

Improving China's Environment: Increasing Adoption Rates of Energy Efficient Household Appliances

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Consumer adoption of energy efficient household appliances in China is very low despite government efforts since 2005 to boost the purchase of these money and energy saving devices. This paper builds on a prior publication of the authors (2014) which concluded that a large part of the problem is a combination of poor marketing of the cost savings of these devices coupled with lower levels of purchases with credit versus cash. A survey that seeks to provide an answer to what specific changes need to be made in marketing and credit was administered to 462 consumers in four Chinese cities (Beijing, Lanzhou, Fangchenggang, and Jinchang) in the summer of 2015. The findings indicate better labeling and funneling funding away from rebates and toward low-interest loans would significantly increase the adoption rates of energy efficient appliances. Improving the adoption rates of energy efficient household appliances in China is good for manufacturers (who make money selling more expensive items), consumers (who benefit from a reduced cost of ownership), the Chinese government (which is currently engaged in a campaign to lower the amount of energy used), and the world (which benefits from a cleaner environment).

Keywords: China's environment, energy efficient appliances, improving adoption of energy efficient appliances in China, Chinese consumers, China Energy Label, impact of consumer labeling, Energy Star

This research builds on a prior paper that sought ways to improve consumer energy consumption patterns. Earlier work found that:

Low adoption of energy efficient appliances has more to do with a lack of information on the benefits of these devices coupled with a label that does not provide all information needed for consumers to make a sound decision as to which appliance will give them the lowest cost of ownership. (Huber, Kang, & West, 2014)

In that paper, the conclusion noted that:

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The immediate extension of this paper should concentrate on determining whether modifying the existing label, adopting the Energy Star label¹, or creating a new one would be most likely to increase the number of people willing to adopt energy efficient appliances. (Huber et al., 2014)

This paper provides a preliminary answer to this pressing question. The importance of this research is illustrated by the fact that:

Under a business as usual scenario, electricity consumption of air conditioners, copiers, induction cookers, monitors, refrigerators, rice cookers, televisions and washing machines will increase from 591 TWh per year in 2012 to 748 TWh per year in 2020 and 821 TWh per year in 2030 (a 39% increase electricity consumption over the period). (Li, Zeng, Bo, & Tan, 2013)

Air pollution has remained a concern in a number of Chinese cities for multiple years (Guo, 2016). There are several causes of air pollution in China. Although poor air quality is an indirect cost of unchecked economic growth, there is a general sense among officials, citizens, and government that air quality improvement and pollution reduction need to occur. Complaints about the air quality have risen. In 2013, a Chinese researcher said the effect “is to blot out the sun as effectively as a nuclear winter” and a senior editor at *People’s Daily* wrote on his blog in January 2013, “I especially want to know if the party secretary or the mayor is in Beijing these days. If so, how do they guarantee they can breathe safely in Beijing?” (Clifford, 2015). Currently, China’s primary energy source is coal. It is expected that petroleum and natural gas will not be significant parts of the energy mix in China in the short or medium term and while clean energy has been promised, it is not seen as a short term solution. The challenge China has in securing clean energy in sufficient quantity is one of the leading causes of air pollution in China (Zhang, 2005). Air pollution in China has become a serious health problem. Physicists at the University of California, Berkeley have calculated approximately 1.6 million people in China die each year from heart, lung, and stroke problems attributable to air pollution (Rohde & Muller, 2015).

Air pollution is bad. It is however a typical cost of early stage economic development and generally abates only after nations move up the technological ladder in their trade with other nations. It is a side-effect of rapid, unchecked, and unregulated industrialization and requires policy action to solve. To put the issue in context, it should be remembered that China since 1978 is an economic success story. In 1981, three out of four people in Asia lived in extreme poverty (less than \$1.25 a day). By 2008, one out of seven lived in extreme poverty and from 1981 to 2008, China moved 600 million out of the ranks of the extremely poor. China’s economy is 30 times larger than in 1978. While there is no doubt that air pollution is a problem, the problem needs to be kept in context (Clifford, 2015).

Placing the Problem Into Context

One way to look at how well China is doing combating the problem of pollution and improving the status quo is to look at the ratio of total energy usage to GDP (Gross Domestic Product). This is defined as the ratio of

¹ “Energy Star” refers to the US Energy Guide Label. The Energy Star program was established by EPA (Environmental Protection Agency) in 1992, under the authority of the Clean Air Act Section 103 (g). Section 103 (g) of the Clean Air Act directs the Administrator to “conduct a basic engineering research and technology program to develop, evaluate, and demonstrate non-regulatory strategies and technologies for reducing air pollution”. In 2005, Congress enacted the Energy Policy Act. Section 131 of the Act amends Section 324 (42 USC 6294) of the Energy Policy and Conservation Act, and “established at the Department of Energy and the EPA a voluntary program to identify and promote energy-efficient products and buildings in order to reduce energy consumption, improve energy security, and reduce pollution through voluntary labeling of or other forms of communication about products and buildings that meet the highest energy efficiency standards”. Retrieved from <https://www.energystar.gov/about> (Energy Star Program, 2016).

energy use by economic activity to value added. The 2006-2010 five-year plan in China had a target of a 20% reduction in energy consumed per unit of economic activity and the actual reduction was 19% which seems good and within the parameters of the plan. However, the economy in China expanded 70% during the 2006-2010 period so total energy used increased dramatically and as Clifford noted, China's energy use is very inefficient, using about 3.5 times as much per unit of output as the United States does (Clifford, 2015).

An additional problem China faces in terms of pollution is the energy mix China currently uses. Approximately 2/3 of energy is generated from coal. Cleaner technologies such as natural gas, solar, and wind make up relatively small amounts of the total energy used. While it may be ideal to use less coal, China has limited reserves of natural gas and oil while having 11% of the world's known coal reserves. While it may be ideal to use less coal, this is not a practical solution in the short or medium term. China uses a lot of coal compared with the rest of the world (66% versus 21%). The world uses more natural gas than China (under 3% of China's energy use, 27% of world consumption). Thus China is overwhelmingly dependent on coal for primary energy generation while the rest of the world is predominantly dependent on oil and gas. Relatively "clean" technologies (natural gas, nuclear, and hydropower) make up 40% of world consumption but only 9% of Chinese consumption (Clifford, 2015).

So, while it might be possible to shift to cleaner burning fuels in the future, such a solution does not offer much help in the short or medium term. China's natural gas reserves represent less than 3% of their annual energy needs. The nation has 4,500 kilometers of natural gas pipeline (compared with 360,000 kilometers in the United States). Switching to natural gas would involve a massive expenditure for new infrastructure and entail large and ongoing costs to import the fuel. Wind holds promise but so far it represents about 5% of China's energy needs in principle and over 40% of wind capacity is wasted so the effective rate of wind power is less than 3% of China's energy needs (Clifford, 2015).

Energy Efficient Labeling for Household Appliances

With approximately 2/3 of China's energy coming from coal, short term solutions tend to revolve around burning coal more efficiently and using less energy. The authors' focus is on the second point: using less energy. One way to decrease energy usage is for consumers to switch to more energy efficient appliances. Energy efficient appliances can help reduce pollution (lower energy usage), save consumers money (lower energy bills), and help China's economy (increased consumer spending). Not surprisingly, the Chinese government has recognized the potential of encouraging consumers to adopt energy efficient appliances. During the Eleventh Five-Year Plan, the central government set aside 160 billion RMB to promote energy efficient appliances and vehicles. Preliminary estimating that put the annual potential energy savings at 22.5 billion kw/h, and the annual oil savings at 300,000 tons. The government also hoped to reduce carbon dioxide emissions by 1,400 tons (National Development and Reform Commission, n.d.).

The challenge has been that the promise has not been matched by the performance. While Chinese policymakers have come to recognize the potential of energy efficient appliances that they have not been adopted as widely as initially hoped. The limited consumer interest is not from a lack of government initiatives. Education and incentive campaigns have included the "Comprehensive Working Plan of Energy Conservation and Carbon Reduction in the 12th Five-Year Plan" and a series of incentive programs, such as the "Appliances to the Rural Areas Program" in 2008, the "Promoting Energy-Efficiency Appliances for the Benefit of People Program, and Appliances Trade-in Program". In 2012, The State Council expanded the "Promoting

Energy-Efficiency Appliances for the Benefit of People Program” by committing 26.5 billion RMB (\$4.26 billion USD) to the newest phase of this program. This subsidy program was popular but there is limited evidence that it had the intended effect on individual’s behavior (Zeng, Yu, & Li, 2014).

It is possible that part of the problem is that consumers do not behave as predicted. Generally, it is assumed by advocates of energy efficient appliances that consumers will consider the total price of ownership and not just the price to purchase when making decisions that which appliance represents a better value for the money. It is true that there is some evidence that some consumers may perform a cost-benefit analysis and consider aspects such as energy price (Young, 2008). There is however limited evidence that consumers always conduct a cost-benefit analysis when making these decisions. In part, the problem is that consumers generally have limited awareness of impact energy efficiency has on the total purchase price and they often do not know how much they pay for energy (Yamamoto, Suzuki, Fuwa, & Sato, 2008). Additionally, some research suggests that some of the consumers who say they would be willing to pay a higher price for energy efficient appliances do not always do so in practice, placing more value on other factors such as brand recognition, purchase price, and perceived quality (Solomon & Banerjee, 2003).

In China, an additional barrier a Chinese consumer can face is trust. There is evidence to suggest that at least some manufacturers are reporting appliance energy-efficient values which are different (both higher and lower) than actual performance (Li et al., 2013). China has attempted to improve consumer trust by adopting an energy efficiency labeling scheme for major appliances in 2005—the “Mandatory Energy Information Label” (Zhou, 2008). The label China adopted was loosely based on the label in use in the Europe in 2005. The label China adopted grouped appliances into five categories for major appliances and into three categories for small appliances based on how energy efficient the appliance was (Zhou, 2008). Category one is the most energy efficient and category five (or three in the case of small appliances) is the least energy efficient. Currently the China Energy Label covers 29 categories of products including most major household appliances (Li et al., 2013).

Label Limitation

Labels cannot solve all problems. A study of Chinese residential consumers found that 56% did not choose an energy efficient appliance because of the price to purchase, 39% had doubts of whether energy efficient appliances would perform as well as non-energy efficient appliance believing energy efficiency was achieved by sacrificing other functions. Twenty-six percent of consumers had no interest in the government subsidy of energy efficient appliances since they believed the process to claim the subsidy was too complicated. While more than half of the consumers surveyed had heard of the subsidy program and were aware of energy efficient labeling on appliances, most lacked a meaningful understanding of either (Zeng et al., 2014).

China’s energy efficient label is not as developed or widely accepted as useful compared with its European or American counterpart. The authors contend that a major limitation of the label is the design. While the design benefits from simplicity (three or five tiers with one being best), it lacks enough information to make an informed decision. While it is true that appliances that receive a tier one energy efficient ranking are more energy efficient than those that receive a tier two ranking, it is not possible to determine how much more efficient they are or the difference in energy usage or average energy savings. Comparisons are made particularly hard because in many categories, virtually all products are ranked in the same tier. A recent report on the subject recommended a series of changes to the labeling scheme, including revising the current strategy

for developing energy efficient tiers, reorienting the focus of future subsidy programs to encourage the purchase of more energy efficient appliances, making efficiency requirements technology neutral, researching consumer usage patterns, revising labels to include actual energy usage, and requiring energy labels to reflect typical energy performance (Li et al., 2013).

Poor labeling is a possible reason that can explain the lower than anticipated adoption of energy efficient appliances in China. Consumers cannot make meaningful distinctions between the actual energy usage of different appliances which may cause them to ignore the labels altogether. In some cases, consumers choose the middle tier products because they view them as a reasonable compromise between price and performance. However, in many cases, there are no products that rank in the bottom tier so what seems like a compromise is in fact the worst performing product (from an energy usage standpoint) on the market (Li et al., 2013).

There is precedent to consider the importance of labeling. In the United States, the FTC (Federal Trade Commission) introduced a new energy label in 1994 (Energy Star), which was intended to be more user friendly than the previous label. In the new format, the primary information in the center of the label is units of energy consumed per year. Information on how the appliance compares with other similar appliances is also provided. Estimated annual operating costs are provided in many cases, but appear in smaller font at the bottom and are accompanied by the energy price used in its calculation, thus avoiding the problem of cost fluctuations (Solomon & Banerjee, 2003). The label has proven effective and has been adopted in other countries. While there have been multiple studies examining potential reasons for the lower than expected adoption of energy efficient appliances in China, this is the first to examine whether different labeling changes consumer behavior.

Research Method

Determining consumer attitudes toward energy efficient appliances and label preference was done by survey. A 15 questions survey was developed and translated into Mandarin. Seven of the questions had more than one part. A total of 462 surveys were administered during the summer of 2015 (June-August) in the cities of Beijing, Fangchenggang, Jinchang, and Lanzhou. The cities were chosen to provide diversity in terms of geography (north/south and east/west) and different types of cities. Beijing is a first-tier city, Fangchenggang and Jinchang are prefecture level cities, and Lanzhou is a second-tier capital city (Gansu Province). The median age of consumers surveyed was 30, median household income was 80,000 RMB annually, 83.6% of respondents were financially responsible for paying the utility bills, and 83.1% of respondents were involved in the decision to purchase new appliances for their home. The pool did however have a gender bias with 62.8% of the respondents being male.

The first part of the survey asked three demographic questions (gender, age, and income) and two questions to determine the degree respondent is likely to have knowledge relevant to the questions (are you currently financially responsible for the utility bill at your home and are you involved in the decision to purchase new appliances for your home).

The second part of the survey focused on views toward energy efficient appliances and factors that influenced consumer sentiment toward them. The respondents were asked the conditions under which they purchased new appliances and whether they had energy efficient appliances in their home. Respondents were asked to rate the importance of the following factors in their purchase decision: after-sales service, appearance, brand, energy efficiency, features, price to purchase, and recommendations of friends and family. Respondents were asked the effect on their purchase decisions of the following: celebrity endorsements; government

promotion; lower operating costs; recommendations of friends/family; and energy/environmental savings. The effect of low interest loans was examined and whether respondents believed various claims of the benefits of energy efficient appliances. Various rationales for purchasing energy efficient appliances were tested to see which were viewed compelling.

The third part of the survey tested the effect of better labeling. A mockup of the Energy Star label (used in the United States) and the EU (European Union) Energy Label were put on the survey (in color, translated to Mandarin) and respondents were asked a series of questions about the labels. The Chinese label does not have information on total operating cost, how the appliance being rated compares with other appliances, total energy cost, or reliability. Respondents were asked which label did a better job in each of these categories. The survey asked which label had a better format for being easily understood and which was more visually appealing. Finally, respondents were asked if appliances sold in China were required to display the information on the above labels, would that make them more likely to consider energy usage when they purchased appliances in the future.

Results

A previous paper on this topic found “low adoption of energy efficient appliances has more to do with a lack of information on the benefits of these devices coupled with a label that does not provide all information needed for consumers to make a sound decision as to which appliance will give them the lowest cost of ownership” (Huber et al., 2014). The results of this study support this conclusion and provide evidence on how best to solve this problem.

What Matters to Chinese Consumers When Purchasing Appliances

The survey asked a series of questions to help determine this. Consumers were asked under what conditions they routinely purchase new appliances. Thirty-nine point eight percent do so only after saving enough money to pay for it, 17.3% buy new appliances on sale (even if they do not have enough money saved), and 42.9% buy new appliances whenever they feel the need for them (even if they do not have enough money saved). The results show that over 80% of consumers surveyed are willing to contemplate making purchasing decisions without having the funds in the bank. A question asked later in the survey “would a low interest loan make purchasing an energy efficient appliance more attractive?” was answered “yes” by 65.4% of respondents. Price does matter but credit does as well. The Chinese government has offered rebates on energy efficient appliances in the past with somewhat mixed results. These results suggest that low interest loans (in place of rebates) might yield better results. Rebates are most useful for those paying with cash. Those buying on credit tend to benefit more from access to credit than a rebate after purchase.

Consumers were asked to identify how important seven different characteristics of an appliance were to them in deciding to purchase an appliance: price to purchase, appearance, energy efficiency, recommendation of friend/family, features, brand, and after-sales service. Respondents could identify each as “very important”, “somewhat important” or “unimportant”. Table 1 gives the percentages for “very important”.

A very similar question was asked on the survey given to consumers in a previous study. The two sets of questions are not directly comparable because of differences in the wording of several options and the category choices. Category differences were “price to purchase” was “price”, “features” was “functions and features”, and “energy efficiency” was “total cost of ownership”. In the previous survey, respondents were asked to rate

things as “essential”, “very important”, “somewhat important”, or “unimportant”. This led to very large percentages of respondents who choose either “essential” or “very important”. However, the results here are generally consistent. The recommendation of friends or family ranked lower than any other item (39.6% for this survey and 37.3% who saw it as “essential” or “very important” on the previous survey). Functions were ranked first in both surveys, and most of the other items received similar rankings. The only outlier was price to purchase. In the first survey, it ranked second with 88.4% ranking it as either “essential” or “very important” and it ranked lower in this survey. The reason appears to be related to the income and age difference of the two samples. This sample had a higher median age and higher income than the previous sample so price tended to be ranked somewhat lower.

Table 1

Features Consumers Identify as “Very Important” to a Purchase Decision

Price to purchase	55.9%
Appearance	50.2%
Energy efficiency	64.2%
Recommendation of friend/family	39.6%
Features	91.0%
Brand	53.7%
After-sales service	82.7%

The different aspects can be best thought of as following into one of three tiers. Tier one is features and after-sales service. These two elements can be thought of as essential for virtually all consumers and must be always given attention. Regardless of how energy efficient an appliance is, lacking either of these will mean most consumers will not choose to purchase it. Tier two is brand and appearance and is very important to approximately half of consumers. Tier three is recommendation of friends or family and is very important to less than half of consumers. The results of the previous survey show that the importance of price varies with the income and age of the consumer. Younger and poorer consumers are more sensitive to price than older and wealthier consumers. In and of itself, this information is quite valuable when constructing a plan to increase the adoption of energy efficient appliances because it demonstrates items that appliances must have in order to be considered for adoption by consumers.

These results are supported by the answers received on the next set of questions asked. Respondents were asked what effect different actions would have on their decision to purchase a new appliance. Respondents were asked to consider five possibilities: a celebrity endorses this appliance; the government promotes this appliance; this appliance has demonstrated lower operating costs; friends or family members recommend this appliance; and this appliance is demonstrated to save energy and the environment. Three options were provided. Respondents could indicate that the action would make them: more likely to purchase an energy efficient appliance; have no effect on their decision to purchase an energy efficient appliance; or make them less likely to purchase an energy efficient appliance. Very few people felt any of the actions would make them less likely to purchase². Table 2 shows the percentage of respondents who are positively affected by each action.

Government and celebrity endorsements do not appear to have a large impact on the decision to purchase. However, lower operating costs and energy savings do matter to a large majority. This matters for several

² The range of “less likely to purchase” went from 0.9% for “lower operating costs” to 8.2% for “government endorsement”.

reasons. First, it suggests that the lower rates of adoption of energy efficient appliances are not due to a lack of interest in the benefits they provide. Second, it supports the conclusion that at least part of the problem is the poor labeling of these products. Finally, it offers a possible explanation as to why past promotions to encourage consumer adoption of energy efficient appliances have not been as successful as might have been hoped. The results show some support for considering better labeling as a potential partial solution to the adoption dilemma. This is further supported by the fact that 82.6% of respondents reported having energy efficient appliances in their homes (5.0% did not have them and 12.4% did not know) and that only 20.2% of respondents reported that they did not consider total operating costs when purchasing an appliance.

Table 2

Percentage “More Likely to Purchase” if the Following Occurs

A celebrity endorses this appliance	32.4%
The government promotes this appliance	38.2%
Appliance has demonstrated lower operating costs	81.7%
Friends or family members recommend this appliance	61.4%
Appliance is demonstrated to save energy and the environment	70.1%

What Chinese Consumers Believe About Energy Efficient Appliances

The survey asked two questions to determine consumer sentiment on the major claims made by advocates of energy efficient appliances. Generally, energy efficient appliances are thought to save money (in the form of lower energy costs), help the environment (in the form of reduced energy consumption resulting in reduced emissions), and help reduce dependence on foreign sources of energy (for nations that are net energy importers). Respondents were first asked to rate statements on these three propositions as either “definitely true”, “possibly true”, or “not true”. Less than 4% of respondents rated any of the statements “not true”³.

Respondents were then asked which of these statements they viewed as a good reason to consider purchasing an energy efficient appliance and given the options of “very good reason”, “somewhat good reason”, and “not a good reason”. For two of the three statements, less than 5% viewed the rationale as “not a good reason” for purchasing an energy efficient appliance⁴. The exception was reducing the need for foreign oil. Despite only 3.8% viewing the statement as untrue, 16.8% did not view it as a good reason to consider purchasing an energy efficient appliance. Table 3 shows the percentage who view the statement as definitely true and Table 4 shows the percentage who view the statement as a very good reason to consider purchasing an energy efficient appliance.

Saving money is the primary benefit consumers see from energy efficient appliances. This makes the importance of the label all the more evident. If consumers are primarily motivated by a desire to reduce energy usage (either to save the environment or to reduce the need for foreign energy), it is less important to know how much you will save and more important to know which will use the least energy. The current energy label in China does provide information on whether the appliance is tier one, two, or three but no information on how much you will (or will not) save by purchasing an appliance with a better energy rating. Given the importance of this information, the lack of it helps explain the lower than hoped adoption of energy efficient appliances. This finding mirrors our previous study. “Most consumers care about the cost of ownership of appliances and

³ Percentage who answered “not true” for saving money (0.9%), help the environment (2.3%), reduce need for foreign oil (3.8%).

⁴ Percentage who answered “not a good reason” for saving money (2.5%), help the environment (4.7%).

desire information. A campaign to educate consumers seems more likely to succeed if it focuses less on patriotic appeals and more on saving money and the environment” (Huber et al., 2014).

Table 3

Percentage Who View the Statement as “Definitely True”

Energy efficient appliances can save me money	70.1%
Energy efficient appliances can help the environment	46.0%
Energy efficient appliances can help China by reducing our need for foreign energy	52.5%

Table 4

Percentage Who View the Statement as a “Very Good Reason” to Consider Purchasing an Energy Efficient Appliance

Energy efficient appliances can save me money	81.2%
Energy efficient appliances can help the environment	42.0%
Energy efficient appliances can help China by reducing our need for foreign energy	40.4%

Which Label Should China Adopt

The authors’ previous study compared the China Energy Label with the Energy Star label. At that time, they were attempting to establish what motivated consumers, whether the label in use provided the information needed, and whether consumers wanted information on total operating cost, how the appliance compared with other similar appliances, total energy cost, and reliability. Their results indicated that there was a demand for this information and providing it would be of value. However, the authors noted that:

The major limit of this study is in the Energy Star label itself. While it is clear that the China Energy Label does not include all necessary information and the Energy Star label is an improvement, it remains to be seen whether adopting the Energy Star label is a superior strategy to modify the China Energy Label to include the information available on the Energy Star label. A good argument can be made for both approaches. The Energy Star label has been successfully adopted by multiple countries (including several Asian nations and economies). However, the China Energy Label has been used for a number of years in China and consumers are familiar with it. The results point to the need to either modify the existing label or adopt a different one that contains all the needed information. The immediate extension of this paper should concentrate on determining whether modifying the existing label, adopting the Energy Star label, or creating a new one would be most likely to increase the number of people willing to adopt energy efficient appliances.

In this study, the authors have verified the earlier results and are able to extend their analysis to tackle this question. Respondents were shown mockups of the Energy Star label and the current EU Energy Label (translated into Mandarin) in full color side by side. Directly below, there was a series of questions. Respondents were first asked which label does a better job providing information on total operating cost, how it compares with other appliances, total energy cost, and reliability (see Table 5). Respondents were then asked which label is easier to understand and which is more visually appealing (see Table 6). Finally, they were asked if appliances in China were required to display the information on the above labels, would this make you more likely to consider energy usage when you purchase appliances⁵.

The current China Energy Label was modeled on the EU Energy Label (in 2005) and looks more similar to the current EU Energy Label than it does to the Energy Star label. This is true for both format and color. The authors anticipated that consumers would favor the EU Label for this reason. It was surprising to find this was not always the case. In two of the four categories (total operating costs and total energy costs) consumers

⁵ The wording of this question is appropriate given both labels provided the same information and differed only in format.

avored the Energy Star label—and in the case of total operating cost—by a wide margin. There was only one category (how it compares with other appliances) where a majority (50.3%) favored the EU Energy Label over the Energy Star label. Given the importance consumers place on saving money and energy as factors that influence their decision on whether to purchase energy efficient appliances, the Energy Star label is the superior (albeit non-consensus) choice. Table 6 provides additional support for this conclusion.

Table 5

Which Label Does a Better Job Giving Information on the Following

	Energy Star	EU Label	Both are equal
Total operating cost	72.5%	21.4%	6.1%
How it compares with other appliances	42.6%	50.3%	7.0%
Total energy cost	49.9%	41.1%	9.0%
Reliability	39.7%	45.1%	15.1%

Table 6

Which Label Does a Better Job at Providing the Following

	Energy Star	EU Label	Both are equal
Easier format for important information to be understood	55.6%	28.5%	15.9%
More visually appealing	33.1%	47.2%	19.7%

The EU Label is viewed as more visually appealing (likely from its similarity to the current label) but is not seen as the easier format for important information to be understood. Again, given the importance of saving money and energy on consumer decisions of which appliance to purchase, it seems clear that the Energy Star label is the best choice for better labeling to improve the adoption rates of energy efficient appliances. The importance of making this change is highlighted by the answer to the final question on the survey. Respondents were asked the following: “If appliances sold in China were required to display the information you see on the above labels, would this make you more likely to consider energy usage when you purchase appliances?”, 89.7% of respondents answered “yes”.

Conclusions

The results mirror the findings of the authors’ previous work and provide the needed evidence to support adoption of the Energy Star label. Government programs that extend credit for energy efficient appliances are likely to have more success than those that offer rebates given spending patterns of Chinese consumers. Consumers are unwilling to sacrifice needed features or strong after-sales service for the sake of energy efficiency and although appearance and brand matter, recommendations of family and friends do not. Price is a factor but it tends to be less important as age and wealth increase. Consumers are most influenced to purchase energy efficient appliances if they can be shown they will have lower operating costs and demonstrated energy savings over a rival appliance. Unfortunately, the current China Energy Label does not provide enough of this information. They are less impacted by endorsements to purchase these products coming from either celebrity or government officials. This suggests that providing information to consumers is more effective than large-scale programs to encourage adoption. Consumers are already primed to purchase energy efficient appliances. They merely need to be given the proper information in the form of updated labels.

Consumers are more motivated to purchase energy efficient appliances if they feel it will save them money than by appealing to save the environment or reducing the need for foreign sources of energy. They believe the first statement more and are more motivated by it. Given that updated labels would be the easiest method of providing the information on how much money can be saved, it makes sense to focus efforts on better labeling. While each label seems to be considered better for different reasons, the Energy Star label is the clear favorite in terms of presenting information on total operating cost. It is also seen as the label that presents information in a way that can be most easily understood. Given Chinese consumers are most motivated to purchase energy efficient appliances if they can be shown to save money, the Energy Star label is the better choice. Finally, the authors would note that given almost 90% would be more likely to consider energy efficient appliances if this information was available and the benefits of higher adoption rates of these appliances which exist for consumers, the environment, and the broader Chinese economy were clear, making the change appear to be in the interest of all.

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