependant variables are nominal values of school revenue categories.

4.1 Variables and Hypotheses

We explain in turn the dependent variables that will be used, our heterogeneity measures, and finally the other control variables.

4.1.1 Dependant Variables

We consider the three main categories of local funds received by public or integrated schools. First, parental contributions are the dollar amount that a school receives from parents in the form of "suggested" but non-compulsory fees. Parents of children enrolled in a school receive bills specifying the parental contribution expected. The level of suggested fee is set by the individual school. Although non-compulsory by law, there is significant pressure on parents to pay these fees. Schools may phone and email parents to remind them that fees are due and, in extreme cases, have referred non-payment to debt collectors (Woulfe, 2008). The second sub-category of local funds is fundraising, which is any money which the school or its students receive in exchange for providing goods and services. This includes, for example, proceeds from school fairs or concerts, or the sale of confectionary or Christmas trees. The third sub-category

of local funds is donations, which consists of money contributed to a school, apart from school fees, that is not paid in return for direct goods or services. This category includes money left in wills or given by businesses or individuals, but some schools may also report money from quasi-compulsory parental contributions in this category. Because of categorisation ambiguity, we will initially treat parental contributions and donations separately, but later in combination.

4.1.2 Measures of Heterogeneity

Following the social capital literature, we will be considering social heterogeneity along the dimensions of race/ethnicity, household and individual income, language, and religious affiliation (Putnam 2007, Alesina and La Ferrara 2000, 2002). We consider these the group dimensions (whether of neighbours or of a schools' students) to be among those most likely to be salient or observable to the people considering contributing funds to a local school. As is common in the literature, we measure heterogeneity using a fragmentation index for qualitative dimensions such as language or religion, and a Gini coefficient for ordered dimensions such as personal or household income.[9] These are constructed based on the population of the area unit in which each school is located. A fragmentation index *F* is defined as:

$$F = 1 - \sum_{k=1}^{n} p_k^2$$

(6)

where p_k is the share of group *k* among the n possible groups in the neighbourhood. *F* is bounded between zero and one, though its exact upper bound is increasing in the number of possible groups *n*. It can be interpreted as the probability that two people, drawn randomly from a neighbourhood, belong to different groups. A Gini coefficient is defined as:

$$G = \sum_{i=1}^{n} \left(\sum_{j=1}^{n} \frac{1}{2} \frac{|x_i - x_j|}{n^2 \mu} \right)$$

(7)

In our case, x_i refers to the imputed midpoint income from one of six income categories that person or household *i* reports to contain their true income. Like the fragmentation index, the Gini is bounded between zero and one, and is increasing in heterogeneity.

The construction of our specific heterogeneity variables is described in detail in Appendix A, but is summarized below. Note that all group shares used to construct heterogeneity

measures will also themselves be included as control variables. This will enable us to focus on the effects of heterogeneity *per se* on local funds, while controlling for the possibility that different income, ethnic, language or religious groups may have different propensities to contribute to local schools.

1. Ethnicity – As used in both the 2001 and 2006 census, a person belongs to a specific ethnic group if they identify with it or they feel they belong to it. Ethnicity thus embodies more than physical race or origin. Features common to people of the same ethnicity may include language, religion, a common geographic origin and uniqueness of interest (Errington, Cotterell, Randow, & Milligan, 2008). The New Zealand census provides six categories of ethnicity: European, Maori, Pacific Peoples, Asian, Middle Eastern/Latin American/African (MELAA) and Other. Because people can report more than one ethnic affiliation, ethnic "shares" are constructed over the total number of ethnic affiliations reported, rather than over the number of people responding. In addition, *European* and *Other* affiliations were combined for both census years because in 2006 there was a large increase in those who identified 'New Zealander' as their ethnicity on the census form. In 2001 Statistics New Zealand included 'New Zealander' responses under *European*, but in 2006 they were added to *Other*. This caused the formerly small *Other* category to increase by a factor of over five hundred.[10]

2. Language – people report on the census all languages in which they have the ability to carry on a conversation. Statistics New Zealand reports the frequency of languages spoken in each area unit, where the categories are aggregated to English, Maori, Samoan, NZ Sign Language and Other. As with ethnicity, people can report speaking more than one language, so that language shares in a neighbourhood are constructed over the total number of languages spoken, rather than over the total number of people responding.

3. Religion – as with ethnicity and language, people could report multiple religious affiliations for the census. Statistics New Zealand releases affiliations by the categories No Religion, Buddhist, Christian, Hindu, Islam/Muslim, Judaism/Jewish, Maori Christian, Spiritualism and New Age Religions, Other Religions, and Not Elsewhere Indicated. Given the relative size of the shares, for our main analysis these were aggregated to the categories Christian, None and Other Religion.[11]

4. Individual and Household Income – These refer to the amount of money earned from all sources before tax in the 12 months up to the 31st of March in the census year. It is difficult to know in advance whether it would be household or individual income inequality that might affect peoples' tendency to contribute funds to local schools, so we use each alternatively. Income data are available only by the frequency of individuals or households who belong to particular income bands[12], unadjusted for inflation between 2001 and 2006. While own group bias or preference dispersion might suggest that income heterogeneity could depress contributions to local schools, it is also possible that people earning relatively more may feel that they need to make larger contributions to compensate for those with relatively low incomes. Alternatively, the relatively rich may contribute less if they think that the poor are free-riding.

4.1.3 Control Variables

Leaving aside heterogeneity measures and their underlying shares, there are a number of school and neighbourhood factors which could affect local funding for schools via demand or supply. We begin with factors specific to schools, then to the neighbourhoods in which they are located. One of the most important school-specific factors is total enrolment, which clearly has both demand and supply effects. If more children go to a school then a larger number of families are associated with it and the supply pool of local funds will be greater. Similarly, higher enrolments increase the need for schools to procure funds. Second, the number of international students enrolled affects supply in a similar way to general enrolment, but has two offsetting effects on demand. More international students increase a school's demand for local funds purely because there are more students to cater for. However, demand for local funds may also decrease as schools receive full tuition fees per international student enrolled, in contrast to the lesser subsidy they receive per domestic student. That is, for schools seeking additional funds beyond what governments provide, enrolling international students may be a substitute to local funds.

A third control specific to each school is its socio-economic decile ranking as calculated by the Ministry of Education. The decile measure reflects the socioeconomic characteristics of the households students belong to, in particular their immediate neighbourhood's average household income, occupation, household crowding, and educational qualifications.   The Ministry uses census data in a manner which is unavailable for this research, matching the actual address for a sample of students to the exact neighbourhoods in which they live. The decile measure is used to determine the size of government grants and targeted educational funding

for the school, which may then have an impact on its demand for non-governmental local funds (Ministry of Education, 2010b).

A final school-level control is a dummy variable for whether it is public or integrated. In New Zealand, integrated schools (as opposed to fully private schools) negotiate individual "special charters" with the government. They must meet the curriculum standards of public schools while additionally meeting charter requirements. Integrated schools receive partial government funding, but must fund their own capital and maintenance costs. Hence the local funds required by integrated schools may differ from public schools (Ministry of Education, 2010a). The special charter is usually put in place so a school can have the benefits of being a state school while preserving its religious underpinnings (Association of Integrated Schools New Zealand, 2010).

Turning to neighbourhood-specific controls, we have followed other studies of voluntary donations[13] by including measures relevant to supply, such as age, number of children, and marital status. Age is included as share categories for the ranges: 0-24, 25-59 and 60 or older. The number of children born to females over 15 years of age is available only for 2006, but included where possible under the share categories: no children, 1-4, and 4 or more. For 2001 cross-sectional or pooled regressions, we use instead the share of family types: single parents with children, a couple with children, or couple with no children. Marital status is the fraction of people who are legally married or in a civil union.

With regressions involving only 2006 data, we also include a supply side measure of neighbourhood stability: 'Years at usual residence.' This is defined as the length of time which a person has lived at their current usual residence. We include this as share variables: 0 years, 1-4, 5-9, 10-14, 15-29 and 30 years or more. Following others in the social capital literature (e.g. Alesina and La Ferrara 2002), we predict that the longer people have lived in a particular community, the more likely they are to have developed relationships which will predispose them to contribute to local schools. Next, as a proxy for people's unobserved taste for supporting schools, we include highest educational qualification shares: none, high school, undergraduate, postgraduate, or other.

Finally, we also include the shares of people who receive income from self-employment (a business), and of those who own their own home. Aside from enabling us to proxy for

unobserved wealth and tastes, self-employment or home ownership could also increase incentives for people to supply local funds, if doing so creates exposure for a business or increase the desirability of a neighbourhood.

4.2 Empirical Estimation Strategy

Taking our two years of data together, 90.6% of schools report receiving positive parental contributions, while 81.2% report positive fundraising revenues, and 38.4% report positive donations. Our approach will be to use Tobit regression to analyse cross-sectional data for 2001 and 2006 separately. We will then move to pooled cross section Tobit regression with controls for year and region. Finally, in cases where pooled cross section Tobit regression yields similar results as analogous OLS regression, we will use linear fixed effects regression to control for unobserved, but time-invariant characteristics for each individual school.

4.2.1 Cross-Sectional Estimation

We begin with a baseline specification which contains variables found to be significant in past studies and other variables whose inclusion is guided by the reasoning mentioned above[14]. The specification will take the form:

$$Y_{ijkt} = \beta_o + \beta_1 \text{Religion}_{jt} + \beta_2 \text{Language}_{jt} + \beta_3 \text{Ethnic}_{jt} + \beta_4 \text{Income}_{jt} + \beta_5 C_{ijkt} + \beta_5 D_{jkt} + \varepsilon_t. \quad (8)$$

Here Y_{ijkt} is the local funds of type k reported by school i in area unit j in the year t. *Religion*, *Language*, *Ethnic* and *Income* are measures of heterogeneity, C_{ijkt} is a vector of school-specific control variables, D_{jkt} is a vector of neighbourhood level control variables and 15 region dummies, and ε is the error term. With only ethnic and language heterogeneity being highly correlated (.85), our baseline specification includes all four heterogeneity measures simultaneously.[15] From the baseline, a second specification for 2006 only adds a lag of the 2001 dependent variable as a proxy for historical factors which may be influencing current contributions. Unobserved historical factors are likely to be correlated with other regressors which are included in the baseline specification. This correlation will transfer to the lag of the dependent variable, leaving other variables' coefficients with less bias. This approach assumes however that the unobserved factors are constant between 2001 and 2006 (Wooldridge, 2009).

Our third specification repeats the baseline but removes language heterogeneity to address its high correlation with ethnic heterogeneity measures. A fourth specification repeats

the baseline, but uses natural logs for all variables that are measured in dollar terms to test for a possible non-linear relationship. Our fifth and final cross section specification removes insignificant variables from the baseline, exempting our heterogeneity measures, underlying share variables, and region dummies. Control variables are removed if doing so decreases the Akaike Information Criterion (AIC), starting with the least significant variable. Variables belonging to a set are only removed if their joint test for significance is also rejected at the 5% level. The variables removed using this procedure are listed in Appendix E.

4.2.2 Pooled and Fixed Effects Estimation

Unavoidably, some determinants of the supply and demand for a school's local funds will be unobserved, such as the amount of time and effort that a school puts into generating revenue, whether there are full time staff devoted to this, how caring and supportive parents and local residents are, how much money parents give to other charitable causes etc. Fortunately, those unobserved characteristics which do not vary between 2001 and 2006 can be captured using fixed effects (effectively assigning a dummy variable specific to each school). In keeping with the the non-negligible portion of schools who report zero amounts of each type of local funds, we would prefer to use Tobit fixed effects to correspond to Tobit cross section. However, unconditional Tobit fixed effects regressions are biased. We will therefore start with pooled cross section Tobit regressions that include both year and region dummies. Region dummies ensure that unobserved, time-invariant characteristics that are common within a region, but differ across regions, are controlled (such as differences in regional cost of living or common custom regarding the use of quasi-compulsory parental contributions). Next, while not reported, we will compare the results of these tobit pooled cross section regressions with analogous OLS regressions. If the latter results are sufficiently similar for us to conclude that the clustering of local funds at zero is not biasing OLS regressions, we shall then proceed to run linear fixed effects regressions that control for unobserved school and neighbourhood characteristics. These exploit variation in differences in heterogeneity across neighbourhoods over time, in the form:

$$(Y_{ijk2006} - Y_{ijk2001}) = \beta_o + \beta_1(H_{j2006} - H_{j2001}) +$$

$$\beta_2(C_{ijk2006} - C_{ijk2001}) + \beta_3(D_{jk2006} - D_{jk2001}) + \beta_3(\rho_{ij2006} - \rho_{ij2001}) + (\varepsilon_{2006} - \varepsilon_{2001}) . \qquad (9)$$

Here H_j is a matrix containing our four dimensions of heterogeneity, and ρ_{ij} are the unobserved effects in school i in area unit j in each time period. Our pooled cross section and fixed effects

regressions will use similar control variables as the baseline specifications in cross section, though for pooled cross section we also add the specification removing language heterogeneity.

Finally, the reader should note that even a fixed effects specification that controls for unobserved neighbourhood and school characteristics cannot address the issue of households self-selecting into neighbourhoods and schools. If, for example, individuals with less sympathy for contributing funds to local schools are more likely to settle in more heterogeneous neighbourhoods, a spurious negative effect of neighbourhood heterogeneity on contributions may be generated. On the other hand, one could argue that school fixed effects could address unobserved individual characteristics such as 'sympathy for donating' if people self-select into neighbourhoods and schools with a 'contributions ethos' that matches their own, in a manner akin to the Tiebout hypothesis of sorting between jurisdictions (Tiebout, 1956). But this is a strong assumption. If it does not hold, then all we can search for across specifications is a robust co-varying relationship between social heterogeneity and the local funds received by schools.

5. Results

5.1 Cross-Section Results

We begin with cross-section results for 2001 and 2006. Starting with Parental Contributions, we provide complete regression results in Table 2 using household rather than individual income. To illustrate the interpretation of the coefficients, the coefficient on *Religion* for 2006 is -310,655, and it is statistically significant. This indicates that, holding all else constant, changing the religious fragmentation of a school's area unit from complete homogeneity to complete heterogeneity in 2006 would have lowered total parental contributions by $310,655. Alternatively, a one percentage point increase in religious fragmentation in a school's area unit in 2006 would have lowered total parental contributions by $3,107, or 4.8% of the sample mean. We will use this latter marginal interpretation.

Starting with non-heterogeneity controls, we see that total parental contributions are rising in school enrolment, falling in the population density of the school's area unit, and lower if the school is public rather than integrated. Region dummies also indicate that schools in the (omitted) Auckland region receive higher parental contributions (controlling for roll) than most other regions. Surprisingly, total parental contributions do not increase in school decile, nor in

		2001		2006		Regression Statistics	
		Coefficient	St Err	Coefficient	St Err		
Heterogeneity	Religion	-26853	105656	-310655	100762***	2001	
	Language	-51309	473933	-409896	420011		
	Ethnicity	14274	78854	43287	67913	Obs	2323
	HH Income	122370	109758	161652	171254		
Ethnicity	Asian	-135957	274659	9161	212236		
	Maori	-54382	75282	-171328	94436*		
	MELAA	784068	771379	197561	525183		
	Pacific	90407	149450	-116361	149721		
Income HH	20-30	1717	133740	96628	192360	F-stat	9.12
	30-50	-27570	114664	-36679	125848		
	50-70	-367734	135631***	-61823	132229		
	70-100	68840	143529	-125247	188340		
	100+	-192848	117057*	-18359	154574		
	Not Stated	-174231	110521	39186	133634		
Language	Maori	158022	606481	697651	497566		
	Other	-159656	861077	414108	727871		
	Samoan	-262400	741808	553655	724307		
	Sign	404657	1055859	546497	954460		
Religion	Christian	-19211	74377	20040	47202		
	None	-20759	71140	-103926	61235*		
Qualification	Highschool	-43298	100454	-158518	108313		
	Other	-404941	182233**	102236	190780		
	Undergraduate	-31435	213728	393409	213522*		
	Postgraduate	437898	298552	-130339	215236	2006	
Children	1-3			160080	101788		
	4+			70096	120664	Obs	2237
Residence	1-4			7054	118520		
	5-9			-259481	109286**		
	10-14			14782	124723		
	15-29			-158684	121693		
	30+			35898	129061		
Family Type	Couple with Children	24295	77149			F-stat	10.73
	Single with Children	-12183	81863				
Age	25-59	311490	118395***	84832	107848		
	60+	-73578	119225	-170539	94019*		
Other	Female	-52494	167228	-796393	567770		
	Married	138144	79717*	-100467	112004		
	Home Ownership	-75087	49864	56405	53169		
	Self-employed	45427	48400	-121093	56614**		
	Donations	-0.0809	0.1878	-0.1269	0.0889		
	Fundraising	0.2195	0.2140	-0.1753	0.1241		
	School Income	-0.0213	0.0399	0.0387	.0200*		
	School decile	-132.0	1478	1166	821.7		
	International roll	2516	1318*	174.7	978.5		
	Total roll	309.0	62.97***	252.2	48.49***		
	School type State	-18213	8570**	-36131	9469***		
	Population Density			-11.52	4.582**		

Table 2: Complete Tobit regression for Parental Contributions using 2001 and 2006 Area Units

Table 2 (Cont'd): Complete Tobit regression for Parental Contributions using 2001 and 2006 Area Units

| | | 2001 | | 2006 | | Regression Statistics |
		Coefficient	St Err	Coefficient	St Err	
Regional Dummies	Bay of Plenty	-22037	17271	2214	18461	
	Canterbury	-92298	22246***	-40441	13931***	
	Gisborne	-48671	20089**	-9554	17040	
	Hawkes Bay	-17086	19549	-1937	18442	
	Manawatu-Wanganui	-25767	17935	-32120	13440**	
	Marlborough	-46923	19745**	-21857	16604	
	Nelson	-3599	37202	47739	71134	
	Northland	14998	14514	27317	13890**	
	Otago	-67325	21234***	-36460	15745**	
	Southland	-54607	19894***	-57230	16500***	
	Taranaki	-16611	16292	-30900	13568**	
	Tasman	-42006	18051**	-29141	14619**	
	Waikato	-24129	14410*	6049	13511	
	Wellington	-25710	13674*	-29107	12925**	
	West Coast	-82160	22591***	-45625	24197*	
Constant		-8667	171478	651724	306151**	

*** ** and * denote significance at the 1%, 5% and 10% levels, respectively. Baseline Tobit regression for Parental Contributions. Robust standard errors are used. Only the household Gini is used for income heterogeneity.

the proportion of households with higher incomes in the school's area unit, nor do they decrease in the funds schools receive from fundraising or donations. Other area unit characteristics may have some explanatory power, but none are robust across 2001 and 2006.

Turning to the heterogeneity measures, we see that the signs on religious and language fragmentation of school's area units are negative for 2001 and 2006. In contrast, the signs on the ethnic fragmentation and household income inequality of a school's area units are positive for both years. Of these, however, only religious fragmentation has a statistically significant (negative) effect, and then only in 2006. Otherwise, evidence of a relationship between social diversity and parental contributions in either direction is fairly weak.

To see whether these results are robust to alternative cross section specifications, we move to Table 3. Here we repeat the results for the baseline specification, but also examine the effect of including a lagged dependent variable (in 2006), dropping language fragmentation, using natural logs, and eliminating insignificant variables using the Akaike Information Criteria.

Table 3: Parental Contributions - Tobit Cross Section, Coefficients on Heterogeneity Only

	2001					2006				
	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini
1	-6835	-84162	21639	100947		-289400	-727455	98822	192753	
	106186	489352	80466	115440		99021***	369403**	62729	153546	
(a)	-26853	-51309	14274		122370	-310655	-409896	43287		161652
	105656	473933	78854		109758	100762***	420011	67913		171254
2						-278712	-787278	96284	144681	
						93682***	347905**	60328	136535	
(a)						-291063	-537856	49382		137501
						96751***	380767	62050		146217
3	-5905		8924	102547		-280335		-11126	208834	
	107388		45979	114364		99478***		43058	153841	
(a)	-26354		6627		122857	-306917		-17650		166410
	106739		46143		109417	101542***		38228		169367
4	-7.017	-11.19	4.135	5.239		1.145	-.7127	-.2873	3.736	
	5.140	9.390	2.062**	3.737		4.330	7.183	1.666	2.857	
(a)	-9.563	-14.18	5.760		5.554	1.262	-2.221	-.4559		5.202
	5.123*	9.832	2.337**		3.229*	4.308	7.532	1.645		2.881*
5	-4713	-94081	24386	106648		-300287	-591363	108245	175507	
	109971	484585	79436	116914		101255***	396414	61744*	164582	
(a)	-10355	-242732	38858		111095	-296772	-341775	49358		41061
	108061	472943	76622		102569	99782***	459370	69614		158157

***, ** and * denote 1%, 5% and 10% significance, respectively. Robust standard errors are below coefficients. (a) specifications control for household rather than individual income. Specifications: (1) Baseline (2) Includes a lagged dependant variable (3) Removes Language heterogeneity (4) Takes the natural log of all monetary variables (5) Reduced model. All subsequent changes were made to specification (1).

We report results separately for specifications using individual income and income inequality, or household income and inequality. For brevity, only our heterogeneity coefficients are reported.

As becomes clear in Table 3, our cross section baseline results persist across a variety of specifications. While the signs on religious and language heterogeneity tend to be negative, and the signs on ethnic and household income heterogeneity tend to be positive, no type of heterogeneity tends to be consistently significant in explaining variation in parental contributions, with the exception of religious fragmentation in 2006.

Turning next to our cross section findings for fundraising revenues, Table 4 provides results in a similar format to Table 3. Heterogeneity appears to have greater effect on fundraising than on parental contributions, but the results are not robust across years. Once

	2001					2006				
	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini
1	-97878	-364618	83984	-48828		-57172	-107626	7095	-183134	
	40922**	172590**	30725***	57883		49191	219631	37869	77208**	
(a)	-98471	-334163	72528		-56103	-50942	-232031	15008		-241314
	41048 **	168642**	29587**		46597	48853	240080	39784		80888***
2						-59069	-197002	13898	-136642	
						46798	218467	38532	77918*	
(a)						-48373	-351190	28132		-187713
						46837	235384	39295		79231**
3	-94280		28844	-43551		-55613		-9083	-180662	
	41745**		16421*	57584		48734		25667	77364**	
(a)	-95791		22600		-53373	-48464		-19283		-238550
	41996**		16593		46448	48571		23545		79999***
4	-4.282	-9.360	3.331	-9.145		-4.746	26.11	-3.970	2.629	
	5.847	12.269	2.693	4.314**		6.060	11.14**	2.376*	3.801	
(a)	-3.571	-10.06	4.360		-6.050	-5.288	21.42	-2.663		-3.524
	5.979	12.56	2.697		4.298	6.608	11.16*	2.361		4.033
5	-103565	-333433	82410	-56265		-56166	-107167	7382	-184868	
	41287**	173409*	29162***	53051		49090	219484	37903	76762**	
(a)	-105564	-310380	70219		-40488	-49885	-231150	15188		-243717
	41726**	169361*	28319**		45393	48743	239933	39830		80510***

***, ** and * denote 1%, 5% and 10% significance, respectively. Robust standard errors are below coefficients. (a) specifications control for household income. Specifications: (1) Baseline (2) Includes a lagged dependant variable (3) Removes Language heterogeneity (4) Takes the natural log of all monetary variables (5) Reduced model. All subsequent changes were made to specification (1).

again, the signs of the coefficients on religious and language fragmentation tend to be negative across various specifications, while the signs on ethnic fragmentation tend to be positive. Unlike with parental contributions, however, the signs on (individual or household) income inequality tend to be negative also. While religious fragmentation's negative covariance with fundraising tends to be significant in 2001 across specifications, it is not in 2006. Language fragmentation's negative covariance is also significant in some specifications in 2001, but not in 2006, while ethnic fragmentation's positive covariance is similarly significant in some specifications in 2001 but not in any in 2006. Finally, household or individual income inequality's negative covariance does not tend to be significant across specifications in 2001, but does in 2006. Thus, each type of heterogeneity in a school's area unit varies significantly with the fundraising revenue it

receives for at least some specifications in 2001 or 2006. But no type of heterogeneity varies significantly across all specifications in both years.

Turning finally to our cross section findings for donations, Table 5 provides results in similar format to Tables 3 and 4. In general, there is less evidence that social heterogeneity is having an effect on donations than it was on fundraising, or even parental contributions. The sign on religious fragmentation switches to being positive across specifications in 2001 and 2006, but is almost never significant. Language fragmentation switches to have a positive sign in 2001 and retains a negative sign in 2006, but is never significant. Ethnic fragmentation switches to have a negative sign in both years, but is significant only in 2006, and only in the specification where language fragmentation is not controlled for. Interestingly, the coefficients on household and individual income inequality tend to have a positive sign for donations, just as they did for parental contributions, but unlike for fundraising. This might suggest that neighbourhood income inequality encourages straight cash support for local schools, even as it discourages successful fundraising via the sale of goods. But income inequality too is significant only for a minority of specifications.

While our single-year cross section estimates of heterogeneity's effect on schools' local funds are interesting, they are undoubtedly biased because of the omission of unobserved factors. In particular, unobserved school- or neighbourhood characteristics that influence local funds received, and that are correlated with heterogeneity, can bias our estimates (up or down) of heterogeneity's effects.

5.2 Pooled Cross-Section and Fixed Effects

By moving to pooled cross section, with school and neighbourhood observations from both 2001 and 2006, we can also include a year dummy to control for unobserved time- as well as region effects. The estimated effects of each dimension of heterogeneity are provided in Table 6. In general, pooled cross section results are similar to those found for single year cross section, but are informative when results differed between the two single year regressions.

Regarding parental contributions, Table 6 suggests that religious fragmentation has no significant effect, despite the findings for 2006 alone. As in 2006, language fragmentation may have a negative effect in specifications using individual rather than household income, while ethnic fragmentation continues to have no effect. In contrast, pooled cross section differs from

	2001					2006				
	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini
1	230531	30362	-40936	143073		251653	-304657	-41478	61042	
	177537	363928	71128	128555		175811	385898	66312	137887	
(a)	202361	110351	-67415		204499	211971	-256588	-68519		144702
	173321	363235	70294		114818*	169862	388491	67009		120385
2						253616	-237434	-39621	41155	
						172512	379174	66015	135990	
(a)						196921	-168890	-73659		140535
						165833	378796	66127		122491
3	230495		-36394	142454		240707		-88110	64400	
	177596		43130.8	127640		173489		42538**	138168	
(a)	202300		-51172		202751	204814		-107291		145458
	173368		43746		113849*	168319		42199**		120234
4	11.48	9.199	-1.680	.4649		1.722	-13.14	1.013	-6.600	
	5.341**	8.864	1.731	2.902		4.533	8.438	1.747	3.092**	
(a)	10.31	9.210	-2.010		-.8932	2.620	-11.20	.1337		-8.579
	5.237**	8.898	1.906		2.793	4.448	8.010	1.618		2.694***
5	226248	50857	-42008	125530		265783	-321169	-26977	37051	
	172526	362540	71170	129085		175773	381461	65849	136270	
(a)	160463	19007	-44211		177344	229698	-236787	-57051		80021
	166048	351749	68391		108545	168909	386426	66927		115564

***, ** and * denote 1%, 5% and 10% significance, respectively. Robust standard errors are below coefficients. (a) specifications control for household income. Specifications: (1) Baseline (2) Includes a lagged dependant variable (3) Removes Language heterogeneity (4) Takes the natural log of all monetary variables (5) Reduced model. All subsequent changes were made to specification (1).

either single year analysis in suggesting that household income inequality may be significantly positively associated with parental contributions, though only at the 10% level.

Regarding fundraising revenues, Table 6 suggests that religious fragmentation has a negative effect as it did in 2001 alone. As in 2001, language fragmentation may have a negative effect, though this is only significant at the 10% level, and only in the specification using household income. In contrast, Table 6 suggests that ethnic fragmentation has no significant association with fundraising, despite some 2001 results to the contrary. Finally, Table 6 confirms that individual or (particularly) household income inequality is negatively associated with fundraising revenues, as it was in 2006.

Finally, with regard to donations, pooled cross section suggests that religious fragmentation is positively associated, despite lack of significance in either 2001 or 2006

Table 6: Tobit Pooled Cross Section Results - Coefficients on Heterogeneity Only				
	Area Unit			
	Rel Frag	Lan Frag	Eth Frag	Gini	HH Gini

Parental Contributions:	Rel Frag	Lan Frag	Eth Frag	Gini	HH Gini
Individual Income	-62744	-513536	83938	114270	
	69350	310775*	51619	76645	
Household Income	-78012	-256931	33141		167985
	66637	340619	55087		90934*
(a) Individual Income	-57253		6943	121718	
	69447		30291	76574	
(a) Household Income	-75813		-5022		169685
	66859		28268		90188*
Fundraising					
Individual Income	-70987	-224629	39202	-76069	
	32194**	138595	24446	39863*	
Household Income	-67113	-255059	39022		-110071
	31604**	150009*	25607		40691***
(a) Individual Income	-68608		5598	-73188	
	32156**		15188	39891*	
(a) Household Income	-64988		1202		-108605
	31613**		14714		40424***
Donations					
Individual Income	290356	-114935	-47960	59536	
	120907**	271495	49445	73227	
Household Income	276026	-53392	-73714		184137
	116856**	283212	50824		78244**
(a) Individual Income	288974		-65370	61328	
	120618**		30380**	73213	
(a) Household Income	275389		-81680		184374
	116633**		30989***		78038**

***, ** and * denote signifiance at the 1%, 5% and 10% levels, respectively. Robust standard errors are below coefficients. (a) specifications omit language fragmentation.

separately.   Language fragmentation remains of no effect, while ethnic fragmentation may be negatively associated when language fragmentation is excluded, as in 2006.   Table 6 also suggests that household income inequality is positively associated with donations, as it was for 2001.

While pooled tobit cross section results improve over single year analysis by controlling for unobserved differences in year as well as region, they still do not control for unobserved characteristics of individual schools or of their surrounding neighbourhoods. While tobit school-level fixed effects models could not be estimated automatically in Stata, and did not converge when estimated manually, we did compare tobit with linear versions of pooled cross section regressions. We found the coefficient signs and magnitudes and significance to be similar for parental contributions and fundraising, but less so for donations. This is not surprising, given that 81-91% of schools reported receiving the first two types of local funds, but only 38% the third.   Thus, to better control for un-observables that do not vary over time, and to check the robustness of our pooled cross section results, we also estimate linear school fixed effects models. While we report these results for all three types of local funds, they are most valid for parental contributions and fundraising. Table 7 reports results for the baseline specification using household income.

Regarding non-heterogeneity controls, Table 7 indicates that unlike in cross section, parental contributions and fundraising are now falling in the revenues schools receive from substitute local funds, as predicted by theory.   They are also falling in the share with undergraduate qualifications relative to no qualifications, and in the share Pacific Islander relative to European.   Parental contributions and fundraising are also rising in the share reporting a Christian religious affiliation or No/not indicated affiliation relative to Other affiliation. Fundraising is also falling in the share not reporting their household income on the census, relative to the lowest reported income bracket, and in the share who own their own homes, while rising in a school's enrolment size.

Regarding heterogeneity, few types are significantly related to local funds once the unobserved (but time invariant) characteristics of schools and their neighbourhood are controlled. For parental contributions, religious fragmentation changes tack once again, moving from a negative or no association in cross section, to a positive significant effect. In particular, schools whose area unit experienced a 1 percentage point increase in religious fragmentation

		Parental Contributions		Fundraising		Donations		Regression Statistics	
		Coefficient	St Error	Coefficient	St Error	Coefficient	St Error		
Heterogeneity	Religion	480037	165113***	113425	67954*	113697	66554*	Parent Contrib	
	Language	4653	719612	-447749	296028	192518	326997		
	Ethnicity	-28035	141645	-36126	80689	19309	75144	Obs	4561
	HH Income	113665	95529	-139781	53601***	-19506	46915		
Ethnicity	Asian	-21888	427491	-18494	174679	4503	158999	R^2 within	0.174
	Maori	-50658	163757	119351	119514	-115719	89203	R^2 betw	0.184
	MELAA	-1275319	861244	-548184	370846	-356974	395063	R^2 overall	0.175
	Pacific	-535498	286826*	-279087	138550**	-354628	153449**		
Income HH	20-30	112690	97902	5919	57602	-68923	52970	F-stat	3.83
	30-50	80382	120603	2786	54893	15348	58802		
	50-70	39111	111805	-55957	52608	-3289	44902	Fundraising	
	70-100	148401	134407	28492	54768	68.08	58754		
	100+	164175	136460	28847	64990	61667	61738	Obs	4561
	Not Stated	-160089	121534	-107818	42661**	-65478	53150		
Language	Maori	300367	1112648	736785	459113	-180126	502541	R^2 within	0.193
	Other	72084	1378704	804099	519149	-.181267	583082	R^2 betw	0.118
	Samoan	140670	1161276	711165	465586	-147708	502580	R^2 overall	0.126
	Sign	48660	1374940	1083084	587467*	-392008	645553		
Religion	Christian	449016	176883**	273385	89991***	162295	102120	F-stat	3.09
	None	282501	135727**	184490	70536***	112136	89611		
Qualification	Highschool	-293371	112345***	-43713	48227	-124929	47953***	Donations	
	Other	5083	198654	-26200	107564	-17507	97009		
	Undergrad.	-466483	225815**	-221292	126013*	-68535	137695	Obs	4561
	Postgrad.	439836	406231	34652	159587	-198880	178670		
Family Type	Couple w Kids	3742	85098	-201.4	42245	19228	40859	R^2 within	0.196
	Single w Kids	-125351	110177	-51794	47126	-7394	40253	R^2 betw	0.052
Age	25-59	-87373	148336	11364	73530	-48152	65268	R^2 overall	0.012
	60+	-466874	215426**	-11795	94341	-28543	78816		
Other	Female	-214416	212752	-64843	80307	-153137	93055*	F-stat	2.76
	Married	-90415	93718	-40117	56658	-29463	42716		
	Home Owner	-88554	83947	-138033	44535***	-45250	34301		
	Self employed	-85575	85084	22461	45309	12413	35435		
	Parent Contrib			-0.1344	0.0297***	-0.1274	0.0383***		
	Fundraising	-0.5611	0.1192***			-0.2858	0.0544***		
	Donations	-0.5076	0.1640***	-0.2727	0.0647***				
	School Income	-0.0168	0.0269	0.0153	0.0115	0.0125	0.0107		
	School decile	-415.8	453.2	251.6	231.9	141.7	189.5		
	Int'l roll	2870	1578*	333.8	600.7	-1924	673.2***		
	Total roll	206.1	137.9	143.7	44.15***	52.37	37.38		
	Year = 2001	-27420	14883*	-10299	6075*	-6630	7148		
Constant		-125602	278033	-48666	143588	56767	149916		

*** , ** and * denote significance at the 1%, 5% and 10% significance levels, respectively. Robust standard errors are used. Only household income fragmentation is used for income heterogeneity.

saw parental contributions increase by $4800, all else equal. Language and ethnic fragmentation remain of no effect, and household income inequality loses the 10% significance it had in pooled cross section. For fundraising revenues, religious fragmentation also changes tack from the negative effect of pooled cross section, to a positive effect, albeit significant only at the 10% level. Language and ethnic fragmentation are of no effect largely as before, while household income inequality retains its negative effect. Schools whose area unit experienced a 1 percentage point increase in household income inequality saw fundraising revenues drop by $1,398 on average, all else equal. Finally, while the linear fixed effects estimates for donations revenues are likely biased, they indicate that religious fragmentation retains a positive effect, while ethnic and household income heterogeneity now join language fragmentation in having no effect.

5.3 Summing Up

The reader could be forgiven for struggling to identify a pattern to our results. To assist, Table 8 provides a summary of qualitative findings for each type of heterogeneity across our models and specifications. Positive coefficients that were significant at the 10% level or better in all or almost all specifications are denoted "+", negative coefficients by "-", and insignificant coefficients by a "0". Hyphenated entries refer to cases where half of our specifications gave one outcome, and half another.

Our most robust findings are that the ethnic diversity of the area unit in which schools are located does not significantly affect the local funds they receive, whether as parental contributions, fundraising, or donations. Similarly, language fragmentation in a school's area does not appear to affect its ability to raise local funds. It appears to lower schools' revenues from parental contributions or fund-raising in a few cross section specifications, but not in most, nor in fixed effects that best controls for unobserved confounds. In contrast, household income inequality in a school's area unit has a robust negative effect on the revenues it gains from fundraising, though not the revenues it gains from parental contributions or donations. Lastly, the religious fragmentation in a school's area unit seems to have inconclusive effects. In pooled cross section it appears to lower revenues from fundraising and raise them from donations, but in fixed effects it raises revenues from all three sources. We shall shortly consider this further.

Before interpreting our results, we report two additional robustness checks, and address potential measurement error in our donations data. Our first check is to replace the religion,

		2001	2006	Pooled Cross Section	Fixed Effects
Parental Contributions	Religious Fragmentation	0	-	0	+
	Language Fragmentation	0	0/-	0	0
	Ethnic Fragmentation	0	0	0	0
	Individual Income Gini	0	0	0	
	Household Income Gini	0	0	+	0
Fundraising	Religious Fragmentation	-	0	-	+
	Language Fragmentation	-	0	-/0	0
	Ethnic Fragmentation	+/0	0	0	0
	Individual Income Gini	0	-	-	
	Household Income Gini	0	-	-	-
Donations	Religious Fragmentation	0	0	+	+
	Language Fragmentation	0	0	0	0
	Ethnic Fragmentation	0	0	-/0	0
	Individual Income Gini	0	0	0	
	Household Income Gini	+/0	0	+	0

Table 8: Qualitative Summary of Findings

language and ethnicity fragmentation measures with alternative Reynal-Querol (2002) polarisation indices (see endnote 9). This yields very similar results to those summarized in Table 8. The exception is that both the negative (cross section) and positive (fixed effects) effects of religious fragmentation are attenuated. Religious polarisation no longer lowers parental contributions in 2006 cross section or fundraising in 2001 cross section, but also no longer raises fundraising or donation revenues in fixed effects. Other changes induced by using polarization are that parental contributions now appear decreased by language heterogeneity and increased by ethnic heterogeneity, but only in pooled cross section. These latter effects do

not emerge in single year cross section or fixed effects, and so we retain our interpretation that ethnic and language heterogeneity do not affect parental contributions.

Our second robustness check was to disaggregate the 3 coarse religious affiliation shares (Christian, None, and Other) back to their underlying 10 shares with a corresponding fragmentation measure. This too yielded results very similar to those summarized in Table 8. Exceptions were that, as with polarisation, the apparent positive effects of religious fragmentation on fundraising and donations are no longer significant in fixed effects. In contrast, the negative effect of religious fragmentation on fundraising is now significant in all cross section specifications. Overall, both robustness checks confirm that household income inequality has a negative effect fundraising revenues, that ethnic or language fragmentation have no significant effect on any of the three sources of local funds, and that religious fragmentation has inconclusive effects.

5.4 Addressing Misclassified Parental Contributions

As mentioned previously, prior to the Ministry of Education's releasing standardised revenue definitions in 2007, there was some ambiguity in whether individual schools might report their quasi-compulsory fees as "donations" rather than as "parental contributions." As a result, it is possible that some revenues listed as donations may in fact have been parental contributions. We address this potential measurement error two ways. First, we combine parental contributions and donations together and rerun the analysis already described using the baseline specification. Second, since schools are not likely to misreport true donations as parental contributions, we run linear regressions for the 90.6% of schools who report receiving parental contributions. The results of both approaches are presented in Appendix Table D.

In general, the effects of each type of heterogeneity are similar in either our combined or restricted parental contribution analysis as they were in Table 8 for parental contributions. In particular, religious fragmentation looks to have no significant effect in pooled cross section, but to raise combined or restricted sample parental contributions in fixed effects. Conversely, household income inequality looks to raise combined or restricted sample parental contributions in pooled cross section, but to have no significant effect in fixed effects.

6. Discussion and Conclusion

In this paper we have sought to test whether increased social diversity in New Zealand is having an effect (positive or negative) on a particular social capital indicator: the voluntary revenues

received by schools from their local communities. This issue is distinct from the question of whether various demographic groups differ, on average, in the amounts they contribute to local schools (which some do). An international literature, particularly based on U.S. data, has found evidence of a negative correlation between neighbourhood heterogeneity in dimensions such as race or language, and social capital indicators such as people's likelihood of trusting others, being members of organisations, or contributing time or money to local public goods. However, there have been few studies of the effect of social diversity on local communities' financial support of their schools. A rare exception is a study by Miguel and Gugerty (2005), who find a negative relationship between local ethnic diversity and voluntary funding of schools. Their study, however, is in a developing country context (rural Kenya).

We use data provided by the New Zealand Ministry of Education on the local revenues reported by individual schools in 2001 and 2006, along with census data on the characteristics of the areas surrounding these schools in both years, to test whether a similar relationship holds between heterogeneity and school support in New Zealand. We examine the effect of heterogeneity in the neighbourhoods ("area units") surrounding schools on three categories of local revenues they receive: quasi-compulsory parental contributions, fundraising, and donations. We measure neighbourhood heterogeneity in terms of religion, language, and ethnic fragmentation, and in terms of individual or household income inequality using the Gini coefficient. Controlling for other characteristics that might be expected to affect local revenues, such as income, education or age, and for the ethnic, language or religious affiliation shares in the population, we test whether variation in neighbourhood heterogeneity can explain variation in the support schools receive. We use Tobit cross section estimation for 2001 and 2006 separately, as well as pooled, and use linear fixed effects that controls for any unobserved individual school and neighbourhood characteristics that were stable between 2001 and 2006.

In contrast to what might be expected from the findings of the broader social capital literature, we find little evidence that neighbourhood social heterogeneity affects the local funds received by schools in New Zealand, whether positively or negatively. Our most robust evidence of a relationship concerns household income inequality and school fundraising. We find schools generate less revenue from fundraising as household income inequality rises in their area. From our fixed effects estimation, a one percentage point increase in the Gini coefficient of a school's neighbourhood is associated on average with a $1,398 decrease in the revenues itreceives from

fundraising, all else equal. Curiously, we do not find evidence that income inequality has a similar effect on parental contributions or cash donations. We also find no systematic evidence that ethnic or language fragmentation affects any of the three categories of local funds, particularly once unobserved school and neighbourhood characteristics are taken into account. More puzzlingly, we find conflicting evidence regarding the effect of religious fragmentation. In cross section analysis, religious fragmentation defined over three coarse categories looks to depress revenues from fundraising, and for 2006, from parental contributions. But under fixed effects that follow individual schools and neighbourhoods over time, religious fragmentation looks to *raise* revenues from parental contributions (and also possibly from fundraising and donations, though the latter effects do not persist under an alternative polarization measure of heterogeneity, or with less aggregated religious categories). Between these conflicting results for religious fragmentation, fixed effects may be more persuasive because it better controls for unobserved school and neighbourhood characteristics. However, lack of variation in neighbourhoods over a 5 year period may make effects difficult to detect in fixed effects. The lack of robustness in fixed effects results for religious fragmentation on fundraising or donations when definitions are altered also suggests some caution. We are left with inconclusive findings regarding the effects of religious fragmentation on the local funds schools receive.

While none of our specifications can fully address potential bias from people's endogenous choice of neighbourhood and school, in general we find little evidence that increasing social diversity per se in New Zealand is eroding community financial support for local schools. For schools in particular, our findings may support Putnam's (2000) concept of bridging social capital. Unlike other voluntary social networks, the compulsory nature of schooling encourages contact between children and parents of differing races, languages, religions and incomes. This "encouraged" mixing may offset the social withdrawal or depletion of social capital that has been associated with social heterogeneity using other indicators. In the context of the international social capital literature, this is good news indeed.

Appendix A – Variable Construction Details

Dependant Variables

Parental Contributions: This is a single monetary variable provided directly by the Ministry of Education. It is unadjusted for inflation between 2001 and 2006, and consists of "voluntary" payments by parents.

Fundraising: This is a single monetary variable provided directly by the Ministry of Education. It is unadjusted for inflation between 2001 and 2006. It includes money received in exchange for goods and services.

Donations: This is a single monetary variable provided directly by the Ministry of Education. It is unadjusted for inflation between 2001 and 2006. It includes bequests and other monetary gifts.

Heterogeneity Measures (*Religion, Language, Ethnicity, Income (Individual and Household)*)

Heterogeneity by religion, language and ethnicity is measured using the fragmentation index as described in equation (6), while heterogeneity by individual or household income is measured using the Gini coefficient as described in equation (7). Because the New Zealand census allows people to report more than one ethnic, language or religious affiliation, the denominator used to calculate population shares is the sum of the affiliations rather than total number of people.

The shares underlying the fragmentation indices are themselves Included as controls, and are based on the same level of aggregation as for the calculation of the fragmentation indices.

Religion: Statistics New Zealand provides the frequency of people claiming affiliation as Buddhist, Christian, Hindu, Islam/Muslim, Jewish, Maori Christian, Spiritualism/New Age, Other Religion, and 'Not Elsewhere Identified'. For our main analysis, we aggregate the 10 affiliation shares to 3: *None* (from No Religion and Not Elsewhere Identified), *Christian*, and *Other* (from the remaining 7 categories). We repeat all analysis using the 10 disaggregated categories and corresponding fragmentation measure. The *Other* share is omitted from our main analysis as the baseline.

Language: Language spoken shares are calculated for English, Maori, Samoan, Sign Language, None and Other. The share English is omitted from all regressions as the baseline.

Ethnicity: Shares are calculated for European, Maori, Pacific Peoples, Asian, and Middle Eastern/Latin American/African (MELAA). *European* is the aggregation of categories European and Other. The aggregated share *European* is omitted from all regressions as the baseline.

Income: Shares are calculated for those with individual income within the brackets $0-$5,000, $5,001-$10,000, $10,001-$20,000, $20,001-$30,000, $30,001-$50,000, 50,001+ and Not Stated. Shares are calculated for those with household income within the brackets $0-$20,000, $20,001-$30,000, $30,001-$50,000, $50,001-$70,000, $70,001-$100,000, 100,001+ and Not Stated. For both individual and household income specifications, the share with the lowest income range is omitted as the baseline.

The Gini measure is constructed as $\sum_{i=1}^{n}\left(\sum_{j=1}^{n}\frac{1}{2}\frac{|x_i - x_j|}{n^2\mu}\right)$. Each person in a specific census income band is

assumed to have the midpoint income value. Individuals in the top category of *$50,000+* were assumed to have $100,000 and households in the top category of *$100,000+* were assumed to have $150,000. Individuals and Households in *Not Stated* were omitted when calculating the Gini coefficient.

Appendix A (Cont'd): Variable Construction Details

Other Neighbourhood Level Control Variables

In general the variables that follow are shares with the denominator being the sum of the reported affiliations rather the than total number of people in the area unit unless otherwise stated. Shares are based on the corresponding census variable unless otherwise stated.

Age (Years): Shares are for age ranges 0-24, 25-59 and 60+. Each category was made up from the sum of the relevant five year age cohorts contained in the census data. The share *0-24* is omitted as the baseline.

Children (Number of): Shares are None, 1-3, and 4+. Those who objected to answering or not elsewhere included were omitted. The share None is omitted as the baseline. Data is only available for 2006.

Family Composition: Shares are Couple without Children, Couple with Children and Single with Children. The share Couple without Children is omitted as the baseline.

Educational Qualification: Shares are None, High School, Other, Undergraduate University, and Postgraduate University. None is the sum of Not Elsewhere Included, and No Qualification. *High School* combines the census categories: Level 1, 2, 3 or 4 (certificate gained either at high school or post high school), and Overseas Secondary School Qualification. Other is made up from the census categories Level 5 Diploma and Level 6 Diploma. Undergraduate University is made up from the categories Bachelor Degree and Level 7 Qualifications. Postgraduate University is made up from the census categories Postgraduate and Honours Degree, Masters Degree, and Doctorate Degree. *None* is the omitted baseline.

Years at Residence: Shares are None, 1-4, 5-9, 10-14, 15-29 and 30+ years. The category *None* is omitted as the baseline. Data is only available for 2006.

Female: Shares are Female and Male. Male is omitted as the baseline.

Self Employed: the share of individuals over all individuals who report self-employment income.

Married: the share of individuals 15 or older who were legally married, or (in 2006) in a civil union.

Home Ownership: the share of individuals 15 or over who owned or partly owned their usual residence.

School Level Control Variables

School Income: This is calculated as the sum in dollars of what tend to be schools' five largest revenue categories (excluding teachers' salaries): Ministry of Education Grants, Other Government Grants, Investment Interest, Trading Sales, Overseas Students Tuition.

Decile: The is calculated by the Ministry of Education. They assign a decile number to each school based on census data regarding the household income, occupation, household crowding, educational qualifications and income support of their students' immediate residential neighbourhoods ("meshblocks"). Only data for households with school age children are included and the importance of a meshblock is weighted by the number of students that live in it. The lowest ten percent of schools – the worst off socioeconomically – are assigned decile one and so on. Government grants are larger per pupil for schools assigned a lower decile, as captured in School Income.

School Type State: This dummy variable equals one if the school is "state: not integrated", and zero if the school is "state: integrated" or "private: fully regulated". Fully private schools are not included.

Roll (Number of Students): we include controls for the International Roll and Total Roll.

	APPENDIX B: SUMMARY STATISTICS					
		2001			2006	
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
School Level Variables						
Parental Contributions	2553	50447	138168	2405	64790	142366
Fundraising	2553	24334	49742	2405	33312	65583
Donations	2553	16661	54900	2405	23132	61835
Min of Education Grants	2553	294698	310180	2405	414294	458460
Grants from Other Depts	2553	29382	67640	2405	39974	158604
Interest Income	2553	11185	17929	2405	20902	31521
Overseas Students	2553	20030	106095	2405	37947	151041
Trading Sales	2553	29731	95004	2405	32423	77347
School Income (sum of 5)	2553	385026	480174	2405	545540	704989
School Decile	2553	5.4250	2.8645	2405	5.5875	3.9423
International Roll	2553	3.5511	12.6149	2405	3.5023	12.0127
Total Roll	2553	272.5347	286.6115	2404	299.5674	327.4279
School Type State	2553	0.8723	0.3338	2405	0.8653	0.3415
School's Area Unit Variables						
Ethnic Fragmentation	2326	0.3338	0.1654	2243	0.3566	0.1636
Language Fragmentation	2326	0.2331	0.1177	2243	0.2460	0.1194
Religion Fragmentation	2326	0.5234	0.0426	2243	0.5381	0.0383
Income Gini	2326	0.4404	0.0309	2243	0.4226	0.0285
Household Income Gini	2323	0.3714	0.0320	2239	0.3551	0.0358
European	2326	0.7532	0.1901	2243	0.6262	0.1603
Other	2326	0.0002	0.0007	2243	0.1076	0.0413
Eur+Other	2326	0.7534	0.1902	2243	0.7338	0.1951
Maori	2326	0.1608	0.1448	2243	0.1595	0.1411
Pacific Islander	2326	0.0438	0.0950	2243	0.0483	0.1009
Asian	2326	0.0379	0.0562	2243	0.0528	0.0788
ME/LA/A	2326	0.0041	0.0069	2243	0.0057	0.0081
English Lang	2326	0.8635	0.0833	2243	0.8539	0.0867
Maori Lang	2326	0.0502	0.0562	2243	0.0468	0.0548
Samoan Lang	2326	0.0134	0.0325	2243	0.0134	0.0330
NZ Sign Lang	2326	0.0070	0.0035	2243	0.0057	0.0035
Other Lang	2326	0.0659	0.0549	2243	0.0802	0.0660
Christian	2326	0.5489	0.0753	2243	0.4973	0.0727
No Religion	2326	0.2624	0.0560	2243	0.3092	0.0684
Buddhist	2326	0.0076	0.0088	2243	0.0092	0.0100
Hindu	2326	0.0066	0.0120	2243	0.0096	0.0182
Islam/Muslim	2326	0.0039	0.0080	2243	0.0057	0.0109
Judaism	2326	0.0013	0.0020	2243	0.0013	0.0019
Maori Christian	2326	0.0229	0.0410	2243	0.0221	0.0416
Spiritualist	2326	0.0041	0.0030	2243	0.0046	0.0030
Other religions	2326	0.0044	0.0046	2243	0.0051	0.0060
Not Elsewhere Indicated	2326	0.1380	0.0348	2243	0.1360	0.0419

APPENDIX B (Cont'd): SUMMARY STATISTICS						
		2001			2006	
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Individual Income						
$0 - $5000	2326	0.1286	0.0286	2243	0.1163	0.0278
$5001 - $10,000	2326	0.1235	0.0359	2243	0.0741	0.0206
$10,001 - $20,000	2326	0.2305	0.0514	2243	0.2066	0.0568
$20,001 - $30,000	2326	0.1496	0.0281	2243	0.1438	0.0248
$30,001 - $50,000	2326	0.1608	0.0433	2243	0.2072	0.0391
$50,001 plus	2326	0.0924	0.0597	2243	0.1451	0.0764
Not Stated	2326	0.1145	0.0489	2243	0.1070	0.0522
Household Income						
$0 - $20,000	2323	0.2044	0.0775	2239	0.1442	0.0585
$20,001 - $30,000	2323	0.1313	0.0334	2239	0.1123	0.0367
$30,001 - $50,000	2323	0.1789	0.0340	2239	0.1727	0.0350
$50,001 - $70,000	2323	0.1294	0.0341	2239	0.1381	0.0298
$70,001 - $100,000	2323	0.0811	0.0369	2239	0.1227	0.0378
$100,001 plus	2323	0.0827	0.0689	2239	0.1382	0.0934
Not Stated	2323	0.1922	0.0620	2239	0.1719	0.0675
Female	2326	0.5042	0.0259	2243	0.5064	0.0242
Age 0-24	2326	0.3634	0.0570	2243	0.3534	0.0596
Age 25-59	2326	0.4746	0.0507	2243	0.4730	0.0509
Age 60+	2326	0.1620	0.0616	2243	0.1736	0.0646
Share Married	2326	0.4763	0.1057	2243	0.4543	0.1048
Share Homeowners	2326	0.5177	0.1195	2243	0.5113	0.1291
Share Self-employed	2326	0.1918	0.1226	2243	0.1797	0.1074
Education Qualification:						
None	2326	0.4202	0.1185	2243	0.3668	0.1168
High School	2326	0.4122	0.0544	2243	0.4364	0.0484
Other	2326	0.0879	0.0258	2243	0.0817	0.0240
Undergraduate	2326	0.0551	0.0432	2243	0.0819	0.0536
Postgraduate	2326	0.0246	0.0266	2243	0.0332	0.0319
Family Composition						
Couple, no children	2326	0.3898	0.0871	2243	0.4051	0.0936
Couple, with children	2326	0.4219	0.0753	2243	0.4127	0.0759
One parent, with children	2326	0.1882	0.0877	2243	0.1822	0.0872
Share HH with no children				2242	0.2800	0.0960
Share HH 1-3 children				2242	0.5483	0.0774
Share HH 4+ children				2242	0.1718	0.0660
0 Ys at Residence				2243	0.2332	0.0644
1-4 Yrs at Residence				2243	0.3152	0.0399
5-9 Yrs at Residence				2243	0.1736	0.0301
10-14 Yrs at Residence				2243	0.1012	0.0249
15-29 Yrs at Residence				2243	0.1222	0.0325
30+ Yrs at Residence				2243	0.0547	0.0240
Population Density				2243	1070.40	1126.54

Appendix C: Variables Removed from Cross Section Specification 5 Using Akaike Information Criteria

2001

Parental Contributions		Fundraising		Donations	
Gini Specification	HHGini Specification	Gini Specification	HHGini Specification	Gini Specification	HHGini Specification
Decile	Decile	Family Comp	Family Comp	Female	Female
Female	Female	Self-employed	Self-employed	Family Type	Family Comp
Family Comp	Family Comp	Age	Age		Education
	Education	Home-owners	Home-owners		Self-employed
	Self-employed	Married	Married		
	School Income				

2006

Parental Contributions		Fundraising		Donations	
Gini Specification	HHGini Specification	Gini Specification	HHGini Specification	Gini Specification	HHGini Specification
Int'l Roll	Int'l Roll	Education	Education	School Income	School Income
Age	Home-owners	Home-owners	Home-owners	Pop Density	Pop Density
	Married	School Income	School Income	Self-employed	Self-employed
	Yrs Resident	Pop Density	Pop Density	Family Size	Family Size
		School State	School State	Yrs Resident	Yrs Resident
		Self-employed			

		2001	2006	Pooled Cross Section	Linear Fixed Effects
Parental Contributions + Donations (Tobit)	Religious Fragmentation	-28121 123554	-313317 104701***	-83637 75765	507698 164661***
	Language Fragmentation	-103233 482022	-598759 446871	-331442 353805	105684 699026
	Ethnic Fragmentation	-2642 80444	37790 75855	16103 57765	-15991 148485
	Household Income Gini	198659 190229	42076 200073	176144 95803*	95774 100347
Only Schools with Positive Parental Contributions (OLS)	Religious Fragmentation	59266 109015	-264868 99211***	-40529 66003	404979 184105**
	Language Fragmentation	-209441 491402	-103235 410817	-155452 338072	383289 729056
	Ethnic Fragmentation	-9499 82417	-16628 68109	-2479 54494	-96551 157731
	Household Income Gini	261677 161946	74263 194474	165890 86807*	99900 93654

Appendix Table D: Addressing Measurement Error

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Baseline Specification. Robust standard errors are used. Only the household Gini is used for income heterogeneity.

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Notes:

[1] See Thornton and Clark (2010) and Smeith and Dunstan (2004). Age-specific fertility rates by ethnicity for 2001 and 2006 are available from Statistics New Zealand.

[2] See Hanifan (1916, 130-131).

[3] See Putnam (2007, 137).

[4] See Lieberman (1993, 171).

[5] See Okunade and Berl (1997) page 210.

[6] Personal correspondence, Sarah Tumen of the Ministry of Education.

[7] It seems reasonable to assume that parents choose a school based in part on its proximity to the family home. New Zealand has a zoning system where schools are obliged to accept any students who are usually resident within their catchment area. Students who live outside the area can apply to go to that school but face the possibility of having to enter a ballot and being put on a waiting list (Ministry of Education, 2010c).

[8] These five main sources are: Ministry of Education Grants, Other Government Grants, Investment Interest, Trading Sales, and Overseas Students. Teachers' salaries are excluded.

[9] As an alternative measure of heterogeneity for qualitative characteristics, we also try the Reynal-Querol (2002) polarisation index, given by $P = 1 - 4 \sum (o.5 - p_k) \, p_k$ for $k = 1,...,n$ categories. The polarisation index rises more quickly than fragmentation for small degrees of heterogeneity, and has an upper bound of 1 regardless of the number of categories. We report the (minor) variation in results in Section 5.3.

[10] See Appendix B for the exact figures.

[11] For aggregation details see Appendix A. As a robustness check, we repeat all analysis using the original 10 religion shares (treating "not elsewhere indicated" as a separate category), along with the corresponding fragmentation index. We report the (minor) variation in results in Section 5.3.

[12] The exact bands are described in Appendix A.

[13] Especially that of Okunade and Berl (1997).

[14] See section 4.1.3.

[15] The second highest correlation is between ethnic and religious fragmentation, at .706, and third highest is between language and religious fragmentation, at .621.