Chapter 1

Policies, Environmental Norms and Household Characteristics

Projections indicate that households' impacts on the environment are likely to increase in the future. As governments develop environmental policies to promote greener behaviour, the OECD survey offers insight into what affects our decisions and what really works in five areas: water use, energy use, personal transport choices, organic food consumption, and waste generation and recycling. Before turning to the presentation of the main results, this introductory chapter reviews some of the main factors that are likely to have an impact on households' environmental practices and behaviour. The political context is first examined with the wide range of policy measures used by OECD countries to influence decision-making. Particular attention is also paid to the role of environmental attitudes and norms, improving our understanding of how policy makers can choose instruments to improve the effectiveness and efficiency of policies.

1. Why household behaviour matters

Household consumption patterns and behaviour have an impact on natural resource stocks, environmental quality, and climate change. Projections indicate that these impacts are likely to increase by 2030 (OECD, 2008a). One key determinant of household consumption is economic growth, with the relative economic importance of countries such as China and India increasing. Rapid growth in the world population, with a projected global population of over 8.2 billion in 2030, will also be an important driver and with a trend towards an ageing population. Urbanisation and changing lifestyles will also influence the structure of consumption.

Concerns about the environmental impacts of consumption have been raised at the global level by the United Nations since the 1992 Earth Summit. In response to the increasing environmental impact of household consumption, governments have introduced a variety of measures to promote more sustainable patterns. Recent initiatives include the introduction of environmentally-related taxes, the phasing-out of incandescent light bulbs, energy performance standards and labels for homes, carbon dioxide (CO_2) emission labels for cars and financial support to purchase less environmentally damaging vehicles and solar panels.

However, designing policies to influence household behaviour is a challenge for policy makers. The objective of the OECD project on "Household Behaviour and Environmental Policy" is to improve the understanding of the determinants of households' responses to environmental policies in five areas: residential energy use, water consumption, transport choices, organic food consumption, and waste generation and recycling. This will allow for the design of more efficient and effective policies, and the conclusions will serve as an input into the OECD's Green Growth Strategy.

Total residential energy use in OECD countries is expected to increase by an average of 1.4% per year from 2003 to 2030. This increase will be more rapid in non-OECD countries where, according to forecasts, residential energy use will be nearly 30% higher than the OECD total in 2030. Residential energy demand grows with income, as households increase their stock of electrical appliances. This results in a rise in energy consumption overall, despite energy efficiency gains (see OECD, 2008a).

Passenger-kilometres travelled (by rail, air, buses and light-duty vehicles) are projected to expand by 1.6% per year worldwide to 2030. Transport-related greenhouse gas (GHG) emissions are also expected to grow significantly. Improvements in the energy efficiency of transport vehicles will be more than offset by increases in the number of vehicles owned and in average vehicle use (OECD, 2008a).

Current waste management policies have been successful in diverting increasing amounts of valuable materials from landfill for further use, thereby reducing the associated environmental impacts. However, municipal waste generation is still rapidly increasing, in particular in non-OECD countries, and waste management will be a major challenge in the coming decade. The generation of municipal waste is projected to increase by 38% from 2005 to 2030 (1.3% per year) within the OECD region (OECD, 2008a).

Significant water scarcities already exist in some regions of the OECD and in many non-OECD countries. Even though many OECD countries in recent years have successfully reduced water use per capita and in total, it is projected that approximately 47% of the world's population will be living in areas with high water stress by 2030, mostly in non-OECD countries (OECD, 2008a).

A review of existing work in these five areas (OECD 2008b) brought to light the need for commensurable data and more empirical work across countries. To this end, a survey covering these five policy areas (energy, waste, organic food, water and personal transport) was implemented in 2008.[1] Ten countries representing different OECD regions took part in the survey: Australia, Canada, the Czech Republic, France, Italy, Korea, Mexico, the Netherlands, Norway and Sweden. Responses from over 10 000 households were collected.[2] The analysis of the survey data was co-ordinated by the OECD Environment Directorate. The list of research teams with extensive experience involved in the project is provided in Annex C. Initial results were presented at the OECD Conference on "Household Behaviour and Environmental Policy" organised by the Environment Directorate, on 3 and 4 June 2009, in Paris.

The project analyses the responses of households to various types of policy measures implemented by governments. These include economic instruments (such as energy taxation, water pricing structure), labelling and information campaigns, direct regulation (technical standards of appliances), and the provision of environment-related public services (recycling schemes, public transport). Differences in environmental behaviour across individuals and households (income, age, household size, education) are also analysed. And finally, the effect of personal environmental attitudes and norms is also assessed.

The objectives of this book are two-fold:

- to present the main findings of the OECD 2008 Household Survey and cross-country analysis on the determinants of households' environmental behaviour; and

- to summarise the main policy implications of the analytical work in the different areas addressed by the survey.

The publication consists of five thematic chapters covering the following areas:

- Water – investment in water-efficient appliances; adoption of water-saving practices; determinants of water consumption levels; willingness-to-pay for improved water quality.

- Energy – investment in energy-efficient appliances; adoption of energy saving practices; decisions to "source" electricity (directly or indirectly) from renewable energy sources; and willingness-to-pay for renewable energy.

- Waste – solid waste generation; recycling efforts (distinguished by material); waste prevention; willingness-to-pay for a recycling service.

- Personal transport – transport mode choice; use of public transport and cycling; vehicle ownership.

- Organic food – consumption levels of organic food (distinguished by food type); willingness-to-pay for organic food.

Finally, the book concludes by providing policy recommendations for the design of effective and efficient policies targeting households.

Before turning to the chapters that summarise the main results, it is important to enumerate some of the main factors that are likely to affect households' environment-related practices and decisions.

2. The environmental policy context

OECD governments use a wide range of policy measures to influence households' decision making in the five areas of study. These include:

- taxes and charges (*e.g.* for fuel);
- subsidies (*e.g.* grants for insulation);
- direct regulation (*e.g.* appliance standards);
- information-based measures (*e.g.* eco-labels); and
- provision of infrastructure (*e.g.* cycle paths).

Table 1.1 provides a summary of examples of policy types for waste, energy, water and transport. In the case of organic agriculture most policy measures are targeted on the supply side. The only measures which are targeted directly on the household are labels. Some of the policy questions examined in the survey in the five areas covered are listed in Annex D.

Table 1.1. **Examples of policy types**

	Waste	Energy	Water	Transport
Information-based measures	Label indicating manufactured from recycled materials.	Energy efficiency label for appliances.	Water efficiency label for washing machines.	CO_2 label for cars.
Taxes	Unit-based waste fee.	CO_2 tax on fuel/ electricity use.	Water charging.	Fuel taxes.
Grants/subsidies	Refund for recyclable bottles.	Grants for installation of solar panels.	Reduced VAT for water-efficient appliances.	Reduced sales tax on alternative-fuelled vehicles.
Performance standards	Minimum recycled content standard.	Minimum thermal efficiency standards for new dwellings.	Minimum water efficiency standard for dishwashers.	Maximum sulphur content in diesel.
Technology standards	Ban on presence of toxics in certain products.	Mandated double-glazing of windows.	Mandated use of dual-flush toilets in new buildings.	Mandated use of catalytic converters.
Supply/access measures	Collection of recyclables.	Option to be supplied with renewable energy.	Not applicable.	Public cycle lanes.

Economic instruments, such as environmentally-related taxes,[3] are often advocated to be the most cost-effective manner to meet environmental objectives. Taxes have a direct effect on relative prices and will provide incentives for polluters and resource users to reflect environmental impacts in their decisions (in other words to internalise externalities). Their relative efficiency will depend very much on the extent to which the tax can be levied directly on the pollutant or resource input, rather than on some proxy for the pollutant. While it is preferable to target the externality directly, this may not be possible at reasonable administrative cost (see Eskeland and Devajaran, 1996 for a discussion).

In some sense subsidies – such as those for alternative-fuelled vehicles or less environmentally damaging household appliances – will have a similar effect as environmentally-related taxes on relative prices, and thus will encourage a change to less polluting alternatives. However, their effects will differ from taxes since subsidising the consumption of a less environmentally damaging good or input will result in increased consumption overall. The importance of this effect will depend on the relative price and income elasticities. Perhaps more importantly, it can be difficult to target subsidies efficiently, whether at the level of either the good (efficient appliances) or the recipient (insulation programmes) (see Wirl and Orasch, 1998).

Direct regulation – such as performance standards or technology standards – are certainly the most widely-used policy affecting household decisions in OECD countries. Standards on the energy efficiency of appliances or cars are particularly common. Outright bans (for example on disposal of some products)

are also widely used. Such measures can be quite effective, constraining the behaviour of consumers in a manner which reduces environmental impacts. However, in some cases direct regulation may create rigidities that limit their environmental effectiveness and/or their economic efficiency. Different consumers with different demand and market conditions are not able to trade off product attributes or behavioural choices in a manner that reflects their underlying preferences. This results in greater overall social cost.

Policy makers can also rely on product labelling and public information campaigns. These can fulfil two roles: inform households of the general impacts of their consumption patterns on the environment; and provide information on the environmental impacts of specific products (eco-labels). Assuming that there is an underlying demand for environmental quality, this will affect the choices made by households in the market. Such measures are generally used as complements to other instruments (Newell *et al.*, 1999). However, trust in the source of the information is important, as are other factors such as ease of recognition and understanding.

And finally, policy makers can increase households' access to goods or services that facilitate their ability to adopt less environmentally damaging practices. This could include areas in which the government plays a direct role as "service provider" (as in the case of cycle paths), or a more indirect role as regulator (when making "green" energy).[4] Other aspects of supply, such as direct regulation of the characteristics of supply (support for organic agriculture, for instance) are beyond the scope of this study.

In the different thematic areas covered by the survey, respondents were asked to indicate whether they were subject to specific policy measures. There is variation across countries. For instance, the reported extent to which households face "marginal" incentives to reduce their environmental impacts varies from one country and thematic area to another. While 80% to 90% of households are charged on a per-unit basis for electricity consumption, relatively few houses face unit waste charges (by volume or weight). Moreover, there is much greater variation across countries in the case of waste charging – from almost 80% in Korea to less than 30% in Mexico and Italy. Water charging is in between, with water-rich countries (Canada, Sweden and Norway) having the lowest percentages (see Figure 1.1).

With respect to information-based charges, respondents were shown visual images of eco-labels which were in place in their country. They had to indicate if they recognised these labels, and if they used the information these provided in their consumption choices. Figure 1.2 presents the responses in the areas of organic food and energy efficiency. In the first case, respondents in different countries were shown either one or two labels, while in the latter case they were presented with one to three labels.

Figure 1.1. **Use of unit charging for "environmental" services**
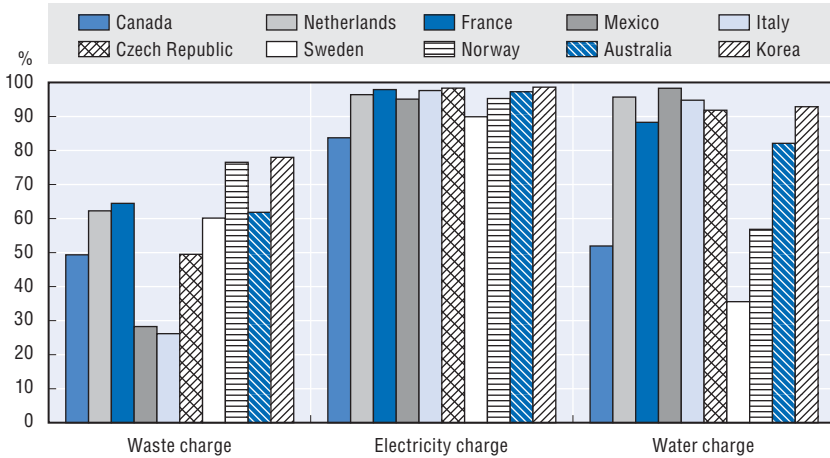
Source: OECD Project on Household Behaviour and Environmental Policy.

Figure 1.2. **Recognition and use of "information-based" measures**

Organic food and energy efficiency
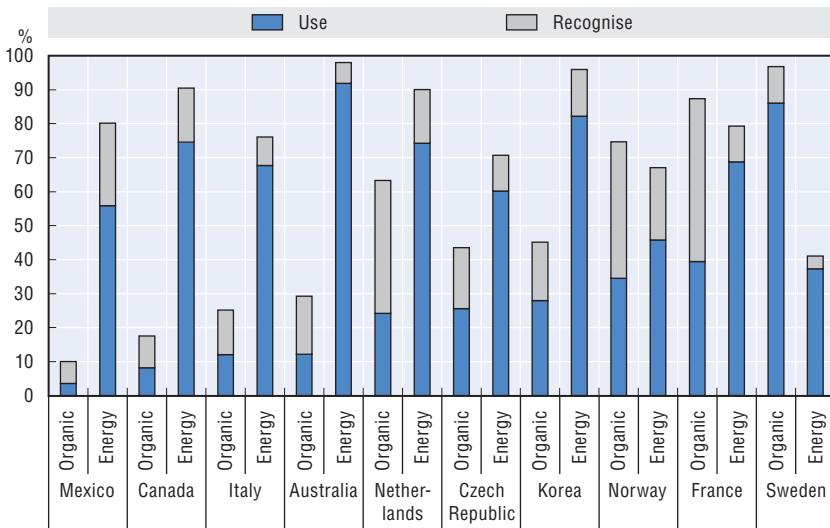
Source: OECD Project on Household Behaviour and Environmental Policy.

Generally, respondents were more likely to recognise and use energy efficiency labels. However, there is variation across countries. In Australia there is high recognition and use of energy efficiency labels and low recognition and

use of organic food labels. Swedish respondents reported the opposite. The gap between recognition and use is very small in Sweden and large in Norway, France and the Netherlands (particularly for organic food labels).

Variation in reported use of government measures to give households the option to adopt less environment-intensive practices is presented in Figure 1.3. Three types of measures are presented: ability to explicitly select renewable energy as part of the household's electricity mix; access to public transport within 15 minutes from home; and the availability of door-to-door collection services for wastepaper and cardboard. Giving consumers the option to source their electricity from "renewable" sources seems to be widespread in the Netherlands, particularly in light of the relatively low level of renewables in the fuel mix. Korea, Australia and Sweden also have relatively high reported rates.

Figure 1.3. **Improving access to "environment-related" services**
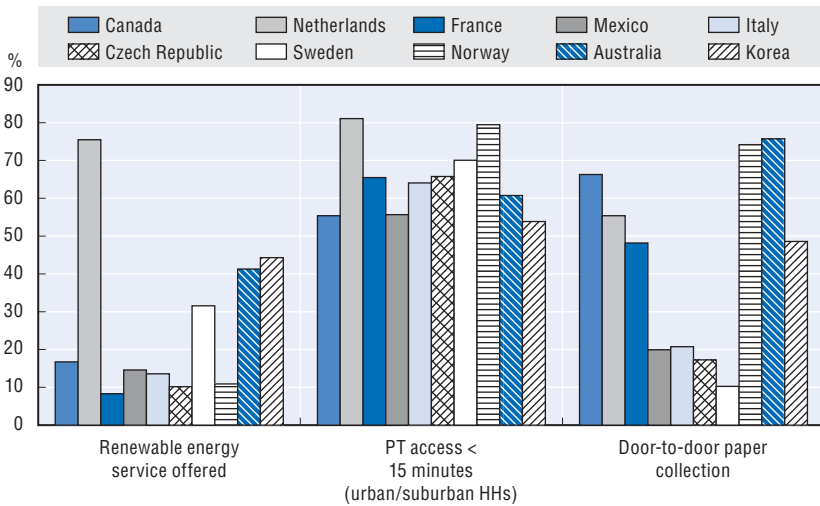
Source: OECD Project on Household Behaviour and Environmental Policy.

Urban and suburban households in the Netherlands and Norway are more likely to live within 15 minutes from a public transport stop or station. Canada, Mexico and Korea have the lowest percentage of households for which this is true. Door-to-door paper collection is common in Australia and Norway, and rare in Mexico, Italy, the Czech Republic and Sweden. However, the percentages are quite different for other materials (see Chapter 4).

Data on government provision of financial support were only obtained from those households that actually made investments in the different areas. In Figure 1.4 these data are presented for dual-flush toilets, water-restrictor

Figure 1.4. **Providing grants (percentage of households having invested who received financial support)**
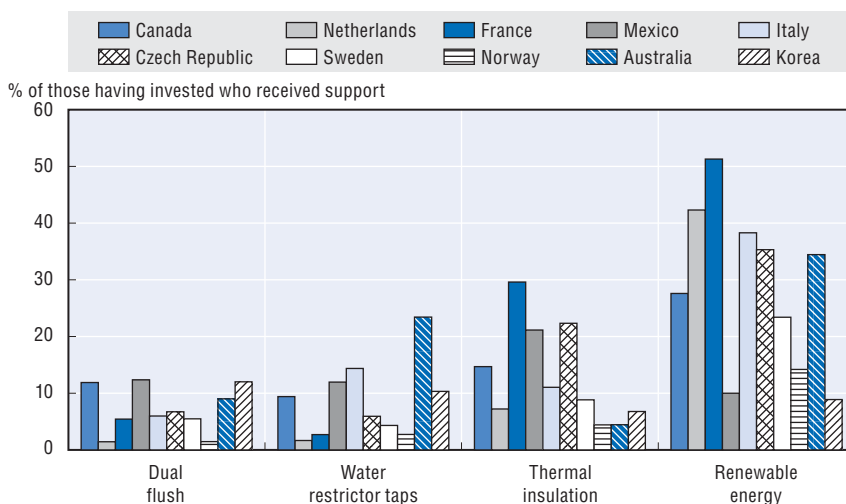
Source: OECD Project on Household Behaviour and Environmental Policy.

taps, thermal insulation and renewable energy. Over 50% of households that had invested in solar panels or residential wind turbines in France had received support for the investments. In Mexico and Korea the figure is less than 10%.

For thermal insulation, France also has the highest percentage, although it is less than 30%. For the water-efficiency related investments, the figures are lower. This is certainly due in part to the relative cost of such investments, making explicit programmes of this kind relatively more administratively burdensome. Australian respondents were more likely (over 12%) to say that they received support for their investment in water-restrictor taps. For dual-flush toilets, Korea, Mexico and Canada are the only countries for which more than 10% received support.

The effect that these different policy measures (and others) have on environmental behaviour and investments is reviewed in the thematic chapters which follow.

3. The role of environmental attitudes and norms[5]

As noted in the introductory chapter, one of the distinct contributions of this project is the attention paid to the role of attitudinal characteristics (*e.g.* environmental concerns, norms and values) in determining environmental practices and behaviour. Such motivations have not been an important element in much of the previous work on household responses to environmental

policies. However, some previous studies which have taken norms into account include analyses of energy use,[6] travel mode choices,[7] organic food purchases[8] and recycling activities.[9]

Better understanding of how norms and values affect the environmental behaviour of individuals can provide useful insights to policy makers for choosing (and combining) instruments to improve the effectiveness and efficiency of policies. In the longer term, governments can also influence norms (Nyborg, 2003), particularly through information-based instruments such as communication campaigns; this may also contribute to increasing the political acceptability of policies.

Conversely, there are areas where households' reactions to the introduction of environmental policies might be less pronounced than predicted by models that do not take into account the effects on norms. For example, evidence suggests that households have strong personal motivations to sort waste, and that relying on mandates or economic incentives may undermine such motivations (Frey, 1999; Frey and Oberholtzer-Gee, 1997).

How concerned were the respondents over specific environmental issues? Taken together, respondents in the ten countries surveyed expressed the highest degree of concern over natural resource depletion, air and water pollution, and climate change. Noise and genetically-modified organisms were the areas in which respondents expressed the least concern (see Figure 1.5).

Figure 1.5. **Respondents' degree of concern over selected environmental issues**
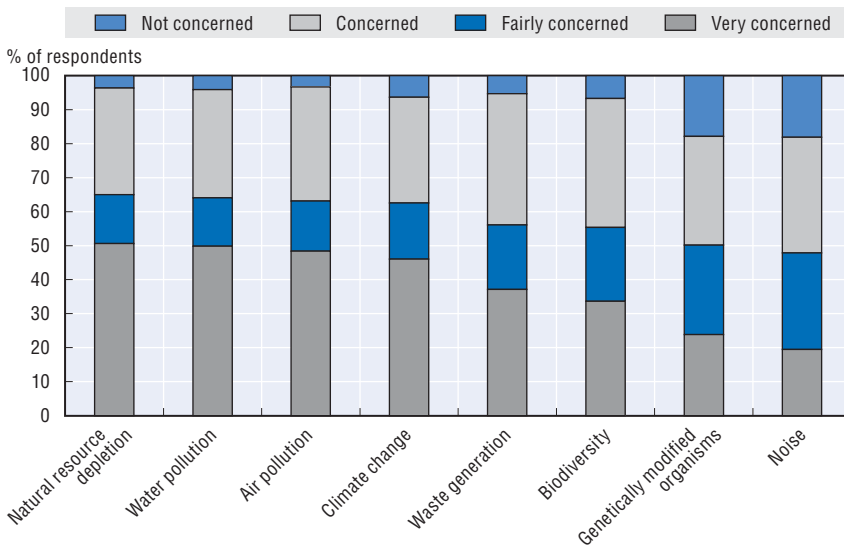
Source: OECD Project on Household Behaviour and Environmental Policy.

At the level of individual countries, respondents in Mexico were those who were most often "very concerned", while respondents in the Netherlands, Norway and Sweden were least often "very concerned". Sweden is the only country where climate change is the issue for which respondents were most likely to say they were very concerned. Noise is cited as being more of a concern in Korea than elsewhere (Figure 1.6).

Figure 1.6. **Percentage of respondents who are "very concerned" over a given environmental issue**
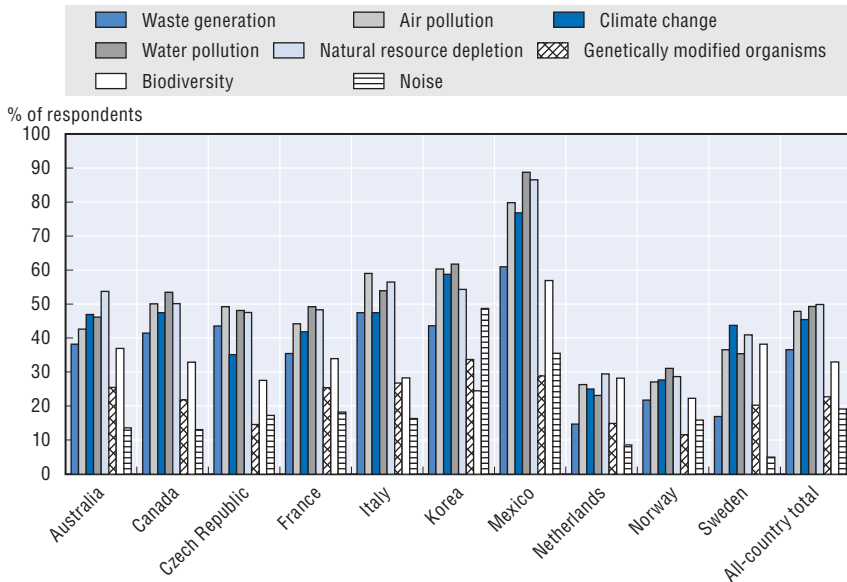
Source: OECD Project on Household Behaviour and Environmental Policy.

In the second section of the questionnaire, five general statements relate to environmental attitudes. Respondents were asked to indicate whether they strongly disagree (2), disagree (1), have no opinion (0), agree (–1), or strongly agree (–2). An environmental attitude index was constructed, with values ranging from –2 to +2, a higher value of the index indicating more pro-environmental values/attitudes.

The figures below present these data, first for European countries and then for the other countries. Amongst the European countries, the Czech distribution is further to the right indicating a stronger reported attitude toward environmental concerns. The Italy distribution is to the left of the other European countries. Amongst the other countries, the Canadian and

Figure 1.7. **Environmental attitude by country (percentage of respondents)**
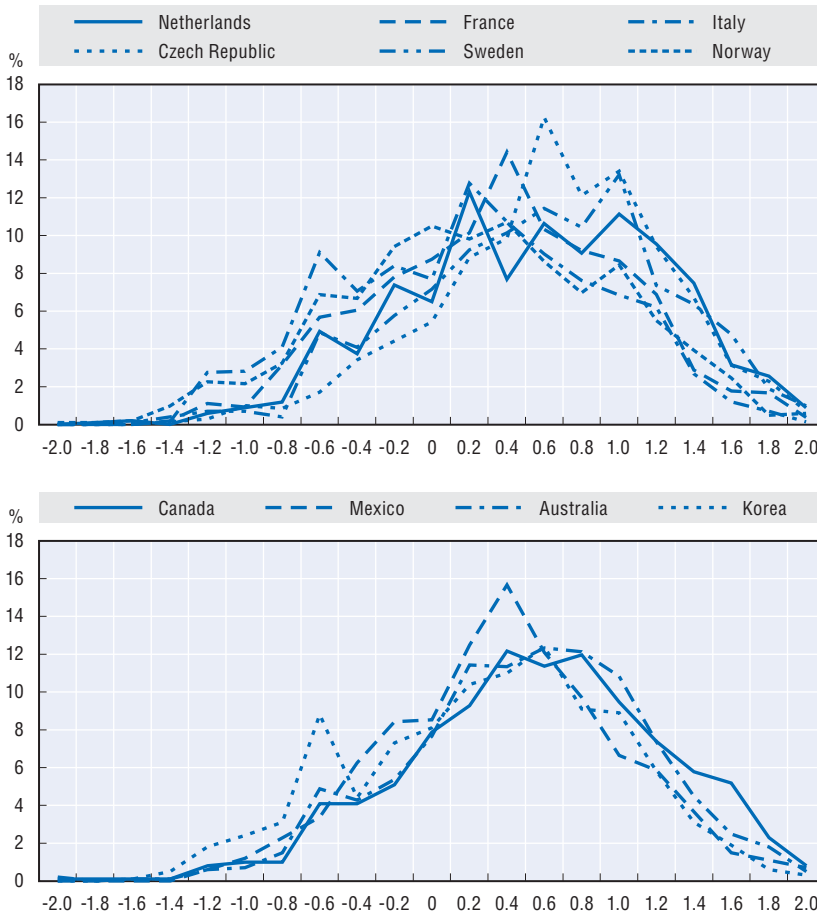
Source: OECD Project on Household Behaviour and Environmental Policy.

Australian distributions are to the right of those of Mexico and Korea. (Evidence on the relationship between the index and demographic and socio-economic factors is presented in the Annex 1.A1 to this chapter.)

One of the individual questions underlying this index was included in order to elicit information on respondents' sense of personal responsibility for environmental concerns. In Figure 1.8 country-level data on the extent to which respondents disagreed (or strongly disagreed) with the statement that "individuals/households can contribute to a better environment" are presented.

Relatively few respondents disagreed with this statement. However, it is interesting to note that the Dutch and Australian respondents are (with the Norwegians) the most likely to disagree with this statement. They are, however,

Figure 1.8. **Percentage of households who disagree with the statement that each individual/household can contribute to a better environment**
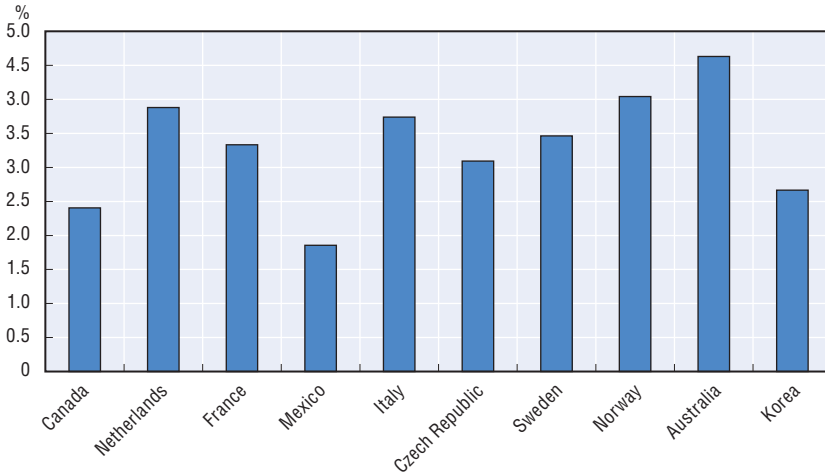
Source: OECD Project on Household Behaviour and Environmental Policy.

the most likely to be "members of (or contributors to) an environmental organisation" (see Figure 1.9). This underscores the importance of taking into account attitudes toward environmental concerns, and how respondents feel they can be best addressed, when assessing the determinants of environmental practices. Perhaps more importantly, it also underscores the need in empirical

Figure 1.9. **Percentage of respondents who are members of (or contributors to) an environmental organisation**
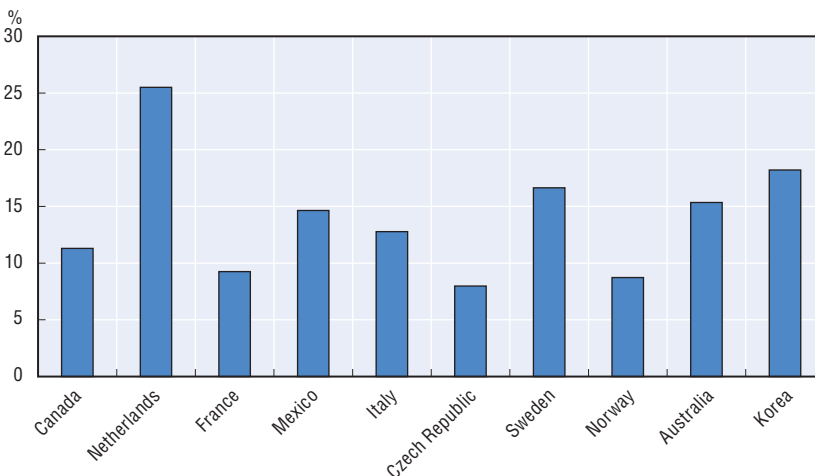
Source: OECD Project on Household Behaviour and Environmental Policy.

analyses to take into account cultural factors which may affect how individuals respond to a given question – *i.e.* through the inclusion of control variables for country of residence.

4. Variation across economic and demographic characteristics

There is little question that economic factors play an important role in affecting household decision making with respect to the environment. The price of the good in question (water, electricity) is clearly paramount. Environmental policies influence prices explicitly (taxes, subsidies, tradable permits, etc.) or implicitly (regulations). However, even in the absence of environmental policies, household decisions in environmentally-sensitive areas will be affected by relative prices. Rising fuel prices will affect household decisions to purchase a fuel-efficient vehicle (or change travel modes), whether or not the source of the price change arises from a fuel tax, scarcity of the resource, or the existence of an oil cartel.

By increasing consumption levels, higher income can clearly have negative implications for environmental pressures in aggregate. However, the relationship is not necessarily negative. For instance, household income can positively affect the extent to which households take environmental factors into account in their decision making in all of these five areas. This can arise both directly and indirectly. On the one hand, depending upon the income-elasticity of demand for environmental quality, richer households will be more or less likely to pay a premium for environmental factors when purchasing different goods and services. While it is generally found that the income-elasticity of demand for environmental quality is positive, it is unclear whether it is greater than unity, and it may vary greatly depending upon the "good" in question.[10]

Respondents to the survey were requested to rank a set of six issues in terms of their importance to them. In general, respondents in the ten countries tend to rank economic and personal safety issues as a high priority, social and environmental issues are of medium concern, and health and international issues as least important. However, there is variation across income groups. Those in the highest income classes tended to rank environmental concerns relatively higher (see Figure 1.10).

On the other hand, greater income may allow households to purchase goods and services which have more or less environmental impact, irrespective of their underlying preferences for environmental quality. For instance, many appliances which save on energy and/or water are relatively more costly at the outset, but result in lower operating costs over their lifetime. Conversely, the "cost" of taking the time to sort recyclables may be much greater for high-income households. All of these examples illustrate the fact that there are often a mixture of private (finance, health, convenience, etc.) and public (environmental quality) factors at play in the decisions addressed in this report.

Figure 1.10. **Percentage of respondents ranking environmental concerns in the top 3 out of 6 concerns**
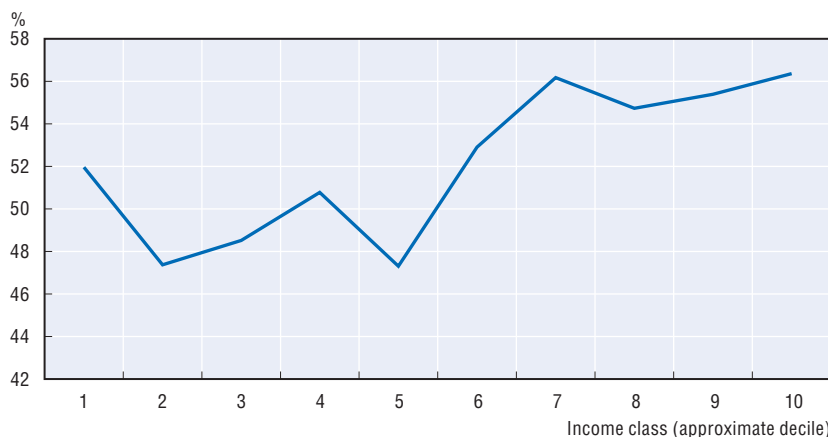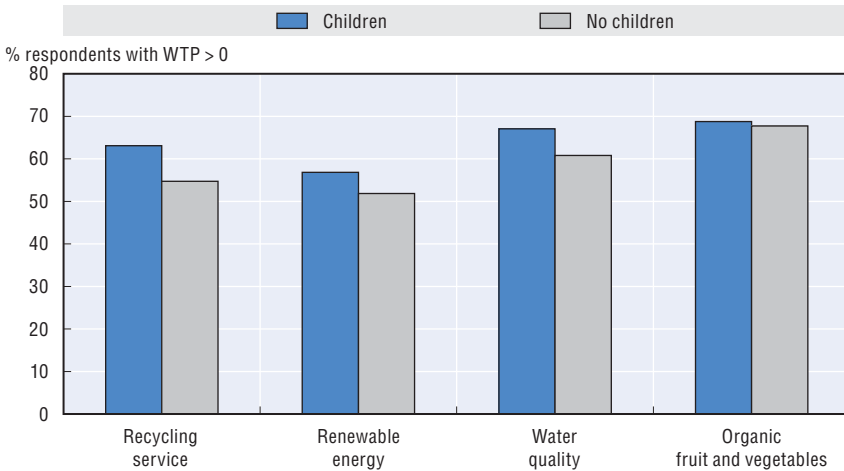
In addition, environmental behaviour and consumption patterns may vary across household demographic factors such as gender, educational status, household size and composition, location of residence, etc. An assessment of the role of these factors is necessary in order to determine the effect of policy variables on environment-related behaviour and practices in specific areas. For instance, the effect of recycling programmes can vary significantly depending upon household composition and occupation status. In addition, tenants may be less likely to undertake costly investments with positive environmental consequences than owner-occupiers whose benefits are only realised over the long term. It may be necessary to design policies with this in mind.

The demographic characteristics considered include the age and gender of the respondent, household size, marital status, and the presence of children in the household. In many cases there are clear differences between apparent demand for environmental quality. For example, Figure 1.11 presents data on the percentage of respondents with and without children who have a positive willingness-to-pay for a recycling service, renewable energy, and water quality. While such relationships may be illustrative, the thematic chapters report on formal empirical analysis of the relative importance of such factors.

In some cases, the existence of environmental externalities may not be the only source of market inefficiency. Other sources of market barriers and failures in consumer markets include: information asymmetries; capital market failures; and split incentives.[11] Particular groups may be particularly subject to such barriers and failures and when this is the case, policy makers

Figure 1.11. **Willingness-to-pay for different environmental "goods"**

Source: OECD Project on Household Behaviour and Environmental Policy.

may need to use complementary measures to remove other failures in addition to the instruments more directly targeting the environmental externality. As such, some of these measures need to be targeted at specific household groups to improve the effectiveness and efficiency of the policy.

For instance, some households (*e.g.* low-income households) may face constraints to access the credit market, preventing them from making investments in environmentally preferable goods (*e.g.* alternative fuel vehicles, water/energy efficient equipments) which would appear to be cost-effective for them to undertake. In general, it is found that households would have to discount the benefits of reduced future expenditures by as much as 20% *per annum* in order to explain why they choose less energy-efficient durables in favour of more efficient alternatives.[12] If this is not a true reflection of underlying preferences, policy makers may need to adopt complementary measures to address these barriers in the capital market. These measures include grants or preferential loans targeted at vulnerable households.

In addition, some households may face few incentives to invest in environmentally preferable goods or to adopt environmental behaviour. For instance, the landlord has little incentive to choose the most water/energy-efficient equipment (such as space heaters and lighting systems) and/or to invest in insulation, when the tenant benefits from these choices through reduced energy/water bills (see Sorrell, 2004). Governments may need to introduce targeted measures to address this source of market failure (see Figure 1.12).

Figure 1.12. **Percentage of owner-occupiers and tenants having undertaken specific investments**
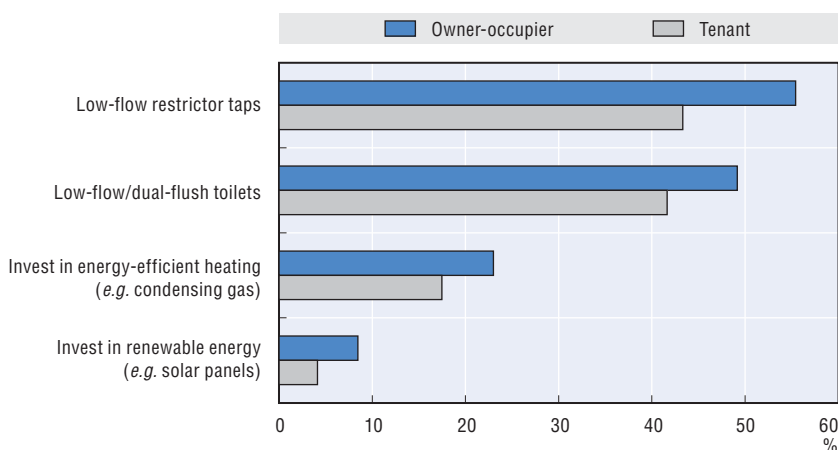
Source: OECD Project on Household Behaviour and Environmental Policy.

There are, therefore, cases in which policies should be targeted at (or designed for) specific groups. However, such targeting may not be costless. In particular, targeting measures at specific groups may entail important administrative costs that need to be taken into account by policy makers.

5. Conclusion

The results of more formal analyses of the relationship between policy measures, environmental attitudes and norms, and household socio-economic characteristics are summarised in the following chapters. The analyses cover actual purchase decisions (*e.g.* energy-efficient appliances), behaviour (*e.g.* water-saving practices), and willingness-to-pay for goods which are perceived to yield environmental benefits (*e.g.* organic agriculture). These factors may play very different roles in the different areas covered.

Part of the reason for this is due to the fact that in all of the decisions assessed, a complex mixture of "public" and "private" considerations enter into households' decision-making processes, and the relative importance of private and public motivations in specific decisions varies from one area to the other. For instance, the purchase of energy-efficient and water-efficient appliances may reduce pressure on the environment (public benefits) and expenditures on water and energy use (private benefit). Purchasing a fuel-efficient car may as well reduce emissions of greenhouse gases (public benefits) and reduce vehicle operating costs (private benefits). Similarly, purchasing organic food products may result in lower use of pesticides (public benefits) and improved personal health (private benefits).

In addition, there is variation in the nature of the decisions and choices which households make. For instance the determinants of whether or not to own a car may differ from the factors affecting car use, and better understanding of these different mechanisms can matter when it comes to influencing household decision-making processes. In a similar way, the decision about whether or not to be equipped with a certain appliance may differ from decisions which relate to frequency and nature of use of the appliance. More subtly, decisions to recycle or to consume organic food may be distinct from the quantity of organic food consumed in the household or the level of recycling effort.

The time horizon involved can also be very different. In the case of energy demand, for instance, there is a dynamic component that clearly separates the short run form the long run. In the short run, the capital stock is fixed (*e.g.* heating system installed) and, therefore, the short-term response to a measure like price changes may be smaller than the long-term response. In a similar way, there are sharp differences in the possible types of adjustment of households to policies related to personal transport choices in the short run and long run. For instance, individuals may decide to adapt to the increased cost of motoring by changing to a more fuel-efficient vehicle or even moving to another place of residence to facilitate access to public transport. An important consideration when designing policies targeted at households is that in some areas a significant time lag exists for households to adjust.

Such differences should be borne in mind when interpreting the results presented in the chapters which follow. The implications for policy design are discussed in the concluding section of each chapter, as well as in the concluding chapter of the book.

Notes

1. For a description of the survey methodology and sample see Annex A.

2. The full OECD survey questionnaire is provided in Annex B (Canadian English version).

3. Tradable permits have similar characteristics, but there are few cases which target households directly.

4. See Goodwin (1995) for a discussion in the transport context.

5. This section (and the accompanying Annex 1.A1) is based on work undertaken by Ivan Haščič (OECD Secretariat).

6. See Lutzenheiser (1993). Viklund (2002) provides a review of the literature.

7. See Bamberg and Schmidt (2003) and Heath and Gifford (2002).

8. See Grunert and Juhl (1995) and Tanner and Kast (2003).

9. See Berglund and Matti (2006) and Thørgersen (2003).

10. With an income elasticity of demand greater than unity "demand" for improved environmental quality would increase more than proportionately with income. See Pearce (2006) for a review of the evidence.

11. Cases such as where owner-occupiers are more likely to make investments than tenants in cases where benefits are incurred over a period of time.

12. See OECD (2002) for a review of the literature.

References

Eskeland, G. and S. Devarajan (1996), *Taxing Bads by Taxing Goods: Pollution Control with Presumptive Charges*, World Bank, Washington DC.

Frey, B.S. (1999), "Morality and Rationality in Environmental Policy", *Journal of Consumer Policy*, No. 22, pp. 395-417.

Frey, B.S. and F. Oberholzer-Gee (1997), "The Cost of Price Incentives: An Empirical Analysis of Motivation Crowding Out", *American Economic Review*, Vol. 87(4), pp. 746-755.

Newell, R., A. Jaffe and R. Stavins (1999), "The Induced Innovation Hypothesis and Energy-Saving Technological Change", *Quarterly Journal of Economics*, Vol. 114, No. 3, pp. 941-75.

Nyborg, K. (2003), "The Impact of Public Policy on Social and Moral Norms: Some Examples", *Journal of Consumer Policy*, Vol. 26(3), pp. 259-277.

OECD (2008a), *Environmental Outlook to 2030*, OECD, Paris.

OECD (2008b), *Household Behaviour and the Environment: Reviewing the Evidence*, OECD, Paris.

Sorrell, S. (2004), *The Economics of Energy Efficiency: Barriers to Cost-Effective Investment*, Edeward Elgar.

Wirl, F. and W. Orasch (1998), "Analysis of United States' Utility Conservation Programs", in *Review of Industrial Organization*, Vol. 13, pp. 467-486.

ANNEX 1.A1

Household Characteristics and Environmental Norms and Attitudes

Analysis of the data were conducted to examine the socio-demographic characteristics, and other factors, for possible correlation with environmental attitudes (as reflected in the index mentioned above), while controlling for cross-country differences in households' purchasing power as well as other unobserved country-specific heterogeneity (fixed effects). It is found that gender (being a female), education (post-secondary), and to a lesser extent urban place of residence, are positively (and at statistically significant levels) correlated with the environmental attitude (Figure 1.A1.1). In addition, certain types of occupation (liberal professions and salaried employees) are also correlated with the index.

Approximately 14% of respondents indicated that they were members of (or financially supported) an environmental organisation. This varies by country with the highest membership rates in the Netherlands (25%) and lowest in Norway and the Czech Republic (8.4% and 8.0%). Figure 1.A1.2 gives odds ratios* summarising results of empirical models estimated. Individuals of older age, having young children, post-secondary education, or higher income are correlated with the likelihood of being a member of an environmental organisation (*i.e.* have higher odds of being a member than not being one). In addition, the results also suggest that certain types of occupation correlate with membership (*e.g.* respondents working in liberal professions or as teachers and those working as executives are more likely to be members). The most important finding is that higher levels of education are positively correlated with environmental membership.

Focusing on educational attainment in greater detail, an alternative model was estimated with a more refined disaggregation of the educational

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* The odds ratio is the ratio of the *odds* of an event occurring in one group to the odds of it occurring in another group.

Figure 1.A1.1. **Impact of gender, education and place of residence
on environmental attitudes**

Estimated elasticity of environmental attitude index to changes in selected
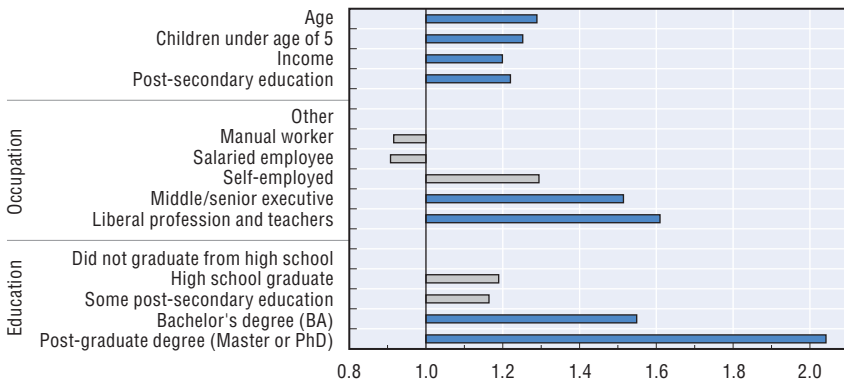(statistically significant) variables
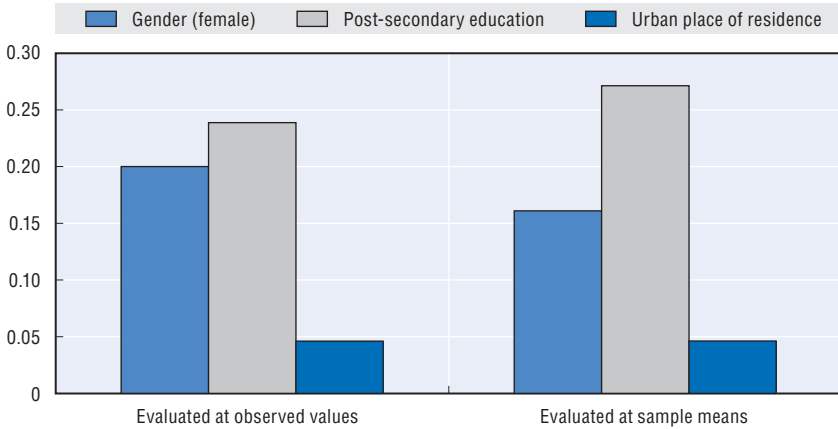
Note: The estimated elasticities are based on: 1) average marginal effects with covariates evaluated at values observed in the sample; and 2) conditional marginal effects with covariates evaluated at mean values of the sample. Estimates based on a panel-data fixed-effects model with explicit controls for socio-demographic characteristics and cross-country differences in purchasing power.

Source: OECD Project on Household Behaviour and Environmental Policy.

Figure 1.A1.2. **Probability of being a member of (or contributor to)
an environmental organisation**

Estimated odds ratios

Note: Only selected estimates are reported here. Estimates that are not statistically significant at the 5% level or higher are shown as blank. The estimated odds ratios are derived from a fixed-effects logit model. For the odds ratios to be comparable across covariates, all previously (semi-) continuous variables were transformed into dummy variables around the sample median (this includes age, income and household size).

Source: OECD Project on Household Behaviour and Environmental Policy.

classes. It is found that high school graduates and those having some form of post-secondary education are somewhat more likely to be members compared to respondents who did not graduate from high school (however, these effects are not statistically significant). On the contrary, obtaining a university-level diploma (Bachelor's and above) increases the odds substantially and in a statistically significant manner.

Overall, the level of educational attainment stands out as an important characteristic that is associated with respondents' pro-environmental values, attitudes and behaviour in the data collected. Being a woman is also found to increase pro-environmental attitudes, as well as living in an urban area, though to a lesser extent.

However, the findings vary somewhat depending on the exact issue examined. While gender and age may correlate highly with some of the issues addressed, in other instances composition of the household or income may appear more important. Nevertheless, the overall message that the data deliver is very encouraging – *educational attainment* stands out as an important characteristic that is associated with respondents' pro-environmental values, attitudes and behaviour. This finding is statistically robust and is common to all the issues examined.