THE GENDER DIMENSION OF SUSTAINABLE CONSUMPTION AND PRODUCTION

A MICROSURVEY-BASED ANALYSIS OF GENDER
DIFFERENCES IN AWARENESS, ATTITUDES, AND
BEHAVIORS IN THE PEOPLE'S REPUBLIC OF CHINA

Li Fan and Veronica Mendizabal Joffre

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The Gender Dimension of Sustainable Consumption and Production: A Microsurvey-Based Analysis of Gender Differences in Awareness, Attitudes, and Behaviors in the People's Republic of China

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ABBREVIATIONS

ADB	Asian Development Bank
CGSS	Chinese General Social Survey
CFPS	Chinese Family Panel Study
GDP	gross domestic product
SDGs	Sustainable Development Goals
SCP	sustainable consumption and production
NBS	National Bureau of Statistics of the People's Republic of China
PRC	People's Republic of China
OLS	ordinary least squares

ABSTRACT

The concept of sustainable consumption and production (SCP) refers to doing more with less and decoupling economic growth from environmental degradation. The link between gender equality and SCP has not been thoroughly explored. Based on microsurveys in the People's Republic of China, this study explores the differences in awareness, attitudes, and behaviors toward SCP issues among men and women. Data suggests that women hold high social preference and action toward environmental protection, while at the same time, regardless of age and education, women appear constrained in their preference due to persistent gender gaps in financial capacity, time poverty, and political representation. This paper suggests that integrating gender analysis into the design of SCP policies, addressing remaining gender gaps, and strengthening women's participation in natural resource management and decision-making can have a positive effect and support the shift toward SCP.

I. INTRODUCTION

The past 40 years saw the great economic revival of the People's Republic of China (PRC). After a long period of extensive growth, but with high pollution and resource extraction, the PRC is now undergoing a phase of transformation focusing on environment-friendly and sustainable development. Building an “ecological civilization” has been reiterated in the 17th, 18th, and 19th National Congress of the PRC's Communist Party. Minimizing energy consumption and pollution emission are continuously endorsed in the National Council's yearly report. As a stand-alone goal in the United Nations (UN) 2030 Sustainable Development Goals (SDGs), sustainable consumption and production (SCP) plays a key role in promoting policy design that aims to influence individual awareness, attitudes, and behaviors toward a sustainable lifestyle.

Sustainable Development Goal 12 (SDG 12) describes SCP as promoting increased human well-being, while decoupling economic growth from resource use and environmental degradation. Based on microsurveys conducted in the PRC over the past 2 decades, individual preference among men and women toward various SCP topics in household consumption, environment protection, industrial pollution, and human–nature relationship was investigated. Data suggest that women, in general, appear to have higher social preference for SCP; stronger action; and on average, more pro-environment behaviors in the fields they are familiar with. However, women—regardless of education, rural–urban setting, or age—also appear constrained toward further action and are impacted by time poverty; low political participation; limited awareness; gender norms; and, for younger and older women, financial limitations.

The rest of the paper is organized as follows: section II looks at SCP and remaining gender gaps in the PRC, section III focuses on data, section IV focuses on individual consumption, section V focuses on production and social awareness, section VI summarizes findings while citing three conflict areas that affect women's action and impact on SCP, and section VII provides recommendations. Section VIII concludes.

II. SUSTAINABLE CONSUMPTION AND PRODUCTION AND GENDER GAPS IN THE PEOPLE'S REPUBLIC OF CHINA

As a stand-alone goal in the 2030 SDGs, SCP seeks to satisfy the basic needs of the current generation, minimize harmful impact on nature, and guarantee the needs of future generations. Global extraction of natural resources reached 92.1 billion tons in 2017, a 254% increase from the 1970 level, and is expected to rise to 190 billion tons in 2060, in the absence of coordinated political action (UN, 2019). With the planet's limited resources, it is now both necessary and urgent to design and implement SCP policies globally.

SCP has gained growing attention in the PRC, whose economy has been booming for over 4 decades, with the gross domestic product (GDP) per capita skyrocketing since 1978. However, growth has been highly reliant on natural resources, with increased pollutant emission at both the household and industry levels. The Government of the PRC has been implementing SCP policies since the late 1970s (Wang and Zheng, 2018). The transformation has been effective from a macro perspective. Figure 1 illustrates that the total energy consumption and production per capita has been stabilizing in recent years, and the energy structure is changing from being coal-dominated to include a growing share of renewable sources (renewables). Figure 2 shows the downward trend in total air and water pollution recorded after 2015.

Total investment in pollution control jumps almost tenfold from 2000, with the annual growth rate even higher than GDP growth. Strong intervention is also seen in the urban domestic waste clearance ratio, which rises continuously and is now close to 100%.

Figure 1: Consumption and Production of Energy Per Capita, 2000–2016

kg = kilogram, KWh = kilowatt-hour.

Source: National Bureau of Statistics (People's Republic of China).

At the micro level, SCP policies are increasingly moving toward directly affecting the lifestyle of individual residents, which is more complex and difficult to observe and regulate than industrial firms and government agencies. In 2019, the Ministry of Housing and Urban–Rural Development launched compulsory garbage classification in 46 major cities across the PRC (China Daily, 2019). The policy soon resulted in a high number of complaints on social media, especially in Shanghai where people complained about the long waiting time for garbage disposal, as the city generates huge amounts of residual waste (19,300 tons) and kitchen waste (5,050 tons) every day (South China Morning post [SCMP], 2019a). Wildlife trade provides another example. After the 2003 severe acute respiratory syndrome (SARS) pandemic, which originated from the consumption of undomesticated civet cat (Xu et al., 2004; Wenhui et al., 2006; Shi and Hu, 2007), the PRC government banned wildlife trade across the country (Reuters, 2007). Nonetheless, a survey conducted by the United States Agency for International Development (USAID) in 2018 in six major cities in the PRC revealed persistent demand from wildlife consumers. The report shows that 68% of respondents who purchased pangolin in the past 12 months say they will continue to buy in the future (USAID, 2018). The high demand has killed more than a million pangolins since 2004 and deteriorated the ecological balance in their habitat (SCMP, 2019b). Environment-unfriendly individual lifestyles gradually become a major obstacle toward further reform.

Figure 2: Pollution and Pollution Control

kg = kilogram, NOx = nitrogen oxide, SO2 = sulfur dioxide.

Source: National Bureau of Statistics (People's Republic of China).

Clearly, in-depth engagement at the individual level is required to sustain SCP in the PRC. Effective policy needs to involve citizens and pay special attention to the segments and cohorts that could help in the implementation of SCP actions. In this case, women, especially those belonging to younger generations, become a key social group. Experiment-based studies find that women, on average, tend to be more socially aware and altruistic (Marianne, 2011; Funk and Gathmann, 2015; Alesina and Giuliano, 2011). The younger generation usually shows increasing concern toward the environment (Wray-Lake et al., 2010), which make them likely to support and adopt an eco-conscious lifestyle. It would then be good to find out whether women's preference could transform into better overall awareness, attitudes, and behaviors toward SCP.

In this case, gender inequality cannot be ignored for it may cause omitted variable bias. Due to the pervasive gender gap across time, region, birth cohorts, and major dimensions of socioeconomic life, the observed differences between men and women may come from gender gaps in wage and social status, instead of their preference toward SCP. Women with higher social preference for SCP may not exhibit higher social awareness due to inadequate financial and political resources. In the PRC, the gender wage gap is as high as 39% in favor of men and only 6.5% of ministerial positions are taken by women (World Economic Forum, 2020). While the PRC has made impressive progress toward gender equality in the past decades, it has also slipped in the ranks of the Gender Gap Index compared with other countries. The PRC ranked 63rd out of 115 countries in 2006, and in 2020 slipped to 106th out of 153 countries, with major gender gaps in economic participation and political empowerment (World Economic Forum, 2006 and 2020).

To rule out bias, gender gaps in terms of economic and social status need to be understood. Traditional research interprets the gender gap in terms of human capital—differences in wages (gender wage gap), occupation, and economic well-being are then linked to differences in human capital (Altonji and Blank, 1999). However, as women quickly catch up with men in terms of educational attainment, especially in the PRC where women, on average, perform better than men in tertiary education, the human capital approach cannot sufficiently explain why women still earn significantly less than men.

Another way to explain the remaining gap is through gender role and social discrimination (Altonji and Blank, 1999). Despite strong gender equality policies in the past decades, gender roles continue to influence individual identities and behavioral patterns. To explore this further, Figure 3 plots some specific questions from the Chinese General Social Survey (2010 and 2015) concerning gender roles in the PRC, with a focus on individual ability, career, employment rights, and family. Data indicate that attitudes are stable over time and relatively old cohorts born before 1970s are less supportive of career-oriented women.

The impact of social norms on gender roles can also be seen through gender-specific attitudes in political participation, which is the major source of gender inequality in the PRC according to the World Economic Forum Gender Gap Index (World Economic Forum, 2006 and 2020). Figure 4 plots four questions concerning people's perception regarding the complexity of public affairs, their own capability of political participation, ability to work as a government official, and self-perception on influence in

Figure 3: Perception of Gender Roles, 2010 and 2015

Note: First row of x axis is birth cohort, second row is observation year. Y axis = 0 is “totally disagree,” while 1 is “totally agree.”

Source: Chinese General Social Survey, 2010 and 2015.

public policy. A gap exists for all birth cohorts in that women appear less confident in public and political affairs. However, the younger generation tends to show a smaller gap than older cohorts.

Another perspective focuses on the difference in psychological perceptions of men and women (Croson and Gneezy, 2009). This approach proposes that gender gaps might stem from differences in risk- and competition-averse attitudes between men and women (Eckel and Grossman, 2008; Niederle and Vesterlund, 2007). Such approaches have also suggested that women may show social awareness and altruistic tendencies (Marianne, 2011), or more pro-redistribution attitudes than men (Funk and Gathmann, 2015; Alesina and Giuliano, 2011). It should be noted that such studies have not been conducted in an Asian context.

Although few policies have been implemented which specifically addresses the role of women's role in SCP, the Asian Development Bank (ADB) Strategy 2030 emphasizes the integration of women into sustainable development through enhanced access to green jobs, climate-smart technologies, and participation in climate-related decision-making (ADB, 2018). ADB is committed to sustainability,

Figure 4: Political Participation

Notes: X-axis is birth cohort. Vertical axis is the measure whether individual agrees with the statement, 0 = agree, 1 = willing, 0.5 = indifferent.

Source: Chinese General Social Survey, 2010.

while gender equality is a corporate operational priority. Finding a connection between the two areas can be a challenge; rigorous studies linking gender and SCP are rare; less so specific to the case of the PRC. Xiao and Hong (2010) found that women in the PRC tend to demonstrate greater participation in environment-friendly behaviors inside the home, but a comprehensive link with SCP is not explicitly stated. Exploring this link is a key contribution of this paper.

Next, an explanation of the data set and the empirical specification is provided before moving on to data analysis. The hypothesis derived from literature review is then tested, that (i) women have higher social preference toward SCP, but (ii) gender gaps in the economic and political spheres can hinder women's action and impact toward SCP.

III. DATA

Data sets linking gender with SCP are rare, especially at the level of individual behaviors. The Chinese General Social Survey (CGSS) conducted by Renmin University of China since 2003 is one of the earliest countrywide comprehensive microsurveys. It is a repeated cross-sectional data set that samples a representative group across the PRC at each projected year. To its merit, CGSS is the only microsurvey that provides detailed (and connected) information about people's attitudes toward gender roles, gender inequality, social and political participation, environment protection, and sustainable growth. Moreover, the 2010 CGSS survey was conducted within the International Social Survey Programme environmental module. Another data set employed is the Chinese Family Panel Studies (CFPS), conducted by the Institute of Social Science Survey of Peking University. Started in 2010, this biyearly panel data set covers a wide range of social, economic, and political issues for individuals and households. The 2005 mini-census from the National Bureau of Statistics of the PRC is also used for supplementary illustration.

Table 1 provides summary statistics for the yearly CGSS and CFPS surveys.

Table 1: Summary Statistics of Data Sets

Chinese General Social Survey						
Survey Year	2003	2006	2010	2012	2013	2015
Sample Size	5,894	10,151	11,783	11,765	11,438	10,968
Share of Women	51.9%	53.9%	51.8%	48.8%	49.7%	53.2%
Average Education Year	10.4	9.1	8.7	8.7	8.8	8.7
Average Age	43.4	42.39	47.8	49	48	50.39
Average Income (yuan)	9,786.8	8,993.6	19,210		23,814	
Chinese Family Panel Studies						
Survey Year	2010	2012	2014	2016		
Sample Size	33,600	35,719	37,147	36,892		
Share of Women	51.5%	50.1%	50%	50.1%		
Average Education Year	6.6	6.7	7.5	7.7		
Average Age	45.5			45.2		
Average Income	10,129			13,768		

Source: Authors.

Gender would be the key variable to distinguish the performance of individuals, with other variables considered, including age, education, income, and urban–rural disparity. These factors are of interest for two reasons. First, technically they may be intersected with gender and cause-omitted variable

bias. Second, they can enrich understanding of the link between gender and SCP, and provide possible methods for policy interventions. Rigorous regression specification is discussed and supplementary regression tables are provided in the Appendix. The most important tables and figures are included in the main text for simplicity, while tables in the Appendix provide supporting evidence.

IV. CONSUMPTION BEHAVIORS

Consumption is the direct demonstration of individual preference. In the PRC, a transformation toward SCP will need to address people's consumption habits, which are relatively stable, hard to change, and hard to regulate. There are four priority consumption areas of interest: food, energy, mobility, and waste disposal. Although the data sets that can link SCP and gender are extremely rare, concrete behaviors were defined in these four priority consumption areas and their related fields, enabling analysis and discussion. Specific topics range from concrete behaviors like *meat consumption*, *fuel use*, *smoking*, *recycling*, *garbage sorting*, *shopping bag reuse*, *environmental donation*, and *choice of transportation* to abstract attitudes such as *consumption attitudes toward environmental protection* and “*consumption sensitivity*.”

A. Meat Consumption

Meat is a basic food for Chinese families. According to the UN Food and Agriculture Organization (FAO) (2016), livestock supply chains contribute to 14.5% of total greenhouse gas emissions, amounting to 7.1 gigatons of carbon dioxide (CO₂) per year. In the PRC, pork is the primary meat consumed and its per capita intake is consistently around 15 kilograms (kg) to 20 kg per year for individual urban residents, and almost doubled for rural residents from 7.3 kg in 1980 to 14.4 kg in 2012, according to data from the National Bureau of Statistics. Figure 5 plots the frequency of meat consumption per week according to gender as well as birth cohorts. Women tend to eat meat less frequently than men in all birth cohorts.

Figure 5: Frequency of Meat Consumption Per Week

Note: Horizontal axis is the birth cohort, e.g., “1930” indicates the cohort born from 1930 to 1939.

Source: Chinese Family Panel Study, 2010.

The gap is statistically robust and economically significant after controlling for education, income, age, and rural–urban disparity (Table B2). If assumed further that women, on average, eat less per meal, which is supported by the difference in suggested calorie intake per day (NHS, 2019), this indicates that women eat meat not only less frequently, but also less in quantity.

B. Cooking Fuel

The type of fuel used for cooking provides another approach to find out whether household consumption contributes to pollutant emission. However, in terms of fuel usage within the family, it is difficult to distinguish between household preference and individual preference. Therefore, we choose a specific group of people, the divorced urban residents, to identify the preference of individual men and women by using the 1% mini-census data at year 2005. Comparatively, they are more likely to live by themselves and thus have more decision-making power on fuel usage. Figure 6 plots the major fuel used for cooking for the urban residents who are divorced. Of these residents, 10% more women use gas, while 10% more men use coal. As gas is considered cleaner than coal, this may indicate that women prefer to use a more environment-friendly type of cooking fuel more than men. This, however, cannot be fully attributed to wage or age (as shown in Table B2), as significant gender gaps exist given various control variables. This pattern is also robust across time and a similar gap exists in the 2000 population census.

Figure 6: Cooking Fuel Use Among Divorced Urban Residents, 2005

Source: 2005 1% mini-census, National Bureau of Statistics.

C. Smoking

Smoking also contributes to indoor pollution. There are more than 250 harmful chemicals, 69 of which are cancer-related due to smoking tobacco (World Health Organization [WHO], 2019). The toxic gas from cigarettes causes second-hand impact on non-smokers, especially inside the home (Center for Disease Control and Prevention, 2018). Figure 7 plots the share of smokers among men and women across time. A downward trend, though quite minor, is recorded over time, and most of the smokers are men. Table B3 implements logit regression to check the robustness of the gender gap, and it is observed that the gender gap is even larger if the impact of income, education, and age is considered.

Figure 7: Smoking

Note: Horizontal axis is the survey year.

Source: Chinese Family Panel Study 2010, 2012, and 2016.

Figure 8: Pro-environment Behaviors, 2003 and 2013

Note: First row of the horizontal axis is birth cohort, e.g., 1930 indicates born from 1930 to 1939. Second row is the survey year.

Source: Chinese General Social Survey, 2003 and 2013.

D. Pro-Environment Behaviors

At the individual level, pro-environment behaviors were selected: garbage sorting, recycling, use of reusable shopping bags, and donation to environment protection. As shown in Figure 8, there is a higher share of people supportive of garbage sorting, recycling, and use of reusable shopping bags (instead of disposable plastic bags). This may indicate that more families are adopting an environment-friendly lifestyle, which applies to both men and women. The younger generation, especially those born after the 1980s, are also more likely to adopt this lifestyle than the older cohorts.

Regression analysis in Table B4 indicates that women in 2013 are 6.1% more likely to sort garbage, 12.8% more likely to use reusable shopping bags, and 7.5% more likely to do recycling than men, after controlling for education, income, and age. However, it is interesting to note that less people donated for environmental protection in 2013 than in 2003. The reason for this is unclear, but it might be due to the lack reliable donation channels and that frustration over controversies involving charitable organizations; however, data is not available to determine the exact reason.

E. Choice of Transportation

Outside of the family, transportation would be a major channel for individual pollution emission. Transport is a main contributor to air pollution, with an estimated 50% of smaller particulate matter emission coming from road transportation in Organisation for Economic Co-operation and Development (OECD) countries (WHO, 2020). Modes of transportation are divided into three categories. “Carbon-free” transportation includes walking, riding a bicycle (or electric bicycle), or riding an animal-driven vehicle. Public transportation includes urban rail transit and bus. “High-carbon” transportation includes riding a motorcycle, private car, and taxi. Figure 9 indicates that a gender gap exists as women tend to

Figure 9: Choice of Transportation

Note: Horizontal axis is the birth cohort, e.g., “1930” indicates the cohort born from 1930 to 1939.

Source: Chinese Family Panel Study (CFPS) 2010.

favor carbon-free and public transportation, significantly more than high-carbon transportation. This gap is pronounced in most of the birth cohorts, which can help rule out the bias due to age and income effect (in table B5, partial impact of gender is robust given income, education, and age). However, income is still an important factor as those born from 1960 to 1979, which represent those who are fully employed and relatively well-off, prefer more carbon-intensive transportation than all other groups. The gender gap is also largest among these cohorts.

F. Attitudes toward Environment Protection

After defining concrete behaviors, abstract attitudes and consumption sensitivity were observed to see whether people are likely to reduce their daily consumption to contribute to environment protection.

Difficulty in changing people's preference is clearly shown in Figure 10. The vertical axis indicates the likelihood for the individual to do the associated behavior for environment protection, where 0 indicates "impossible" and 1 indicates "always." Also, likelihood below 50% implies that the respondent is, on average, unlikely to take the action. It was barely observed for any cohort to exhibit likelihood above 50% for all four types of behaviors, although one positive aspect is that the young generation appears to be more willing to become less dependent on driving/vehicle use and "quit certain consumption goods" (although the questionnaire did not mention the specific kinds of goods). Also, interestingly, there is a gender gap in that women born after 1970 tend to be less willing to reduce their consumption than men.

Figure 10: Willingness to Reduce Consumption for Environment Protection

Note: Horizontal axis is the birth cohort, e.g., "1930" indicates the cohort born from 1930 to 1939. Likelihood = 1 indicates "always," 0 indicates "never," and 0.5 indicates "indifferent."

Source: Chinese General Social Survey, 2010.

G. Consumption Sensitivity

Consumption sensitivity is defined as how likely consumption behaviors will respond to incentives. It can show difficulty in changing people's behavior. Figure 11 plots the responsiveness of consumption behavior to incentives, and the definition of vertical axis is the same as in Figure 9. It can be seen that people are not quite sensitive to policy subsidy, brand, or shopping environment. Price functions as the most effective way to change consumer behavior (all cohorts above 50%), though women born in the 1990s are less sensitive to price than those born in previous decades, and less than men also born in the 1990s. Brand is also important factor for those born after 1980, and there is no significant difference between genders. This may indicate that policy makers can consider brand and price sensitivity when formulating policies that direct people's consumption toward sustainability.

Figure 11: Responsiveness of Consumption Behavior to Incentives

Note: Horizontal axis is the birth cohort, "1930" indicates the cohort born from 1930 to 1939. Likelihood = 1 indicates "always," 0 indicates "never," and 0.5 indicates "indifferent."

Source: Chinese General Social Survey, 2010.

V. PRODUCTION AND AWARENESS OF ENVIRONMENTAL ISSUES

Production can take place in both at the household and at the industry level. It can be described as a process that transforms natural resources and manual labor into outputs and services, and this process is usually closely regulated by industrial policies. Following this definition, this section discusses four parallel topics to show a complete picture of the production side: *housework and time poverty* from home production, *industrial pollution and awareness* from industrial production, people's willingness to bear *policy burden* toward environmental protection industrial policy, and attitudes toward *human–nature relationship*. Data connecting gender with production is even harder to come by than with consumption, thus the discussion here is constrained and may not be able to explore in detail the gender differences in the supply side.

A. Housework and Time Poverty Gap

Figure 12 plots the attitude across time and birth cohort toward equal distribution of housework within the family. It is interesting to observe that more than 60% of respondents support the equal distribution of housework at most cohorts in both the 2012 and 2015 surveys. Women tend to be supportive of equal housework and young women outperform older cohorts. For men, there is no clear trend across age groups. However, comparatively, the actual time allocation remains highly unequal as illustrated in Figure 14. Women spend significantly more time on housework than men in all birth cohorts, for all survey years, and this applies for both weekdays and weekends. In 2016, on average, women performed 1.125 hours more housework than men during weekdays and 1.25 hours more on weekends. The gap is persistent and applies even to the younger generation, which is quite disturbing but consistent with gender role perceptions demonstrated in Figure 3.

Figure 12: Attitudes toward Equal Distribution of Housework

Note: First row of horizontal axis is the birth cohort, e.g., “1930” indicates the cohort born from 1930 to 1939. Second row of horizontal axis is the survey year, Left Hand Side (LHS) for year 2012 and Right Hand Side (RHS) for 2015.

Source: Chinese General Social Survey, 2012 and 2015.

Table 2 shows the ordinary least squares (OLS) regression test to check whether the gender gap can be explained by other variables. Clearly, the gap is lower in magnitude, but still significant in both statistical and economic sense. Interestingly, the opportunity cost of housework, i.e., individual income earned from employment, cannot explain much of the gaps in housework allocation since it is economically negligible for both weekday and weekend cases (variable “income” is measured in CNY1,000).

Table 2: Housework Gap, Ordinary Least Squares Test

Variables	(1) hw_time_wday	(2) hw_time_wday	(3) hw_time_wend	(4) hw_time_wend
Gender	-1.125*** (0.023)	-1.035*** (0.025)	-1.250*** (0.024)	-1.221*** (0.026)
Age		0.019*** (0.001)		0.016*** (0.001)
Education/year		-0.065*** (0.003)		-0.030*** (0.003)
Income		-0.000*** (0.000)		-0.000 (0.000)
Constant	2.440*** (0.017)	2.065*** (0.059)	2.946*** (0.018)	2.478*** (0.062)
R2	0.093	0.169	0.107	0.136
Observations	23,312	19,493	23,320	19,499

Note: Standard errors in parentheses; dummy variable gender = 1 for men and 0 for women.

*** p<0.01, ** p<0.05, * p<0.1

hw_time_wday = housework time for weekday; hw_time_wend = housework time for weekend; R2 = R-squared.

Source: Chinese Family Panel Study (CFPS) 2016.

If combined with previous findings, it can be argued that the division of labor within the family is induced by a combination of internalized gender norms at the individual level, and strong social expectation. Further, looking into the decision-making power within the family, as detailed in Figure 13, there is no big nor systemic gap between men and women, so that the notion that women are forced to do the housework by their husbands can be ruled out, but social norms affect the expectations individuals have toward themselves and others. Given the gap in housework time allocation in Figure 14, women should be afforded careful consideration in terms of increasing their duties to promote sustainable production within the family as they are already on the edge of time poverty compared to men.

Figure 13: Decision-Making Power within the Family

Note: Horizontal axis is the birth cohort. Vertical axis is the measure of decision-making power based on four dimensions: children's education, support for parents, income allocation, and consumption. Higher grade indicates more decision-making power. Maximum grade = 4.

Source: Chinese General Social Survey, 2006.

Figure 14: Time Allocation of Housework

Notes: In across time comparison, x-axis is the survey time; in across cohort comparison, x-axis is the birth cohort.

Source: Across cohort comparison uses the Chinese Family Panel Study (CFPS) 2016 data; across time comparison uses CFPS 2010, 2014, and 2016 data.

B. Awareness of Industrial Pollution

Compared to household production, it is more difficult to link industrial production with gender heterogeneity since the survey of manufacturing firms does not indicate gender and more so, decision-making power. Therefore, the focus is on individual attitude and awareness regarding industrial pollution in order to indirectly show any differences between men and women.

Figure 15 plots the result for respondents' performance in a short test on basic knowledge on industrial pollution. There are 10 questions covering topics, such as whether chemical fertilizer will harm the environment, the relation between acid rain and burning of fossil fuels, and whether CO₂ emissions contribute to global warming. The vertical axis shows how many correct answers each cohort gives on average.

Structurally, men perform better in all birth cohorts and across time. Social awareness improves from 2003 to 2010, the younger generation performs better than older cohorts, and the gender gap shrinks for the younger generation. However, it is worrisome that no cohort can answer correctly more than 50% of all the questions, which implies low general awareness.

Figure 15: Awareness of Industrial Pollution

Notes: First row of x-axis is birth cohort, e.g., “1930” is cohort born from 1930 to 1939. Second row of x-axis is survey year, LHS is for year 2003, RHS is for year 2010. Y-axis represents the number of correct answers for 10 questions on pollution awareness.

Source: Chinese General Social Survey, 2003 and 2010.

To dig deeper into the determinants of awareness toward industrial pollution, regression analysis was conducted and results are shown in Table 3. The dependent variable is the grade as in Figure 15, and the first column includes explanatory variables such as education years (educ), age, gender, and working hours per week (wkhrs). We also add a dummy year “year2010,” which equals to 1 when the observation is taken in 2010 and zero otherwise. Overwhelmingly, the gender gap is robust, subject to different controls as shown in the first row, while the gap shrinks significantly in year 2010 compared to 2003 as indicated by large negative coefficients in the cross-term between gender and dummy year. Among all the controls, education is the most economically significant; with 1 year more of education, the grade increases by 0.184 as shown in column 4. Also, after controlling the impact of education, the influence of age becomes negligible, which may indicate that the younger generations performs better than the older cohorts mainly due to higher education attainment.

Table 3: Awareness of Industrial Pollution, OLS Test

Variables	(1) grade	(2) grade	(3) grade	(4) grade
Gender	0.522*** (0.04)	0.413*** (0.04)	0.435*** (0.05)	0.460*** (0.05)
Age		0.005*** (0.00)	0.0114*** (0.00)	0.0125*** (0.00)
Education		0.161*** (0.01)	0.182*** (0.01)	0.184*** (0.01)
Wkhrs		-0.001 (0.00)		-0.005*** (0.00)
year2010			1.748*** (0.16)	2.016*** (0.30)
year2010×gender			-0.276*** (0.08)	-0.321*** (0.10)
year2010×age			-0.013*** (0.00)	-0.022*** (0.00)
year2010×educ			-0.035*** (0.01)	-0.041*** (0.01)
year2010×wkhrs				0.005** (0.00)
Constant	2.833*** (0.03)	1.022*** (0.12)	0.303** (0.14)	0.418*** (0.14)
R2	0.016	0.107	0.131	0.134
Observations	9,566	7,957	9,559	7,957

Wkhrs = working hours.

Notes: Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Source: Chinese General Social Survey (CGSS) 2003 and 2010.

There is also gender gap in people's perceived seriousness of industrial pollution, as illustrated in Figure 16. Women tend to have lower estimate of seriousness than men, potentially due to a difference in access to information. Compared to their older cohorts, the youngest generation has a higher perception of the seriousness of pollution, which could benefit sustainable production in the future. However, the gender gap becomes less significant or even disappears if we control for education, which greatly increases people's perception (Table B6).

Figure 16: Perceived Seriousness of Industrial Pollution

Note: Horizontal axis is birth cohort. Vertical axis represents seriousness, i.e., 0 = not serious at all, 1 = extremely serious, 0.5 = indifferent.

Source: Chinese General Social Survey, 2010.

C. Willingness to Take Policy Burden for Sustainable Production

Structural transformation into sustainable production is a difficult process. Related policy interventions could be distorting for the current industries and cause higher prices, higher taxes, slow economic growth, and what could be perceived as lower quality of life, especially in the short- to medium-term. Figure 17 plots the willingness of individuals to take on these burdens for the sake of environmental protection. Once again, the 1980 and 1990 cohorts are more willing to take the burden, reflecting high awareness and social preference.

Figure 17: Willingness to Bear the Burden for Pro-environment Industrial Policy

Notes: X-axis is birth cohort. Vertical axis is the willingness to take that burden, i.e., 0 = unwilling, 1 = willing, 0.5 = indifferent.

Source: Chinese General Social Survey (CGSS) 2010.

But here there is a gender gap in that women are less willing than men to bear the burden, except for the 1960 and 1970 cohorts (middle-age women). Regression analyses from Table 4 confirm this finding by including an intersection between gender and a dummy variable “middle_aged” that equals to 1 when the respondent is born in the 1960s or the 1970s. This gap could be due to “income risk” in that younger and older women have less stable incomes than middle-aged women, so that pecuniary incentives, such as higher taxes and price have higher marginal utility for them than age groups, or compared to men. In addition to the gender gap, on average, people are in general not so willing to bear the burden since most of the age groups have a willingness of less than 50%, i.e., the indifference threshold.

Table 4: Willingness to Bear Burden, OLS Test

Variables	(1) price	(2) tax	(3) living quality
Gender	0.035** (0.014)	0.044*** (0.012)	0.028** (0.013)
Gender*middle_aged	-0.032* (0.017)	-0.054*** (0.016)	-0.047*** (0.016)
educyear	0.004*** (0.001)	0.006*** (0.001)	0.005*** (0.001)
Income	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Constant	0.399*** (0.014)	0.422*** (0.013)	0.405*** (0.013)
R2	0.006	0.013	0.008
Observations	2,849	2,811	2,875

Notes: Standard errors in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Chinese General Social Survey (CGSS) 2010.

D. Human–Nature Relationship

Lastly, since production is described as a process wherein humans transform natural resources into products, people’s awareness and attitudes toward the relationship between humans and nature is explored. Here again there is a gender gap when dealing with factual awareness questions in Figure 18. When asked about whether the planet earth has limited resources, whether humans are abusing nature, and whether the balance of nature is fragile, women agree less than men (significantly positive parameters in Table B7). But when dealing with topics more related to environmental care, women show similar or even higher preference than men, especially in the 2010 survey. And although there is a small gap in the 2003 survey on whether wild animals and plants have equal living rights as humans, there is no more systemic difference between men and women in the 2010 survey. Across time comparison also indicates that the awareness of human–nature relationship is quite stable, and that improvement seems to be limited. It is also shown that education year has a high and robust influence on people’s attitudes in human–nature relationship so that improved education attainment can be considered as a major approach for policy intervention.

Figure 18: Awareness and Attitude toward Human–Nature Relationship

Note: First row of horizontal axis is birth cohort. Second row of horizontal axis is the survey year: LHS for year 2003, RHS for year 2010. Vertical axis is whether individual agrees or not, i.e., = totally disagree, 1 = totally agree, 0.5 = indifferent.

Source: Chinese General Social Survey, 2003 and 2010.

VI. THREE CONFLICTS THAT AFFECT WOMEN'S ACTION AND IMPACT IN SUSTAINABLE CONSUMPTION AND PRODUCTION

Data analysis in the previous two sections reveals gaps between men and women toward sustainable consumption and production (SCP). In accordance with the theoretical hypothesis in literature, women do show higher social preference and care for environmental issues, but only in the fields where they are aware and have enough information, such as daily consumption behaviors and household-related issues. When they are constrained by income and awareness, we do not necessarily observe a more pro-environment attitude or behavior. On the contrary, men outperform women in some factual issues that require more awareness and information. On this basis, we have identified three areas that could affect policy making on SCP.

A. Social Preference versus Capability to Act

The first conflict is between women's high social preference and low financial and time capability. In the consumption-side analysis, it was shown that women are more likely to choose and use environment-friendly types of fuel and transportation methods. On the production side, women have equal preference as men toward harmony between human and nature.

In comparison, women, especially young and old age cohorts, are less willing to take pecuniary burden for sustainable production, partly because of their financial disadvantages. Time poverty is also quite severe due to the division of labor within family. These two constraints limit women's capability to take action on SCP issues. To improve the situation, methods that could reduce gender gaps in wage and time allocation, and reshape the underlying norms and institutions, will be the breakthrough points.

B. Action Force versus Awareness

The second conflict is between women's strong "action force" and limited awareness in certain areas of environmental concern. As shown in the consumption-side results, compared with men, on any given day, women demonstrate environment-friendly behaviors such as recycling, sorting of garbage, and using reusable shopping bags. They also eat meat less frequently and smoke less. These all indicate a stronger action force in transforming the concept of sustainability to reality.

However, although quite related to their livelihood, women appear less informed on industrial pollution, in particular on topics like global warming and climate change. This could be due to lower education opportunities for women in older cohorts. It is observed that, with higher number of women enrolled in higher education than men, the gender gap in terms of awareness will narrow for the youngest generation. Low awareness limits women's participation and engagement; thus, to improve their awareness, the natural approach would be to improve education.

C. Potential Benefit versus Political Empowerment

The last conflict deals with political empowerment of women. Women, particularly among poorer segments of society and in rural areas, risk being highly affected by disasters induced by climate change (UN, 2016) and environmental degradation. However, the existing gender gap in representation and decision-making reduces their capacity to shape the political agenda. Nonetheless, as shown in Figure 4,

the gap induced by deep-rooted perceptions and social norms against women in political and leadership positions is becoming less predominant among the younger generations, and this provides optimism in achieving greater levels of women's participation of environment-related policy and dialogue.

VII. AREAS OF ACTION TO REDUCE GENDER GAPS AND POSITIVELY AFFECT SUSTAINABLE CONSUMPTION AND PRODUCTION

Based on data analysis, this paper proposes that high social preference and strong action force toward environmental concerns could encourage and enable the adoption of sustainable choices among women. At the same time, women, in general, are constrained by existing gender roles and social norms that result in unresolved gender gaps in income, responsibility for unpaid household care work, social awareness, and political representation. It has been argued that these gaps limit the capacity of women to act on their preference, and that addressing such gaps could have a positive spillover effect toward sustainable choices. Four areas of action are proposed.

- (i) Include a gender perspective in SCP policy design.** We recommend integrating gender analysis into the existing policy agenda of SCP; specifically, policy makers need to ask whether gender differences in information access and decision-making over resources will contribute to varying impact on men and women. Will the gender gaps hinder the action of a certain social group? And can promoting gender equality facilitate better performance? Data suggests that women, especially the younger generations, could have action force toward environment protection, while an agenda without emphasizing their roles could limit policy effectiveness.
- (ii) A gender analysis in SCP should focus on the imbalances in political and economic participation of women.** To have a say in shaping the environmental agenda requires representation in decision-making; however, a gender gap exists in representation at all levels, from village-level such as in farmers' groups or water user associations, to representation in decision-making on natural resource management at provincial and national levels. Government policies have tried to address this aspect, for example, imposing quotas on the number of women as village chiefs or as representatives in other critical governance bodies—and progress has been made. However, a key aspect going forward will be to focus on strengthening policy implementation and enforcement. It is also important to get a better understanding of the underlying mechanisms that limit women's participation in decision-making on managing natural resources. Better data on women's participation in environment-related decision-making processes is urgently needed to make policies sensitive to women's needs.
- (iii) Gender gaps in economic areas can also result in disincentives toward sustainable consumption in the absence of supportive policy.** In this study, we identified (i) price sensitivity among older and younger generations of women as a factor affecting their action as consumers of green, environment-friendly products, and (ii) imbalances in terms of responsibilities around household care leading to women's time poverty that limit their access to labor markets. The rapid transformation into a migrant-dominated society has deprived families of outside support from relatives and neighbors and increased the burden on women for unpaid care work within the home, while the care economy is not fully developed in the PRC. Strengthening the care system could help to ameliorate the time poverty for women, while providing employment and social participation opportunities. However, care provision is only one aspect that needs to be complemented with a wider change on social expectations for men and women.

- (iv) Continue investing in environmental education and awareness.** Action is based on awareness. This paper identifies a general “threshold of indifference.” This means that despite efforts at education and improvements over time, still a significant share of the population, regardless of gender or age, continues to have low awareness about environmental processes, and the impacts of individual and societal choices and behaviors. This is important and suggests that more efforts are needed to obtain a level of awareness among the population that would result in changes in perception and behavior toward sustainable choices. The specific aspect of consumer information also needs to be considered, including regulation regarding formal certification of products as green, environment-friendly products, and information provision on sourcing can help consumers make informed choices. This indicates that awareness raising is one of the central areas for environmental policy toward SCP.

VIII. CONCLUSION

We have briefly illustrated the gender difference toward SCP in the specific case of the PRC based on the analysis of microsurveys. Identified gender differences in behaviors, attitudes, and awareness point to the importance of integrating a gender dimension in SCP policy design and implementation, and improving women’s participation in decision-making and implementation can help make policies more effective. This requires reducing gender gaps and empowering women with more awareness, capability to act, and political influence.

The third decade of the 21st century started with unprecedented environmental risks, including the ferocious bushfires in Australia, the devastating locust swarm sweeping from Africa to Asia and the Pacific, and the COVID-19 pandemic affecting countries globally. Sustainable development is more a concrete necessity for today than an abstract target for tomorrow. In the PRC, the goal of building an “ecological civilization” urgently needs policy tools to improve people’s behaviors, attitudes, and awareness toward SCP, and facilitating women’s participation can strongly increase the chances of achieving this goal and reestablishing environmental balance.

APPENDIX

A. Data and Specification

Data linking gender with sustainable consumption and production (SCP) is extremely rare not only in the People's Republic of China, but also across the world. A rigorous treatment of this topic would require a representative sample of residents in the PRC, which is the reason why Chinese General Social Survey (CGSS), Chinese Family Panel Study (CFPS), and population census data are employed in this study.

The observed difference between men and women could come from many different channels. Omitted variable bias may distort results. To figure out the main channels and test the robustness of gender gaps, Table 1 includes some control variables to be considered when dealing with the regression analysis. Classical gender research summarized by Altonji and Blank (1999) initiated a human capital approach to explain gender differences, and here we follow the tradition in literature to use education year as a proxy to control the impact (Kwon, 2009). Income is another pivotal variable that may affect people's behaviors due to both risk averseness and income effect. From an empirical perspective, Jappelli and Pistaferri (2010) made an insightful review by discussing the relationship between income and people's consumption, "smoothing" behaviors, as well as the marginal propensity to consume. We also control for age since different age groups usually hold dissimilar preferences, beliefs, and cognitive skills that may impact decision-making, which is discussed in numerous behavioral, clinical, or economic research (Ross et. al., 2018). Histograms based on birth cohort will be shown in data analysis to check the persistency or change of gender gaps across age, and age will also be used in regression to test the controlled difference between men and women.

The basic ordinary least squares (OLS) specification will be like the following:

$$y_i = \beta_0 + \beta_1 \text{gender}_i + \beta_2 \text{educyear}_i + \beta_3 \text{age}_i + \beta_4 \text{income}_i + \gamma X_i + \epsilon_i$$

where y_i is the dependent variable of individual i in the survey, gender_i is a dummy variable that equals to 1 for men and 0 for women, and educyear_i is the education years the respondent received. Age is measured in year and income is measured in CNY1,000. Variable X_i includes a list of other controls such as urban-rural dummy, body weight, height, etc. We also use logistic regression for binary choice problems, where the linear specification is the same for the log odds. With this specification, the parameter β_1 can be explained as the partial correlation between gender and explanatory dependent variable y_i after controlling for the impact of education, age, and income.

Despite the merits of these data sets, a shortcoming is the limited longitudinal coverage of the SCP variables. Fixed effect cannot to be implemented to control for idiosyncratic characteristics. Since most of the study is based on binary choice data, this results in low model fitting. But if we assume that the remaining idiosyncratic features are randomly drawn for each individual, this will not distort the comparison of the gender difference in the first moment. Collection of higher quality data would be an important requirement for further research.

B. Supplementary Regression Tables

The following tables split out the partial impact of gender, age, education year (educyear), income, urban–rural disparity (urban). These tables are discussed in the main text as supplementary results.

Table B1: Frequency of Meat Consumption, OLS Test

VARIABLES	(1) meat	(2) meat	(3) meat
gender	0.525*** (0.066)	0.970*** (0.067)	0.530*** (0.066)
age		-0.043*** (0.002)	-0.022*** (0.002)
educyear			0.159*** (0.008)
income			0.031*** (0.002)
urban			2.270*** (0.070)
Constant	0.929*** (0.046)	4.032*** (0.104)	0.864*** (0.129)
R2	0.001	0.019	0.101
Observations	42,590	33,600	33,575

Note: Standard errors in parentheses; dummy variable gender = 1 for man and 0 for women.

*** p<0.01, ** p<0.05, * p<0.1

Source: Chinese Family Panel Study (CFPS) 2010.

Table B2: Cooking Fuel Use, Logit Test

VARIABLES	(1) firewood	(2) coal	(3) gas
gender	0.881*** (0.102)	0.508*** (0.054)	-0.599*** (0.045)
age	-0.043*** (0.005)	-0.035*** (0.003)	0.036*** (0.002)
educyear	-0.240*** (0.018)	-0.157*** (0.010)	0.154*** (0.008)
income	-1.032*** (0.113)	-0.781*** (0.054)	0.633*** (0.040)
Constant	1.637*** (0.342)	1.959*** (0.197)	-2.563*** (0.168)
Pseudo R2	0.110	0.079	0.082
Observations	11,278	11,278	11,278

Note: Standard errors in parentheses; dummy variable gender = 1 for man and 0 for women.

*** p<0.01, ** p<0.05, * p<0.1

Source: 2005 1% mini census, National Bureau of Statistics.

Table B3: Smoking, Logit Test

VARIABLES	(1) smoke	(2) smoke
gender	3.671*** (0.050)	3.736*** (0.055)
age		0.004*** (0.001)
educyear		-0.047*** (0.004)
income		0.003*** (0.001)
Constant	-3.557*** (0.047)	-3.489*** (0.084)
Pseudo R2	0.308	0.312
Observations	33,014	27,982

Note: Standard errors in parentheses; dummy variable gender = 1 for man and 0 for women.

*** p<0.01, ** p<0.05, * p<0.1

Source: Chinese Family Panel Study (CFPS) 2016.

Table B4: Pro-environment Behaviors, OLS Test

VARIABLES	(1) garbage_sort	(2) own_bag	(3) recycle
gender	-0.061*** (0.010)	-0.128*** (0.009)	-0.075*** (0.008)
age	-0.001*** (0.000)	0.001*** (0.000)	0.000* (0.000)
educyear	0.030*** (0.001)	0.014*** (0.001)	0.012*** (0.001)
income	0.000*** (0.000)	-0.000* (0.000)	-0.000 (0.000)
Constant	-0.061*** (0.015)	-0.128*** (0.014)	-0.075*** (0.013)
R2	0.100	0.037	0.025
Observations	11,410	11,407	11,403

Note: Standard errors in parentheses; dummy variable gender = 1 for man and 0 for women.

*** p<0.01, ** p<0.05, * p<0.1

Source: Chinese General Social Survey (CGSS) 2003 and 2013.

Table B5: Choice of Transportation, OLS Test

VARIABLES	(1) carbonhigh	(2) carbonlow	(3) carbonfree
gender	0.178*** (0.005)	-0.086*** (0.005)	-0.062*** (0.004)
age	-0.006*** (0.000)	0.000*** (0.000)	0.002*** (0.000)
educyear	-0.003*** (0.001)	0.017*** (0.001)	-0.006*** (0.000)
income	0.003*** (0.000)	-0.000*** (0.000)	-0.002*** (0.000)
Constant	0.491*** (0.010)	0.236*** (0.010)	0.835*** (0.008)
Observations	33,575	33,575	33,575
R2	0.102	0.033	0.044

Note: Standard errors in parentheses; dummy variable gender = 1 for man and 0 for women.

*** p<0.01, ** p<0.05, * p<0.1

Source: Chinese Family Panel Study (CFPS) 2010.

Table B6: Perceived Seriousness of Industrial Pollution, OLS Test

VARIABLES	(1) greenhouse	(2) greenhouse	(3) water	(4) water
gender	0.018* (0.010)	-0.014 (0.013)	0.037*** (0.011)	0.024* (0.014)
age		-0.001* (0.001)		-0.002*** (0.001)
educyear		0.017*** (0.002)		0.022*** (0.002)
wkhrs		-0.000 (0.000)		0.000 (0.000)
Constant	0.587*** (0.007)	0.499*** (0.039)	0.526*** (0.007)	0.390*** (0.042)
R2	0.001	0.083	0.003	0.122
Observations	3,672	2,063	3,672	2,063

Notes: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Chinese General Social Survey (CGSS) 2010.

Table B7: Awareness and Attitude toward Human–Nature Relationship, OLS Test

VARIABLES	(1) animal_human	(2) human_pri	(3) human_abuse	(4) limited_resource	(5) nature_fragile
gender	0.006 (0.005)	-0.004 (0.007)	0.018*** (0.006)	0.030*** (0.006)	0.017*** (0.006)
age	-0.000 (0.000)	0.002*** (0.000)	0.001** (0.000)	0.001*** (0.000)	0.001*** (0.000)
educyear	0.008*** (0.001)	-0.011*** (0.001)	0.011*** (0.001)	0.012*** (0.001)	0.011*** (0.001)
income	-0.000 (0.000)	-0.000** (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)
Constant	0.739*** (0.013)	0.536*** (0.019)	0.590*** (0.015)	0.549*** (0.015)	0.556*** (0.014)
R2	0.020	0.038	0.031	0.037	0.032
Observations	7,916	7,857	7,911	7,543	7,614

Notes: Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Chinese General Social Survey (CGSS) 2003 and 2010.

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The Gender Dimension of Sustainable Consumption and Production

*A Microsurvey-Based Analysis of Gender Differences in Awareness, Attitudes, and Behaviors
in the People's Republic of China*

Using microsurveys conducted in the People's Republic of China over the past 2 decades, this paper explores the individual preferences among men and women toward sustainable consumption and production—the concept of doing more with less and decoupling economic growth from environmental degradation. The study finds that women exhibit greener living and working habits than men. However, women—regardless of education, rural–urban setting, or age—are impacted by time poverty, low political participation, limited awareness, gender norms, and, for younger and older women, financial limitations. To encourage and increase women's capacity in shaping environmental solutions, economic and political gender gaps must be addressed and awareness on the impact of consumption needs to be strengthened.

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