OBESITY AND EMPLOYMENT: THE CASE OF ICELAND

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ABSTRACT

The effect of obesity on labor-market outcomes has been studied to some extent, as well as the related effects of beauty and health. Generally, results have differed by gender. Limited effects have been found for males, while obesity is found to affect females negatively in the labor market. The case of Iceland is interesting as many would argue that the labor-market behavior of the genders differs less in Iceland that in most other countries. Female labor-force participation is very high and female educational attainment is considerable. Females participate in politics and Icelanders were the first in the world to elect a female president. In the current study, survey data collected by Gallup Iceland in 2002 are used to examine the direct effect that weight has on employment within this political and social setting. Results indicate that, as in other less gender-equalized countries, weight has a negative and statistically significant effect on female employment while no relationship is found between male employment and obesity. Results controlling for the potential endogeneity of weight, show very slight differences from the general results that do not control for endogeneity. Hausman tests suggest that the causal pathway of the sizable effect found for women runs from body weight to employment. This is consistent with, although not sufficient for, the hypothesis of discrimination in the labor market.

JEL Classification: I1, J0, J2, J7

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1. INTRODUCTION

As the population continues to gain weight, it is important to know the real effects of obesity in the labor market. This relationship is obviously important to multiple policies regarding those affected in the labor market. Furthermore, many governments are responsible for a wide variety of income replacements. That makes societies as a whole sensitive to the effects of lifestyle choices on the labor market. Lower employment levels of the obese could be interpreted as imposing externalities on fellow taxpayers, as they would indicate a higher incidence of income replacements for heavy individuals.

The majority of studies on the effects of body weight on the labor market have been done in the United States, and most of the studies available use one specific US dataset, the National Longitudinal Survey of Youth (NLSY)(Arvette and Korenman, 1996; Págan and Dávila, 1997; Cawley, 2000 & 2004). However, for the general applicability of the currently available American results, it is important for policy makers in multiple countries to see the robustness of those results to changes in data and context. A further incentive for investigation is given by the focus of existing work in this field on how the overweight fare once employed, often estimated without controls for selection. In the current study, emphasis is given to the effect of obesity on employment.

Generally, results have differed by gender. Limited effects have been found for males, while obesity is found to affect females negatively in the labor market(Register and Williams, 1990; 2005;Arvette and Korenman, 1996; Págan and Dávila, 1997; Cawley, 2000 & 2004). Discrimination has been hypothesized as a cause (Cawley, 2000 & 2004). The gender differentials could be a form of cosmetic discrimination in a culture where being thin has become a requirement for being considered attractive, particularly for women. However, the studies have been few and the details of the relationship between obesity and labor-market outcomes are still unresolved. A final answer is unlikely to be provided with a single study, but as the literature grows, some theories are less favored, while others become more convincing. The relationship between weight, employment, and other variables, such as gender, may have different weights in different populations and under different political circumstances. The case of Iceland is interesting, due to the very high labor-force participation and high educational attainment of females. Women participate in politics and maybe the views of the Icelandic populace is represented through the electoral process, but Icelanders were the first in the world to elect a female head of state, president Vigdís Finnbogadóttir in 1980. In the current study, survey data collected by Gallup Iceland in 2002 are used to examine the direct effect that weight has on employment within this political and social setting.

It frequently been assumed in previous studies that the causal relationship runs from obesity to labor-market outcomes, but very few have actually tested this assumption.[1] It is important to test the direction of any weight-labor-market relationships for policy purposes. If the causality is not such that obesity affects the labor-market directly, then attempts to influence those outcomes through controlling the population's weight might fail to affect labor-market outcomes, even if they successfully reduce the population's weight. If, however, there is a direct causality between obesity and labor-market outcomes then such policies can be, ceteris paribus, effective.

The most notable studies addressing causality use instrumental variables to determine the causal effect of obesity on labor-market outcomes, particularly wages are (Arvett and Korenman,

[1] Examples of work assuming exogeneity include Register and Williams (1990), as well as Vince and Cole (2005). Examples of work that takes possible endogeneity into account is Arvett and Korenman (1996), Pagán and Dávila (1997) and Cawley (2002, 2004).

1996; Pagán and Dávila, 1997; Cawley 2000 & 2004). However, the instruments used by Cawley (2002, 2004) and Arvett and Corenman (1996)are such that they are only apropriate for subsamples of the populations and thus results only apply to the subjects treated and raises questions about the potential introduction of a selection bias. Pagán and Dávila (1997) failed to reject the hypothesis that weight is uncorrelated with the error term of the wage equation. In the current paper, similar techniques are used to examine the relationship between weight and employment, but a different dataset and different instruments will be utilized, insturments that pass the traditional test and apply to the whole populations.[2]

This study thus contributes to the literature by …

2. THE DATA

The data utilized in the current study come from a health and lifestyle survey collected by Gallup-Iceland in January of 2002. A random sample of 2000 Icelanders between the ages of 20 and 80, received questionnaires on nutritional habits, drinking and smoking, exercise, illnesses, accidents, stress, quality of life, use of drugs, dental care, and other lifestyle factors, as well as demographics and work-related issues. This sample comprises approximately 1.4 percent of the adult population.

The net-response rate, after a telephone follow-up, was 54%. This equates to 1062 returned questionnaires.[3] Such a low response rate might be a cause for concern. However, the sample proved to be representative of the Icelandic population, with matching averages showing

[2] A discussion of the previous literature and the instruments used in available studies will be provided upon request.

[3] Discrepancies can occur due to the time lag between changes in people's lives and those changes being reported in the census. The net response rate refers to responses after sample deductions based on deaths or emigration. The gross response rate, however, is based on all subjects who were originally sent questionnaires and would accordingly be 53%.

only slight discrepancies between population and census data (Statistics Iceland 2005). For example, gender representation was off by 1%; the labor-force participation in Iceland was 86.5%, while in the sample it was 86.9%; hours worked in a week for the working population were 43.8, compared to 44.23 for the sample.[4] Although the inconsistencies found were not significant enough to warrant serious concerns, the most pronounced ones should be mentioned.

The greatest inconsistency between the sample and population data pertains to age representation, as subjects in their twenties were less likely to turn in their questionnaires than other age groups were. Furthermore, those above the age of 65 were slightly more likely to do so than average. Although the discrepancies are not large, they are reported in Table 1, as they show greater divergence from population data than do other variables in this particular survey. In summary, subjects who failed to return the survey do not appear systematically different from subjects who successfully completed the study, with regard to available population statistics.[5]

[Insert table 1 here]

The strength of the data lies in the amount of information obtained for each individual. The number of variables available increases the options for use of statistical techniques such as instrumental variables and experimentation with different control variables. Nevertheless, the actual data available generally differ from the ideal, and this study is no exception. One limitation regards the sample size. The power of the sample in this regard, and the subsequent likelihood of type-one and type-two errors, needs to be considered when interpreting results. Besides that, the analyses would have benefited from the availability of longitudinal data, which

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[4] 44.23 refers to total hours worked in main, as well as extra, jobs for the working population. The sample mean for hours worked in a main job is 41.67.

[5] Two observations were dropped from the sample altogether due to major inconsistencies between questions, inconsistencies that take more than a great imagination to believe. Furthermore, missing values resulted in case-wide deletion, unless otherwise specified.

are not available. Each variable used and preparation of the data for further statistical analysis will now be discussed. Summary statistics on key variables are reported in Table 2.

[Insert table 2 here]

Employment: Employment status was based on a question that asked if the individual is an employee, employer, student, homemaker, pensioned, unemployed or disabled. A dummy variable was created from this question, indicating employment if the individual identified himself or herself as being in either of the first two categories. Part time employment for the other categories is not observed. Unfortunately, not enough individuals reported themselves as being unemployed to draw meaningful inferences about that group.

Body Weight: Being overweight is generally defined as an excess or surplus of body fat. This is also the case with obesity, although it refers to those whose weight deviates from the optimal to a greater extent. While it is technologically feasible to ascertain the fat composition of an individual directly, such procedures are extremely costly and are rarely used in large samples. Indirect measures of fat composition, which are based on weight and height, are employed instead. The primary measure of this type is the Body Mass Index (BMI), which calculates the ratio of weight in kilograms to height in meters squared. In this study, the data allow for the use of this standard measurement. Optimal BMI levels for adult males and females are generally believed to lie between 20 and 25. BMI below 20 is considered thin, BMI 25-30 is overweight and BMI above 30 is obese. These distinctions are based on the medical literature, which shows increasing rates of disease and deaths as BMI rises above 25.[6] However, this measure has its

[6] A recent article in the Journal of American Medical Association challenged those standard cut-off points and suggests optimal BMI levels above 25 (Flegal et al. 2005). It is too early to say whether this study will have an

shortcomings, as under-reporting of weight in obese individuals and over-reporting of height may underestimate BMI. For this reason, some researchers have used a lower cut-off point between overweight and obese individuals when height and weight are self-reported. However, this has not changed the fundamental results in other studies (Spencer et al. 2002, Crawley and Portides 1995, Viner and Cole 2005). This information is presented here to give the reader a sense for the scale of the BMI variable. The cut-off points are, however, not relevant for the statistical analysis done here as BMI is used in continuous form.

A further limitation of BMI is that it does not distinguish between fat and other tissue. Very muscular individuals can thus measure as being overweight, even though their bodies have very little fat. Although variation in female muscle mass is generally too small to affect the results, male results could potentially be affected. For this reason, all estimations were repeated with a separate measure for weight. This alternative variable is based on five categories of people's self-evaluated weight status; very overweight, rather overweight, neither over- nor underweight, rather underweight, and very underweight. A binary measure of obesity was constructed from this variable. It takes the value one if the individual indicates being very overweight and zero otherwise. This dichotomization is motivated by the use of statistical techniques, which are not supported within a multinomial framework.[7] The correlation coefficient between BMI and the self-reported weight measure was 0.5351 for men and 0.6256 in the case of women.

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effect on the traditional cut-off points employed. Thus, the traditional cut-off point of 30 for obesity is employed in the current analysis.

[7] Here reference is made to two-stage estimations with instrumental variables that will be described further in later chapters.

Health: The survey contains several measures of health. The one chosen for the empirical analysis is the traditional five-level self-assessed health variable (SAH), ranging from "very good" to "very poor." This choice was motivated in part because the variables use is supported by a literature that shows it to predict mortality and morbidity, even when a variety of other health and behavioral measures are controlled for (Kaplan and Camacho 1983, Okun et al. 1984, Connelly et al. 1989, Idler and Angel 1990, Wannamethee and Shaper 1991, Idler and Kasl 1991 & 1995, McCallum et al. 1994, Idler and Benyamini 1997, Gerdtham et al. 1999, Burstrom and Fredlund 2005). What made this variable even more attractive was the fact that as the first variable in the survey, it did not suffer the missing observations that the other health variables did. The numeric values of the SAH variable are reorganized such that a higher number indicates better health. This is done to assist interpretation of empirical results. Furthermore, the log of SAH is used, making the health variable ranges between 0 and 1.6, rather than 1 and 5. This is motivated by studies that have shown that the difference between "Very good" and "Rather good" is smaller than the difference between "Rather good" and "Fair", and so on.[8]

Demographics and Education: Gender, age, number of children, marital-status-dummy variables are included in the analysis, as well as educational dummies, indicating if the individual has finished the degree each question refers to.

[8] This method was proposed by Wagstaff and Van Doorslaer (1994), and two further studies support this suggestion. Gerdtham et al. (1999) use a survey from Uppsala County in Sweden to examine SAH and two measures of quality of life (QoL): a visual analog rating scale (RS) measure and a time trade-off (TTO) measure. They compare the RS and TTO to the SAH, and find, in both cases, that the higher the SAH rating, the smaller is the difference between the QoL measures from one SAH level to the next. Humphries and Van Doorslaer (2000) report similar findings when comparing SAH and the McMaster Health Utility Index (HUI), a generic health index computed from an eight dimensional questionnaire.

Dieting: Three dummy variables were generated from the responses to dieting question. They indicate if the individual had tried successfully to lose weight in the last 12 months, if they had made unsuccessful attempts, or if they had not tried at all.

3. METHODS AND RESULTS

The first question to ask when examining the relationship between weight and the labor market is whether weight-related differences in employment exist after controlling for traditional employment-related characteristics. This section examines the causal effect that weight has on employment. The relationship between employment and weight is assumed to be of the following form:

$$E_i = \beta X_i + \alpha BMI_i + \varepsilon_i ,$$

where E_i is an indicator variable measuring the probability of employment for individual *i*. *E* takes the value of one if the individual is employed, but zero if the individual is unemployed or out of the labor force.[9] *BMI* is a vector of the individual's BMI and BMI-squared, α is a vector of the two coefficients associated with the polynomial BMI, X_i is a vector of the individual's background characteristics, β is a vector of parameters. Finally, ε is the individual specific error term.[10] Probit estimations were done separately by gender in accordance with the previous literature.

The White (1980) test for heteroscedasticity revealed heterogeneous standard errors in the obesity variable. Thus, robust errors associated with the marginal effects of the weight

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[9] Not enough subjects reported themselves as unemployed to make a meaningful distinction between that group and other non-workers.

[10] Variables used in the estimation include the different weight measures reported, age, age squared, self-rating of the individual's health, education, marital status, and number of children.

variables are shown with the results in Tables 3-6. In situations where the error structure is heteroscadastic, traditional tests of overidentifying restrictions and endogeneity are not valid. In order to better deal with determination of exogeneity, instrumental-variables General Method of Moments (IV-GMM) estimations were performed. In this case, overidentification is tested with the Hansen (1982) test.[11] Endogeneity in this context is tested with a modified Hausman test according to Baum et al. (2003).[12] Since GMM comes at a cost of possibly poor finite sample performance, its use is limited to the context of endogeneity vs. exogeneity determination. Reported coefficients are results of probit, and IV-probit estimations.

In the current study, indicator variables on the individuals' dieting in the past 12 months are used as instruments to eliminate a potential endogeneity bias. The instrumental variables used report whether people had tried to lose weight in the past year, and whether these attempts had been successful. People can attempt to lose weight in different circumstances and be successful or unsuccessful, regardless of the nature of their labor-market participation, or lack there of. However, an individual's dieting behavior is going to be related to their weight. Therefore, these variables seem plausible instruments, but one needs to test for their applicability as well.

The instruments were highly significant in the weight equations, but not significant when added to the employment equation, as is required of an instrument. Further statistics regarding the instruments come out favorably and are reported along with results in the appropriate tables.

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[11] The joint null hypothesis is that the instruments are valid instruments, that is, uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. For the efficient GMM estimator, the test statistic is Hansen's *J*-statistic, the minimized value of the GMM criterion function. The *J*-statistic is consistent in the presence of heteroskedasticity. Under the null, the test statistic is distributed as *Chi*-squared in the number of overidentifying restrictions. A rejection casts doubt on the validity of the instruments. For further discussions see, for example, Hayashi (2000) and Baum et al. (2003).

[12] This test goes by a variety of names, such as the modified Hausman test, *C*-test, difference-in-Sargan-test, and GMM-distance test. It is, for example described in Hayashi (2000) and Baum et al. (2003). The test is simply the difference of two Sargan statistics, one for the consistent, and the other for the efficient estimation, having used the error variance from the more efficient estimator in calculations for both.

Full estimation results from the first stage regressions can be found in Appendix A. The Hansen (1982) tests come out favorably in the case of females, although they indicate that male results should be read with caution. Those statistics are reported in the appropriate tables, along with other estimation results. Although, there appears to be limited doubt about the direction of this relationship in the literature. Nevertheless, it is the job of researchers to confirm or reject conventional wisdom. Given the availability of usable instruments, a two-stage model was estimated for comparison.

[Insert table 3 here]

Estimation results for males are reported in Table 3. The results do not indicate that weight is related to employment decisions by men or that heavy males are discriminated against in the labor market. The results from a modified Hausman test performed after IV-GMM estimations indicate that the two models are systematically different and support the hypothesis of endogenous BMI. However, which model is used is quite irrelevant in this situation, as the coefficient on BMI is statistically insignificant either way.

The case is quite different when female estimates are considered. By examining Table 4, we can see that weight has a significant effect on female employment. When estimated in a single stage, both BMI and BMI-squared are statistically significant at the 10% level. When estimated in a two-stage probit model, the coefficients of interest are no longer statistically significant.

In this case, the results from a modified Hausman specification tests are quite important, and the hypothesis that weight is exogenous cannot be rejected. The estimates from the single-stage model should therefore be the focus of attention and are hereafter interpreted as causal effects.

[Insert table 4 here]

The results can be difficult to read, since BMI is not related to the probability of employment in a linear way, with the two weight coefficients being of opposite sign. A careful look shows that weight has sizable negative and statistically significant effect for women, while no evidence of a relationship between weight and employment can be found for men. For females, the point estimates are quite large. With an additional unit of BMI, a woman's probability of employment falls by approximately 1%, if evaluated at the mean. For a woman who is at the mean height of 1,67 meters (5 feet and 6 inches), this reflects a weight gain of less than 3 kg (6 lbs). This effect is of the opposite sign, but roughly two thirds of the magnitude of adding a graduate degree to one's résumé, according to the data. Another practical application of the results show that a female of 90 kg (198 lbs) has a 10% lower probability of being employed than her 60 kg (132 lbs) counterpart, given that they share otherwise typical traits.[13] This effect is of the opposite sign, but of similar magnitude to that of finishing vocational school or training.

Due to possible errors in the BMI variable, the above-reported estimations were repeated with an alternative weight measures. That measure was a self-evaluation of weight status. The measure is one if the individual reported being far overweight, and zero otherwise.

[Insert tables 5 & 6 here]

The results from those estimations are shown in Tables 5 and 6. They show the previous findings to be robust to changes in the measurement of weight where female weight status

[13] Typical refers to other variables being kept at their means, including the height at 1.67 meters, while calculating the probability of employment.

significantly influences their employment, but male results show no statistically significant effect.[14]

When self-ratings of weight status are used, an otherwise typical woman who considers herself very overweight has an expected employment of 0.60, while her counterpart, reporting to be neither under- nor overweight has a 0.75 probability of being employed. A woman reporting herself to be too thin has an employment likelihood of 0.94. For comparison, a person of mean weight who finishes only elementary school has a 0.67 probability of being employed; one finishing high school has a 0.48 probability of being employed; one finishing vocational school or training has a 0.77 probability of being employed; one who holds a masters or journeyman's certificate has a 0.95 probability of employment; one with an undergraduate degree has a 0.89 probability of employment and a woman with a graduate degree has a 0.90 probability of being employed.[15]

4. CONCLUSIONS

The results of this study suggest that the ongoing rise in the prevalence of obesity in Iceland may have a non-negligible effect on the labor -market status of women. This is consistent with results from other social and cultural settings. The results indicate that the sizable effect found for women can be interpreted as a causal effect of obesity on the probability of employment. This would be necessary but not sufficient for the following hypothesis to hold: (1) discrimination against overweight females exists in the hiring process, (2), productivity differences between

[14] Experimentation with different cut-off points did not indicate results to be sensitive to such changes. Consistent with previous findings, even being underweight increases female probability of employment.

[15] There is in fact a reversal of the effect at levels of severe obesity. However, only 14 women are in that weight range, and the reversal remains despite their removal from the sample. This indicates that the curvature of the polynomial relationship at lower levels of BMI is guiding this reversal.

non-obese and obese females exist and/or (3) overweight females do not have the same incentives to participate in the labor market.

Besides the first hypothesis, second on hypothesis can also be partially related to the discrimination story. Theories have been developed in an attempt to explain why there might be discrimination in spite of market forces operating against it, at least to some extent (Black 1999). It should be noted that customer discrimination, and even co-worker discrimination, can be related to productivity and would, therefore, not be eliminated through profit-maximizing behaviors. . Non-obese individuals could for example be more productive in settings where customers prefer to be served by the non-obese or in jobs where these workers have more favorable interactions with other employees.

Several problems arise when trying to distinguish discrimination from productivity differences, as discrimination by customers and coworkers can be related to productivity. Non-obese individuals could for example be more productive in settings where customers prefer to be served by the non-obese or in jobs where these workers have more favorable interactions with other employees.

Some would argue that productivity differences might arise through the health effects of obesity and related stereotyped reasoning or statistical discrimination (Phelps 1972, Arrow 1973). Employers do not observe actual productivity, especially at the time of initial employment; they only observe signals or indicators of these metrics. The process of inference from the signal can cause individuals of equal productivity who are emitting different signals to be treated differently. This is not the same as discrimination based on taste, as the employer is making the profit-maximizing decision under uncertainty, and the workers do have different productivity on average. Beliefs about a group being less productive can even be self-fulfilling, for these beliefs may cause the group in question to under-invest in education, training, and other productivity-related actions such as punctuality if the average for the whole group is substituted for the true value for the individual (Loury 1992). This could be the case with the obese and might not be fully accounted for in the current analysis since productivity measures are unavailable.

However, this is not consistent with the finding that obesity does not seem to affect male employment and that it is not healthy weight that maximizes employment for women, but rather being underweight. The gender difference makes it difficult to argue that the explanation lies in exogenous characteristics that make people who maintain their weight be more productive. Even though the subject's health is controlled for in this study, one might argue that obesity has a signaling effect indicating to the employer that the overweight worker could have potential health problems. Again, comparisons with the male results raise questions. Why would health signaling have such an effect for women, but not for men? If anything, excess body weight has been shown to be more harmful for men's health. Men and women store fat differently. Women store fat closer to the surface of their skin, but men accumulate their fat largely in the tissue surrounding the muscles. While this visceral fat may look better than fat stored closer to the surface, as it is not as limp, it is generally more dangerous, increasing the risk of life-threatening conditions such as heart diseases and stroke.

This is further complicated by theoretical developments concerning the consequences of stereotyped reasoning or statistical discrimination (Phelps 1972, Arrow 1973). Employers do not observe actual productivity, especially at the time of initial employment; they only observe signals or indicators of these metrics. The process of inference from the signal can cause individuals of equal productivity who are emitting different signals to be treated differently. This is not the same as discrimination based on taste, as the employer is making the profit-maximizing decision under uncertainty, and the workers do have different productivity on average. The analysis further suggests that the beliefs about a group being less productive can be self-fulfilling, for these beliefs may cause the group in question to under-invest in education, training, and other productivity-related actions such as punctuality if the average for the whole group is substituted for the true value for the individual (Loury 1992). This could be the case with the obese and might not be fully accounted for in the current analysis since productivity measures are unavailable. However, as mentioned before, the question remains why average productivity would decrease with weight only in the case of women.

This gender difference, however, is less puzzling when put in the context of the psychological literature, which consistently shows women's looks to have a greater impact on both male and female observers. This difference in attitudes toward the genders may cause overweight women to have less desire to be employed, and thus leave female employment more dependent on weight. However, partial support for double-standard explanations for the male and female differences can be found in the psychological literature, where it is well established that females' appearances have a greater impact on observers' reactions than men's do (Hatfield and Sprecher 1986).

One should use caution in interpreting the results of this study as indicating non-profit-maximizing discrimination since the study does not include measures of productivity differences, which would be expected to have the same causal effect: from weight to the probability of employment. If part of the wage penalty is customer- or productivity-related, a policy that targets employer discrimination may be economically inefficient by hampering profit-maximizing behavior on the part of employers.

As the results differ dramatically between men and women, future research should pursue explanations for this difference between genders, and explore how those results factor into the general gender differentials and gender discrimination in wages. Unfortunately, individual wages are not in the available dataset. Further, it might be interesting to analyze differences in job security, employment mobility, and employment durations to examine possible differences in risk aversion based on body weight. Unfortunately, the data at hand are not rich enough to analyze this in a meaningful way. Therefore, such estimations are left for future work.

Previous studies of labor-market outcomes have mainly focused on the effect that obesity has on people already employed. The interestingly large and negative effects found for women in the labor market are just a part of the story, since results from the current study show that female employment itself depends heavily on weight. The result that weight does not affect male employment status is consistent with the previous literature.

5. DISCUSSION

Policy matters need to be based on many factors. Although some relevant policies will now be discussed, this paper should not be construed as a plea for intervention. Some of the options discussed have wide-ranging effects, which have not been a part of this analysis, in addition to considerations regarding the appropriateness of interventions in general.

The difference in results between genders is consistent with the psychological literature, which has repeatedly shown female looks to have a greater impact on people when compared to male looks. If body composition changes labor-market productivity of females, either in the form of coworker discrimination or customer discrimination, then employer discrimination might be a profit-maximizing behavior. Therefore, policies aimed at changing this behavior of the employer would need to be considered with the efficiency trade-off in mind.

If these women, who invest less in their human capital through weight management, are the ones facing decreased employment probabilities, one might be inclined to say that they are bearing the costs of their own preference decisions. However, the external effect of the individual's consumption pattern on the taxpayers who finance income replacements needs to be considered. One of the problems with interventions—which would internalize those external costs, for example by means of taxation of food—is that it would also change the consumption choices of those who are not overweight or obese.

Some may argue that, as voluntary lifestyle choices are of paramount importance in determining body composition, there is no fairness issue involved. Yet, others may argue that the gender difference itself is unjust. The fairness literature that expanded from Kolm (1972), characterizes situations such as these as sub-optimal from a standpoint of fairness.[16] That literature suggests that a situation remains fair during exchanges in a free market, as long as the initial opportunities and endowments were equally distributed. This necessary condition is violated if greater demands are placed on women in the workforce, as gender is a part of the initial endowments, against which an individual cannot buy insurance.

This may also be considered from the viewpoint of a risk-averse individual, making decisions behind John Rawls's famous veil of ignorance.[17] Such an individual would like to purchase actuarially fair insurance against the risk of being held to a higher standard based on

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[16] This literature defines fairness as an envy-free situation, or a situation in which an individual would not like to substitute his decisions and life outcomes for those of someone else.

[17] The fairness literature in economics is in many ways consistent with theories by the political philosopher John Rawls (1971). His well-known "veil of ignorance" puts individuals in a pre-birth position, where they are ignorant about the positions they will occupy in society. Rawls argued that the rules of justice, agreed upon by individuals in these circumstances, are genuinely impartial.

unknown future gender. Therefore, this can be characterized, in economic terms, as a market failure in an insurance market. This market would be failing because of the unavoidable bounds of human life, which has to start at some point for each person. Prior to this point, we cannot purchase insurance against any future risk. Thus, the equal endowments suggested as fair by the fairness literature are not obtained.

"Blind" interview procedures, such as formal written applications and telephone interviews should reduce what seems to be a gender based inequality in hiring, although it might be argued that it would reduce efficiency in hiring along other dimensions. This as well as other possible mitigating policies involve trade-offs that are difficult to measure. Evaluating whether the corrections are gained at small or great costs will undoubtedly involve a judgment call.

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TABLES

Table I – Representation by Age

Age group	% in census	% in sample
20-24	11.4	7.7
25-29	11.2	10.8
30-34	10.4	10.9
35-39	11.3	11.4
40-44	11.1	10.2
45-49	10.1	11.2
50-54	8.7	8.9
55-59	7.0	8.2
60-64	5.1	5.1
65-69	4.9	5.2
70-74	4.7	6.7
75-80	4.2	4.9

Table II - Summary Statistics

Variable	Males (N=512) Mean (S.D.)	Females (N=543) Mean (S.D.)
1 if employee	0.63 (0.48)	0.62 (0.48)
1 if employer	0.17 (0.38)	0.07 (0.25)
1 if student	0.03 (0.17)	0.07 (0.25)
1 if working for home	0.01 (0.10)	0.08 (0.26)
1 if pensioned	0.11 (0.31)	0.12 (0.32)
1 if unemployed	0.02 (0.15)	0.01 (0.10)
1 if disabled	0.03 (0.17)	0.04 (0.19)
Log of health	1.152 (0.294)	1.129 (0.386)
Body Mass Index	26.76 (4.44)	25.72 (5.09)
1 if BMI > 30	0.17 (0.37)	0.15 (0.35)
1 if very overweight	0.08 (0.27)	0.13 (0.33)
Age	46.665 (15.945)	45.080 (16.053)
1 if married/living together	0.786 (0.407)	0.722 (0.447)
1 if never married or co-habiting	0.120 (0.324)	0.082 (0.273)
1 if divorced/separated	0.062 (0.238)	0.107 (0.309)
1 if widow/widower	0.032 (0.174)	0.089 (0.284)
Number of children	2.379 (1.510)	2.458 (1.490)
1 if finished elementary school	0.240 (0.419)	0.332 (0.461)
1 if finished high school	0.086 (0.274)	0.162 (0.362)
1 if finished vocational school or training	0.208 (0.399)	0.247 (0.421)
1 if finished masters or journeyman's cert.	0.274 (0.442)	0.048 (0.199)
1 if finished undergraduate degree	0.126 (0.326)	0.163 (0.362)
1 if finished a graduate degree	0.066 (0.245)	0.047 (0.205)
1 if not tried to lose weight in last 12 months	0.697 (0.458)	0.535 (0.495)
1 if tried and succeededin losing weight in last 12 months	0.096 (0.294)	0.204 (0.400)
1 if tried unsuccessfully to lose weight in last 12 months	0.206 (0.403)	0.262 (0.436)

Table III – Male Estimations – Marginal Effects at Mean

Dependent variable is employment	Probit	Two-Stage Probit
Variable	dy/dx (robust S.E.)	dy/dx (robust S.E.)
BMI	0.0087 (0.0086)	-0.0924 (0.0896)
BMI squared	-0.00025 (0.0013)	0.0014 (0.0015)
age	-0.0033 (0.0022)	-0.0020 (0.0016)
age squared	-0.00071 (0.00018)***	-0.00064(0.00014)***
1 if never married or lived wiht anyone	-0.0561 (0.0902)	-0.0499 (0.0575)
1 if devorced/separated	-0.1203 (0.1051)	-0.1320 (0.0793)*
1 if widow/widower	-0.1894 (0.1169)	-0.1528 (0.1510)
children	0.0094 (0.0223)	0.0122 (0.0153)
1 if finished high school	-0.1891 (0.0848)**	-0.1901(0.0661)***
1 if finished vocational school or training	-0.0420 (0.0584)	-0.0358 (0.0463)
1 if finished masters or journeyman's cert.	-0.0203 (0.0613)	-0.0514 (0.0482)
1 if finished undergraduate degree	0.0303 (0.0804)	0.0126 (0.0931)
1 if finished graduate degree	0.2009 (0.7878)	0.1364 (0.6429)
log health	0.4319 (0.1139)***	0.3528 (0.0861)***
p-value of modified Hausman test	0.9223*	
p-value of Hansen test	0.0836	
Pseudo R-square	0.4216	
Number of observations	506	506
Instruments	none	Dieting behavior
First stage estimations	none	See Appendix

Benchmark for education is finishing elementary school and benchmark for marital status is being married or living with someone

*** significant at 1% level, ** significant at 5% level, * significant at 10% level

Table IV - Female Estimations – Marginal Effects at Mean

Dependent variable is employment	Probit	Two-Stage Probit
Variable	dy/dx (robust S.E.)	dy/dx (robust S.E.)
BMI	-0.0117 (0.0062)*	-0.0425 (0.0813)
BMI squared	0.00078 (0.00043)*	0.00063 (0.0013)
age	-0.0022 (0.0022)	-0.0023 (0.0019)
age squared	-0.00094 (0.00013)***	-0.00095(0.00013)***
1 if never married or lived wiht anyone	0.0510 (0.0953)	0.0454 (0.0801)
1 if devorced/separated	-0.0964 (0.0766)	-0.0958 (0.0630)*
1 if widow/widower	-0.1485(0.1182)	-0.1520 (0.1052)
children	-0.0107 (0.0189)	-0.0120 (0.0207)
1 if finished high school	-0.1552 (0.0664)**	-0.1539 (0.0742)**
1 if finished vocational school or training	0.0876 (0.0645)	0.0869 (0.0663)
1 if finished masters or journeyman's cert.	0.4127 (0.1735)**	0.4135 (0.1547)***
1 if finished undergraduate degree	0.2397 (0.0755)***	0.2424 (0.0947)***
1 if finished graduate degree	0.2871 (0.1792)	0.2902 (0.1563)*
log health	0.2515 (0.1196)**	0.2609 (0.1588)*
p-value of modified Hausman test	0.9269	
p-value of Hansen test	0.2573	
Pseudo R-square	0.3550	
Number of observations	535	535
Instruments	none	Dieting behavior
First-stage estimation	none	See Appendix

Benchmark for education is finishing elementary school and benchmark for marital status is being married or living with someone

*** significant at 1% level, ** significant at 5% level, * significant at 10% level

Table V - Male Estimations – Marginal Effects at Mean

Dependent variable is employment	Probit		Two-Stage Probit
Variable	dy/dx (robust S.E.)		dy/dx (robust S.E.)
1 if individual is very overweight	-0.0068 (0.0786)		-0.2138 (0.2700)
age	-0.0027 (0.0018)***		-0.0030 (0.0020)
age squared	-0.00070 (0.00014)		-0.00076(0.00037)***
1 if never married or lived wiht anyone	-0.0551 (0.0768)*		-0.0571 (0.0758)
1 if devorced/separated	-0.1207 (0.0679)		-0.1332 (0.1113)
1 if widow/widower	-0.1731 (0.1381)		-0.1792 (1.2260)
children	0.0092 (0.0208)		0.0118 (0.0201)
1 if finished high school	-0.1882 (0.0801)**		-0.2141 (0.1212)*
1 if finished vocational school or training	-0.0438 (0.0723)		-0.0605 (0.0739)
1 if finished masters or journeyman's cert.	-0.0263 (0.0543)		-0.0351 (0.0612)
1 if finished undergraduate degree	0.0298 (0.0633)		0.0332 (0.0999)
1 if finished graduate degree	0.1811 (0.5644)		0.1863 (1.4002)
log health	0.3980 (0.1005)***		0.3754 (0.2098)*
p-value of modified Hausman test		0.3257	
p-value of Hansen test		0.1287	
Pseudo R-square	0.4174		
Number of Observations	506		506
Instruments	none		Dieting behavior
First-stage estimation	none		See Appendix

Benchmark for education is finishing elementary school and benchmark for marital status is being married or living with someone

*** significant at 1% level, ** significant at 5% level, * significant at 10% level

Table VI - Female Estimations – Marginal Effects at Mean

Dependent variable is employment	Probit	Two-Stage Probit
Variable	dy/dx (robust S.E.)	dy/dx (robost S.E.)
1 if individual is very overweight	-0.1481 (0.0697)**	-0.0947 (0.2711)
age	-0.0023 (0.0021)	-0.0024 (0.0019)
age squared	-0.00091(0.00015)***	-0.00093(0.00013)***
1 if never married or lived wiht anyone	0.0387 (0.0969)	0.0364 (0.0913)
1 if devorced/separated	-0.0904 (0.0774)	-0.0909 (0.0810)
1 if widow/widower	-0.1678 (0.1027)	-0.1676 (0.0974)*
children	-0.0137 (0.0188)	-0.0150 (0.0162)
1 if finished high school	-0.1402 (0.0608)**	-0.1420 (0.0735)*
1 if finished vocational school or training	0.0889 (0.0531)*	0.0869 (0.0761)
1 if finished masters or journeyman's cert.	0.3868 (0.1848)**	0.3919 (0.1904)**
1 if finished undergraduate degree	0.2320 (0.0815)***	0.2383 (0.0847)***
1 if finished graduate degree	0.2782 (0.1870)	0.2788 (0.1780)
log health	0.2393 (0.1282)*	0.2600 (0.1835)***
p-value of modified Hausman test	0.8726	
p-value of Hansen test	0.2135	
Pseudo R-square	0.3538	
Number of observations	535	535
Instruments	none	Dieting behavior
First-stage estimation	none	See Appendix

Benchmark for education is finishing elementary school and benchmark for marital status is being married or living with someone

*** significant at 1% level, ** significant at 5% level, * significant at 10% level

Appendix

FIRST-STAGE ESTIMATIONS - WEIGHT EQUATION ESTIMATES

Table A1 - Male sample - first stage estimations

variable	Dependent = BMI dy/dx (S.E.)	Dependent = BMI^2 dy/dx (S.E.)
1 if tried unsuccessfully to diet	4.75 (0.64)***	282.09 (43.62)***
1 if tried successfully to diet	1.90 (0.46)***	106.99 (31.72)***
age	0.06 (0.02)***	3.67 (1.09)***
age squared	-0.0030 (0.0008)***	-0.18 (0.05)**
1 if single	0.08 (0.69)	6.97 (47.46)
1if divorced/separated	-0.27 (0.78)	-1.93 (53.63)
1 if widow/widower	-0.06 (1.09)	-8.83 (74.63)
children	0.007 (0.16)	-1.95 (11.20)
1 if finished high school	-1.20 (0.76)	-57.56 (52.17)
1 if finihsed vocational school or training	-0.09 (0.56)	-5.99 (38.35)
1 if finished masters or journeyman's cert.	-0.41 (0.53)	-7.29 (36.05)
1 if finished undergraduate degree	-0.90 (0.65)	-48.55 (44.73)
1 if finished a graduate degree	-1.15 (0.83)	-48.08 (56.82)
log health	0.68 (0.82)	-52.58 (55.85)
R-squared	0.1765	0.1348
Partial R-squared	0.1064	0.0825
F-test instruments joint significance	32.17	23.73
Number of observations	506	506

Benchmark for education is finishing elementary school, and benchmark for marital status is being married or living with someone, benchmark for dieting is not having tried to loose weight in the past 12 months.

*** significant at 1% level, ** significant at 5% level, * significant at 10% level

Table A2 - Female sample - first stage estimations

variable	Dependent = BMI dy/dx (S.E.)	Dependent = BMI^2 dy/dx (S.E.)
1 if tried unsuccessfully to diet	4.11 (0.53)***	215.47 (36.28)***
1 if tried successfully to diet	2.68 (0.49)***	146.83 (33.34)***
age	0.066 (0.018)***	3.95 (1.21)***
age squared	-0.0013 (0.0009)	-0.054 (0.063)
1 if single	0.98 (0.85)	31.93 (57.48)
1if divorced/separated	-0.10 (0.67)	1.13 (45.33)
1 if widow/widower	-0.63 (0.82)	-55.93 (55.93)
children	0.039 (0.18)	-3.71 (11.94)
1 if finished high school	-0.79 (0.68)	30.55 (46.40)
1 if finihsed vocational school or training	0.09 (0.56)	0.056 (38.22)
1 if finished masters or journeyman's cert.	-1.01 (1.07)	-70.52 (72.61)
1 if finished undergraduate degree	-0.80 (0.66)	-54.44 (44.50)
1 if finished a graduate degree	-1.16 (1.05)	-67.95 (71.17)
log health	-1.45 (0.89)	-71.63 (60.35)
R-squared	0.1778	0.1160
Partial R-squared	0.1090	0.0717
F-test instruments joint significance	35.07	21.44
Number of observations	535	535

Benchmark for education is finishing elementary school, and benchmark for marital status is being married or living with someone, benchmark for dieting is not having tried to loose weight in the past 12 months.

*** significant at 1% level, ** significant at 5% level, * significant at 10% level

Table A3 – Male and female samples - first stage estimations

variable	Males dy/dx (S.E.)	Females dy/dx (S.E.)
1 if tried unsuccessfully to diet	0.287 (0.039)***	0.244 (0.035)***
1 if tried successfully to diet	0.032 (0.028)	0.079 (0.032)**
age	0.00030 (0.00097)	0.00071 (0.00118)
age squared	-0.00008 (0.00005)*	-0.00002 (0.00006)
1 if single	0.034 (0.043)	0.048 (0.056)
1if divorced/separated	0.0034 (0.048)	-0.0091 (0.044)
1 if widow/widower	0.021 (0.067)	-0.046 (0.054)
children	0.005 (0.1010)	0.014 (0.012)
1 if finished high school	-0.73 (0.047)	-0.029 (0.045)
1 if finihsed vocational school or training	-0.057 (0.034)*	0.048 (0.037)
1 if finished masters or journeyman's cert.	-0.034 (0.032)	-0.037 (0.071)
1 if finished undergraduate degree	-0.019 (0.040)	-0.036 (0.043)
1 if finished a graduate degree	-0.102 (0.051)**	0.022 (0.069)
log health	-0.153 (0.050)***	-0.223 (0.059)***
R-squared	0.1445	0.1488
Partial R-squared	0.0923	0.0776
F-test instruments joint significance	26.87	24.09
Number of observations	506	535

Benchmark for education is finishing elementary school, and benchmark for marital status is being married or living with someone, benchmark for dieting is not having tried to loose weight in the past 12 months.

*** significant at 1% level, ** significant at 5% level, * significant at 10% level