Overweight/obesity penalties in economic outcomes: A longitudinal study of Chinese adults, 1991-2009

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Abstract

China has experienced the burden of increasing weight since the last decade of the 20th century. China's social and economic reform, beginning in 1978, accelerated capitalism and the availability of energy-dense, high fat foods and opened the door to Western ideas, including body image. However, it is unknown if the same weight penalties seen in the U.S., such as wage reductions for overweight/obese individuals, are associated with China's social and economic reform. This study examines the economic outcomes from individual ages of 18–55 (n= 12,095) who participated in a 1991–2009 study, the China Health and Nutrition Survey (CHNS). **Methods:** Linear fixed-effects regression estimates the net effect of weight status on monthly wages. All analyses are stratified by gender. **Results**: There are overweight/obesity penalties for women but not for men; becoming overweight or obese is associated with a 5.7% reduction in wages for women. We did not find that occupation functions as a mediator for the association between weight status and economic outcomes regardless gender; however, there is emerging overweight/obesity penalty in men with profession-based occupations after 2004, and there is disappearing overweight/obesity reward in men with service-based occupations after 2000. **Conclusions**: This article argues that recent Chinese social changes may have potentially reproduced the Western experience of weight penalties in economic outcomes.

Keywords: Body mass index (BMI);Overweight; Obesity; Gender; Weight penalty; Body image; Chinese social change; China Health and Nutrition Survey (CHNS)

Introduction

Since 1980, when the Chinese reform began, there have been remarkable social and economic changes, leading China to open new roads to Western fashion enterprises (Segre Reinach, 2005). This accelerated urbanization, along with explosive capitalism and West-dominated fashion ideas (Hartley & Montgomery, 2009), has led to thin and skinny becoming one of the new identities for Chinese women (Chen, Gao, & Jackson, 2007; Luo, Parish, & Laumann, 2005; Xu et al., 2010). Chen (2001) observed that Chinese modernization reshaped norms for the female body, even among pregnant or postpartum women. With the rise of energy-dense, sugar-rich, high fat diets and sedentary lifestyles (Astrup, et al., 2008; Bell, Ge, & Popkin, 2002; Ng, Norton & Popkin, 2009), it is even more difficult for women to maintain ideal bodies. The ever-increasing pressure felt by Chinese women to attain the ideal body, has led to an increase in eating disorders in Chinese society (Chen & Jackson, 2008; Huon, Mingyi, Oliver, & Xiao, 2002; Lee & Lee, 2000; Tong, et al., 2012). On the other hand, Chinese men generally display less concern about body type (Yates, Edman, & Aruguete, 2004). Chinese society rarely portrays the ideal male body in media, and Chinese men are much less preoccupied with body image compared to Western men (Yang, Gray, & Pope, 2005).

Past research investigations into the association of body mass index (BMI) and economic outcomes are predominately focused on Western populations. Previous Western studies have suggested there is a significant negative association between body mass and socioeconomic outcomes in females (Baum & Ford, 2004; Cawley, 2004; Conely & Glauber, 2007; Glass, Haas & Reither, 2010). On the other hand, the association between body weight and economic outcomes among men is weaker with mixed outcomes. For example, some studies show that wages are lower for obese males (Baum & Ford, 2004; Kline & Tobias, 2008); while others

discover that weight penalty does not exist among men (Averett & Korenman, 1996). Cawley (2004) argued that weight penalty may differ by race/ethnicity and discovered a negative relationship between body mass and wage among white and Latino/Hispanic males but a positive relationship among black males.

Relatively few researchers have investigated the effect of body mass on individual economic outcomes in under-developed, non-Western countries; where food scarcity is highly related to malnutrition and inferior BMI (Behrman & Deolalikar, 1989; Deolalikar, 1988, Dinda et al., 2006; Glick & Sahn, 1998; Haddad & Bouis, 1991; Zheng, et al., 2010). Researchers argue that health status functions as a mediator between BMI and economic well-being. In other words, higher BMI is associated with greater productivity which is positively related to economic well-being (Gao & Smyth, 2010; Shimokawa, 2008; Zheng, et al., 2010).

The socio-cultural values that cite Western ideal body figures have increased considerably among Chinese youth post 1980s, brought about by the "After Mao" revolution in popular culture (Chen & Jackson, 2008; Chen & Jackson, 2009; Chen, Jackson, & Huang, 2006; Jackson & Chen, 2008; Leung, Lam, & Sze, 2001; Li, et al., 2005). The rates of overweight and obesity increased noticeably during this same time period (Du, Lu, Zhai, & Popkin, 2002; Ma et al., 2005; Wang et al., 2007). We argue that past studies did not adequately address the dynamic transitions of socio-cultural values toward ideal body figures and its impact on economic outcomes when a country experiences rapid westernizing body identity and great economic transformation. In addition, the economic expansion in China has brought enormous changes to occupational structure. After the economic reform, the number of tenured employees working in labor intensive and permanent occupations provided by state-run and collective-owned enterprises declined noticeably; along with increasing non-manual employee work in service,

customer-based, private-owned industries (cite). Thus, interpersonal relationships with customers or colleagues have been increasing in the workplace as the results of urbanization, capitalization, and service-based employment. Past studies show that the prejudice and distaste toward obese people is mostly found among the occupations which require more social interactions (Han et al., 2008). Due to the industry transition in China, weight penalty may exacerbate or emerge due to the increasing interpersonal relationships in workplaces.

Based on previous discussions, we hypothesize (1) becoming overweight or obese will be associated with reductions in economic outcomes. (2) Occupations will function as a mediator underlying the association between weight status and economic well-being. (3) There is rising or exacerbating weight penalty in individual economic outcomes for occupations which require more social interactions. Finally, (4) women becoming overweight or obese will be more likely to be punished by economic outcomes compared to men.

Methods

Study population

The China Health and Nutrition Survey (CHNS) is an ongoing longitudinal project which gathers data on health, nutrition, and socioeconomic indicators at the individual, household, and community levels. The survey began in China in 1989 with follow-ups in 1991, 1993, 1997, 2000, 2004, 2006, and 2009. A multistage, random-cluster procedure was used to draw an initial sample from 8 provinces. CHNS data are not nationally representative; however, previous research findings on key physical composition and dietary data trends based on CHNS are similar to those revealed by nationally representative data (Ge, et al., 1994; Wang, Du, Zhai & Popkin, 2006).

For this research, only the subsample with complete weight and height is included. We calculate individual weight status and wage in each wave. Only individuals who were working during any given survey year are included with 16.74 % of individuals who did not have a job being omitted. In addition, the 4.16 % of women pregnant or breastfeeding during any given survey are also omitted. Our CHNS longitudinal data subsample includes 6,962 males and 5,133 females observed in CNHS survey waves in 1991, 1993, 1997, 2000, 2004, 2006 and 2009 between the ages 18-55. The study has omitted the 1989 survey due to the year 1989 collecting information only for preschoolers and young adults ages 20–45 and lacking information for health limitations.

Measurements

Dependent variables

Wage comes from CHNS longitudinal files, which have all of the data for each individual at each wave. Wage refers to the total individual income from all non-retirement salaries earned by the individual each month and is used in this study as the economic outcome variable. For interpretability, wage has been logged. In such models, the logged case refers to the proportional change in the wage for one coefficient increase.

Independent variables

Body mass index is defined as (weight (kg)/ (height (m) ^{2}) in its continuous form. Underweight and Normal weight is defined as BMI < 23 kg/m^2; overweight/obesity is defined as BMI ≥ 23 kg/m^2 according to World Health Organization's (WHO) - pacific region criteria, due to the absolute levels of diabetes and hypertension on the age- and sex-specific basis being higher in people of Asian origin (James, Leach, Kalamara, & Shayeghi, 2001). Weight status is entered as a dichotomous variable based on whether participants were overweight or obese in the

survey year. Overweight/obesity is coded as 1 if an individual's BMI is greater than or equal to 23.

Mediating variables

In this study, we categorized occupations into three groups by types of interactions in workplace: (1) Profession-based occupations: individuals working in this occupation category have professional knowledge, skills, or contacts which are less likely to be replicable. These occupations require high interactions with colleagues or customers in the workplace. Included in this category are senior professional workers (doctor, professor, lawyer, architect, and engineer); junior professional workers (midwife, nurse, teacher, editor, and photographer); administrator, executive, manager (working proprietor, government official, section chief, department or bureau director, administrative cadre, village leader); army officer, police officer, ordinary soldier and policeman. (2) Service-based occupations: individuals working in this occupation category require many interactions with colleagues or customers in the workplace; however, compared to profession-based occupations, this category requires a higher standard in service and customer or colleague satisfaction. This category includes, office staff (secretary, office helper); service worker (housekeeper, cook, waiter, doorkeeper, hairdresser, counter salesperson, launderer, and child care worker); skilled worker (foreman, group leader, craftsman); athlete, actor, and musician. (3) Reference group or manual labors: these occupations require relatively few interactions in the workplace; farmer, fisherman, hunter, non-skilled worker (ordinary laborer, logger), and driver are grouped into this category.

We argue that all but the reference group (manual labors) has high interpersonal contact with colleagues or customers. However, the wages earned by professional workers are less likely to be impacted by their weight status compared to service workers due to being less likely to be

replaced; while the wages made by manual labors are least likely to be impacted by their weight status. Manual labors are also less likely to be prejudiced or discriminated by weight status due to few social interactions with customers or colleagues. In short, we predict that individuals working in service-based occupations will be most likely to be judged by their weight status in a society experiencing westernization of body image.

Covariates

The time-varying characteristics in this study include:

1. Survey year, 1991, 1993, 1997, 2000, 2004, 2006, and 2009 and entered as a continuous variable from 0 to 18.
2. Current age: recoded as age minus 18 from 0 (18) to 37 (55) and entered as a continuous variable. Age squared: the square of current age representing the non-linear relationship of age on economic well-being.
3. Marital status: recoded as a binary variable, currently married and currently not married (includes single, divorce, widow and separated). Married is coded as 1.
4. Education is measured as the total number of years of formal schooling completed and entered as a continuous variable from 0 to 18.
5. Working hours is measured as the total working hours per day and entered as a continuous variable from 0 to 16.57
6. Health constraints or limitations are entered as a dichotomous variable based on whether participants reported having been sick, injured, or suffered from a chronic or acute disease in the last 4 weeks. Previous Western studies have suggested that weight gain is associated with negative health consequences (Must, et al., 1999; Renehan et al., 2008; Shai, et al., 2005); such as, less productivity due to absenteeism, sick leave and injuries

that limit performance in the workplace (Schmier, Jones, & Halpern, 2006; Schultz & Edington, 2007). On the other hand, weight gain may also relate to better nutrition and strength in low-income, developing countries, which leads to increased economic outcomes by reason of higher productivity (Behrman & Deolalikar, 1989; Glick & Sahn, 1998; Thomas & Strauss, 1997). Our models include health constraints in order to understand whether or not health limitations have confounded or mediated the weight status and economic outcomes.

Statistical analyses

It is important to rule out sources of potential endogeneity when investigating the association between body mass and economic well-being. Several methods used to deal with potential endogeneity of body mass on economic outcomes have been discussed thoroughly (Baum & Ford, 2004; Cawley, 2004; Conley & Glauber, 2007).

In this study, we utilize individual fixed-effect (FE) linear regression to remove unobserved time-invariant heterogeneity.

FE linear regression models are designed to study the causes of changes within an individual by controlling for potential unobserved heterogeneity bias in order to generalize the results to all of the individuals in the analysis. In other words, FE linear regression models can solve potential unobserved heterogeneity by *using each individual as his or her own control* (Allison, 2009). Specifically, the linear regression model with time-invariant covariates in our study is written as:

$$\ln(Wage)_{it} = \alpha_t + \sum_{k=2}^{K} \beta_k \, x_{kit} + \sum_{m=1}^{M} \gamma_m \, z_m + u_i + \varepsilon_{it} \quad (1)$$

Where α_t is an intercept; β and γ are vectors of coefficients. x represents time-varying covariates, including the independent variable: weight status; mediator: occupations; and

covariates: survey wave, age, age square, marital status, educational years, health limitations, and working hours. Z represents time-invariant covariates, including year-specific and person-specific effects that play a role in changing individual economic outcomes. Covariates with "person-specific effects" are those which affect individual wage in different ways but are constant across time, such as, childhood SES, genetic factors, intelligence, ethnicity, etc. Covariates with "year-specific effects" are those which affect all individual wage in the same way but change over time, such as, income tax, federal policy, economic growth, etc. There are two error terms in this model, ε_{it} represents the random variation of each individual at each wave, and u_i represents the effect of all unobserved variables on economic outcomes that vary across individuals but are constant over time (Allison, 2009).

When estimating first-difference equations, the factors that are constant over time such as, $\sum_{m=1}^{M} r_m \ z_m$ and u_i are removed from the equation, and the final equation is written as:

$$\ln(Wage_{it}) - \ln(Wage_{it-1}) = \Delta\alpha + \sum_{k=1}^{K}(\beta_k - \beta_{k-1})(x_{2it} - x_{kit-1}) + \Delta\varepsilon_{it} \quad (2)$$

FE methods are able to control for all time-invariant covariates by doing the regression with different scores and does not allow the assessment of time-invariant covariates (Allison, 2009; Baltagi, 2005; Wooldridge, 2002). Further, we add interaction terms of weight status with survey year to the equation; the weight status is introduced into the models as a dummy variable, with under/normal weight (BMI< 23) as the reference; the survey year is an ordinal but treated as a continuous variable from 0 (1991) to 18 (2009) in models. All models were run separately by occupational group (labors, profession-based, and service-based) and gender. The marginal effects estimate whether the effects of overweight/obesity (compared to under/normal weight) on wages vary by survey year within each occupational group and gender in an individual fixed effect model.

Results

Table 1 presents descriptive statistics by person-year divided by gender. On average, body mass index is slightly higher for men (22.99 kg/m^2) than women (22.38 kg/m^2); and overweight/obesity rate is higher for men (45.73 %) than women (37.87 %). The average wage for men (760 yuan/month) is higher than women (571 yuan/month). In addition, men are slightly older, have more educational years, more likely to be married, and work longer hours per day; while women suffer more health constraints. Both men and women are more likely to work in the service-based occupations compared to other types of occupations.

[Table 1 here]

Table 2 presents the estimates effect of the overweight/obesity group, relative to the under/normal weight group, on log wages during 1991-2009 separated by gender based on fixed effects linear regression. Survey year, age, age squared, educational years, marital status and working hours are controlled in all models. Due to the small size for underweight (5.16 % for men; 6.99% for women) and in order to simplify the analyses, we collapsed the reported BMI categories into "under/normal weight" (BMI<23) and "overweight/obesity" (BMI≥23) groups. Further, we did not find any statistically significant linear relationship between body mass index and log wage, so we only present the non-linear effect of weight status on log wages in the final models. In these models, all coefficients refer to the percent change in wages. We added health constraints in models 2 and 5 and added the occupational groups in models 3 and 6.

For women, becoming overweight or obese is associated with a reduction in wages by 5.8% (Model 1; †p<.10). The effects of becoming overweight/obese on wages changed to 5.9% after controlling health constraints (Model 2; †p<.10). Occupation does not function as a mediator on the relationship between weight status and wages (Model 3; †p<.10). For men, there

is no evidence to indicate that becoming overweight/obese is associated with a reduction in wages (Model 4). Health limitations are not a significant mediator between overweight/obesity and wages (Model 5), and wage outcomes are not mediated by occupation (Model 6). Our results support the hypothesis (1) that there is a wage penalty for becoming overweight/obese in women but not men; we did not find the effects of overweight/obese on wages to be mediated by occupational groups and rejected the hypothesis (2)

[Table 2 here]

In Table 3 the marginal effects of overweight/obesity on log wages vary by survey within gender and occupation subgroups (manual labors, profession-based, and service-based occupations) from 1991-2009 using the FE model. The results show, there is no significant overweight/obesity wage penalty or reward for women in any of the survey years for all samples and occupation subgroups (Model 1, 2, and 4).

Conversely, there are significant overweight/obesity wage rewards for men during years 1991-1997; specifically, becoming overweight/obese, increases wage for men by 11.7 % in 1991, 9.6 % in 1993, and 5.4% in 1997; but the wage rewards are insignificant after 2000 (Model 5). For male manual labors, there are no significant overweight/obesity penalties or rewards during 1991-2009 (Model 6). For males with profession-based occupations, there are no significant overweight/obesity penalties or rewards before 2000; after 2004, becoming overweight or obese leads to 14.8 %, 18.3 % and 23.7 % less wages in 2004, 2006 and 2009 (Model 7). For males with service-based occupations, there are overweight/obesity rewards from 1991 to 2000. Becoming overweight/obese, increases male wages by 20.8 %, 18.0 %, 12.3%, and 8.0% in 1991, 1993, 1997 and 2000, and overweight/obesity rewards become insignificant after 2004 (Model 8).

The Figure 1 demonstrates the decreasing log wages among overweight/obese during 1991-2009 by gender and occupation group. All the trends (except women who had manual or service-based occupations) show declining wages for becoming overweight or obese during 1991-2009.

[Figure 1 here]

In short, we found overweight/obesity penalty in women during 1991-2009 (Table 2, Model 1-3), and it is not mediated by occupations (Table 2, Model 3). On the other hand, there is no overweight/obesity penalty in men during 1991-2009 (Table 2, Model 4-6). When we evaluate whether there is emerging overweight/obesity penalties from 1991-2009, we found overweight/obesity penalties in male professional workers since 2004 (Table 3, Model 7). We also found that overweight/obesity rewards in male service workers has disappeared after 2000 (Table 3, Model 8).

Discussion and Conclusions

It is important to learn from China's experience on how body mass impacts economic outcomes in the rapidly developing world. To our knowledge, this study is the first research to investigate weight penalties associated with Chinese social change. We hypothesized: (1) becoming overweight or obese is associated with reductions in economic outcomes; (2) Occupations function as a mediator underlying the association between weight status and economic well-being; (3) There is rising or exacerbating weight penalty in individual economic outcomes for occupations which require more social interactions; (4) Women becoming overweight/obese will be more likely to be punished by economic outcomes compared to men

Past studies showed that women are more likely to be prejudiced or discriminated by body weight due to the thin-ideal standard of beauty; while there was mixed evidence to indicate

the association between weight status and economic outcomes among men. Our results confirmed the hypothesis (1) there is no overweight/obesity penalties in wage for men; while becoming overweight or obese is related to reductions in wages for women between 1991-2009. We further argue that weight penalty in economic outcomes may be mediated by occupations due to the transition from labor intensive/state-owned/permanent to service-based/private-owned industries in the past decades. We presume that the wages earned by professional workers are less likely to be impacted by their weight status compared to service workers because professionals are less likely to be replaced. Wages made by manual labors are least likely to be impacted by their weight status, because they have least interpersonal interactions with customers or colleagues. However, our results reject this hypothesis (2). We did not find that occupation functions as a mediator for the association between weight status and economic outcomes regardless gender. Further, we argued there is emerging weight penalty from1991-2009. The results only partially confirmed the hypothesis (3). There is emerging overweight/obesity penalty in men with profession-based occupations after 2004, and there is disappearing overweight/obesity reward in men with service-based occupations after 2000.

The reasonable postulation could be that the overweight/obesity penalties have occurred and spread extensively among women regardless occupations before 1991, so that we were unable to find the emerging patterns during 1991-2009. The obesity/overweight rewards in male service workers disappeared after 2000; while overweight/obesity penalties in male professional workers emerged in 2004. The gender difference in terms of emerging/disappearing penalties and rewards during 1991-2009 may imply that the cultural ideal body weight impacted men and women in different stages when a country experiences rapid nutrition transition and westernization. Another possibility is that overweight/obese women may suffer more severe

consequences in weight penalties, such as losing jobs, and were dropped out from our study sample. Therefore, the results show mediocre wage penalties for women's weight.

Our results call attention to the fact that recent Chinese cultural changes may have linked thin-ideal weight to economic outcomes. We did not see weight penalties among Chinese men in general; however, the decreasing trend of wages in overweight/obese males between 1991-2009 shows emerging weight penalties occurring in men. Since we are unable to distinguish whether the association between economic outcomes with overweight/obese male differs between fat and muscularity, further investigations are needed. Finally, the rapid nutrition transition and westernization only takes place in the past 30 years for China, our study sample is restricted to years 1991-2009, longer follow-up studies will help to understand the true nature of its impact.

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TABLE 1 DESCRIPTIVE STATISTICS BY PERSON-YEAR DIVIDED BY GENDER, CHNS 1991-2009

	Female (N=5,133)			Male (N=6,962)		
VARIABLES	%	Mean	S.D.	%	Mean	S.D.
BMI (kg/m^2)		22.38	3.00		22.99	3.13
Wage (per 100 yuan/month)		5.71	8.38		7.60	14.50
Log wage		5.79	1.10		6.00	1.13
Age (year)		36.14	8.96		38.09	9.55
Education (year)		10.24	3.66		10.26	3.41
Working hours (day)		5.70	1.73		5.73	1.79
Overweight/obesity (BMI ≥ 23)	37.87			45.73		
Profession-based occupation	19.52			14.94		
Service-based occupation	52.64			57.54		
Health constraints	7.79			7.08		
Married	82.37			84.09		

TABLE 2 WEIGHT STATUS ON ECONOMIC OUTCOMES BASED ON LINEAR FIXED-EFFECT REGRESSION MODELS DIVIDED BY GENDER, CHNS 1991-2009 [1,2]

VARIABLES	Female (N=5,133)			Male (N=6,962)		
	(1)	(2)	(3)	(4)	(5)	(6)
Overweight/obesity (BMI ≥ 23)	-.058†	-.057†	-.058†	.015	.015	.016
	(.033)	(.033)	(.033)	(.028)	(.028)	(.028)
Health constraints		-.067†	-.069†		.056	.056
		(.037)	(.037)		(.035)	(.035)
Occupation (ref.=manual labors)						
Profession-based			.099*			.043
			(.043)			(.038)
Service-based			.049†			.002
			(.028)			(.025)

Notes:
[1]All models controlled for survey wave, age, age^2, education years, marital status, working hours per day
[2]All coefficients refer to the percent change in wages
[3]Robust standard errors are reported in parentheses *** p<.001, ** p<.01, * p<.05, †p<.10

TABLE 3 MARGINAL EFFECT OF WEIGHT STATUS AND YEAR (1991-2009) ON LOG WAGE DIVIDED BY GENDER

	Female				**Male**			
	All Occupations (N=5,133)	Manual (N=1,429)	Profession-based (N=1,002)	Service-based (N=2,702)	**All occupations (N=6,962)**	Manual (N=1,916)	Profession-based (N=1,040)	Service-based (N=4,006)
	(1)	(2)	(3)	(4)	**(5)**	(6)	(7)	(8)
1991	**.031**	-.143	-.023	-.003	**.117****	.139	.084	.208***
	(.048)	(.120)	(.104)	(.074)	**(.041)**	(.142)	(.092)	(.056)
1993	**.023**	-.112	-.028	-.004	**.096****	.118	.048	.180***
	(.042)	(.107)	(.092)	(.065)	**(.036)**	(.124)	(.082)	(.049)
1997	**.007**	-.050	-.038	-.006	**.054†**	.075	-.023	.123**
	(.035)	(.092)	(.073)	(.054)	**(.030)**	(.098)	(.069)	(.042)
2000	**-.005**	-.004	-.046	-.008	**.023**	.043	-.076	.080*
	(.034)	(.096)	(.065)	(.053)	**(.029)**	(.093)	(.067)	(.041)
2004	**-.021**	.058	-.056	-.010	**-.018**	-.0001	-.148†	.024
	(.040)	(.119)	(.068)	(.061)	**(.338)**	(.109)	(.076)	(.048)
2006	**-.029**	.089	-.061	-.011	**-.039**	-.022	-.183*	-.004
	(.044)	(.135)	(.074)	(.068)	**(.038)**	(.124)	(.085)	(.053)
2009	**-.041**	.136	-.069	-.012	**-.070**	-.054	-.237*	-.047
	(.053)	(.162)	(.088)	(.081)	**(.045)**	(.151)	(.101)	(.064)

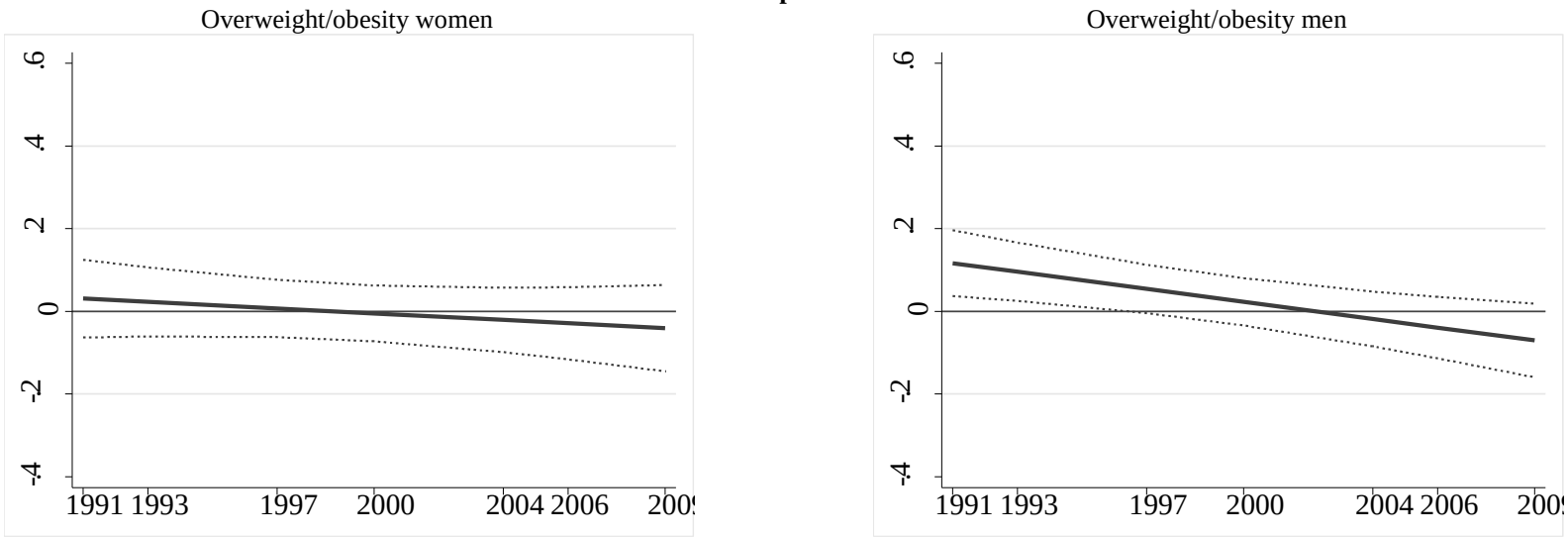
Notes:

1The fixed effect models were run seperately by gender, controlling for age, age2, education years, marital status, health constraints, and working hours per day

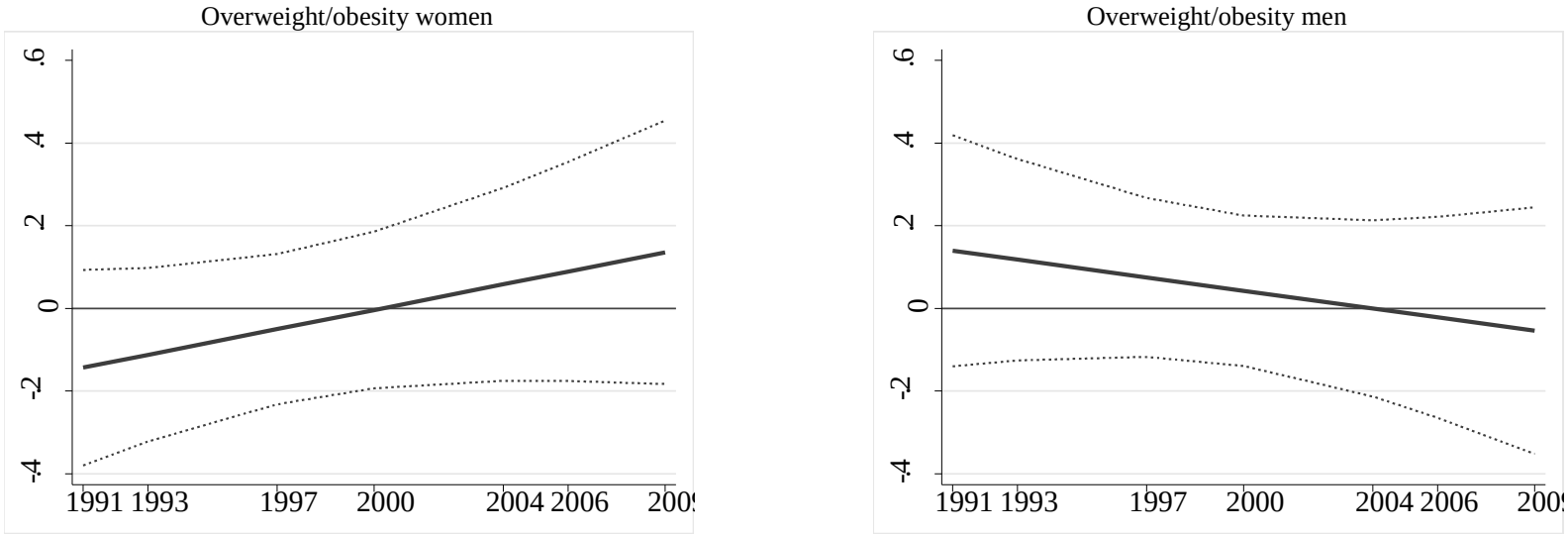
2 Estimates displayed in the table calcuate marginal effects from the inteaction terms of years (1991-2009) with weight status, using the category "under/normal weight" as the reference group. Standard errors are in the parenthese. *** p<.001, ** p<.01, * p<.05, †p<.10

FIGURE 1 MARGINAL EFFECT OF OVERWEIGHT/OBESITY ON WAGES

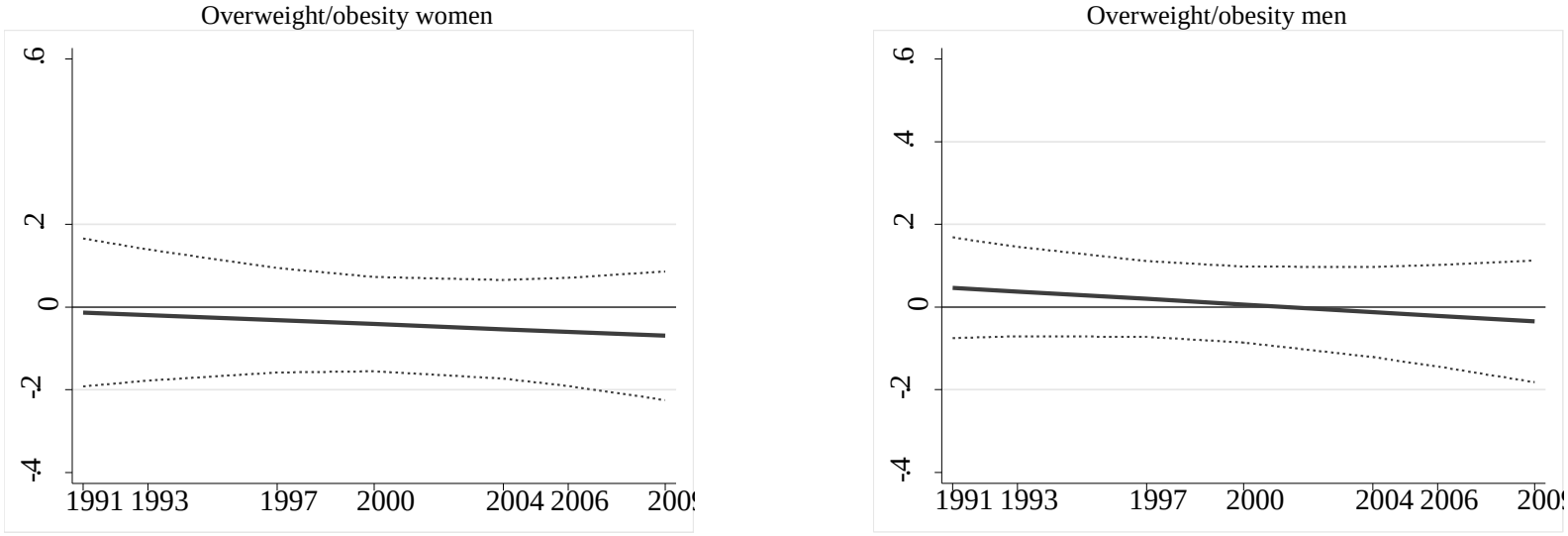
All occpations



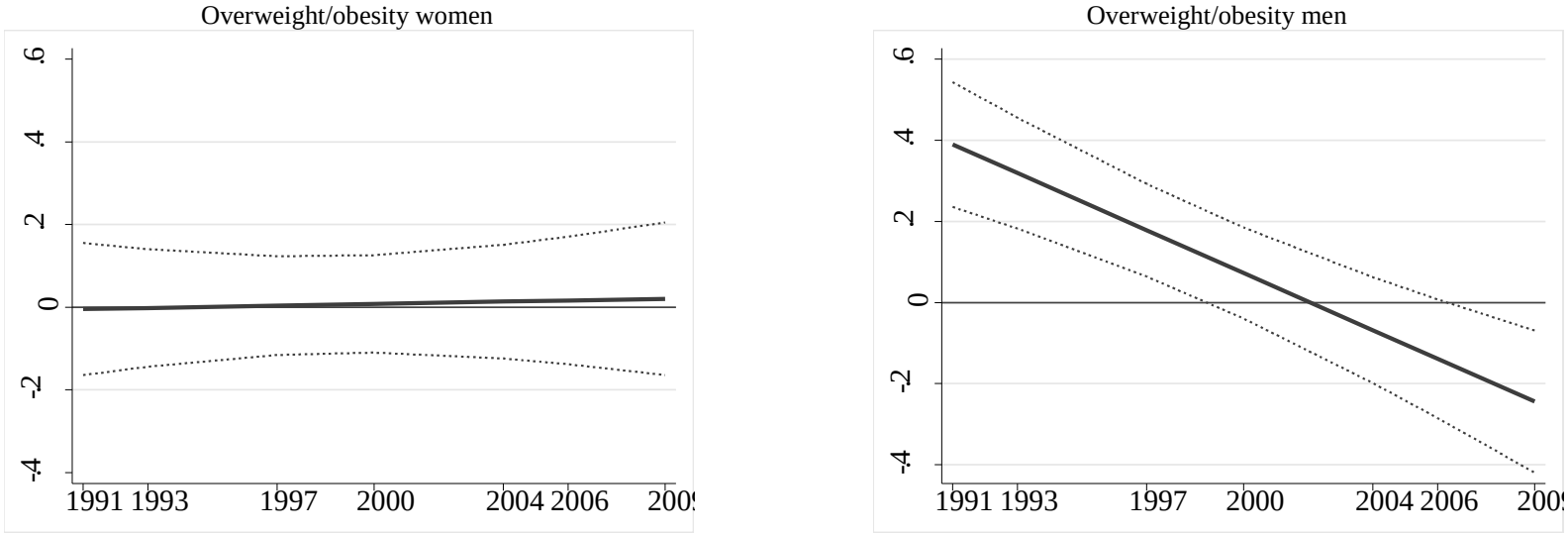
Manual labours



Profession-based occupation



Service-based occupation



*Notes:*The lines represent the marginal effects of a unit change in the log wage. The slopes present the estimates of the interaction terms of overweight/obesity (ref.=under/normal weight) and survey year (1991-2009).