The Value of Objective Characteristics to Predict the Extent of Household Recycling

Joel Huber, W. Kip Viscusi, Jason Bell

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Abstract:

This article assesses the relative effects on household recycling across characteristics of individuals and their households, their counties, and the states in which they live. A representative United States sample assesses household recycling between 2005 and 2014, making possible a pooled regression with over 380,000 observations. A clear theme emerges demonstrating the importance of measurable resources and economic motives that encourage individuals, households, counties, and states to support recycling. Among individuals, there is more recycling by people with more education and age. However, there is less recycling among those divorced, separated, or widowed, and among those who are too disabled to work, or have a child under six. Counties providing the resources to support recycling see greater recycling if they have larger populations, have greater median income, or a more homogeneous dominant culture. Finally, states or provinces have more recycling if they have laws requiring counties to provide recycling to their citizens, or impose bottle deposits, but less if their government or citizens are Republican instead of Democratic, or if they have lower landfill costs.

Joel Huber Professor Fuqua School of Business, Duke University, Durham NC 27708
joel.huber@duke.edu.

W. Kip Viscusi, University Distinguished Professor Vanderbilt Law School: 21st Avenue South
E-mail: Nashville, TN 37203 kip.viscusi@vanderbilt.edu

Jason Bell, Research Associate, Fuqua School of Business. Duke University Durham NC 27708.
JBB@Duke.edu

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Introduction.

Household recycling is valuable because it reduces demands for virgin raw materials and lessens the cost of producing products containing paper, metal, glass, or plastic. Effective recycling programs limit the amount of materials sent to landfills. Understanding the policies and contexts that are most conducive to promoting recycling can assist in the development of more effective recycling systems. It can also help businesses who are concerned with the disposition of its products.

Many studies have focused on a specific country or region, providing insight on issues such as the optimal location of recycling centers, the impact of home pickup, or the effectiveness of various sorting strategies (Zaharudin et al. 2021, Saphores and Nixon 2014, Sörme et al. 2019). Pieters (1991) examines the effectiveness of a number of recycling efforts in Netherlands and Germany. This article quantifies the relative impact of characteristics associated with recycling in different populations, under different governmental rules and having different facilitating resources. Comprehensive household recycling reviews are available (Berger 1997, Hornik et al. 1995, Miafodzyeva & Brandt 2012, Rousta et al. 2020).

A number of experiments have evaluated the impact of emotions, beliefs and attitudes on household recycling (Iyer and Kashyap, 2007, Wang et al. 2017). Others have related recycling to individual differences such as susceptibility to interpersonal influence (Sciandra et al. 2017), individualism and locus of control (McCarty & Shrum 2001), or strong identity connections (Trudel et al. 2016). More recent papers have explored psychological factors with political measures that assess the factors affecting public support of positive environmental policies. Wan, Shen and Yu (2015) identify numerous characteristics influencing support for recycling policies and for building recycling infrastructure in Hong Kong. They provide evidence that past behavior and perceived effectiveness are the best predictors of support for recycling household actions, while support for expanded infrastructure is best predicted by social influences and perceived benefits of the expansions. Wan, Shen and Choi (2018) then expand the analysis of support for Hong Kong policies requiring shopping bag levies, charging for waste, educational campaigns, support for recycling industries, and recycling infrastructure. The main psychological factors are attitude, perceived benefits, and attachment to the city, while fairness and policy preference are the major political factors that predict support for strong recycling policies.

These two papers show that the samples match Hong Kong with respect to gender, age, education, and income, but do not include those variables in their analysis. It is likely that there would be little impact from including them. Indeed, in the Wan Shen and Choi (2017) review of the factors influencing public support of urban environmental efforts, they find inconsistent support for those demographic factors as major influences.

An article by Bruno, Gianchi and Sanchez (2022) focuses on the intention to participate in future recycling. Positive factors include influence from others, acceptance of government policy and its reliability. The most important negative factor is the perceived difficulty of household recycling and its cost terms of time. Trust in government has a positive effect but that becomes insignificant if current recycling has a high score. These psychological studies are valuable in generating informational campaigns to encourage recycling. More important, they reveal consistent psychological insights into sustainable actions.

In contrast, the current study of recycling behavior in the United States encompasses objective long-term characteristics of people, their households, communities and regions. The depth of the analysis derives from a U.S. dataset that includes over 380,000 observations of annual household recycling behavior based on information for more than 145,000 nationally representative households in nearly 3,000 counties across 50 states (plus D.C.) spanning ten years. The breadth of the analysis comes from 59 variables that reflect individual, household, county, and state characteristics.

Establishing consistent objective measures that predict household recycling provides a framework that can be directly actionable for recycling policy. Knowing the demographics of who recycles provides a geographical focus for educations campaigns, and for infrastructure and recycling laws that will encourage households to change their behavior. Households can be identified by their resources, housing types, and county resources. By contrast it is more difficult to locate citizens who reach households who have positive attitudes towards environmental improvements, trust government regulations, and are willing to support recycling regulations require effort or higher taxes.

There are a number of ways that household recycling is different from other actions that increase global sustainability and cooperation in their antecedents and consequences. These differences make recycling a reasonable topic for examination in a journal that is concerned with public policy. First, recycling is *visible*. Unlike consumption reduction and reuse, household

recycling is more apparent to neighbors and can generate interpersonal praise or blame. Further, local recycling efforts can reflect positively or negatively on a town depending on the convenience and attractiveness of its roadside bins, collection centers and landfill areas. Bagozzi & Dabholkar (1994) use laddering methodology to uncover household goals related to recycling. The topmost recycling goals sought to promote health and avoid sickness, with intermediary goals of curtailing pollution and helping the community. Those goals suggest those households strongly connected to their community will be motivated to support effective recycling. Wan, Sheng and Choi (2022) show that the best predictor of household recycling is a strong personal identification with the area.

Second, recycling is *repetitive*, becoming more automatic and fluid with practice, unlike the change-then-ignore effects of the installation of solar collectors, low energy heating and cooling, or water-saving appliances. This habitual nature of repeated recycling behaviors makes it more difficult initially but more easily maintained once established. That inertia justifies governmental information or incentives to begin recycling.

Third, household recycling is *effortful*, making it more difficult for citizens who lack learning, space, time, or the physical ability to do the tasks. That effort can be reduced if local governments provide easy labeling and frequent pickups, but those programs must tap limited local or state resources.

Finally, because it is visible and can generate generates substantial government and citizen expense, recycling is *political* as it affects both recycling actions and votes of citizens. Recycling can thus pit political factions espousing individual freedom and responsibility against those willing and able to support taxes and actions that increase local welfare. The fact that recycling is visible, repetitive, effortful and political suggest that recycling can serve as a lead indicator of other sustainability actions and beliefs (Berger 1997, Biswas et al. 2000, Wan et al. 2017).

The results below derive from a regression that includes 21 characteristics at the individual, household, county, and state levels. Those characteristics are broken into two to four levels to generate 59 independent variables. The resulting coefficients reveal the extent to which characteristics are predictive of household recycling. This is a different kind of study. Its goal is not a focus on a small set of variables or hypotheses, but instead to quantify the relative contributions of 21 characteristics on household recycling. Making theoretical sense of so many

variables may seem a daunting prospect. We present evidence to support the general hypotheses that physical resources and economic benefits are strongly associated with recycling for individuals, households, counties and states.

Consider a number of the results consistent with that general hypothesis that recycling levels depend on facilitating resources and psychological motives. Greater education increases both an appreciation of the value of recycling and provides the cognitive resources facilitating complying with complex rules. Age provides an intergenerational long-term perspective that can be reinforced by established habits of recycling. Ownership and income offer resources that facilitate recycling and motivate its local support through prospective increases in home value. Counties are better able to afford recycling amenities if citizens have high incomes and close neighbors to lower the per person cost of recycling. Finally, states with laws requiring households to recycle or demand that counties support that effort encourage household recycling, and those efforts are more likely when motivated by a high cost of putting trash in a landfill.

The large number of observations and the high variability in recycling levels and characteristics enable stable estimates of the magnitude of expected recycling changes within and across characteristics. It is also reasonable that those who stand to gain economically or emotionally from recycling will be more likely to do so. What is surprising is the relative effect of resources and motives differs so substantially across the 21 characteristics, enabling researchers and policy makers to focus in on factors that have the greatest impact.

While the credibility of the study may gain from the broad scope of its 21 characteristics, it is important to acknowledge that there are a number of factors known to influence recycling that are not available in our data. For example, information on individuals and households does not include attitudes and beliefs about recycling or the environment. Having such information can provide critical guidance on the effectiveness of promotions to different households. For counties, the study has measures of resource differences between counties but not specific amenities such as recycling centers or home pickup. Finally, differences in the stringency of state recycling or deposit laws do not assess how strongly the laws are enforced or the amount of support the state provides to encourage household recycling. Where relevant, we reference articles that link our results to define actual or potential studies that help clarify the causal chain.

Data Used in the Analysis

The U.S. recycling dataset used is from the Knowledge Networks-GfK KnowledgePanel from 2005 to 2014. The household data come from annual profile surveys. Respondents took these surveys as part of their panel membership rather than for separate studies, thus avoiding possible selection effects based on the nature of a survey invitation. One identified person representing each household completed the surveys, but questions about income, family membership, and recycling reflect the household generally. The analysis merges data collected between 2005-2014 from more than 145,000 unique panel members providing individual and household characteristics, as well as recycling information.

Four questions from the panel surveys generate the critical recycling questions for this analysis. It asked “In the past 12 months, have you recycled your [material]", where the material is indicated in different check boxes for cans, plastic, paper, and glass. We use the total number (0-4) of materials recycled in the previous twelve months as our primary measure of household recycling behavior. Other researchers have distinguished the effects of individual materials recycled (Hage et al. 2006, Martin et al. 2006). Given our focus the effort required for household recycling, the number of materials recycled provides a general measure of the extent of recycling participation. Further, there are high correlations between the aggregate measure and the measures for the individual materials, for plastic (0.89), glass (0.87), paper (0.83), and cans (0.82), suggesting that our results would differ little if the analysis separates the four materials.

To assess the appropriateness of our dependent variable as a measure of actual recycling, we tested the relationship between the number of materials recycled and actual tonnage of recycled materials across 72 counties in Wisconsin (Bell et al. 2013). A regression of log tonnage of recycled materials against log average number of household materials recycled in each county yields a coefficient of 0.82 (SE=0.24). This elasticity estimate implies that counties whose respondents report a 10% higher participation on average generate 8.2% greater recycled tonnage. In the current study, the predicted increases in recycling across the 21 characteristics range from 2% to 22% of the average 2.7 materials recycled.

In addition to the recycling measure, the profile surveys provides individual and household characteristics. Individual data include age, gender, education, race, and political party identification. Household data identifies type of residence, whether it is owned or rented, marital status, household income, and employment. County level assessments of median income,

population, population density, and percent white come from census data, while state level identifiers arise from a variety of publicly available sources. The United States census provides information on state population growth and spending[1] per person. Information on deposit laws is from BottleBill.org,[2] and political control of the governorship and in the legislature is available from the National Conference of State Legislatures.[3] Finally, tipping fees reflecting the average cost per ton to dump in a state landfill in 2013 came from a website[4] that is no longer available, although the Environmental Research & Education Foundation (EREF) has continued to publish such estimates.

An important public policy variable builds from an analysis of the stringency of different state laws to support recycling, originally detailed in Viscusi et al. (2013) and Viscusi et al. (2014). Figure 1 identifies states with five levels of legal intensity and deposit laws during the sample period. The strongest forms of recycling laws come from six states and the District of Columbia. These laws require citizens to separate their recyclable materials from the rest of their garbage. Another strong recycling law adopted by eight states requires municipalities to provide residents with an opportunity to recycle, which is often accomplished with services such as curbside pickup or convenient drop-off stations. Fifteen states have laws in the next tier of stringency requiring municipalities to generate a recycling plan, but do not specify specific services. The remaining 21 states have the weakest requirements in that they either have no state recycling laws or only specify a general recycling goal without accompanying mandates.

[1] http://www.usgovernmentspending.com
[2] https://www.bottlebill.org/images/PDF/BottleBill10states_Summary41321.pdf
[3] http://www.ncsl.org/documents/statevote/legiscontrol_2002_2014.pdf
[4] http://www.cleanenergyprojects.com

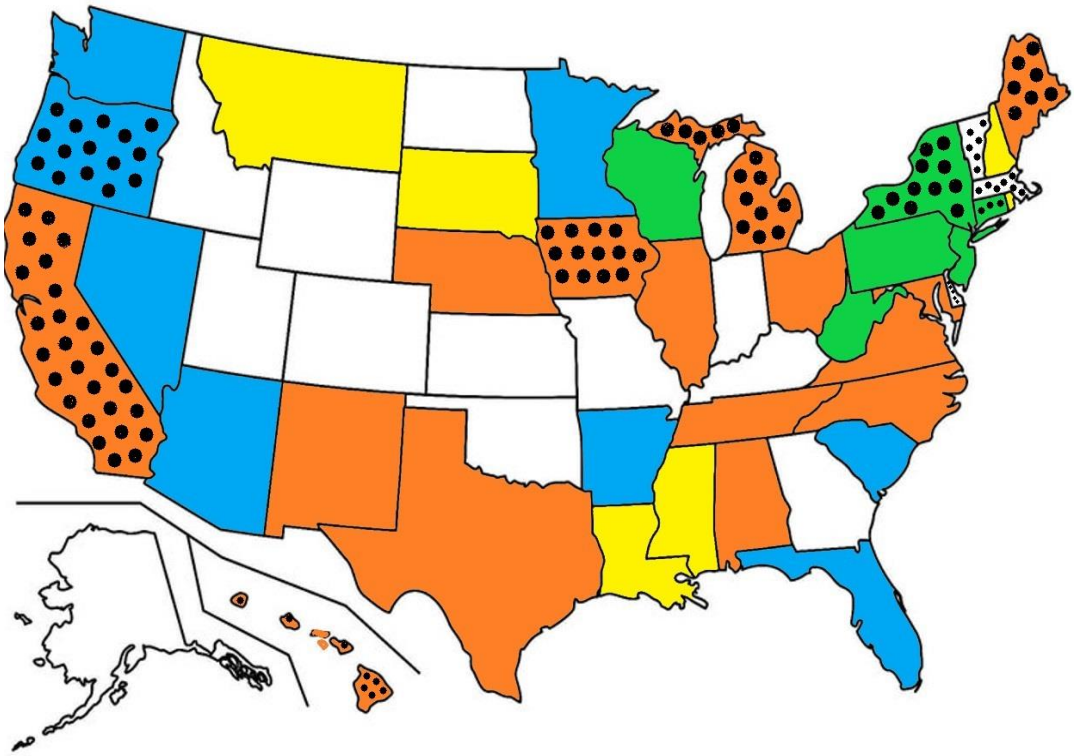

Figure 1: Recycling laws by state.

Notes: States with laws that require households to recycle (marked green), require counties to support houshehold recycling (orange), require counties to make rcecyling plans (blue), specify a recycling goal (yellow), or have no statewide recycling laws (white). States with bottle deposit laws are marked with black dots.

Appendix Table A1 describes all included variables, providing for each the proportion of the sample in each level, along with the mean and standard deviation of its number of materials recycled. Individual respondent information relates to education, age group, race, political party identification, and gender. Household characteristics assess shared resources that facilitate recycling within the household. Marriage is contrasted with those who have never been married and those whose marriage has been disrupted. A dwelling is defined as mobile home, apartment, or house, and a separate question establishes whether that dwelling is owned or rented. Counties are characterized by their median income, population, population density, and the percent of the population that self-identify as white. State level characteristics are differentiated by the recycling laws discussed earlier, state spending per person, ten-year population growth, the presence of a state deposit law for beverage containers, political dominance of either Republicans or Democrats, and average landfill tipping fees per ton in the state.

Analysis

The regression assesses the degree to which individual, household, county, and state characteristics are jointly associated with recycling. Since the sample includes over 380,000 surveys, most variables examined are statistically significant at a $p<0.01$ level. We limit our presented analysis to 21 characteristics whose largest coefficient predicts recycling with a magnitude of 2% or more of the 2.7 mean number of materials recycled. The effect of each characteristics predicting household recycling measured by the difference between their lowest and highest levels. Those listed are all significant at a $p<0.001$ level.

The analysis presented is deliberately limited to a core set of characteristics that substantially predict recycling. For example, we excluded state population and state GDP that have small but statistically significant effects. By contrast, we include state government spending per capita that has a substantial relationship. Beyond the results that we present, we tested a hypothesis about the relationship between recycling and family life cycle, but a trend combining marriage, number of children and empty nesters had little impact beyond controlling for income, education, and home ownership. Examining marital relationships, we found similar effects of marriage disruptions due to separation, divorce, or widowhood, which we group together as the excluded variable, compared to the married or never-married respondents. We considered including controls for each state, but by doing so state characteristics specifying state recycling laws or political control were no longer statistically reliable.

Once the general results are presented and discussed, a robustness section compares results across different ways to analyze this data. First, it contrasts the gain from joint regressions compared with the impact of raw individual means. The second test assesses the assumption of additivity and shows that most interaction terms have a limited impact on the results. The final robustness tests show that the results differ little if the data is split by low- vs. high-income areas or split by the first vs last five years of the data. These tests provide a confidence in the general stability of our reported results.

Results

Tables 1 and 2 present different aspects from a single regression. Table 1 displays the coefficients for the individuals and households, while Table 2 presents the results for the counties and states. Appendix Table A2 gives the complete regression analysis including covariates and additional statistics.

The most predictive characteristics are presented first. For ease of interpretation, the regression excludes the level associated with the lowest relationship to recycling. Continuous characteristics are broken into three categories with nearly equal numbers of observations. The difference between the least and most important level for each characteristic provides a measure of general predictive value, while the difference in slopes between levels provides information on possible nonlinear response within each characteristic.

Table 1: Individual and household variables predicting number of materials recycled

Characteristic	Variable		Excluded level	Coef.	Std.err.
Individual					
Education:	Some college	v.	No college	**0.302**	0.010
	Bachelors or higher	v.	No college	**0.595**	0.011
Age:	Generation X (1965-1980)	v.	Millennial (after1980)	**0.118**	0.013
	Boomer (1946-1964)	v.	Millennial (after1980)	**0.236**	0.014
	Greatest (before 1946)	v.	Millennial (after1980)	**0.396**	0.018
Race:	White	v.	Nonwhite	**0.371**	0.010
Party:	Democrat	v.	Republican	**0.164**	0.008
Gender:	Female	v.	Male	**0.116**	0.008
Household					
Residence:	House	v.	Apartment, mobile home	**0.387**	0.010
Income:	$37,500 to $67,500	v.	Under $37,500	**0.126**	0.009
	Over $67,500	v.	Under $37,500	**0.235**	0.010
Owns home	Yes	v.	No	**0.174**	0.010
Employment:	Unemployed	v.	Disabled	**0.022***	0.014
	Employed	v.	Disabled	**0.054**	0.010
	Retired	v.	Disabled	**0.101**	0.014
Marriage:	Never married	v.	Formerly married	**0.043**	0.014
	Married	v.	Formerly married	**0.099**	0.011
Children under 6	No	v.	Yes	**0.052**	0.010

Notes: Standard errors are adjusted to account for multiple observations per household. Coefficient without an asterisk is significant at $p<0.01$; others are significant at $p<0.10$. These coefficients come from a focal regression that also includes county and state data.

Table 2: County and State variables predicting number of materials recycled

Characteristic	Variable		Excluded Level	Coef.	Std.err.
County					
Median income:	$39,000 to $46,000	v.	Less than $39,000	**0.253**	0.011
	Over $46,000	v.	Less than $39,000	**0.347**	0.012
Population:	220,000 to 825,000	v.	Less than 220,000	**0.221**	0.014
	825,000	v.	Less than 220,000	**0.287**	0.016
Population % white:	70% to 85%	v.	Under 70%	**0.128**	0.011
	Over 85%	v.	Under 70%	**0.233**	0.014
Population. density:	300 to 1280/sq mile	v.	Under 300/sq mile	**0.146**	0.014
	over 1280/sq mile	v.	Under 300/sq mile	**0.183**	0.016
State Recycling laws:	Plan	v.	None or goal	**0.205**	0.012
	Opportunity	v.	None or goal	**0.491**	0.015
	Mandatory	v.	None or goal	**0.570**	0.015
Landfill tipping fee:	$42-$52 /ton	v.	Under $42/ton	**0.233**	0.012
	Over $52/ton	v.	Under $42/ton	**0.379**	0.016
Deposit law:	Yes	v.	No	**0.257**	0.013
10-year population increase:	5% to 11%	v.	Under 5%	**0.172**	0.012
	Over 11%	v.	Under 5%	**0.087**	0.014
Control of government:	Split gov and legis.	v.	Republicans	**0.032**	0.014
	Democrats	v.	Republicans	**0.072**	0.015
Gov't spending/capita:	$8500 to $10,000/year	v.	Under $8500/year	**0.101**	0.009
	Over $10,000/year	v.	Under $8500/year	**0.186**	0.013

Notes: Standard errors are adjusted to account for multiple observations per household. All coefficients are significant at $p<0.001$. These results come from a focal regression that also includes individual and household data.

Findings for Individuals, Households, Counties and States

We discuss separately the individual, household, county, and state characteristics from the pooled model including all 21 characteristics and date dummies. Figure 2 graphically presents the predicted effect of individual characteristics. The heights of bars indicate the shift in predicted recycling relative to the 2.70 average. The regression assigns a coefficient of zero to the excluded, least predictive level of each characteristic. For figures 2-5 the coefficients from Tables 1 and 2 are then centered to sum to zero within each characteristic. The slopes of lines on the graphs reflect the predictive change in the number of materials between adjacent levels of the characteristic. Since the standard errors are quite small, averaging 0.012 and rarely over 0.015, differences between levels greater than the 0.050 spacing between horizontal lines are strongly significant.

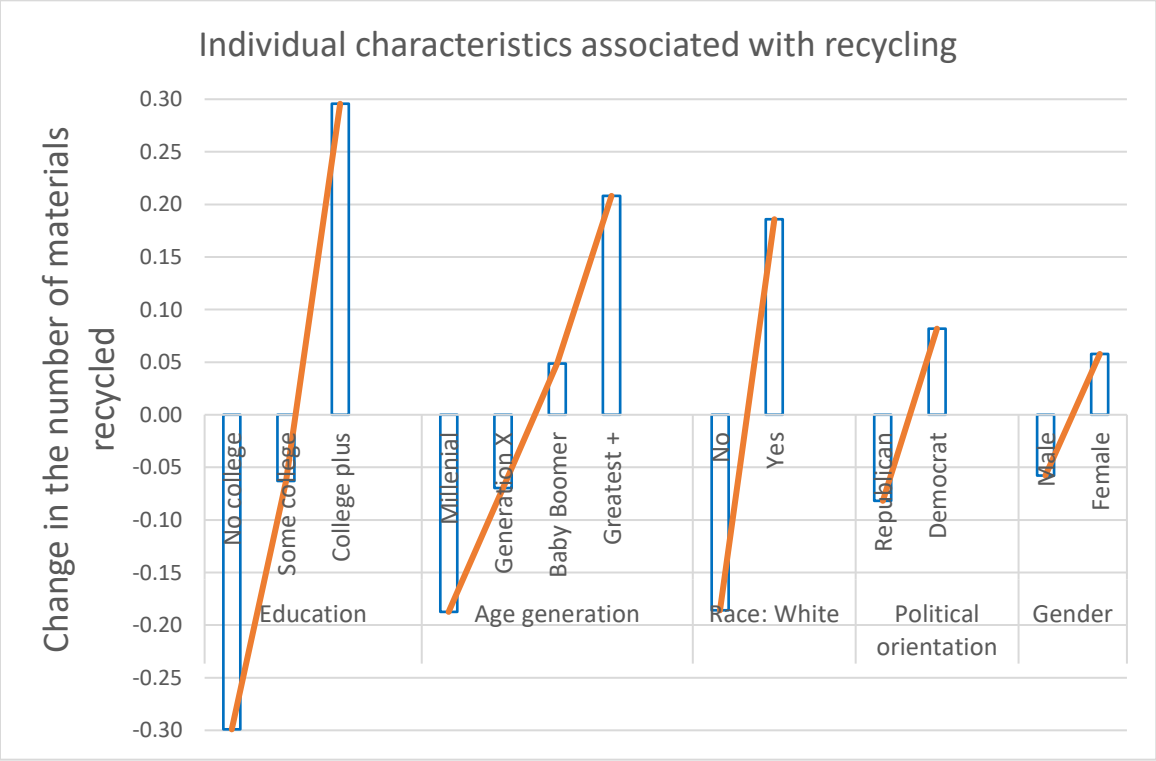

Figure 2: Individual effects centered on the mean of each characteristic

Figure 2 tells a clear story. Education is the most predictive recycling characteristic. Materials recycled by those without college education are -0.30 compared with the average, rising to close to zero for those with some college education and +0.30 for those graduating from

college or having advanced degrees. To put that result in perspective, the number of materials recycled has a shift of 0.60 across the span of the education levels, a 22% increase from the mean number of materials recycled of 2.7.

Other research has shown that education is consistently associated with a greater support for recycling (Berger 1997, Miafodzyeva and Brandt 2012, Wan et al. 2017,). Additionally, Mehner et al. (2020) show how educational efforts related to recycling have a positive impact on participation. Huber et al. (2017) demonstrate that education is strongly associated with being upset from seeing a neighbor violate recycling norms and that that upset leads to greater recycling later. Strydom (2018), and Hornik et al. (1995) identify a further mechanism generated by education. They find that one of the best predictors of household recycling is correct knowledge of sorting rules.

Age, grouped by generational cohort (shift = 0.40) is less predictive of recycling than education. Millennials (born after 1980) have the lowest rate of recycling, followed by Generation X (1965-1980), Baby Boomers (1946-1964), and peaking with the most participation from the Silent and the Greatest Generations (born before 1946). Age has been generally shown to be positively related to recycling (Miafodzyeva and Brandt 2012, Coffey and Joseph 2013, Wanga et al. 2020, Harring et al. 2019). However, Xiao et al. (2012) find that recycling is negatively related to age and education among those in emerging and informal recycling systems. In a meta-analysis of studies done before home-recycling collection became common, Hornick et al. (1995) found that younger respondents recycled more than their elders did. That result may arise because those 25-45 years old in 1990 were Baby Boomers born after 1946 who may have carried their positive recycling habits with them over time.

Race (shift = 0.37), identified if the panelist self-describes as “white”, has a similar impact predicting recycling as age. This result is consistent with Saphores and Nixon (2014) who report lower recycling among blacks in America, and Martin et al. (2006) who document lower recycling among minorities in England. On the other hand, Liu et al. (2014) with a US sample find that whites are less concerned about the environment, global warming or pollution. If replicated, that result suggests that such general environmental concerns may be inversely related to performing specific household recycling tasks.

Political orientation (shift = 0.16) shows that people who identify as Democrats recycle more than Republicans. Coffey and Joseph (2013) demonstrate a similar effect and identify a

mechanism. Democrats and liberals are more willing to pay for expanded recycling and support government to take recycling responsibilities on behalf of households. In all, Democrats may increase recycling both by their own direct actions and by voting for local recycling efforts. The liberal orientation that characterizes Democrats has also been shown to be related to a positive environmental attitudes and behavior (Cheung et al. 2019) and with general environmental concern (Liu et al. 2014).

Females have slightly greater recycling participation than males (shift = 0.12). This relatively small effect is consistent with a meta-analysis by Miafodzyeva and Brandt (2012) showing that most gender effects are small or insignificant. However, Hunter, Hatch, and Johnson (2004) and (Liu et al. (2014) show that women have a greater concern for the environment compared with men.

Figure 3 graphs the impacts on recycling from household characteristics. The most important predictor, housing, (shift = 0.39) indicates greater recycling for respondents living in a house rather than an apartment or mobile home. Studies in Australia (Coffee et al. 2013) and Canada (Berger 1997) find that living in a house is a strong predictor of recycling. Other surveys report less recycling among those living in cramped spaces (Martin et al. 2006, Rousta 2020). Recycling requires support facilities that may be lacking or hard to use in apartments. Further, those in multi-family residences may have greater difficulty identifying who recycles, possibly limiting social pressure to recycle. Relatedly, people who own their dwellings recycle more than renters (shift = 0.17). Homeowners have a greater stake in community ecological health (Hornik 1995), possibly buttressed by a greater expected change in home equity if the community flourishes.

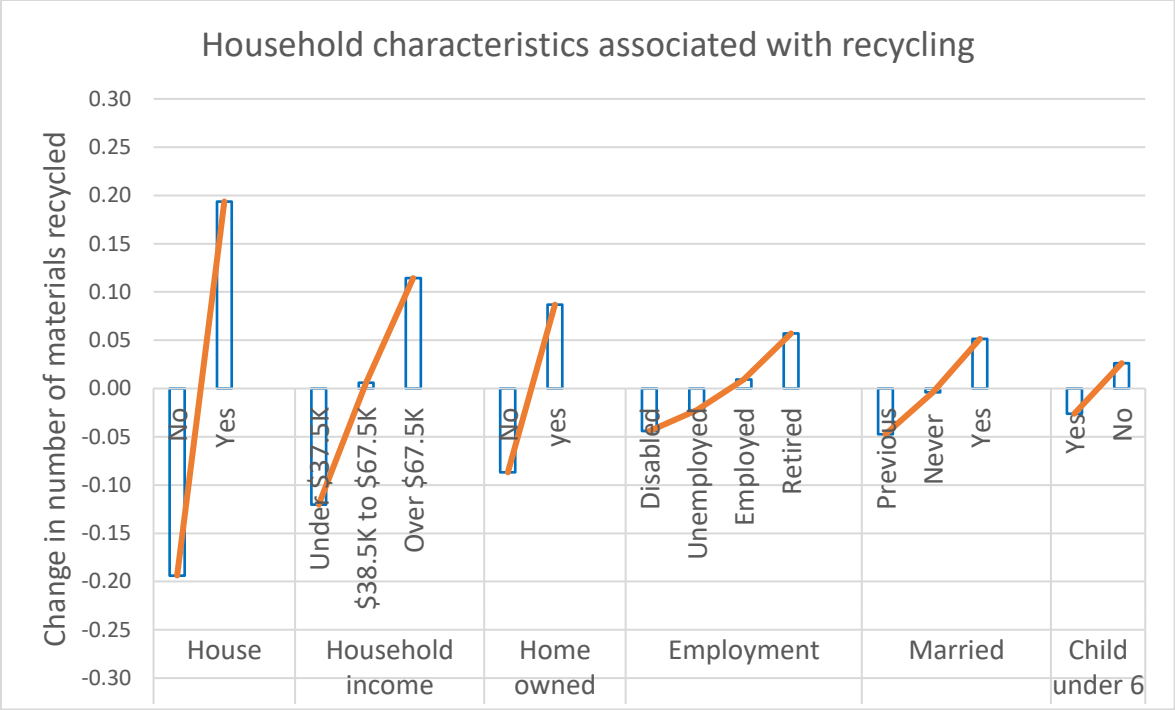

Figure 3: Household recycling centered on the mean of each characteristic

An important predictor of recycling is annual income (shift = 0.24), as found in other studies (Miafodzyeva & Brandt 2012, Coffey and Joseph 2013, Berger 1997). Employment also matters (shift = 0.10), but notice that those retired from jobs recycle more than those still employed, a result consistent with retirees having more time to recycle. Recycling also drops among those who are disabled, possibly mediated by greater difficulty lifting and sorting. Being married (shift = 0.10) is associated with greater recycling, but drops if the marriage is disrupted by separation, divorce, or widowhood. Finally, we find an increase in recycling for households that do not include a child under six years of age. This last difference is small but strongly significant and allies with the idea that a preschool child can hinder many activities, including recycling participation.

In summary, these results from individual and household survey data suggest that recycling is a task requiring knowledge about recycling, past experience with the process, along with the motivation and resources to perform the task. The impact of process knowledge from other researchers is consistent with the positive effect we find of age and education (Harring 2019). Greater recycling comes from those who perceive they are part of the majority culture, have jobs, and own homes are thus motivated and able to support local recycling. Factors that decrease recycling from personal challenges are most apparent for those who are disabled,

widowed, separated, divorced, or have young children. These relatively small negative relationships have not often been reported, as they are difficult to detect with fewer observations.

Next, Figure 4 graphs the effects of county characteristics on household recycling. Counties provide local support through recycling centers, home pickup, and promotional materials that simplify and encourage recycling. Counties in the top third of median incomes recycle 0.35 more materials more than those in the bottom third. A combination of county median county income with the 0.24 shift from individual income indicates that income combined at both levels has a substantial association with recycling. McCarty and Shrum's (2001) measure of wealth combines personal income with median income and median home value in the respondent's zip code. They provide evidence that their combined wealth measure is mediated by perceived recycling convenience which then leads to greater recycling. An experimental study by Iyer and Kashyap (2007) finds that students whose parents have more income, education and work in white-collar jobs respond more positively to recycling promotions. That result suggests that the impact of parent income and education on recycling

may carry on to their children.

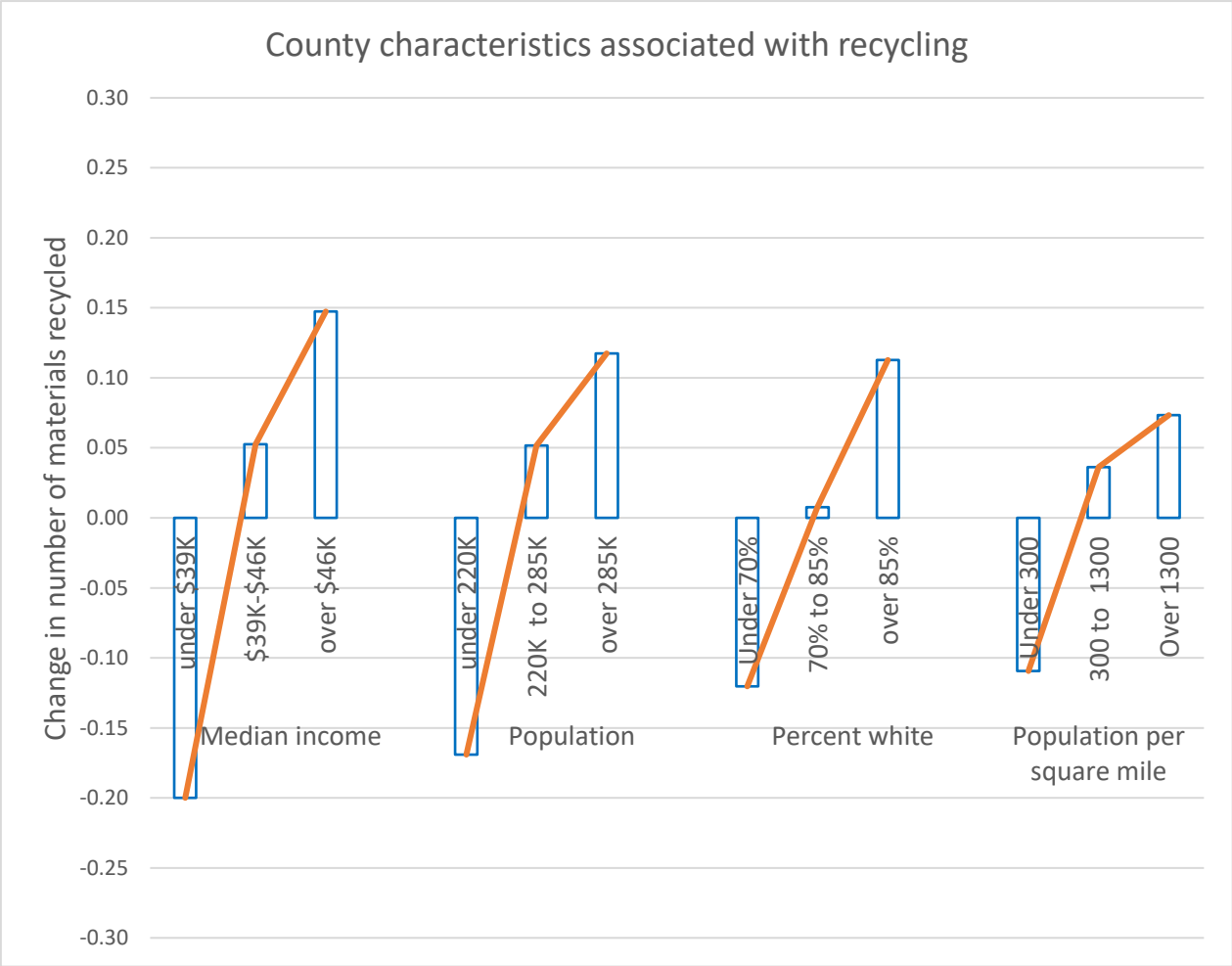

Figure 4: County recycling effects centered on the mean for each characteristic

The effects of state characteristics are displayed in Figure 5. Laws are the most predictive state characteristic that support recycling (shift = 0.58). Average recycling is greatest in states that mandate citizen recycling. Next come states that require counties to offer appropriate opportunities for households to recycle, followed by those only requiring a plan. The average cost to dump a ton of trash in a state landfill is also important (shift = 0.38). High fees encourage states to support the recycling of glass, paper, cans, and plastic rather than permitting their disposal in a landfill.

Container deposit laws for plastic, metal, or glass containers (shift = 0.26) are strongly associated with additional recycling. That result is similar to findings from Saphores and Nixon

(2014). Deposits are also helpful in communities such as cities that generate large quantities of waste, encouraging the collection of deposit-eligible bottles and cans by those willing to salvage them, particularly in communities with few resources (Rousta et al. 2020).

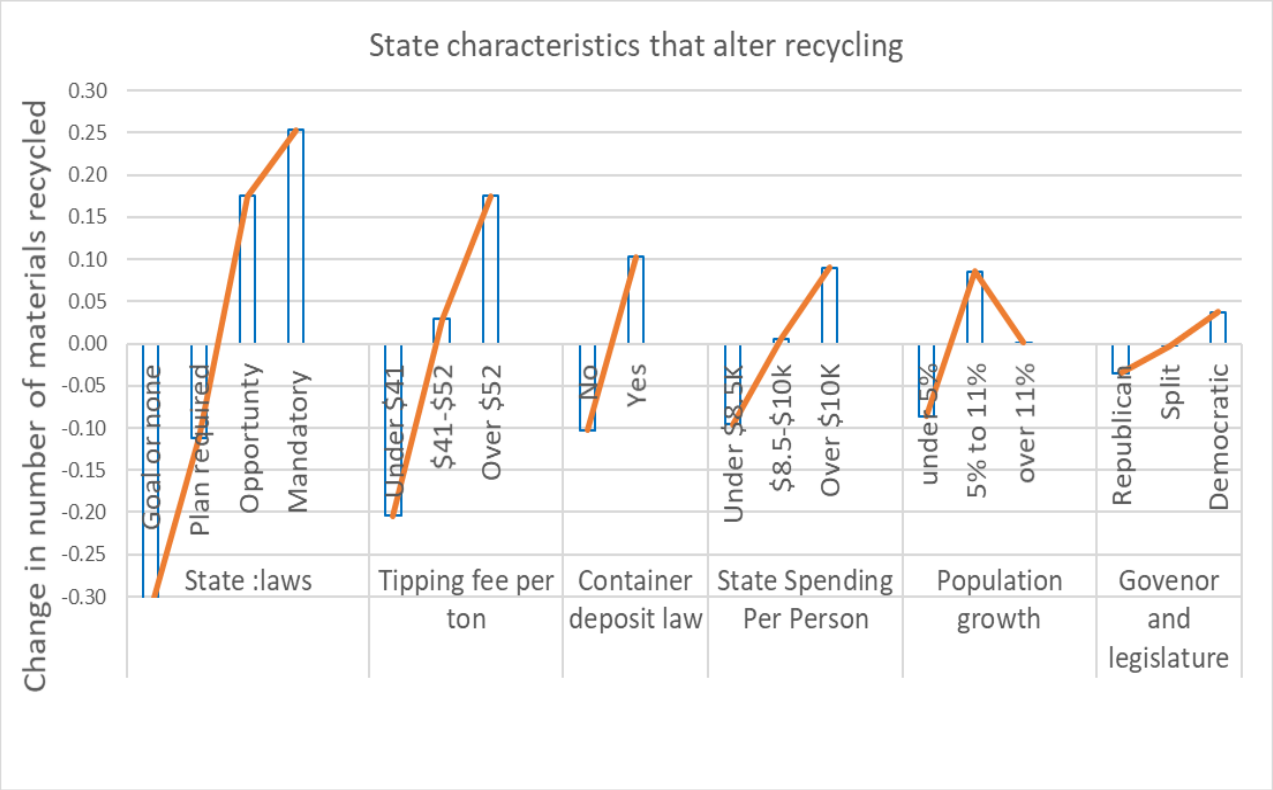

Figure 5: State variables centered on the mean for each characteristic

Generally, the combined positive impact of state recycling laws and container deposit laws provides important support for direct action by state legislatures to encourage recycling. These legal effects have been shown before, but not controlling for more than 50 individual, household, county, and other state characteristics.

The next important characteristic is spending per person by the state government. States that spend more money per person (shift = 0.19) have the capability to commit greater resources to support households and counties in their recycling efforts.

Additionally, population growth displays a nonlinear relationship with household recycling (max shift = 0.17). Growth under 5% per decade may be a sign of less investment in infrastructure, while over 12% growth may characterize a state struggling to develop sufficient recycling infrastructure in the face of a fast-growing population.

The relatively small shift of 0.07 materials for states with Democratic legislatures and governorships builds on the 0.16 shift for Democratic voters, making a general political orientation a moderate predictor of recycling.

Robustness Tests

This section describes four robustness tests. The first compares the predictive scores from the regression with an analogous contrast from the raw means of the recycling rates. The second tests the assumption of additivity implicit in the initial regression equation. The last two examine stability of the coefficients despite splits separating county income or time.

Means vs. Regression Estimates

This test compares the simple recycling means across 51 variables in Table A1 with the regression results in A2. Some analyses of recycling only contrast the mean recycling levels for individual demographic characteristic, rather than estimating joint effects with regression. Comparing the simple monadic means in Table A1 against the regression estimates in Table A2 shows that the mean recycling ranges for each category are generally larger than regression estimates, but differ in predictable ways as correlated variables limit the effect of each other. For example, the recycling range between means across different levels of education differ by 0.93 while the range for the regression coefficients is 0.60. The positive associations among variables such as education, income, and home ownership generally reduce their univariate impact when they are included in the regression. For that reason, the multivariate regression results are preferred because they reflect incremental effects after adjusting for the levels of the other variables.

Does Simple Additivity Apply?

The second robustness exercise tests the assumption of additivity. Showing limited interaction effects is important as it justifies joining the effects from the different variables. To establish the extent of interactions, a separate analysis with 21 linearized characteristics assesses interactions with bilinear interaction terms. As examples, consider three sets of variables with expected overlap. The interaction term for personal and county income is -0.026. The interaction term for white respondent and percent white population in the county is -0.025, and for

respondent leaning democratic and democratic control of the house and senate is -0.006. Those interaction terms, while statistically significant, reduce the impact of the additive sum by a quantity that does not come close to our inclusion standard of a 2% percentage change. Put differently, in these cases and quite generally, we find little evidence that deviations from additivity substantially alter the additive implications of our general results.

Does County Income Matter?

A third robustness check examines the regressions split by the county median income. That test questions whether the results would differ had the KnowledgePanel sample only included low- or high-income levels and is relevant to the broader question of the projectability of our results to areas with different incomes. Table A3 provides coefficients from the independent regressions. The correlation between the coefficients between the different income levels is 0.84.

Despite overall similarity, Table A3 identifies two variables, beverage container deposits and respondent age, that are substantially stronger in low- over high-income counties. Adding deposits is associated with a shift of 0.46 recycling shift in low-income counties compared with shift of 0.18 in high-income counties. That difference has economic justification in that deposits for low-income counties can inexpensively encourage recycling, while the same time income from collection can support needy citizens. The second outlier is age, which generates a 0.48 shift for low-income counties compared with 0.32 for high-income counties. That shift may be due to lack of recycling resources in low-income counties that lost job prospects for youthful millennials when the great recession hit in 2008.

Do the results differ across time?

The final check determines the stability of the coefficients over time. That analysis splits 2005-2014 into two five-year segments. The patterns of coefficient reflecting different times in Table A4 have a correlation of 0.91. There are moderate increases (change > 0.05) for the important household characteristics like education, age, gender (female) and income. By contrast, the impact of strong state laws requiring recycling drop strongly across time (change < -0.20), while deposit laws drop as well (change < -0.10). The lessened impact of state actions compared with the positive changes from household characteristics may arise from two

sources. First, less success from state actions may simply be a ceiling effect. It is harder for states with strong recycling laws in the first period to increase recycling in the second period because more of their households are near the maximum number of materials. Second the increasing strength of household factors may occur because the real benefits of recycling are locally visible, and may evolve positively over time through social pressure and reinforcing effects of positive local environmental efforts.

These robustness checks increase confidence in the stability of the results in three ways. First, the contrast of univariate means against regressions estimates, clarifies the benefit of a unified analysis. Second, the tests of interactions provide confidence that one can combine the coefficients additively with limited distortion. Finally, the strong correlations between estimates from independent split halves clearly identifies a few outliers, and confirms the general stability of the effect of the 21 characteristics and their consistent ordering across analyses.

Summary and Conclusions

This paper identifies 21 substantial predictors of household recycling in the United States arising from individual, household, county, and state characteristics. The richness and detail in this study would not have been possible without individual and household data from over 380,000 observations as part of Knowledge Network's panel surveys from 2005-2014.

Figures 2 through 5 show the expected change in recycling within each characteristic relative to the mean recycling level. It is instructive to convert those measures to percentage changes for each characteristic dividing its total shift by 2.7, the average number of materials recycled. Across characteristics, education (22%) and mandatory recycling laws (21%) are most predictive, followed by age (15%), self-identifying as "white" (14%), living in a house (14%), tipping cost per ton (14%), living in a county with high median income (13%), a more populous county (11%), a state with deposit laws (10%), greater county percent white (9%), high household income (9%), a state with high per capita government spending (7%), a county with high population density (7%), a state with moderate population growth (6%), for individuals voting Democratic (6%), owning rather than renting their home (6%), being female (4%), married (4%), retired (4%), a state with Democratic control of the state government (3%), and not having a child under six (2%).

The robustness checks increase confidence in these measures, and these percentages can

be combined under the additivity assumption. However, the analysis cannot account for variables that are not available with the current data set. Below we review our central findings and discuss related public policy research and the actions by counties and state governance that have promise to further encourage household recycling.

While these results arise from one country within a limited time span we believe the way resources needed to support household resources and the economic motivations will be found in other countries. Consider first the ways that individual characteristics provide the resources and economic motivation to support recycling. Income increases the likelihood of owning a residence that may allow storage or access to home recycling pickup. Education brings with it recognition of recycling's environmental benefits and a heightened ability to learn and follow recycling requirements. The role of age suggests that both experience with recycling and responsibility to others are positively linked to recycling. Building on their lower opportunity costs of their time, retirees recycle more than those employed. In contrast, those with stressed resources recycle less. In particular, there is less recycling among youth, those in low-income counties, and those too disabled to work. Recycling is also lower for those divorced, separated, or widowed.

This study does not have direct measures of attitudes towards or beliefs about recycling. However, a number of referenced studies show that education and income are positively associated with support for the environment and recycling. We find a strong link between age and recycling, but valuable studies could identify the extent to which recycling habits remain durable across levels of economic cycles, across generations, and within families over time. Additionally, the strong joint positive effects of income, education and home ownership on recycling justifies measuring community awareness and civic engagement as promising intervening variables.

Counties, for their part, provide services to process waste and encourage household recycling. Counties can increase recycling with convenient recycling centers, home pick up, and single-stream recycling. Greater recycling occurs for local governments whose citizens have the resources to support recycling. Those resources are more likely to be provided in populous counties having more income per person, a more homogeneous dominant culture, and lower collection costs serving areas with higher population density.

This study does not directly measure the extent to which particular amenities contribute the success of a county's recycling policies. Moller, Ryan and Deci (2006) advocate the use of

government actions that avoid penalties, seek ways to provide clear unambiguous choices, and present supportive information in a non-condescending way. Saphores and Nixon (2014) indicate that curbside pickup increases the odds of recycling by nearly 50%. Abbott et al. (2011) show that home pickup is a major predictor of recycling efficiency across regions in Britain. Bell et al. (2017) show that counties in Wisconsin increased recycling by collecting paper, glass, cans, and plastic in one household bin. Such single-stream recycling increases recycling rates and reduces recycling costs. However, Kinnaman (2013) questions the extent to which recycling is generally cost-effective. Indeed, from a public policy perspective, there is a need for more work to balance the total societal costs and benefits of various recycling efforts and the role of household efforts in the development of a circular economy.

In contrast to those states with weak recycling statutes, states with laws that require citizens to recycle or counties to support their efforts see substantially greater recycling levels, demonstrating that policies and politics matter. The positive association we find between tipping fees and household recycling has economic justification. The real cost of placing recyclable waste in landfills tends to be higher where land is expensive and there are many people per square mile. Additionally, there is more recycling within states that require bottle deposits, an effect that is more beneficial in counties with low per capita income. State spending per person and Democratic state control have relatively minor, but positive incremental effects on recycling.

More research is needed on the ways a state can effectively encourage recycling. The stringency of the written laws has a demonstrated importance, but the split sample across time suggest that the impact of state laws may be declining. In addition, our analysis does not measure the extent to which the state enforces its recycling requirements or supports them with targeted recycling support to local municipalities. Valuable research could further explore the substantial positive effect of high landfill tipping fees. High fees may lead counties to encourage more household recycling to reduce its cost of placing unrecycled trash in landfills. Differences in state landfill laws and restrictions may directly alter dumping fees. The strong results found here justify detailed studies of the impact of fees attached to exporting unrecycled trash or placing it in landfills.

Other productive paths for future research can expand the understanding of why households differ despite their resources and the support of counties and states. Directions for more public policy research could productively examine the effectiveness of the following action

steps to encourage recycling.

1. Explore the effectiveness on recycling of community programs to encourage local awareness and civic pride. That happens through neighborhood cleanup campaigns, programs at school on civic engagement, and the coverage of environmental community issues on local media.
2. Test the effect of general environmental concern on political activities such as voting at elections, messages on social media, and discussion with friends.
3. Measure the impact of allowing counties and cities to increase their income, sales, and land taxes so that they can afford to offer support for recycling and other environmental improvements.

This paper has emphasized personal, social and governmental characteristics associated with the extent of household recycling. However, the data clearly show that the converse is true. People who recycle less than average are younger, poorer, less educated, and more likely to be racial minorities. They are also more likely to live in an apartment, be unemployed or unmarried. The counties they live in may have difficulty supporting household recycling due to less income from fewer residents, and greater per capita recycling costs due to low population density. Finally, household recycling is low in states where tipping fees are low, where political orientations and laws support individual and county autonomy, and state spending per capita and GDP growth are below average. Accordingly, if a society wants to encourage recycling across the board, greater change would occur if counties focus support for household recycling in areas with lower income and by increasing recycling requirement for rental apartments. For their part, states could pass additional resources for counties in rural and low-income counties in return for effective recycling programs. Indeed, much research into recycling has focused on the actions of households. More attention is needed on the critical public policy roles of counties and states.

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Appendix

Table A1: Variable Descriptions, percent of sample for each variable, recycling mean and standard deviations.

Variable description	% of sample	Mean materials recycled	Materials standard deviation
Education: High school or less	24.3%	2.18	1.66
Education: Some college	36.3%	2.63	1.59
Education: Bachelors or more	39.4%	3.11	1.41
Age: Millennial (after 1980)	13.7%	2.28	1.68
Age: Generation X (1965-1980)	24.5%	2.60	1.62
Age: Baby Boomer (1946-1964)	42.8%	2.79	1.55
Age: Silent or Greatest (before 1946)	19.1%	2.98	1.46
Race: Nonwhite	18.6%	2.27	1.66
Race: White	81.4%	2.81	1.55
Party: Republican	44.3%	2.67	1.59
Party: Democrat	52.7%	2.76	1.57
Gender: Male	39.5%	2.69	1.60
Gender: Female	60.5%	2.72	1.57
Residence: Apartment or mobile home	18.2%	2.26	1.67
Residence: House	80.1%	2.83	1.54
Income: $0-$37,500	34.3%	2.27	1.65
Income: $37,500-67,500	31.0%	2.74	1.57
Income: $67,500+	34.6%	3.12	1.41
Ownership: Renter	21.3%	2.26	1.67
Ownership: Owner	76.1%	2.85	1.53
Employment: Disabled	5.6%	2.13	1.66
Employment: Unemployed	7.1%	2.38	1.64
Employment: Employed	58.5%	2.74	1.58
Employment: Retired	19.8%	2.98	1.46
Relationship: Formerly married	17.5%	2.59	1.61
Relationship: Never married	16.2%	2.48	1.65
Relationship: Married	66.2%	2.80	1.55
Yes children in home under 6 years old	12.9%	2.45	1.64
No children in home under 6 years old	87.1%	2.75	1.57
County median income 2001: -$39k	33.3%	2.25	1.64
County median income 2001: $39k-$46k	33.4%	2.75	1.56
County median income 2001: $46k+	33.3%	3.13	1.41
County population: -220k	33.7%	2.32	1.64
County population: 220k-825k	33.2%	2.86	1.54
County population: 825k+	33.0%	2.95	1.49

County pop. % white: 0%-70%	33.1%	2.70	1.59
County pop. % white: 70%-85%	33.5%	2.79	1.57
County pop. % white: 85%+	33.4%	2.64	1.59
County pop. density: 0-0.30	33.8%	2.35	1.63
County pop. density: 0.30-1.28	33.8%	2.86	1.53
County pop. density: 1.28+	32.4%	2.93	1.52
State recycling laws: None or goal	19.2%	2.24	1.65
State recycling laws: Plan	46.4%	2.65	1.58
State recycling laws: Opportunity	17.8%	2.90	1.53
State recycling laws: Mandatory	16.5%	3.22	1.36
State landfill tipping fee: $24-$41.50	31.4%	2.16	1.64
State landfill tipping fee: $41.50-$52.00	32.6%	2.71	1.60
State landfill tipping fee: $52.00+	36.0%	3.19	1.34
State has no deposit law	71.1%	2.53	1.64
State has deposit law	28.7%	3.15	1.35
Population change: to +5%	33.5%	2.80	1.57
Population change: +5% to +11%	33.4%	2.84	1.52
Population change: +11% or more	33.2%	2.49	1.63
State: Republican gov. and leg.	34.5%	2.39	1.65
State: Split gov. and leg.	35.4%	2.75	1.56
State: Democratic gov. and leg.	30.1%	3.02	1.45
State gov. spending: $6k-$8.5k	34.0%	2.34	1.65
State gov. spending: $8.5k-$10k	32.7%	2.66	1.60
State gov. spending: $10k+	33.3%	3.13	1.38
Date: 2005	8.4%	2.49	1.65
Date: 2006	5.6%	2.52	1.63
Date: 2007	10.2%	2.69	1.59
Date: 2008	3.6%	2.69	1.57
Date: 2009	10.5%	2.80	1.55
Date: 2010	13.3%	2.75	1.57
Date: 2011	10.7%	2.79	1.56
Date: 2012	12.8%	2.73	1.57
Date: 2013	14.8%	2.73	1.56
Date: 2014	10.1%	2.75	1.59

Notes: N=383,571. Total number of materials recycled: Mean =2.71 Standard deviation=1.58

Table A2: Regression, total materials recycled across all dependent variables

Variable	Coef.	Std.Err.	t	P>|t|
Education: Some college	0.3018	0.0101	29.77	0.000
Education: Bachelors or more	0.5946	0.0108	55.06	0.000
Age: Generation X (1965-1980)	0.1181	0.0133	8.85	0.000
Age: Baby Boomer (1946-1964)	0.2364	0.0137	17.21	0.000
Age: Silent or Greatest (before 1946)	0.3960	0.0180	22.02	0.000
Race: White	0.3712	0.0100	37.04	0.000
Party: Democrat	0.1639	0.0075	21.77	0.000
Gender: Female	0.1161	0.0081	14.31	0.000
Residence: House	0.3875	0.0102	37.84	0.000
Income: $37,500-67,500	0.1263	0.0090	14.10	0.000
Income: $67,500+	0.2349	0.0102	23.07	0.000
Ownership: Owner	0.1736	0.0101	17.20	0.000
Employment: Unemployed	0.0218 *	0.0145	1.50	0.132
Employment: Employed	0.0536	0.0105	5.11	0.000
Employment: Retired	0.1014	0.0143	7.09	0.000
Relationship: Never married	0.0433	0.0143	3.04	0.002
Relationship: Married	0.0988	0.0107	9.27	0.000
No children in home under 6 years old	0.0524	0.0104	5.04	0.000
County median income 2001: $39k-$46k	0.2526	0.0108	23.46	0.000
County median income 2001: $46k+	0.3473	0.0117	29.77	0.000
County population: 220k-825k	0.2207	0.0140	15.79	0.000
County population: 825k+	0.2866	0.0164	17.46	0.000
County pop. % white: 70%-85%	0.1280	0.0110	11.62	0.000
County pop. % white: 85%+	0.2332	0.0137	17.05	0.000
County pop. density: 0.30-1.28	0.1456	0.0136	10.73	0.000
County pop. density: 1.28+	0.1827	0.0159	11.52	0.000
State recycling laws: Plan	0.2048	0.0119	17.17	0.000
State recycling laws: Opportunity	0.4910	0.0149	32.88	0.000
State recycling laws: Mandatory	0.5699	0.0153	37.15	0.000
State landfill tipping fee: $41.50-$52.00	0.2327	0.0116	20.07	0.000
State landfill tipping fee: $52.00+	0.3793	0.0160	23.67	0.000
State has deposit law	0.2573	0.0120	21.53	0.000
Population change: +5% to +11%	0.1717	0.0106	16.21	0.000
Population change: +11% or more	0.0873	0.0136	6.43	0.000
State.: Split gov. and leg.	0.0317	0.0104	3.06	0.002
State.: Democratic gov. and leg.	0.0722	0.0113	6.37	0.000
State gov. spending: $8.5k-$10k	0.1011	0.0086	11.74	0.000
State gov. spending: $10k+	0.1859	0.0128	14.48	0.000
Date: 2006	0.0311 *	0.0127	2.44	0.015
Date: 2007	0.1234	0.0090	13.72	0.000
Date: 2008	0.0723	0.0146	4.95	0.000

Date: 2009	0.1637	0.0110	14.95	0.000
Date: 2010	0.1618	0.0115	14.05	0.000
Date: 2011	0.2481	0.0123	20.21	0.000
Date: 2012	0.2496	0.0118	21.20	0.000
Date: 2013	0.2200	0.0119	18.46	0.000
Date: 2014	0.1676	0.0128	13.12	0.000
Constant	-0.5704	0.0290	-19.68	0.000
Observations	383571			
R-Squared	0.2184			

Note: All coefficients except those with an asterisk are significant a $p<.01$

Table A3: Regression, total materials recycled by full samples against split halves by low and high median county income

	Full Sample	**Higher Income (>$42,173)**	**Lower Income < $42,173)**
R-squared	0.22	0.20	0.19
Education: Some college	0.3018	0.2998	0.3073
Education: Bachelors or more	0.5946	0.5755	0.6275
Age: Generation X (1965-1980)	0.1181	0.0981	0.1303
Age: Baby Boomer (1946-1964)	0.2364	0.1928	0.2747
Age: Silent or Greatest (before 1946)	0.3960	0.3101	0.4831
Race: White	0.3712	0.4165	0.3396
Party: Democrat	0.1639	0.1526	0.1726
Gender: Female	0.1161	0.1285	0.1015
Residence: House	0.3875	0.4014	0.3719
Income: $37,500-67,500	0.1263	0.1492	0.1147
Income: $67,500+	0.2349	0.2492	0.2249
Ownership: Owner	0.1736	0.1978	0.1542
Employment: Unemployed	0.0218 *	-0.0122 *	0.0569
Employment: Employed	0.0536	0.0624	0.0483
Employment: Retired	0.1014	0.0943	0.1093
Relationship: Never married	0.0433	0.0296 *	0.0542
Relationship: Married	0.0988	0.1083	0.0889
No children in home under 6 years old	0.0524	0.0601	0.0487
County median income 2001: $39k-$46k	0.2526		
County median income 2001: $46k+	0.3473		
County population: 220k-825k	0.2207	0.1528	0.3046
County population: 825k+	0.2866	0.2235	0.2957
County pop. % white: 70%-85%	0.1280	0.1015	0.1458
County pop. % white: 85%+	0.2332	0.1666	0.2459
County pop. density: 0.30-1.28	0.1456	0.1975	0.1219
County pop. density: 1.28+	0.1827	0.1793	0.2628
State recycling laws: Plan	0.2048	0.2214	0.1208
State recycling laws: Opportunity	0.4910	0.5511	0.3939
State recycling laws: Mandatory	0.5699	0.5918	0.4695
State landfill tipping fee: $41.50-$52.00	0.2327	0.2929	0.2348
State landfill tipping fee: $52.00+	0.3793	0.4104	0.3885
State has deposit law	0.2573	0.1837	0.4591
Population change: +5% to +11%	0.1717	0.2380	0.1465
Population change: +11% or more	0.0873	0.0637	0.0969

State.: Split gov. and leg.	0.0317	0.0104 *	0.0184 *
State.: Democratic gov. and leg.	0.0722	0.0970	-0.0063 *
State gov. spending: $8.5k-$10k	0.1011	0.1106	0.0786
State gov. spending: $10k+	0.1859	0.1348	0.2319
Date: 2006	0.0311 *	0.0670	-0.0105 *
Date: 2007	0.1234	0.1312	0.1206
Date: 2008	0.0723	0.1129	0.0371 *
Date: 2009	0.1637	0.1756	0.1664
Date: 2010	0.1618	0.1771	0.1637
Date: 2011	0.2481	0.2420	0.2557
Date: 2012	0.2496	0.2511	0.2534
Date: 2013	0.2200	0.2124	0.2331
Date: 2014	0.1676	0.1549	0.1863
Constant	-0.5704	-0.2579	-0.4940
Observations	383571	191,862	191,709

Note: All coefficients except those with an asterisk are significant a $p<.01$

Table A5: Total Number of Materials Recycled, by Full Sample, years (2005-09), and (2010-14)

Variable	Full Sample	First 5 Years	Last 5 Years
Education: Some college	0.3018	0.2646	0.3226
Education: Bachelors or more	0.5946	0.5683	0.6097
Age: Generation X (1965-1980)	0.1181	0.0550*	0.1339
Age: Baby Boomer (1946-1964)	0.2364	0.1836	0.2486
Age: Silent or Greatest (before 1946)	0.3960	0.3461	0.4020
Race: White	0.3712	0.3656	0.3740
Party: Democrat	0.1639	0.1624	0.1642
Gender: Female	0.1161	0.0837	0.1351
Residence: House	0.3875	0.4109	0.3727
Income: $37,500-67,500	0.1263	0.0803	0.1525
Income: $67,500+	0.2349	0.1795	0.2630
Ownership: Owner	0.1736	0.1655	0.1777
Employment: Unemployed	0.0218*	0.0338*	0.0360*
Employment: Employed	0.0536	0.0071	0.0840
Employment: Retired	0.1014	0.0678	0.1207
Relationship: Never married	0.0433	0.0387*	0.0429*
Relationship: Married	0.0988	0.1084	0.0963
No children in home under 6 years old	0.0524	0.0240*	0.0632
County median income 2001: $39k-$46k	0.2526	0.2623	0.2502
County median income 2001: $46k+	0.3473	0.3669	0.3301
County population: 220k-825k	0.2207	0.2304	0.2289
County population: 825k+	0.2866	0.3076	0.2972
County pop. % white: 70%-85%	0.1280	0.0955	0.1583
County pop. % white: 85%+	0.2332	0.2477	0.2392
County pop. density: 0.30-1.28	0.1456	0.1667	0.1233
County pop. density: 1.28+	0.1827	0.2036	0.1560
State recycling laws: Plan	0.2048	0.2475	0.1846
State recycling laws: Opportunity	0.4910	0.6018	0.3920
State recycling laws: Mandatory	0.5699	0.6818	0.4926
State landfill tipping fee: $41.50-$52.00	0.2327	0.2338	0.2312
State landfill tipping fee: $52.00+	0.3793	0.4324	0.3183
State has deposit law	0.2573	0.3150	0.2262
Population change: +5% to +11%	0.1717	0.2122	0.1626
Population change: +11% or more	0.0873	0.0374*	0.0897
State.: Split gov. and leg.	0.0317	-0.0191*	0.0230*
State.: Democratic gov. and leg.	0.0722	0.1278	0.0212*
State gov. spending: $8.5k-$10k	0.1011	0.1514	0.0016*
State gov. spending: $10k+	0.1859	0.1700	0.1993
Date: 2006	0.0311*	0.0297*	
Date: 2007	0.1234	0.1064	
Date: 2008	0.0723	0.0507	
Date: 2009	0.1637	0.1460	

Date: 2010	0.1618		
Date: 2011	0.2481		0.0873
Date: 2012	0.2496		0.0831
Date: 2013	0.2200		0.0485
Date: 2014	0.1676		0.0091*
Constant	-0.5704	-0.5045	-0.3572
Observations	383,571	147,017	236,554
R-Squared	0.22	0.23	0.21

Robust standard errors in parentheses; * not significant at 1%