

Research in PUBLIC POLICY

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...where have all the
young girls gone?

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Bulletin of the Centre for Market and Public Organisation

Editorial

Summer 2011

China and India recently announced their census findings for 2010/11. Both nations show a continuing imbalance in the sex ratio at birth. In China, 118 boys are being born for every 100 girls, up from 116 in 2000. In India, 109 boys are being born for every 100 girls, up from 108 in 2000. This is despite steady economic growth in both nations over the past decade and despite both countries' governments legislating against sex selective abortion.

This issue of *Research in Public Policy* features articles from a recent CMPO conference on sex selection and the interplay of technological and economic change. Collectively, the articles provide a fascinating – if rather grim – insight into the way in which son preference is manifested at different stages pre- and post-birth in a number of Asian countries.

The biological theme continues with two pieces on how genetic information can be exploited to identify the effect of an individual's height, weight and other physical characteristics on key socio-economic outcomes. This is a new and exciting area of interdisciplinary research that CMPO researchers are pushing forward together with colleagues in the School of Social and Community Medicine, exploiting the wealth of information that is available in the Bristol-based Avon Longitudinal Study of Parents and Children.

There are also articles on long-term trends in charitable giving in the UK, on how the publication of school league tables affects pupil performance and on ethnic segregation in schools, focusing on Oldham ten years after the riots of 2001.

Helen Simpson and Sarah Smith

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 To listen to an audio interview with the author, visit: <http://www.bristol.ac.uk/cmipo/audio/>

 To watch a video about this research, visit CMPO's YouTube channel:
<http://www.youtube.com/user/CMPOBristol>



Sex selection and parental investment: the interplay of technological and economic change

There is a long tradition of 'son preference' in South and South East Asia. Persistent neglect has resulted in decades of excess mortality of girls and women at all ages. In the last few decades, the growing availability of ultrasound technology and the legalisation of abortion in developing countries have combined with economic and demographic changes to produce pre-natal sex selection on a massive scale. For example, in the last decade in India more girls have been eliminated before birth each year than are born in the UK.

How widespread is pre-natal sex selection? Do female foeticide and gender differentiation in pre-natal care exist alongside one another? Is there evidence of differential investments after birth, for example, in the time and nutritional inputs given to girls and boys? And what kinds of families engage most in this practice?

Further afield and looking to the longer-term effects, is sex selection prevalent among Asians in the UK, the United States and Canada who, on average, are richer and face a more regulated medical environment? How do birth spacing and fertility respond to the growing incidence of sex selective abortion? Is banning pre-natal sex diagnosis effective? And what are the long-run socio-economic consequences of this unprecedented demographic squeeze working, for example, through marriage and labour markets?

The next five articles look at these issues, presenting new evidence on the prevalence of son preference at different stages pre- and post-birth. Most of the papers were presented at a workshop held at CMPO on 22 October 2010. The workshop was organised by Sonia Bhalotra and co-funded by the ESRC centre grant to

CMPO, an ESRC large grant and the Institute of Advanced Studies at the University of Bristol.

More details on CMPO's conference on sex selection are here:
<http://www.bristol.ac.uk/cmppo/events/2010/sexselection/index.html>

Where have all the young girls gone?

The rise in female foeticide in India

The widespread availability of ultrasound scans in India is giving rise to abortion of female foetuses on an unprecedented scale, according to research by Sonia Bhalotra. The sharp change in the sex ratio could lead to many social problems.

An ultrasound scan in India costs about £10, which is inexpensive for the rich and affordable for the poor. Advertisements in rural areas highlight how small this sum is relative to the cost of a dowry. So while sex-selective abortion was made illegal in India in 1994, it has continued since that date at an increasing pace.

Pre-natal sex detection technology is improving continuously, enabling more reliable resolution of the foetal image earlier in pregnancy. At the same time, the development of smaller and more mobile ultrasound scanners has increased market penetration and rural households are rapidly catching up with urban households.

It is striking that the emergence of this phenomenon in the mid-1980s and its intensification in the mid-1990s coincided with a period of sustained economic growth in India. The growth take-off is widely associated with deregulation of industry and trade. An unintended consequence is that it became easier to import ultrasound machines and, subsequently, for multinationals to start large-scale production in India.

In this way, the practice of sex selection has been facilitated by an intersection of recent

economic, demographic and technological change with deep-rooted social preferences. We estimate that nearly half a million girls are aborted each year, which is more than the number of girls born annually in Britain.

The practice is concentrated among relatively rich and educated families. This flies in the face of ideas about backward women being enslaved to old customs. But it is consistent with 'modern' women being more receptive to new technologies and wanting fewer children. These factors appear to override

Indian parents conduct pre-natal sex selection even after they have a son: they seem to want two boys and one girl

lower self-reported 'son preference' among women of higher socio-economic status.

Conditional on wealth and education, it is Hindu women, especially high caste women, who conduct sex selection. There is no discernible evidence of sex selection among Muslim women. A likely explanation is that, even if they have a similar preference for sons, their religion is more abhorrent of abortion.

Before our study there was considerable anecdotal evidence of abortion of girls in India and suggestive changes in the sex ratio, but no clear causal evidence. As there are no direct records of the practice, sex selection is inferred from changes in the sex ratio at birth.

By analysing data on half a million births in India over more than three decades, our research identifies a dramatic decrease in the ratio of girls to boys being born after, and only after, the arrival of ultrasound machines. This trend is only evident for children born

second or later in the family birth order: there is no decrease in the ratio of girls to boys at birth among first-born children.

We therefore treat the sex of the first birth as random. On this basis, we argue that families in which the first birth is, by chance, a girl, are more likely to engage in sex selection of subsequent conceptions than families in which the first-born is a boy. We further argue that the incentive to practice sex selection increases with parity, as the number of births approaches target fertility.

Our strategy involves comparing the chances of a girl as compared with a boy birth before and after the arrival of ultrasound, in families with and without a first-born son, at different parities. The implicit multiple 'differencing' in this approach takes out of the equation factors other than foeticide that might influence the level and trend in the sex ratio at birth.

While we find that the availability of ultrasound scans plays a crucial role in enabling abortion of girls, it also plays a positive role in improving pre-natal care. It would not therefore be desirable to ban the use of scanners. But once they are in use, it is difficult to monitor the ban on pre-natal sex detection because families and (often unqualified) private medical practitioners collude in evasion of the law.

The phenomenon of female foeticide touches on many of the dilemmas of modern times, including the ethics of scientific progress, gender equality, human rights and freedom of choice. Even where preferences over child sex are relatively balanced, as in the UK, so that issues of gender inequality and an unbalanced demography are muted, the ethical issues are live. For example, the UK

Nearly half a million girls are aborted in India each year – more than the number of girls born annually in Britain

Human Fertilisation and Embryology Authority has banned sex selection for primarily moral reasons.

Son preference is an old tradition in India and other parts of Asia. Previously, poor families with limited resources for food and healthcare made sons a priority because they offer security in old age. Over the centuries, neglect of daughters led to a gradual erosion of the share of women in society. What is new is that girls are now being consciously eliminated before birth on such a large scale that it is creating a sharp change in the sex ratio.

Indian families put enormous weight on having a son. Elderly parents live with sons till they die, at which point the son lights the funeral pyre, which is meaningful in Hindu culture. But these needs are met by one son. A striking and novel finding of our research is that parents conduct pre-natal sex selection even after they have one son. Indian families appear to want two boys and one girl.

The scale of the problem suggests a future of unmarried men at the bottom of the socio-economic distribution in India, increasing violence against women and other ills of an unbalanced society.

This article summarises 'Where have all the Young Girls Gone? Identifying Sex Selection in India' by Sonia Bhalotra and Tom Cochrane, CMPO Working Paper No. 10/254 (<http://www.bris.ac.uk/cmipo/publications/papers/2010/wp254.pdf>)

Sonia Bhalotra is a professor of economics at the University of Bristol and a member of CMPO

Trends in the proportion of females at birth by birth order and previous sex composition (five-year moving averages)

Figure 1: First births and later births in families with previous boys show no tendency for a deficit in girls to emerge with the appearance of ultrasound

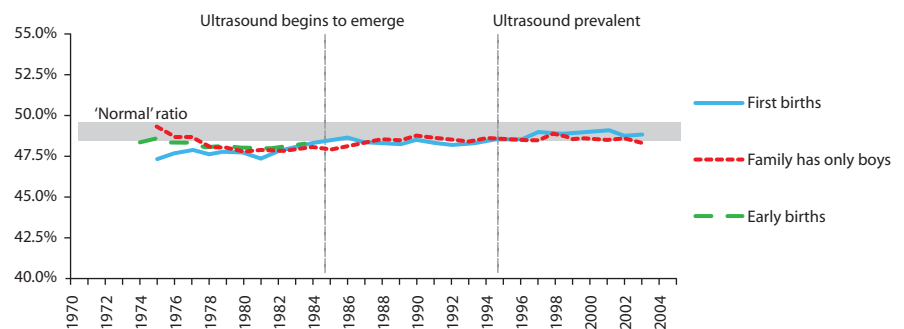


Figure 2: Among second births, the probability of a girl birth falls sharply with the appearance and spread of ultrasound but only in families with no previous boys (note: for second births, families with at least one boy are effectively families with only boys)

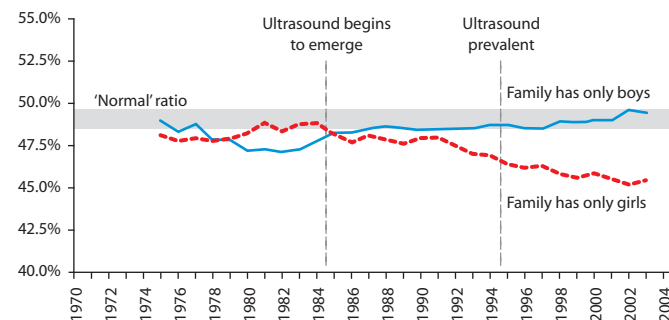
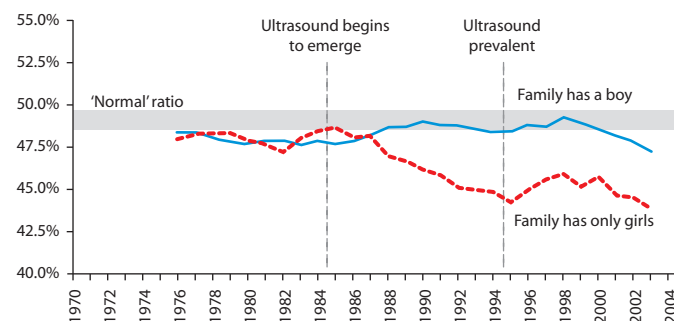


Figure 3: Third births behave like second births but show a larger divergence between families with and without a previous boy



Access to abortion, neonatal health and sex selection in Nepal

Improving women's access to abortion can have a positive effect on children's health, but it might also lead to greater sex selection. *Christine Valente* looks at the experience of Nepal.

Abortion liberalisation took place at the beginning of the 1970s in the United States. The impact of this reform on the health of the next generation has attracted substantial interest, with research finding evidence that, for example, the liberalisation led to higher birth weights and improved neo-natal and infant survival.

A 1981 study by two US economists, Michael Grossman and Steven Jacobowitz, concluded that 'the increase in the legal abortion rate [was] the single most important factor in reductions in both white and non-white neo-natal mortality rates' between 1964 and 1977, dominating not only the other public policies considered in their analysis, but also improvement in maternal schooling and poverty reduction.

The extent to which the correlation between abortion and neo-natal mortality highlighted in this and other early studies can be interpreted as a true causal link is unclear, and the findings of more recent studies are mixed. But the debate started in the context of developed countries such as the United States raises the question of whether improved access to abortion may contribute significantly to better child health in the developing world, where over nine million children still die under the age of five every year.

Most of these deaths occur in sub-Saharan Africa and South Asia, where abortion is generally not legal and safe abortion is only

available at high expense. It is particularly important to shed light on the potential role of abortion reform in decreasing neo-natal mortality, as the incidence of deaths in the first four weeks of life now constitutes over a third of all child deaths.

There are two main channels through which reducing the psychological or financial cost of abortion can affect average child health. The first is a 'behavioural' channel, through which parents can terminate a pregnancy if it is untimely or has other characteristics that parents find undesirable and through which parents can choose to substitute investments in child health for quantity of children.

The establishment of legal abortion centres in Nepal does not seem to have led to more sex-selective terminations

There is a considerable body of economic research on whether and how parents make a trade-off between, on the one hand, having more children and, on the other hand, investing more in the health and education of each child.

The second channel through which a reduction in the cost of abortion can affect average child health is through a 'parental selection' effect. This occurs if a change in the cost of abortion disproportionately reduces the birth rate among parents who have systematically worse or systematically better child outcomes.

The first of these two effects is unambiguously positive for the health of children effectively born, but the direction of the second effect is unclear, implying that the overall effect of abortion is also unclear. Previous studies have not been able to distinguish comprehensively between these two channels, and there is no evidence for developing countries, where the need to find solutions to improve child health is particularly acute.

My research uses data from a recent change in the Nepalese abortion regime to shed light on the consequences of improving access to legal abortion for neo-natal mortality and related gender issues. More specifically, I examine the impact of providing affordable, legal abortion facilities in the high-fertility, high-mortality context of Nepal, on pregnancy outcomes, pre-natal and peri-natal health inputs, neo-natal mortality and sex selection.

The strategy for identifying a causal effect relies on variation across time and space in access to legal abortion centres in Nepal to identify the effect of these centres on

pregnancy outcomes and neo-natal mortality. This was made possible by combining existing individual pregnancies data and new data on dates of opening and latitude and longitude coordinates of the new legal abortion facilities.

The approach taken was to estimate the change in the likelihood for each outcome of interest (for example, neo-natal mortality) to be realised, between pregnancies occurring before a legal abortion facility became available nearby and pregnancies occurring afterwards, holding constant a number of potential confounding factors.

Confounding factors controlled for in the study include pregnancy-specific demographic characteristics, such as maternal age at conception and pregnancy order, changes over time common to all pregnancies irrespective of whether or not they occurred near a legal abortion centre and any characteristic of the location where the pregnancy takes place and of the mother that remains unchanged over time.

Consistent with the prediction that proximity to a legal abortion centre reduces the cost of abortion, the results show that a pregnancy is less likely to result in a live birth when it

so that gender-specific concerns arise with respect to abortion liberalisation. The main concern is that abortion liberalisation may increase sex-selective abortions.

may contribute to preventing sex selection if some women substitute early, gender-blind legal abortions for illegal ones taking place at a later gestational stage.

Improved access to early abortions in a regulated environment may actually reduce sex selection

occurs closer to a legal abortion centre. But there is no evidence that improved access to abortion reduces neo-natal mortality. Similarly, improved access to abortion does not appear to increase parental investment in pre- and peri-natal care, such as the number and timing of pre-natal checks and assistance by trained staff at delivery.

Many countries facing high fertility and high child mortality, and where abortion reform may have the largest effects, are also characterised by a degree of son preference,

In Nepal, however, during the period covered by my data, legal abortion centres were only authorised to carry out first-trimester abortions, and there is evidence that this restriction was largely implemented in practice. Sex-detection technology that is reliable under 12 weeks of gestation is costly and not widely available in Nepal, so that access to these legal abortion centres is unlikely to increase the number of sex-selective abortions.

In fact, these first-trimester abortion centres

The results of my research do not support the hypothesis that legal abortion centres in Nepal have led to more sex-selective terminations. If anything, this study provides some suggestive evidence that improved access to early abortions in a regulated environment may actually reduce sex selection.

Christine Valente is a lecturer in economics at the University of Sheffield

This research was funded by the ESRC and is available here:
http://www.sheffield.ac.uk/economics/research/serps/articles/2011_006.html

Discrimination begins in the womb: evidence of sex-selective pre-natal investment

Even if mothers who are expecting a girl decide to go through with their pregnancies, do they invest less in pre-natal healthcare? Prashant Bharadwaj looks at evidence from a number of Asian countries.

Sex-based discrimination has been studied extensively in the context of 'son preference' in South and South East Asia. Sex-selective abortions and differential care given to boys and girls after birth have resulted in an estimated 30 to 70 million 'missing' women in India and China alone. While economic growth might be expected to erode such discrimination, son preference (as evidenced by skewed sex ratios at birth and after) has been persistent despite high growth rates in these countries.

A number of studies have examined the role of sex-selective abortions and post-birth discrimination strategies, including differences in vaccination rates, allocation of household resources, breastfeeding behaviour and parental time allocation. One potential area of discrimination that has not been examined is whether parents invest less in pre-natal care when pregnant with a girl, while still carrying the girl to term.

Pre-natal discrimination may have sizeable consequences since care during pregnancy is an essential component of the overall health of the child. We know from previous research that in utero events and childhood endowments affect later life health, IQ and labour market outcomes. Maternal inputs during pregnancy can also affect important

immediate outcomes, such as neo-natal survival and birth weight.

In India, attending pre-natal care is correlated with a 27% decrease in the probability of neo-natal mortality. Tetanus shots during pregnancy play a particularly important role in neo-natal survival: about 38% of child deaths (under five years) occur in the neo-natal stage; and neo-natal tetanus is the leading cause of neo-natal deaths, resulting in nearly 200,000 neo-natal deaths per year in South and South East Asia.

Our research examines the extent of sex-selective pre-natal care in a number of countries in South and South East Asia, particularly India. We find significant differences in the pre-natal healthcare

Women make different choices about pre-natal healthcare when they are pregnant with boys compared with when they are pregnant with girls

Pre-natal discrimination occurs largely among mothers who report having received an ultrasound during pregnancy

choices of women when they are pregnant with boys relative to when they are pregnant with girls.

In India, women are 1.1 percentage points more likely to attend pre-natal care when pregnant with a boy, and they receive a significantly greater number of tetanus shots. In northern India, where sex discrimination is known to be more prevalent, women are 4.6% more likely to seek pre-natal care and 3% more likely to receive tetanus shots if they are pregnant with a boy. In the same region, women are 16% more likely to deliver their baby in a non-home environment when pregnant with a boy.

As Figure 1 shows, we also find that women whose previous children were mainly girls tend to discriminate more when the current foetus is male. Moreover, for a subset of the Indian data, we find that pre-natal discrimination occurs largely among mothers who report having received an ultrasound during pregnancy.

We find similar evidence in other countries in South and South East Asia where sex discrimination has been documented. For example, in China, women pregnant with boys are nearly 6% more likely to seek pre-natal care. Mothers in Pakistan are 6% more likely to take iron supplements, and mothers in Bangladesh attend pre-natal care 7% more frequently when pregnant with a boy.

Apart from exploring a new parental avenue for gender discrimination, this research also brings a new perspective to the vast body of research on parental investment, which examines whether schooling or nutrition-based investments reinforce (or are affected by) the distribution of 'initial endowments'.

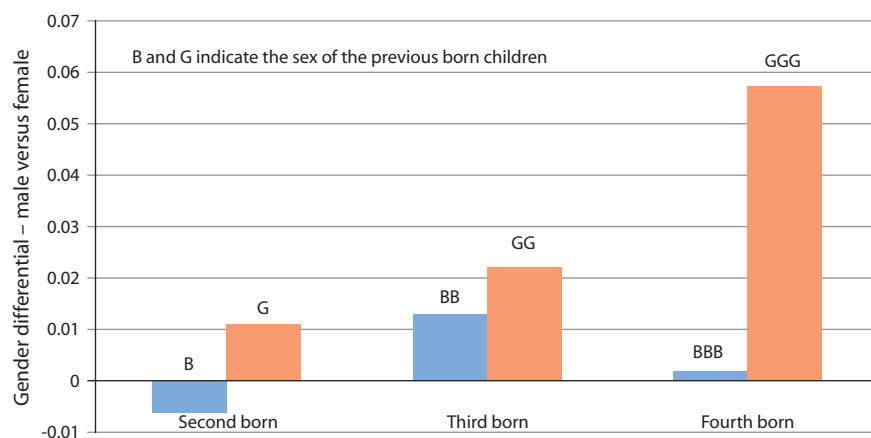
The notion of initial endowments is often related to birth weight or the residual of a human capital production function: we show that initial endowments (even within families) are subject to preferences over gender. Thus, beyond the usual concerns with endogenous endowment formation, such as

maternal behaviour, genetic correlations etc., we suggest gender preferences as an additional channel for consideration when examining the impact of initial endowments on short- and long-term outcomes.

A common policy to address sex discrimination is to prohibit health professionals from revealing the sex of the foetus during ultrasound scans, as India did in the mid-1990s. Despite the legal efforts of the government, sex-selective abortions have risen in recent years in India and policy has tried to stamp it out. We argue that even if all policy efforts were diverted to reducing the incidence of sex-selective abortions, an unintended consequence could be a rise in differential investments in pre-natal care.

Our calculations suggest preferential treatment in one such investment – tetanus shots – can explain between 4% and 10.5% of the excess female neo-natal mortality. So if gender equality is a priority, policy must be concerned about the possibility of discriminatory pre-natal care leading to long-term differences in the outcomes for men and women.

Figure 1: Gender differential (male versus female pregnancy) in whether mother receives pre-natal care, by previous births



This article summarises 'Discrimination Begins in the Womb: Evidence of Sex-selective Pre-natal Investments' by Prashant Bharadwaj and Leah Wilson (available at: <http://dss.ucsd.edu/~prbharadwaj/index/Papers.html>)

Prashant Bharadwaj is an assistant professor at the University of California, San Diego

Son preference and sex choice: evidence from immigrants to Canada

Looking at sex selection among Asian immigrants to rich countries makes it possible to disentangle the economic and cultural motives for 'son preference'. Doug Almond finds significant differences in sex ratios arising from differences in parents' religion.

The last decades have seen high and rising male sex ratios at birth in a number of Asian countries, notably India and China. In China, more than 120 boys were born per 100 girls in 2005 (Li, 2007). Initial claims that the sex ratio was driven by some unknown racial specificity of Chinese people have given way to recognition that daughters are being 'deselected' (Scharping, 2003).

Sex ratios in India are not quite as stark, but show a steadily increasing trend. According to the 2001 census, there were 108 boys per 100 girls in the 0-6 age group, up from 105.8 in the 1991 census.

High and rising sex ratios raise the question of what causes parents to select sons. One set of arguments emphasises socio-economic and institutional factors. In the absence of savings or pensions, the poor rely heavily on children for support in old age, a task that under patriarchal norms falls on sons (Chung and Das Gupta, 2007). For India, it has been argued that high and rising dowry payments place families with daughters at a disadvantage, and even that families depend on males for physical protection (Oldenburg, 1992).

But in both India and China, the sex ratios are the highest in the richest areas, casting doubt on sex choice being the result of economic necessity alone. For example, according to the 2001 census, Punjab, one of the richest Indian states, had 125 boys per 100 girls in the 0-6 age group.

Another strand of explanations stresses the cultural value attached to a male offspring.

According to Hindu tradition, only a son can light a man's funeral pyre. Similar beliefs characterise Chinese traditions, where lineage is traced solely through the male. Failure to produce a son is considered tantamount to 'extinction' of the family line, a grave affront to Confucian values, which emphasise filial piety and ancestral worship.

With communism, Confucianism lost its status as state-sanctioned doctrine, but its continued relevance is evident in the current Chinese law on population and birth, which states that it is 'forbidden to discriminate against or mistreat women who give birth to female infants and women who do not give birth. It is forbidden to discriminate against, mistreat, or abandon female infants.'

For brevity, let us refer to the two motives as the economic and the cultural. If the economic motive were the predominant reason why parents practice sex selection, then we would expect the practice to fade as India and China continue on their path of economic growth. If on the other hand, the cultural motive is important, it is less clear why economic development would change son preference or sex selection.

The relative importance of these two factors is hard to disentangle. But by studying Asian immigrants to Canada where the economic motives favouring sons in the host country are arguably not operative, we hope to shed some light on the issue.

Before describing our study, note the two principal ways to achieve a son: parents may continue childbearing until a son is born or they may practice sex selection. The two methods obviously have different implications for the number of surviving offspring and their sex ratio.

The first method is commonly referred to as a 'stopping rule', and as such does not imply abnormal sex ratios. The number of observed children is higher, since daughters are not suppressed. Lower desired fertility, for example, from a higher opportunity cost of mothers' time, is one mechanism through which economic development could reduce the attractiveness of this method.

Sex selection means that sons can be achieved at lower fertility, and pre-natal sex determination combined with elective abortion has drastically reduced the physiological cost of this choice. Whether it also reduces the moral cost may be culture-specific. While the high sex ratios in China at birth have drawn attention to pre-natal 'deselection' of daughters, the cause is often attributed to the desire to bear a son in Chinese society.

The possibility that the moral cost of sex selection may also vary across cultures has received far less attention. But whereas the abortion of a female foetus because of her sex may be deemed regrettable but understandable in some societies, it would be judged much more harshly in others, including by those otherwise wedded to abortion on demand.

We consider sex ratios among South and South East Asian immigrants to Canada using the 2001 and 2006 censuses. Canadian immigrants offer an interesting case for several reasons. Many of the socio-economic and institutional factors advanced to explain high sex ratios in India and China are not 'portable' to Canada, to use the terminology of Fernandez and Fogli (2009).

Canada is a rich OECD country with extensive welfare provisions, so that poverty and the need to rely on sons for support in old age are less likely to be a factor. Most family heads are admitted based on a points system or through 'investor' or 'entrepreneur' provisions, further ensuring low rates of poverty among immigrants.

Given the large income differences between Canada and India, a daughter's dowry would not be onerous (should it be required). Moreover, the role of land, to pass on or to farm, is likely to be limited since recent immigrants have been decidedly urban, vocationally and locationally.

The economic opportunities for sons and daughters are similar in Canada. International comparisons of crime rates are difficult due to variation in definitions, but homicide rates are lower than in the United States and the

need for physical protection through sons is likely to be minimal. Another advantage of the Canadian setting is that there is obviously no one-child policy to heed.

What Canada does share with India and China is access to technology for pre-natal sex selection and a liberal abortion policy. In fact, Canadian abortion law is among the most permissive in the West. Moreover, abortion procedures are covered by public health insurance with no co-payments, rendering the monetary cost of an abortion negligible.

As Figure 1 shows, sex ratios are abnormally large at higher parities if previous children have been all girls, confirming patterns documented for immigrants from India, China, Korea and Taiwan to the United States and the UK. Unlike US census data, however, we can go further to study assimilation across generations. And there is information on religion, providing an additional insight into the role of culture.

We find higher sex ratios among first generation immigrants who arrived in adulthood. Moreover, while first generation immigrants exhibited higher sex ratios at third parity, they also seem more willing to continue to a third birth than second

generation immigrants. Second generation immigrants do not appear to use the family size channel, but we cannot reject the possibility that they practice sex selection to achieve sons.

Perhaps our most striking finding concerns (self-declared) religion. Religion is interesting because while no religion condones infanticide (traditionally, the main method of sex selection), Christianity and Islam feature strong prohibitions, whereas other religions are silent on the topic.

We find high sex ratios to be entirely driven by immigrants who are neither Christian nor Muslim, the highest sex ratio being found for Sikhs. For this group, there are more than two boys per girl for the third child if the two older children were girls, implying a sex ratio that is 100% above normal.

By contrast, Asian immigrants who are Christian or Muslim (mainly from Pakistan, Bangladesh, the Philippines and Hong Kong) exhibit normal sex ratios, irrespective of parity and sex mix of previous children. This finding resonates with research indicating that Christian South Koreans are much less likely to practice sex-selective abortions than Confucians or Buddhists (Chung, 2007).

The absence of skewed sex ratios could mirror an absence of sex preference among Christians and Muslims, but that does not appear to be the case. Christian or Muslim parents were about five percentage points more likely to continue to a third child if the first two were girls, suggesting that the explicit bans on post-natal sex selection (infanticide) in these religions may also protect the unborn girl against pre-natal sex selection.

This article summarises 'O Sister, Where Art Thou? The Role of Son Preference and Sex Choice: Evidence from Immigrants to Canada' by Doug Almond, Lena Edlund and Kevin Milligan (<http://www.nber.org/papers/w15391>)

Doug Almond is a visiting professor at Cornell University

Further reading

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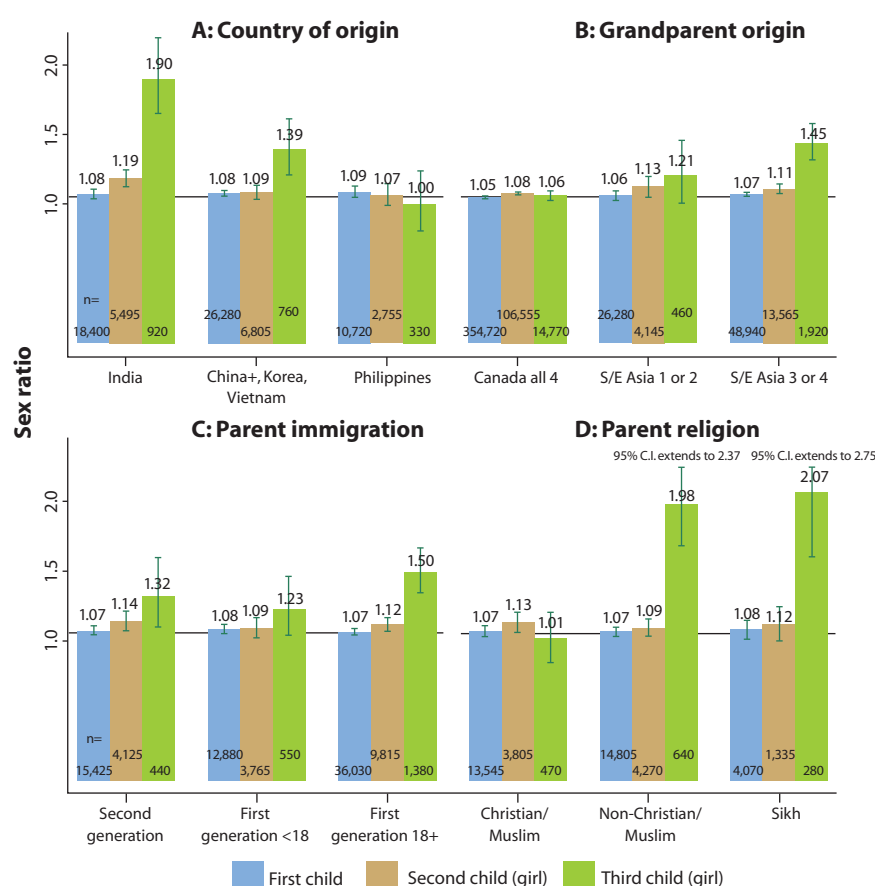
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Thomas Scharping (2003) *Birth Control in China, 1949-2000: Population Policy and Demographic Development*, Routledge

Shuzhuo Li (2007) 'Imbalanced Sex Ratio at Birth and Comprehensive Intervention in China', paper presented at the fourth Asia Pacific Conference on Reproductive and Sexual Health and Rights, October 29-31, Hyderabad, India (<http://www.unfpa.org/gender/docs/studies/china.pdf>)

Figure 1: Sex ratios at birth among immigrants to Canada



Parental investment in India: are boys and girls treated differently?

Do parents give their daughters less time and fewer resources than their sons? *Silvia Helena Barcellos, Leandro Carvalho and Adriana Lleras-Muney* look at data on parental investment in India.

Women in developing countries fare worse than men in many dimensions: they receive less schooling, they have lower rates of labour force participation, they earn lower salaries, they are more likely to be poor and they often lack fundamental rights such as the right to vote or the right to own property. One extreme manifestation is that mortality rates for girls are substantially higher than for boys in many developing countries, particularly in countries with 'son preferences' such as India.

Surprisingly however, research does not always support the idea that these differences are due to explicit differential treatment of boys and girls. Many studies find evidence that boys receive more nutrition, more healthcare, more breastfeeding and more vaccinations than girls. But Deaton (1997), for example, states that there is no evidence that parents spend more on boys than on girls; and Duflo (2005) concludes that 'even in the countries where the preference for boys is strongest, it is hard to find evidence that girls receive less care than boys under normal circumstances.'

Our research investigates whether parents treat girls and boys differently in India. Previous work assumes that boys and girls live in families with similar characteristics. But we show that this assumption is incorrect if families have a preference for sons and keep having children until they

have the desired number of sons, which appears to be the case in India. As a consequence of these male-biased 'stopping rules' of childbearing, empirical estimates of discrimination are biased.

We develop a novel empirical strategy that addresses these issues. It relies on the observation that – in the absence of sex-selective abortion – the child's sex is random at birth. If the child's sex is random, then families that just had a boy are identical to families that just had a girl in terms of predetermined characteristics. Therefore, any differences in terms of parental inputs can be attributed to the sex of the newborn.

But over time a correlation will develop between the youngest child's gender and family characteristics, because the families that had a girl are less likely to stop having

We use them to study whether boys are given more inputs than girls.

We also use our identification strategy to investigate whether boys and girls are treated differently in terms of an important but infrequently studied type of investment in children: childcare time. Starting with Becker (1965), economists have recognised that, in addition to money, time is a key input into the 'child production function'. Time is particularly important to the extent that it is complementary to many other inputs.

But there are no estimates of gender differences in parental time allocation for developing countries. Using data from the Indian Time Use Survey, we investigate whether families spend more time engaged in childcare when a boy is born instead of a girl. We also study gender differences in other

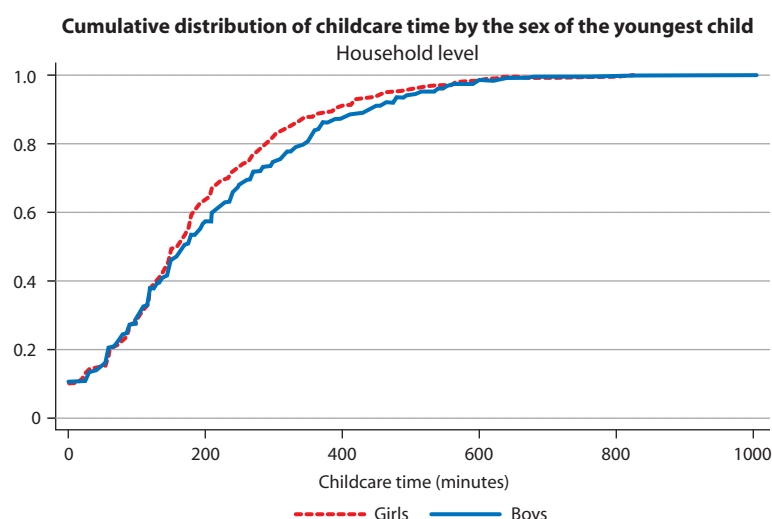
Households with an infant boy under the age of one spend 30 minutes more a day engaged in childcare than households with an infant girl

children. To overcome this problem, we restrict our sample to families with children that are still 'young enough' and have not had the opportunity to have other children.

The data suggest that families with boys and girls aged 0-15 months (and possibly a bit older) look identical in terms of observables.

frequently studied measures of parental investments, such as vaccinations, using the Indian Demographic and Health Survey.

Our results indicate that families do indeed treat boys and girls differently. Preliminary evidence of differential treatment by gender is presented in Figure 1, which shows the

Figure 1: Childcare time by gender, Indian Time Use Survey, 1998-99

cumulative distribution of childcare separately by gender of the youngest child under the age of one. In Figure 1, the baby boy distribution appears to the right of the baby girl distribution, suggesting that boys receive more childcare than girls.

We confirm this pattern in more formal analysis. Our results show that households with an infant boy under the age of one spend roughly 30 minutes more per day – or 14% more time – engaged in childcare than

A back of the envelope calculation using estimates from research on the effects of breastfeeding and vaccinations on mortality suggests that gender differences in investments explain about 27% of excess girl mortality among children 12-36 months old (or two additional girl deaths per 1,000 children). We know of no good estimates of how parental time affects outcomes – but if we assume a modest effect of time inputs on mortality, then we can explain an additional 3.4% of girl excess mortality.

Boys are more likely to be given vaccinations and vitamin supplements, and they are breastfed for longer

households with an infant girl. The quality of the childcare also appears to be higher for baby boys. This gender difference appears for different kinds of childcare, including supervision and physical care.

The effect is larger for households with only one child under the age of six, who spend more than 60 minutes more per day (about 30% more) when their youngest is a boy. In addition, our results show that boys are more likely to be vaccinated, to be breastfed longer and to be given vitamin supplements. In general, we find these inputs to be at least 10% higher for boys.

Although we cannot provide conclusive evidence as to why parents give girls fewer resources, we investigate some possibilities. Parents might prefer boys to girls; investments in boys might have larger returns (for example, men have higher wage rates than women); boys might be seen as needing more resources; and families that have girls might anticipate that eventually their family size will be larger.

We provide suggestive evidence that boys do not in fact ‘need’ more than girls: if we look at South Africa, a developing country with data on investments and no evidence of son

preference, we find that there are no systematic gender differences in most inputs.

We also investigate whether our results are driven by the change in anticipated family size. We find little evidence to support this theory. Therefore our findings suggest that higher returns or preference for boys drive the differential investments.

Silvia Helena Barcellos and Leandro Carvalho are associate economists at RAND; **Adriana Lleras-Muney** is an associate professor at the University of California, Los Angeles

Further reading

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Genetic information: potential uses for economic and social research

New collaborations between genetic scientists and social scientists are exploring links between people's physical characteristics and their behaviour and economic outcomes. *Stephanie von Hinke Kessler Scholder and Neil Davies describe the potential uses of genetic information for social science.*

Recent developments in the science of genetics have dramatically reduced the cost of obtaining genetic data. The first draft of the human genome project was published in 2003 and cost \$3 billion, but since then the cost of sequencing DNA has fallen dramatically. This has led many cohort studies and other surveys, including those often used by social scientists, to collect bio-samples and extract genetic data. But what can genetic information offer social scientists?

Our genome influences many human features – from physical characteristics, such as height (Visscher, 2008), to traits that are more difficult to measure, such as risk preferences (Cesarini et al, 2010). One way to study the influence of our genome on these characteristics is to calculate their *heritability*. This is defined as the proportion of the total variation in the characteristic that is due to genetic differences.

Heritability studies use statistical techniques to estimate this proportion. If certain characteristics of interest to social scientists are found to be heritable, we may then wish to examine and understand the specific underlying differences in DNA and the genetic mechanism that can explain this heterogeneity across individuals.

But how do scientists find genetic variants or specific locations on the DNA sequence that are related to characteristics such as height, weight or risk preferences? Until recently, genetics researchers used a 'candidate gene approach' to examine the association between a specific genetic variant and a particular characteristic.

Based on biological knowledge, researchers examined associations between the variant (the 'candidate genetic variant') and the characteristic. But because the genome is so large, this was a very slow process. Improvements in technology and computing, however, have led to the development of new methods and techniques.

One of the most successful methods has been genome wide association studies, which can relate up to 2.5 million genetic variants to the characteristic of interest. For example, this has allowed researchers to pinpoint specific parts on the DNA sequence that are associated with individual fat mass or 'body mass index' (BMI, calculated as an individual's weight in kilograms divided by their height in meters squared).

Genome wide association studies can relate up to 2.5 million genetic variants to a single human characteristic

The *FTO* gene was discovered using this approach. This gene shows a clear and robust association with BMI, obesity and fat mass. People who carry the rare version of *FTO* are on average slightly heavier, have a larger fat mass and are more likely to be overweight or obese, compared with people who carry the common version.

FTO is often called the 'obesity gene', though this is somewhat misleading. Not all carriers of the rare *FTO* variant are obese, and obesity is influenced by many other factors, some genetic and some environmental. But the rare variant of *FTO* does increase adult body

weight by 2-3 kilograms on average (Frayling et al, 2007).

Genome wide association studies can be applied to characteristics that are of interest to social scientists. For example, the heritability of educational attainment is typically estimated to be around 40% (Beauchamp et al, 2010). Genome wide association studies can attempt to find the exact locations on the DNA sequence that contribute to this heritability.

Indeed, researchers are already attempting to relate educational attainment to specific genetic variants in genome wide data (Beauchamp et al, 2010). Understanding the underlying differences that explain the overall heritability could improve our

understanding of the variation that is observed across individuals.

Genetic information can also be used to test broader causal hypotheses. We know that the allocation of genes from parents to offspring is random, as shown by Gregor Mendel (1822-84) in his study of the inheritance of traits in pea plants.

Studies have also shown that individuals' genes are unlikely to be related to their background characteristics, such as socio-economic position, life expectancy or income. In fact, the term 'Mendelian randomization'

The variation caused by genes can be used to study the causal effects of fat mass on academic performance

refers to studies that exploit this random assignment of individuals' genomes (Davey Smith and Ebrahim, 2003).

Mendelian randomization uses the random assignment of genes to study the effects of a particular characteristic on an outcome of interest. For example, the *FTO* gene can be used to explain variation in fat mass or BMI. This variation can then be related to individuals' academic outcomes to investigate the effect of fat mass on academic outcomes. This is the methodology that economists and genetic epidemiologists at the University of Bristol are using, as described in more detail in the next article.

It may seem counterintuitive to use *FTO* to predict differences in fat mass, rather than measuring fat mass itself. But there are several crucial advantages to this approach. First, unlike fat mass, *FTO* is unlikely to be related to other behavioural, social and physiological factors that may confound the association between fat mass and academic achievement. This means that if *FTO* is used to predict fat mass, it is unlikely to be confounded with such factors.

Second, any association between fat mass and academic achievement may be due to 'reverse causation'. For example, children who perform poorly in school may decide to over- or under-eat in response. This would imply that differences in school outcomes cause differences in fat mass rather than vice versa. In contrast, *FTO* is not affected by the child's performance in school and cannot be biased by reverse causation.

The method of 'instrumental variables', a statistical approach commonly used in econometrics, can be used to study causality. In this case, it would use the variation caused by genes to study the effects of fat mass on academic

performance. The use of genetic information in this way is new, and makes this a novel and exciting area for social scientists.

It allows researchers to explore causal research questions that are difficult or perhaps even impossible to answer in observational studies. In addition, collaboration between social scientists and genetic epidemiologists will benefit both: social scientists will learn about the science behind genetics, and genetic epidemiologists will increase their understanding of the latest statistical and methodological techniques.

The advantage of Mendelian randomization lies in avoiding the confounding factors that often complicate the interpretation of observational studies. But like all research methods, it has limitations that must be taken into account. One potential problem is that the frequencies with which genetic variants occur may differ across different populations, such as ethnic groups. For example, *FTO* is more common among Europeans than among Chinese and Japanese people.

Another potential problem is that when genetic variants are passed on from one generation to the next, they may be linked (or co-inherited) with other variants. Similarly, variants may influence more than one characteristic (Davey Smith, 2010).

These potential problems may therefore re-introduce confounding factors. But rapid developments in our understanding of the genome and in the functions of specific variants, as well as technological and statistical advances, may alleviate some of these problems and make Mendelian randomization an increasingly powerful method for social science as well as medical and epidemiological research.

Stephanie von Hinke Kessler Scholder is a post-doctoral research fellow at Imperial College Business School and a CMPO research associate; Neil Davies is a post-graduate research student in the University of Bristol's School of Social and Community Medicine

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Obesity and children's exam results

The excess body weight of many children in Britain is a major health concern. But according to research by *Stephanie von Hinke Kessler Scholder* and colleagues, which combines genetics and economic analysis, obesity does not seem to have damaging educational consequences.

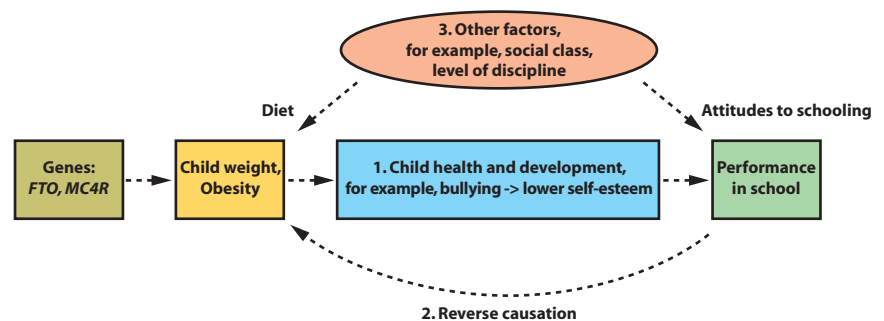


Figure 1: Potential interactions between children's weight and educational outcomes

Two thirds of adults and one third of children in Britain are currently overweight or obese. If nothing is done, these proportions are expected to rise to 90% of adults and two thirds of children by 2050. The trend affects everyone, causing ill health, such as diabetes and heart disease, and a financial cost to society that includes both direct costs to the NHS and indirect costs, such as lost earnings from sickness or early death.

In addition to these health and financial consequences, obesity may be linked to worse economic outcomes for individuals, such as wages in adulthood or the educational performance of children. Our research focuses on the question of whether obesity affects children's exam results.

There are three possible reasons for an association between children's obesity and their exam results. First, obesity could cause worse results by affecting children's health and development. For example, research shows that sleeping problems are more common among overweight children. Insufficient sleep can in turn affect children's concentration in class and hence their exam results.

Similarly, obese children may be bullied by their classmates, lowering their confidence and hence their performance (number 1 in Figure 1). But being treated differently may mean that instead of taking part in social activities such as sport, these children spend more time studying and preparing for school, improving their exam results.

Second, there may be 'reverse causation' with children's exam results affecting their body weight. For example, children may over-eat to compensate for doing poorly at school (number 2 in Figure 1). Conversely, any stress caused by low exam results may reduce children's appetites and lead to weight loss.

Third, rather than a causal relationship, the association may be driven by other factors that affect both weight and exam results in school. For example, a family's socio-economic position will shape children's diet and attitudes to school, affecting both their weight and exam results (number 3 in Figure 1). Similarly, rather than playing sport, some children may have an (unobserved) preference for using this time to study, which in turn improves their exam results.

Our research focuses on the first point: whether there is a causal effect of children's obesity on their performance in school. But simply measuring the correlation between obesity and school performance does not necessarily answer the question since the correlation will combine all three elements into one estimate.

To quantify the actual *causal* effect, we combine the latest developments from genetic epidemiology with statistical methodologies applied in economic and econometric research. More specifically, we use two carefully chosen 'genetic markers' (specific locations on children's DNA), which are known to predict variation in children's weight.

Medical and epidemiological research has shown that genes are spread randomly from parents to children. This randomness implies that they are not related to other factors, such as social class. (Note there is no link between genes and other factors in Figure 1.)

Findings from medical and epidemiological research show that certain sections of both the *FTO* and *MC4R* gene increase children's and adults' weight. We therefore use the



Obesity is not a major factor affecting children's exam results

variation in weight that is explained by these specific genes and relate *that* to children's performance in school. The idea is that this correlation measure excludes any confounding due to other factors as well as any possible reverse causation. It therefore gives an estimate of the *causal* effect of obesity on academic performance.

We analyse data on almost 4,000 members of the 'children of the 1990s' birth cohort, who were born in and around Bristol in 1991/92. These young people are now in their late teens but they continue to be followed up by this long-running study.

The data are very rich. For example, the measure of excess body weight commonly used in research is 'body mass index' or BMI, which is calculated as an individual's weight in kilograms divided by their height in meters squared. Specific points in the BMI distribution categorise people into underweight, healthy weight, overweight and obese groups. But the BMI measure does not distinguish between different types of body mass, such as fat, lean and bone mass.

The 'children of the 1990s' data do make these distinctions: they include a direct measure of the amount of fat mass carried by each child, as measured by a so-called DXA scan. So rather than using the standard BMI, we use a direct measure of children's fat mass, taken at age 11, to examine the effect on children's educational outcomes. More specifically, we focus on children's results at key stage 3, the nationally set exam taken at age 14 in state schools in England.

The results can be described in two stages. First, the simple correlation between children's obesity (as measured by their fat mass) and their exam results shows that heavier children do worse in school. But this association is small: heavier children only do slightly less well.

Second, using children's genetic markers to look at this finding in more detail and specifically explore the *causality*, we find no evidence that obesity causally affects exam results. We therefore conclude that obesity is not a major factor affecting children's educational outcomes.

These findings suggest that the previously found negative relationship is driven by other factors that affect both weight and educational attainment. These could include such factors as social class, but they may also simply represent individual preferences that are not directly observed by researchers.

This article summarises 'Genetic Markers as Instrumental Variables: An Application to Child Fat Mass and Academic Achievement' by Stephanie von Hinke Kessler Scholder, George Davey Smith, Debbie Lawlor, Carol Propper and Frank Windmeijer, CMPO Working Paper No. 10/229 (<http://www.bristol.ac.uk/cmipo/publications/papers/2010/wp229.pdf>)

Stephanie von Hinke Kessler Scholder is a post-doctoral research fellow at Imperial College Business School and a CMPO research associate

The state of donation: long-term trends in UK charitable giving

How can the level of charitable donations in the UK be increased? Edd Cowley and Sarah Smith explore evidence on the public's generosity over the past three decades to shed light on the government's ambition to boost giving.

The government's recent 'Giving White Paper' states its desire to increase the level of giving – of both time and money – as part of creating a 'big society'. Our research with colleagues at the Centre for Charitable Giving and Philanthropy has analysed long-term trends in charitable donations to consider whether – and how – this desire might become a reality.

The research focuses on giving by the whole population, but it is worth noting that measures targeted at the very wealthy may be more effective at increasing total donations than anything directed at everybody. The government has not been clear whether its objective is simply to increase donations, to increase the number

of donors or both. In terms of donations, one Bill Gates would be worth millions of households, but focusing on major philanthropists may be less in keeping with the idea of the 'big society'.

The research uses data from the Living Costs and Food Survey (formerly the Family

The way people give to charity has been transformed but there has been little change in the share of their total spending that they give

Expenditure Survey) to carry out a comprehensive analysis of the main trends in giving to charity over the last three decades, 1978-2008. The survey does not capture major donors. It also covers a two-week period and is consequently likely to under-report the proportion of people who ever give to charity in a year.

But the main strength of the survey is that it provides reliable and consistent information on charitable giving among the general household population over a long period of time, allowing us to examine the main trends in giving. It also has detailed information on household characteristics that can shed light on the drivers of change.

Our first finding is that fewer households give to charity now than three decades ago: 27% of households reported that they had given to charity in the last two weeks in 2008, down from 32% in 1978. More encouragingly, the millennium seems to mark a turning point in a long-term downward trend after giving reached its lowest point in 1999 (see Figure 1).

Second, average donations have increased in real terms over the last three decades. An increase in donors' giving has compensated for falling participation rates. Looking at the whole population (including givers and non-givers), donations have more than doubled. Looking only at givers, they have gone up threefold (see Figure 2).

But measured as a share of total spending, households are giving exactly the same as they were in 1998 and 1988 (0.4%). While the last 20 years have seen short-term increases in giving – in response to the Asian tsunami, for example, and in the millennium year – the spending share has been remarkably constant over a long period.

Figure 1: Proportion of UK households giving to charity in a two-week period

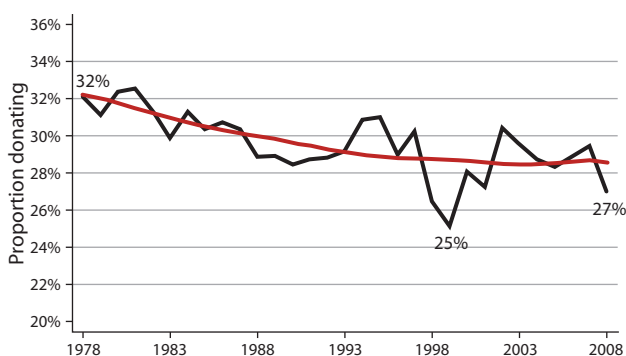
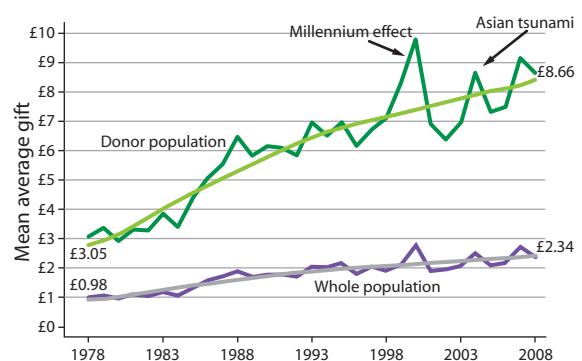


Figure 2: Average donations (£ per week)



Encouraging all donor households to give as much as the most generous households would be a very effective way of raising total donations

The relative stability in giving as a share of total spending is both good and bad news for the sector. Charities can rely on donors, even in times of recession, for example. The data show that over the last three decades, the value of giving has typically grown in times of economic growth, but has not fallen at the same rate as the economy during recessions (although our dataset does not extend to the end of the latest recession).

But the evidence from the past suggests that achieving the kind of step change in giving suggested by the Giving White Paper is likely to be a challenge. Over this period, there have been changes to tax relief (such as the introduction of Gift Aid), changes to giving technology (direct debit and online) and changes to fundraising. These changes may have prevented giving from falling, but there is little evidence that they have led to an increase in giving.

The White Paper highlights the potential of technology to drive increases in giving. But the evidence from the past suggests caution about whether technology can really transform whether and how much people give – or just changes the way they give.

The past 25 years has seen a big growth in donating through ‘pre-committed’ methods, including direct debits, standing orders and deductions from pay. The proportion of households giving in this way almost doubled – from 36% in 1983 to 63% in 2008 – and the share of total donations given in this way grew two and a half times – from 18% of total donations in 1983 to 46% in 2008.

The way in which people give to charity has been transformed, yet at the same time there has been little change in how much people give as a share of their total spending. The key test for new technology to increase giving is not just whether it is adopted but the extent to which it reaches new givers and/or encourages people to give more.

Our research also finds that older givers and richer givers now account for a larger share of total donations than 30 years ago. The over-65s give 35% of all donations now, compared with 25% in 1978. While this partly reflects the growing share of the over-65s in the population, levels of participation and generosity have increased most among older age groups.

This is partly a generational effect – those who are currently in their 60s and 70s have given relatively more at all ages than younger generations. At least in part, these generational patterns are likely to reflect differences in values and beliefs. The White Paper is therefore right to highlight social norms as an important driver of giving behaviour, although understanding what shapes such norms is far from clear.

Increases in both participation and donations among the richest of households over time have meant that they account for an increasing share of total donations: up from 16% in 1978-82 to 22% in 2003-08. But among households that give, poorer households are much more generous in terms of the proportion of their total budgets given to charity: giving comprises 3.3% of total spending among the poorest 10% of givers, compared with 1.1% for the richest 10%.

If all donor households gave the average spending share (1.8% of total spending), it would increase total donations among the household population by a third. If all donor households gave the same spending share as the poorest 10% of donors (3.3% of total spending), total donations among the household population would more than double.

Encouraging current donor households to give more – and to give as much as the most generous households – could be a very effective way of raising total donations, although it would not meet any government objectives of raising levels of participation across the population as a whole.

This article summarises ‘The New State of Donation: Three Decades of Household Giving to Charity, 1978-2008’ by Edd Cowley, Tom McKenzie, Cathy Pharoah and Sarah Smith (<http://www.bris.ac.uk/cmppo/publications/other/stateofdonation.pdf>)

Edd Cowley is a research assistant at CMPO; Sarah Smith is a professor of economics at the University of Bristol and director of CMPO’s capacity-building cluster on the economic impact of the third sector.

Abolishing school league tables in Wales: the impact on pupil performance

The latest international comparisons of educational attainment do not look good for Wales. Research by *Simon Burgess* and colleagues indicates that part of the explanation lies in a decision ten years ago to remove a key mechanism for public scrutiny of how well Welsh schools are educating their pupils.

The release of the latest round of international comparative education results produced some fascinating results. Not least of these was the outcome for Wales, characterised by Leighton Andrews, the Welsh education minister, as alarming and unacceptable.

The PISA (Programme for International Student Assessment) results derive from a standardised international assessment of 15 year olds, run by the OECD. As Figure 1 shows, Wales has fallen further behind since the last tests in 2006, and scored worse than before in each of reading, maths and science. Scores in Wales have fallen relative to England and are now 'cast adrift from England, Scotland and Northern Ireland'. Leighton Andrews described the results as reflecting 'systemic failure'.

What might that systemic failure be? One leading candidate is highlighted in research we have been doing on accountability mechanisms for state schools. We argue that the decision in 2001 by the Welsh Assembly Government to stop the publication of school performance data or 'league tables' has resulted in a significant deterioration in GCSE performance in Wales.

The effect is sizeable and statistically significant. It amounts to around two GCSE

grades per pupil per year – that is, achieving a grade D rather than a B in one subject. This is a substantial effect, equivalent to the impact of raising class size from 30 to 38 pupils.

The PISA results have prompted a thorough rethink of education policy in Wales, set out in a major speech in Cardiff by Leighton Andrews in February 2011. One of the central components of the new policy will focus directly on school accountability, he said: 'We will introduce a national system for the grading of schools which will be operated by all local authorities/consortia. ... All schools

The abolition of league tables in Wales has reduced average GCSE performance and raised educational inequality

will produce an annual public profile containing performance information to a common format'.

Our study is part of a small but growing body of research trying to estimate the effect of school accountability mechanisms. The aim is to estimate a causal effect – the direct impact of introducing (or removing) an accountability system on pupil outcomes.

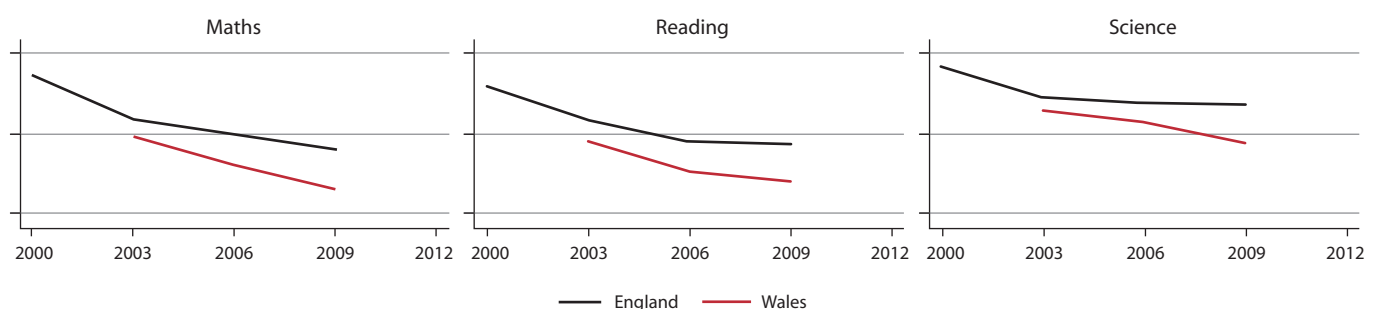
There are two reasons why this is difficult. First, such reform is typically introduced for

an entire country at once. This makes it hard to find an adequate control group to quantify the counterfactual or what would have happened if the reform had not been made.

Second, an accountability system is often put in place as part of a package of measures – new curriculum, new testing procedures, new incentive structures for schools – all alongside the public reporting of performance. This simultaneous introduction of a set of innovations means it is almost impossible to single out the effect of one component.

We exploit an event that gets round these problems. Following a referendum in 1999, power over education policy was devolved to the newly created Welsh Assembly Government. Given a greater belief in 'producer' solutions and a distrust of the 'consumerist' approach to public services in England, the Welsh government wanted to reduce the role of market-like features in education. In July 2001, it was announced that school league tables would not be published that November, and they have not been published since.

Figure 1: PISA scores in reading, maths and science



Because school performance data have continued to be published in England, we can exploit this policy change to estimate the effect of publicly available league tables. In other respects the education systems continued to be very similar so we use pupils in England as the control group for pupils in Wales. The fact that most of the other system components continued means that we can isolate the role of the league tables.

We take each secondary school in Wales, and 'match' it up to a very similar school in England. The matching is based on pupils' prior attainment, neighbourhood poverty and school funding among other factors. We then track the progress ('value added') that pupils make in these schools before and after the league tables reform, comparing each Welsh school with its English match. Our analysis explicitly takes account of the differential funding of schools in England and Wales, and the greater poverty rates in neighbourhoods in Wales.

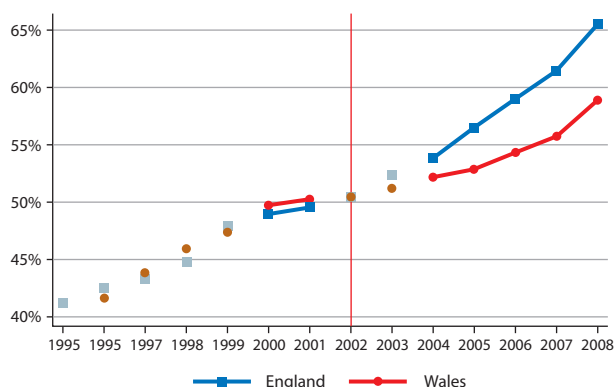
Although our results are based on a study of the GCSE scores school-by-school, Figure 2 gives a very stark impression of the overall effect. Pupils in England and Wales were performing very similarly up to 2001, but thereafter the fraction gaining five good GCSE passes has strongly diverged. We find that the abolition of league tables reduced school performance in Wales by two GCSE grades per pupil per year on average.

'Naming and shaming' puts poorly performing schools in England under pressure to improve; that pressure is absent in Wales

But this effect is not evenly distributed across all schools. The top 25% of Welsh schools, as measured by highest prior attainment or lowest poverty rate, appear unaffected by the reform. It is the lower 75% of schools that are affected negatively, with the poorest and lowest prior attainment schools falling behind the most. Our research shows that the policy reform in Wales reduced average GCSE performance and raised educational inequality.

Why should the removal of league tables lead to a fall in school performance? Standard economic analysis suggests that the public scrutiny of schools' results through performance tables would discourage teachers and schools from 'coasting' and not focusing strongly on attainment. The counter

Figure 2: Proportion of pupils with at least five good GCSE passes



argument is that teachers are professionals, do not need such oversight and that a narrow focus on performance tables reduces their effectiveness.

Part of the effect is through the removal of performance information to support parental choice of school. The league tables allow parents to identify and then apply to the higher scoring schools, and to identify and perhaps avoid the low scoring schools. A lack of applications puts pressure on the low scoring schools to improve.

But this is not the whole story. Perhaps as important is the simple public scrutiny of performance, and in particular the public identification of the low scoring schools. This 'naming and shaming' means that low scoring schools in England are under great

that the lower GCSE results simply reflect a focus on broader aspects of education.

Another broader question is the potential impact on wellbeing. It may be that lower stress from a reduced emphasis on exam performance raises teachers' wellbeing. It may be that it raises pupil wellbeing too. We do not know if this is true but if so, then there is a trade-off to consider: higher teacher wellbeing against higher pupil attainment.

Responding to our research, the Welsh Assembly Government said 'wait for the PISA results'. These results are now in and do not make happy reading. No doubt there are many factors underlying the relative performance of Wales and England, but the diminution of public accountability for schools in Wales is surely one of them.

This article summarises 'A Natural Experiment in School Accountability: The Impact of School Performance Information on Pupil Progress and Sorting' by Simon Burgess, Deborah Wilson and Jack Worth, CMPO Working Paper No. 10/246

For the full paper, see:
<http://www.bris.ac.uk/cmpos/publications/papers/2010/wp246.pdf>

Simon Burgess is CMPO's director and a professor of economics at the University of Bristol

The research on the abolition of school league tables in Wales is discussed in a video on CMPO's YouTube channel:
<http://www.youtube.com/user/CMPOBristol#p/u/4/q9pj374JGMs>

pressure to improve, whereas similar schools in Wales are able to hide and to 'coast'.

This research answers an important but very specific question: what is the impact on GCSE performance of a significant change in school accountability? It needs to be remembered that GCSEs are very important, the gateway to jobs and higher education. But there are broader questions to consider.

It is alleged that GCSEs are a narrow measure of educational attainment, and that the removal of league tables would allow space for a broader plan of learning. But this is precisely what the PISA figures measure – these tests cannot be prepared for and do not reflect cramming or teaching to the test. So the PISA results do not support the idea

Oldham lives: still parallel or converging?

Ten years after the Oldham race riots, *Simon Burgess* and *Rich Harris* examine whether ethnic segregation in the town's schools has changed at all – and the potential impact of initiatives to promote greater integration.

Ten years ago, there were major civil disturbances in Oldham, a town of over 100,000 people that forms part of Greater Manchester. Shortly afterwards, similar riots took place in Bradford and nearby Burnley.

There was a strong ethnic component to the unrest, with confrontations between gangs of white and Asian, largely Pakistani, youths. While the precise triggers of the rioting remain controversial, there is general agreement that a key underlying factor was the polarised nature of schools and communities in the towns.

Standard statistics of segregation for the largest ethnic groups in Oldham show little evidence of change over the past ten years

The phrase that has been widely used to describe the situation in Oldham is that people live 'parallel lives': physically close but never meeting. This idea was prominent in the Cantle report, which was commissioned by Oldham's council to provide an independent review of its efforts to make progress on the issues five years after the event.¹

The report, which was published in 2006, characterised the problems facing Oldham as: 'communities leading parallel lives delineated by high levels of segregation in housing and schools, reinforced by differences in language, culture and religion'. Previous CMPO research has shown that Oldham has the most ethnically polarised schools in England using conventional measures of segregation.

Now, ten years on, it seems like a good time to assess changes in segregation. As part of CMPO's continuing research programme on segregation, we have set up an interactive website, 'Measuring Diversity', which publishes detailed local statistics on ethnic segregation in schools.²

Our research shows that looking at local authorities over England as a whole, there has been essentially no change in levels of ethnic segregation over the last ten years. Of course, that reflects the residential geography of England and the tendency for ethnic groups that are less prevalent nationally to be concentrated in particular urban conurbations and then within particular parts of those towns and cities.

But even within those areas where we might expect changes, there is a little evidence of any clear trend. In Leicestershire, for example,

ethnicity and 14% of Bangladeshi ethnicity (compared with 4% and 2% respectively for England as a whole).

Over 80% of primary school pupils of Pakistani or Bangladeshi ethnicity are in 'minority white' schools (defined as schools where at most 20% of the pupils are white British); and over 70% of white pupils are in 'majority white' primary schools (schools where at least 80% of the pupils are white British). These numbers are lower in secondary schools, in part because there are fewer, larger secondary schools: 60% of Pakistani pupils and 65% of Bangladeshi pupils are in 'minority white' secondary schools.

The standard measures of segregation are the Isolation Index and the Dissimilarity Index, which are defined precisely on the website. The former is designed to capture a measure of 'exposure' between two groups, in effect a statistical measure of the likelihood of meeting someone from the other group. The latter is designed to capture the degree of 'unevenness' between two groups – how much the school population reflects the wider population at the local authority level.

Schools would be perfectly integrated if each school's population reflected the population of the local authority. Both of these indices run from 0 (perfect integration) to 1 (complete segregation). In Oldham, both these levels are very high: for example, an Isolation Index for Pakistani secondary school pupils of 0.41 (and 0.42 for Bangladeshi pupils) compared with upper quartile values in England of 0.35 and 0.17.

So how have things changed over the period for which we have data, 2002-09? Figure 1

there are some years when segregation appears to increase slightly whereas in other years it reduces. In Birmingham, very little has changed over the period 2002-09, though primary schools especially appear to be becoming more mixed. The same is true in Manchester.

The most likely explanations for the changes, where they exist, are demographic changes and because schools have consolidated, merged or opened on new sites. Where there are fewer schools in a local education authority than in the past, then that reduction will tend to create larger and more socially mixed schools.

Here we focus specifically on Oldham. The CMPO's 'Measuring Diversity' website shows that about 60% of primary school pupils in Oldham are white British (compared with 72% nationally), with 17% of Pakistani

Parents may prefer an integrated school but the highly segregated system means that they are forced to send their children to essentially mono-ethnic schools

¹<http://www.oldham.gov.uk/cantle-review-final-report.pdf>

²<http://www.measuringdiversity.org.uk>

shows one straightforward measure of integration, the fraction of pupils of different ethnicities among primary school pupils in 'minority white' schools. Similarly, Figure 2 displays the fraction of pupils of different ethnicities among primary school pupils in 'majority white' schools. Neither chart shows much sign of greater integration. We do not see more white pupils in 'minority white' schools or more Pakistani or Bangladeshi pupils in 'majority white' schools.

Turning to the direct measures of segregation, Figure 3 shows the Isolation Index for each ethnic group and Figure 4 the Dissimilarity Index. All of these lines show only very gentle declines over this eight-year period, indicating very little substantive change. All these findings can be graphed for secondary schools on the website, and show the same pattern over time as primary schools.

Overall, these standard statistics of segregation calculated for the largest ethnic groups over the eight years since the Oldham riots show little evidence of change. Of course, because school attendance is closely tied to residential neighbourhoods, it could be argued that we should not expect dramatic change. This is true to a degree, but distances between the secondary schools are not great, and we know that pupils regularly travel that kind of distance to schools in urban areas in England. So at least in principle, it is feasible for more integration to have occurred.

Another explanation for the lack of change could be the use of geographically based admissions criteria, including a mix of

Figure 1

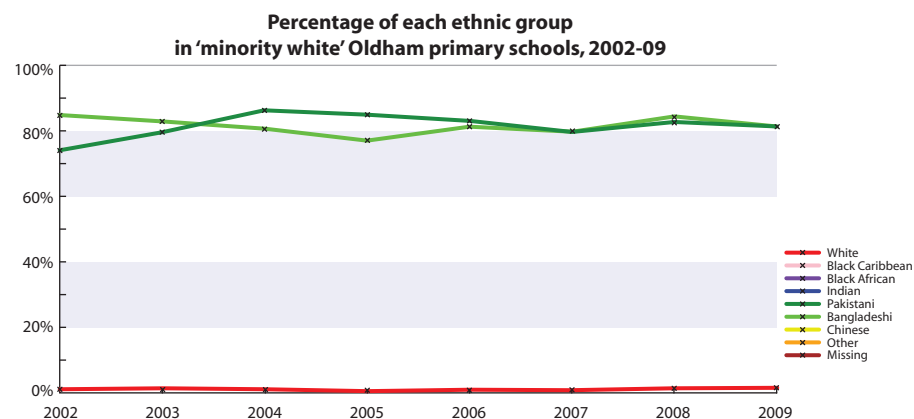
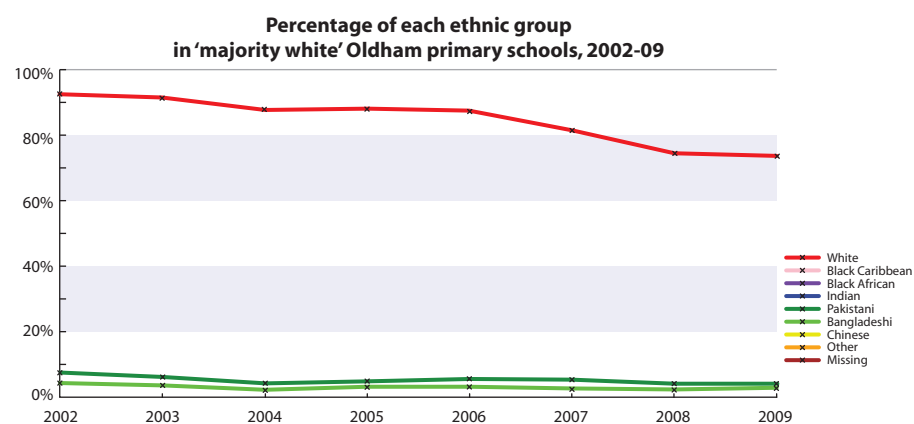


Figure 2



Church of England faith schools including demonstrable practice of a faith among their admissions criteria. If such practices have cultural and ethnic underpinnings – which they do – then including them among the admissions criteria is unlikely to aid mixing within schools.

Should we care about ethnic segregation in schools? After all, it is hard to prove that this truly was associated with the Oldham riots; or that segregation, as opposed to, say, inequality or the restructuring of the industrial/manufacturing sectors are the root causes. In fact, segregation might influence a number of outcomes, some easier to quantify than others.

One easy to measure outcome is educational attainment, typically captured by test scores. US research has shown that racial segregation between schools is strongly linked to differential test scores. Highly segregated cities are associated with black pupils scoring further below white pupils than in more integrated cities.

While similar research in England is hampered by far fewer substantial cities to run the same cross-city research design, our tentative results have shown that the same story does not hold true here. So concern for relative performance at GCSE alone would not support a strong policy interest in reducing segregation.

Concern for ethnic groups' relative performance at GCSE alone would not support a strong policy interest in reducing segregation

geographical priority areas and measures of distance to home from school in Oldham, which could determine who gets into where based on where they live. But this seems unlikely in Oldham, which has taken the bold step of merging and re-opening some of its most ethnically segregated schools, and has moved others to different areas to seek a mixed intake.

A third explanation is the prevalence of faith-based schools. More than one third of primary schools and over 40% of secondary schools in Oldham are Roman Catholic or

Fourth, it may be that other attitudes have prevented a greater mixing across schools. It is undoubtedly very hard to be the first mover and as a parent to lead a movement for integration by applying to a school numerically dominated by another ethnic group. This is a form of co-ordination problem well known in economics: that while there may be a majority of parents who would prefer integrated schools, there is no mechanism to co-ordinate such an outcome without the intervention of an outside agency. We report on an initiative that might perform such a role at the end of this article.

Figure 3

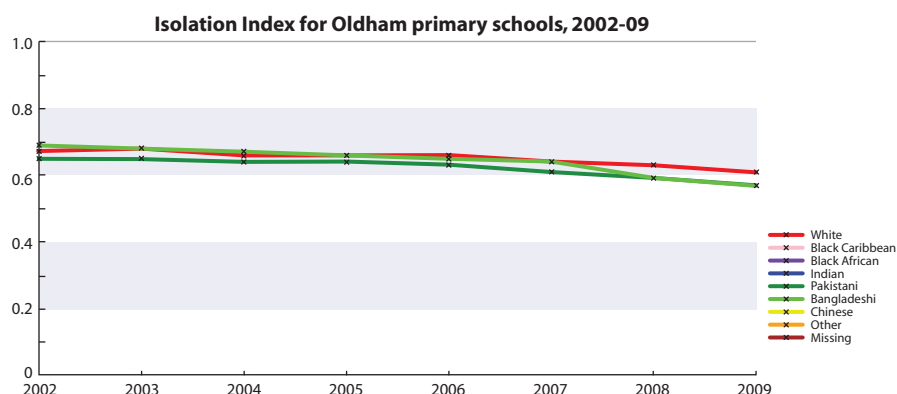
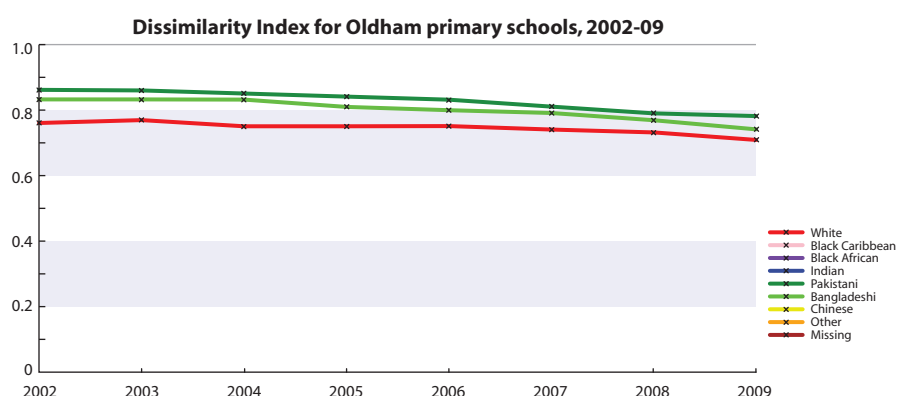


Figure 4



It could be that there are few mixed schools in Oldham because no one really wants a mixed school

An important issue is whether the segregation is voluntary or not. If it is, then the same libertarian arguments that promote school choice can be used to say, 'well, if people choose, so be it.' Indeed, though segregation is often treated pejoratively, it may well be that the identity and security of children from less dominant ethnic groups is strengthened within their own peer groups.

Moreover, any policies seeking more ethnically mixed schools need to recognise that they affect some ethnic groups more than others. The bottom line is that across England the overwhelming majority of white pupils attend 'majority white' schools. Whether this is socially desirable is an important issue, but some caution is required in advocating policies that, in effect, would force some groups to mix more than others.

The key question is hard to answer: what is

the impact of a school's ethnic composition on pupils' attitudes to other ethnic groups? Robert Putnam's results suggest that ethnically diverse communities are associated with 'hunkering down', that is, individuals keeping themselves to themselves, neither having much contact with other ethnic groups in their city nor fraternising much with their own.

Some examples of attitudes arising in highly segregated settings can be gleaned from simply listening to teachers involved in school twinning programmes in the area. School links projects (which have been running in six primary schools in Oldham since 2000) typically start with pupils from two essentially mono-ethnic schools spending time playing together.

A head teacher from Huddersfield, who runs a primary school where 92% of pupils of are

Pakistani heritage, said of her pupils: 'Some of our children could live their lives without meeting someone from another culture until they go to high school or even the workplace'.³ More dramatically, she added: 'Our pupils think it's amazing that they like pizza too'.

Growing up thinking that pupils of another ethnicity are so different that they might not like pizza or don't watch the same TV programmes is a very powerful demonstration of the influence of separation, of simply never talking to people from other ethnic groups. This is perhaps the single most important reason to have major concerns over pupils living their school lives in parallel universes.

What of the future? The Oldham Academy North opened in September 2010 as part of a broader plan for three new academies in the town. The school's ambition is to 'create an academy that promotes integration and social cohesion. We want pupils from different backgrounds to learn, work and play together – creating greater understanding that can be shared beyond the school community'.⁴

It is obviously too soon to tell whether these high hopes can be achieved. It could be that there is a strong but latent demand for a mixed, integrated school. Parents may prefer such a school, but the fact that the school system is so highly segregated means that they are forced to send their children to essentially mono-ethnic schools.

If this is the case, the new academy will attract parents from all ethnicities seeking an integrated education for their children. More pessimistically, it could be that there are few mixed schools because no one really wants a mixed school. We will need to revisit Oldham in another five years time to tell.

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³Reported in the *Times Educational Supplement*, 27 June 2008

⁴www.iroyton.com/academy/EACT_Oldham_Leaflet.pdf

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