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Fatter Attraction: Marital Status and the Relationship between BMI and Labor Supply

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Summary

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Keywords: Body Size, Labor Supply, Earnings, Marriage

JEL Classification: D1, I1, J1, J22

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Abstract

We empirically analyze the labor supply choices of married men and women according to their body size (BMI), using data from the Panel Study of Income Dynamics on anthropometric characteristics of both spouses, and unmarried men and women as comparison group. Heavier husbands are found to work significantly more hours and earn more labor income, controlling for both spouses' demographic and socioeconomic characteristics. Conversely, no such effect is found for either unmarried individuals or for married women. We suggest a marriage market mechanism through which male BMI and earnings are positively related. Heavier married men compensate for their negative physical trait by providing their wives with more disposable income, working more hours and earning more. Heavier women may not able to compensate their spouse through labor supply, as female physical traits are more relevant in the marriage market than the corresponding male traits.

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1. Introduction

The labor market consequences of obesity and, in general its relationship with income, have been widely studied in the literature. We emphasize two strands. First, we find many studies looking at the effect of family (household) income on obesity or BMI (e.g., Cawley, Moran and Simon, 2008; Schmeiser, 2008; Garcia Villar and Quintana-Domeque, 2009). Second, there is also a well established literature interested in the effect of BMI or obesity on wages and earnings (e.g., Atella, Pace and Vuri, 2008; Cawley, 2004; Garcia and Quintana-Domeque, 2006; Han, Norton and Stearns, 2009). The main findings appear to be that there is a negative relationship between BMI, wages and family (household) income for women, whereas the relationship for men is far from being conclusive. Recently, Garcia Villar and Quintana-Domeque (2009) propose a link for these two different findings: if there is a wage penalty for heavier women in the labor market, this may be reflected in the negative relationship between family (household) income and BMI. Decomposing family (household) income into two main components, “individual labor income” and “the rest of family (household) income”, they confirm such an explanation.

Weight has also been linked to labor supply, emphasizing time constraints and on the job physical activity. Individuals working more hours may have less time to exercise, or may work in sedentary jobs, which are likely to be associated with a higher body mass index (BMI) (Lakdawalla and Philipson, 2007; Loh, 2009; Ruhm, 2005). At the same time, individuals working more hours may consume more highly-caloric food to economize on the scarcity of their time, thus increasing their BMI (Chou et al., 2004). Unfortunately, neither the literature on income, earnings and BMI, nor the studies on BMI and labor supply account for marriage market aspects.

We examine a marriage market mechanism through which body size (BMI) and labor supply and earnings may be positively related for married individuals,

investigating the extent to which spouses trade-off anthropometric (BMI) and economic characteristics, using income to compensate for their poor physical trait (being heavier, i.e., having a high BMI), in an attempt to provide each other with a balanced bundle of own body size and income. Using data from the Panel Study of Income Dynamics (PSID) on heads and wives from 1986 to 2005, and on unmarried male and female heads as comparison groups, we focus on the correlation in these anthropometric and economic measures of married men and women, controlling for other individual and household characteristics.

We are not aware of any previous study exploring the role of marriage market forces and marital status when analyzing the relationship between BMI (obesity), labor supply and income or earnings. The importance of our novel approach is twofold: first, we explore a potential mechanism between BMI and income that has not yet been studied; second, we analyze an additional aspect of the actual marriage market impact that body size have on individuals.

Heavier (or obese) individuals, women in particular, have been found to be penalized in the marriage market by matching with partners who are weaker along other physical and/or socioeconomic dimensions (Averett, Sikora and Argis, 2008; Oreffice and Quintana-Domeque, 2009). Specifically, Oreffice and Quintana-Domeque (2009) find that wives' obesity (body size or weight) measures are negatively correlated with their husbands' income, education and height, controlling for his weight (or body size) and her height, along with spouses' demographic and socioeconomic characteristics. Conversely, heavier husbands are not penalized by matching with poorer or shorter wives, but only with less educated women.

In addition to this sorting penalty, there could be a compensation mechanism across own individual characteristics, so that a defect is compensated with a quality. Everything else being equal, if an individual has a higher BMI, he/she may work and

earn more to compensate for the poor physical trait and still match with a decent spouse. In this present study, we further explore the role of marriage market penalties focusing on the extent to which labor supply can provide individuals with means of compensating their obesity with income. We investigate whether this compensation exists, estimate its magnitude and assess whether it varies by gender.

Our empirical analysis reveals that for married men one point increase in average BMI is associated with working almost one percent additional hours. For earnings, married men are found to respond with a 1.5 percent increase in earnings. No significant effects are found either for married women or unmarried men and women.

Our study sheds some light on the relationship between male BMI, labor supply and income. To the best of our knowledge, this is the first analysis to suggest a marriage market explanation for the relationship between labor supply and BMI of married men, and specifically the first empirical evidence of a positive correlation between hours worked and earnings of married men, while no relationship is found for wives, and unmarried individuals. Accounting for marital status may be significant in the analysis of weight and labor market outcomes. In this perspective, our contribution is complementary to this strand of literature, and also to the studies on the marriage market effects of weight (e.g., Averett, Sikora and Argis, 2008).

The findings presented here are consistent with the marriage market reinforcing the negative effects of weight by inducing heavier married men to work more hours to compensate their spouses for their defect. They also suggest that female *physical appearance* may play a more relevant role both in the marriage and labor markets than men's, as for heavier women it is unfeasible to compensate their spouses with more labor supply and earnings, and are instead penalized by matching with husbands of lower socio-economic and physical status (Oreffice and Quintana-Domeque, 2009). This gender asymmetry may reflect the phenomenon that male physical traits, and

weight in particular, are less valuable in the couple than female ones, so that it is possible for men to compensate for their lack of physical attractiveness by working more hours and thus being endowed with more income. At the same time, as heavier men do not appear to be penalized in the labor market (Cawley et al., 2008; Garcia and Quintana-Domeque, 2006; Garcia and Quintana-Domeque, 2009; Schmeiser, 2008), they actually have the means to provide their spouses with this economic compensation. In contrast, for women neither of the above aspects holds. Heavier women are found to be penalized in the labor market with lower wages, earnings and overall income, and the importance of female body size in the eye of men seems substantial (Averett and Korenman, 1996; Braun and Brian, 2006; Carmalt et al., 2008), so that women may not have the means to compensate for such a sizable defect, which is in line with our empirical evidence.

The paper is organized as follows. Section 2 introduces/discusses the conceptual framework. Section 3 describes the data. Section 4 presents the empirical results. Section 5 provides some robustness checks. Section 6 concludes the paper.

2. Conceptual Framework

We develop a simple model of household income (consumption) and work decisions, where the couple's utility depends on the product of the utilities of each spouse. The model is presented to explore the role of BMI on the labor supply decisions of married couples where both spouses are working. Hence, we directly focus on the interior solution of the optimal labor supply choice.

The couple's utility V is defined as:

$$V = U_i U_j \tag{1}$$

where U_i and U_j are spouses' i and j utilities respectively. Each individual i derives satisfaction from own consumption, which depends on both own income I_i and spouse's income I_j, and from own leisure $(1 - h_i)$ while derives disutility from the spouse's body size (BMI) b_j:

$$U_i = U_i(C_i(h_i, h_j), 1 - h_i, b_j) \tag{2}$$

and U_j is symmetrically defined. U_i is continuously differentiable with its first partial derivatives satisfying the following properties:

$$\frac{\partial U_i}{\partial C_i} > 0, \frac{\partial U_i}{\partial h_i} < 0, \frac{\partial U_i}{\partial b_j} < 0 \tag{3}$$

Its second partial derivatives satisfy:

$$\frac{\partial^2 U_i}{\partial C_i^2} < 0, \frac{\partial^2 U_i}{\partial h_i^2} > 0, \frac{\partial^2 U_i}{\partial b_j^2} > 0 \tag{4}$$

Its second cross-partial derivatives satisfy:

$$\frac{\partial^2 U_i}{\partial C_i \partial h_i} = 0, \frac{\partial^2 U_i}{\partial C_i \partial b_j} = 0, \frac{\partial^2 U_i}{\partial h_i \partial b_j} = 0 \tag{5}$$

Note: Perhaps, it would be more realistic to assume that $\frac{\partial^2 U_i}{\partial h_i \partial b_j} < 0$*, i.e., the marginal utility of leisure decreases with the BMI of the spouse. However, this would reinforce the expected positive effect of BMI on hours of work.*

Each spouse i has two sources of income, earnings $w_i h_i$ and lump-sum income S_i:

$$I_i = w_i h_i + S_i \tag{6}$$

If $(1-\alpha_j)I_i$ is the net amount of individual $i's$ own income after transferring $\alpha_j I_i$ to his/her spouse j to compensate for his/her own BMI b_i, and $\alpha_i I_j$ is similarly the amount received from her spouse j, then

$$C_i(h_i, h_j) = (1-\alpha_j)(w_i h_i + S_i) + \alpha_i(w_j h_j + S_j) \tag{7}$$

The maximization problem of couple's utility faced by each spouse consists of deciding the number of hours of work to increase her/his earnings and compensate the spouse for the disutility associated to her/his own BMI. The FOC's for an interior solution are given by:

$$\frac{\partial V}{\partial h_i} = 0 \tag{8}$$

$$\left[\frac{\partial U_i}{\partial C_i}(1-\alpha_j)w_i + \frac{\partial U_i}{\partial h_i}\right] U_j + \left[\frac{\partial U_j}{\partial C_j}\alpha_j w_i\right] U_i = 0 \tag{9}$$

and similarly for j.

The effect of own BMI b_i on hours of work h_i can be obtained after totally differentiating (9) with respect to h_i and b_i, to obtain the following expression:

$$\boldsymbol{\frac{dh_i}{db_i}} = -\frac{\left[\frac{\partial U_i}{\partial C_i}(1-\alpha_j)w_i + \frac{\partial U_i}{\partial h_i}\right]\boldsymbol{\frac{\partial U_j}{\partial b_i}}}{\frac{\partial^2 U_i}{\partial h_i^2}U_j + 2\left(\frac{\partial U_i}{\partial C_i}(1-\alpha_j)w_i + \frac{\partial U_i}{\partial h_i}\right)\boldsymbol{\frac{\partial U_i}{\partial C_i}\alpha_j w_i}} \tag{10}$$

If $\frac{\partial U_i}{\partial C_i}(1-\alpha_j)w_i + \frac{\partial U_i}{\partial h_i} \geq 0$, then $\frac{dh_i}{db_i} \geq 0$. In words, if the marginal increase in utility due to an *increase in own consumption* because of an increase in labor supply is higher or equal to the marginal decrease in utility due to an *increase in labor supply*, the higher is the BMI of spouse i, the higher is his/her labor supply.

Note: If $\frac{\partial U_i}{\partial C_i}(1-\alpha_j)w_i + \frac{\partial U_i}{\partial h_i} \leq 0$ *and* $\frac{\partial^2 U_i}{\partial h_i^2}U_j + 2\left(\frac{\partial U_i}{\partial C_i}(1-\alpha_j)w_i + \frac{\partial U_i}{\partial h_i}\right)\frac{\partial U_i}{\partial C_i}\alpha_j w_i \leq 0$, *then* $\frac{dh_i}{db_i} \geq 0$.

Notice that the magnitude of the effect depends, among other things, on both w_i and $\frac{\partial U_j}{\partial b_i}$.

- For high-wage individuals, the effect of BMI on hours of work is smaller.
- The higher is the disutility that the individual inflicts to his/her spouse, the higher is the effect of BMI on hours of work. However, when $\frac{\partial U_j}{\partial b_i} \to -\infty$, the required increase in hours of work is too big to be feasible, $\boldsymbol{\frac{dh_i}{db_i} \to \infty}$: there is no possible compensation.

Results section: Our empirical analysis suggests that the disutility derived by men from spousal BMI is much bigger than that derived by women. In particular, we cannot reject that $\frac{\partial U_{men}}{\partial b_{woman}} \to -\infty$, $\frac{\partial U_{woman}}{\partial b_{man}} = -c < -\infty$, *as we do find a positive association between BMI and hours worked for men, but not for women: there is no feasible compensation that heavier women can make to their spouses.*

Note: An easy extension to this model consists in allowing wages to be a direct function of BMI, $w_i(b_i)$*, following the literature on the effects of BMI on wages, or to allow for labor supply constraints with respect to BMI. However, the results in the robustness checks section reject statistical significant relationships between wages and BMI for both men and women.*

3. Data Description

Estimation is carried out on data from the Panel Study of Income Dynamics (PSID). The PSID is a longitudinal household survey collecting a wide range of individual and household demographic, income and labor market variables. Additionally, in the survey year 1986, and in all the most recent waves since 1999 (1999, 2001, 2003 and 2005), detailed information on weight and height of both heads and wives is available, which we use to construct measures of body mass index (BMI) for each spouse or unmarried head. The BMI is defined as the ratio of weight in kilograms to height in meters squared. Weight and height are originally reported in pounds and inches, respectively, in the PSID.

In the PSID all the variables are reported by the head of the household, including the information on the wife. Although it is well-known that self-reported anthropometric measures are likely to suffer from measurement error, the error seems to be constant for the 25-55 age group according to the analysis in Thomas and Frankenberg (2000) and Ezzati et al. (2006). However, notice that in the PSID the household head is reporting both his own and his wife's height and weight. Hence, it may not be appropriate to rely on the above measurement error findings. We will discuss the implications of this feature in the robustness checks section.

Our main sample consists of white married couples with wives being between 25 and 40 years old, the age group for which the effects of *physical appearance* (proxied by body size or weight) on economic outcomes should be more relevant. A couple consists of the head and his wife. We include intact couples only if both the head and the wife are actually present. In our sample years, all the married heads with spouse present are males and the wives are females. We also consider the corresponding samples of white unmarried male and female heads as comparison groups. Unmarried individuals are those who are divorced, separated, widowed, or have never been

married. In our analysis we exclude individuals who are cohabiting.

We run regressions of male and female labor market outcomes (hours of work, earnings and wages) separately by gender and marital status, controlling for individual characteristics (and for spousal characteristics too when looking at married individuals). Our dependent variables are, specifically, the log of annual hours worked, the log of labor income, and the hourly log wage rate.

The other regressors are age and education of head, and of wife when appropriate, education being defined as number of completed years of schooling, and top-coded at 17 for some completed graduate work, number of children in the household under 18 years of age. In some specifications, log income variables include the individual and/or the spouse's wage rate and household non-labor income. The latter is constructed as total family income minus the labor income of each spouse (or of the unmarried head). An alternative measure of non-labor income using the spouses' taxable income minus their labor incomes yields comparable estimates. From the health status originally recorded by the PSID as a 5-category variable (from excellent to poor health), we create a dummy variable for being in good health (1 if excellent, very good, or good; 0 if fair or poor). We also create dummy variables for occupation categories (professional-managerial; service; sales; farmers; crafts; transportation; military). State fixed effects are included to capture constant differences in labor and marriage markets across geographical areas in the US.

Our main samples consist of working men and women. We focus on couples where both husbands and wives are working because we want to analyze compensation effects for body size that arise in terms of labor supply decisions of both husbands and wives, and of those who are actually matched to each other, as socioeconomic characteristics of each spouse matter. Since our main predictions concern hours worked and labor income, at this stage we prefer not to include non-working individuals and

labor force participation decisions related to BMI, since we do not wish to confound income and compensation effects in our estimation.

We exclude observations from the top and bottom 1% of the labor income, hours and wage distributions. We also discard the couples and individuals with extreme values of height and weight following Conley and Glauber (2007) in their analysis using PSID data. Thus, we exclude observations where the weight of an individual/spouse is greater than 400 pounds or less than 70, and height greater than 84 inches or less than 45 inches. Finally, household weights are used.

Table 1 presents the descriptive statistics of the main variables for husbands, wives, unmarried male heads and unmarried female heads. On average, wives are younger, less educated, earn lower income and work fewer hours than their spouses. Their BMI is lower than their husbands. It is interesting to compare the body size of married individuals to unmarried. Unmarried women have a higher BMI than married women, while for men the opposite happens, which suggests a marriage market penalty for female body size that is not present for men. Unmarried men (women) work fewer hours, earn less income and are older than married men (women).

[Table 1 about here]

4. Results

Table 2 presents the results of several regressions where the dependent variable is the male log annual hours of work (our measure of labor supply), separately for married and unmarried men.

All the columns show a positive significant correlation between BMI and hours worked by married men, whereas for unmarried men the coefficient does not achieve statistically significance in any of the regressions. All specifications control for state fixed effects, while they differ on the characteristics of the individual and/or of the spouse that are included. The first column already shows a significant positive correlation between husbands' BMI and labor supply. Column (2) adds the individual's age, completed education level as well as the number of children in the household. The following columns add controls for health, wage and household non-labor income, along with the corresponding spousal characteristics. Finally, column (6) refers to the specification including occupation dummies as well. Heavier husbands, on average, tend to work more hours. Moreover, this correlation persists and exhibits comparable magnitudes when accounting for individual and spousal characteristics.

Husbands' labor supply is explained mainly by their BMI, which appears to be its most significant predictor, and by his wage and household non-labor income. Conversely, the labor supply of unmarried men does not exhibit any significant relationship with their BMI, and seems to be explained mainly by the individual age, education, number of children, and non-labor income.

[Table 2 about here]

These results point toward a positive relationship between BMI and labor supply, only for married men. This positive significant effect of BMI on hours worked is robust and present in all the specifications. Men seem responsive to their BMI and willing to alter their labor supply behavior only within marriage. This could be reflecting a compensation mechanism across own individual characteristics, so that a defect is compensated with a quality. Everything else being equal, if a male individual is heavier (has a higher BMI), he may work more hours and earn more to compensate for the poor physical trait and still match with a decent spouse. It seems that heavier husbands with higher labor supply can match to wives comparable to those of thinner husbands, ceteris paribus.

The estimates presented so far do not represent yet conclusive evidence of a marriage market compensation effect between BMI and income of heavier husbands, as higher labor supply does not necessarily mean higher earnings. We now turn to analyze how men's labor income responds to BMI, to test if indeed husbands' labor supply behavior responds to marriage market incentives, as higher disposable income available to the wife may make heavier husbands more attractive in the marriage market.

Table 3 presents the corresponding regression results where the dependent variable is now male earnings, separately for married and unmarried men. The results are qualitatively the same as in the labor supply regressions. Interestingly, the BMI of married men exhibits a positive significant impact on their earnings, across all the specifications. The number of children is a very strong predictor of male earnings for unmarried men. Importantly, there is also a negative significant relationship between the wife's BMI and the husband's labor income, consistent with the marriage market penalties of body size found by Averett, Sikora and Argis (2008) and Oreffice and Quintana-Domeque (2009).

[Table 3 about here]

Tables 4 and 5 display the estimates from labor supply (log annual hours of work) and earnings regressions for women by marital status.

[Table 4 about here]

[Table 5 about here]

If we compare the female estimates to those for men, the most striking finding is that now BMI is not related to either labor supply or earnings. This suggests that either male's preferences for thin women are much stronger than those of women for thin men, or that heavier women are subject to labor market constraints which have not been accounted for in our theoretical framework. Next section will try to disentangle which of these two explanations is more likely.

We also find that married women with children work fewer hours and earn less money, but that this is not the case for those who are unmarried. Also, the wage (positive) substitution and the income (negative) effects on hours of work are significant for unmarried women, but not for those who are married. Finally, the returns to education (in terms of earnings) are very similar for both married and unmarried women.

Overall, our findings suggest a potentially new channel through which BMI affects income, specifically for men. We show that heavier husbands work more hours and earn more income than thinner ones, to compensate their spouse for their poor physical trait. No such positive relationship is found for unmarried individuals or for wives. This evidence may contribute to a better understanding of the relationship between BMI and income, which has been extensively analyzed in the literature for both men and women, without reaching a consensus on the actual effects for men (for women a negative relationship is found in most studies). Some studies have found a positive association between income (earnings) and BMI for men (e.g. Garcia Villar and Quintana-Domeque, 2009), and this may be explained by the interaction effects of BMI and marital status on earnings, through an increase in labor supply due to a compensation mechanism.

Our results are consistent with the male marriage premium literature. Married male workers are found to earn more money, by working more hours, being in higher paying jobs and having better career paths (Goldin, 1990; Grey, 1997; Korenman and Neumark, 1991). Our evidence of a positive significant impact of being married on male labor supply and earnings reflects this premium; however, our focus is on the more specific role of having a higher BMI as a reason why married men work/earn more, to

compensate their spouse for their own defect with better economic standards of living.

We argue that BMI has a positive effect on hours of work for married men, even after acknowledging that hours of work may have an effect on BMI, mainly due to time constraints (to exercise and to prepare -and eat- healthy food). First, individuals working more hours may have less time to ***exercise***, which is likely to be associated with having a higher BMI (Loh, 2009; Ruhm, 2005), and this effect may be reinforced when working in a ***sedentary job*** (when the job is sedentary (or less physically demanding), higher labor supply is found to have a positive effect on male weight (Lakdawalla and Philipson, 2007)). Second, individuals working more hours may ***consume more highly-caloric food*** (convenience food, fast food, eating out) to economize on the scarcity of their time, thus leading to higher BMI (Chou et al., 2002). However, these phenomena should not represent an alternative explanation to our findings of a positive significant relationship between marital status, BMI and labor supply (earnings) of men. Our evidence of a marriage market compensation for obesity shows a positive labor supply effect only for married men, rather than for unmarried men as well, and women, which is hard to reconcile with the above reverse causality argument, which is in principle gender and marital status neutral, especially when we are comparing unmarried with married individuals where both spouses are working. Indeed, none of these studies distinguish between differential effects of weight on labor supply depending on marital status. More surprisingly, they do not seem to hint to marital status being relevant for their analysis of labor supply and weight. In this perspective, our contribution is complementary to the literature, suggesting a marriage market mechanism through which BMI has a positive effect on labor supply and earnings of married men, which has been overlooked so far.

5. Robustness checks

5.1. BMI and Wages

In our conceptual framework we assumed that the wage rate was not a function of BMI, which may seem at odds with the empirical evidence documenting a negative association between BMI and wages for women, and a sometimes positive one for men. We explore the validity of this assumption here. Tables 6 and 7 present a series of wage regressions where the dependent variable is the log of hourly wage for men and women, respectively, by marital status.

[Table 6 about here]

[Table 7 about here]

None of the male and female regressions show a significant relationship between wages and BMI. This may suggest that it is men's strong ***preferences*** for thin women which make it impossible for heavier women to compensate men with higher earnings, i.e., $\frac{\partial U_{men}}{\partial b_{woman}} \to -\infty$ versus $\frac{\partial U_{woman}}{\partial b_{man}} = -c$, rather than ***labor market*** constraints faced by women themselves.

5.2. Unmarried individuals and "married vs. never married" DID

Focusing on only never married individuals rather than unmarried (never married, divorced, separated, widowed) does not modify our findings.

Our results are also robust to estimation by means of a difference-in-differences approach. Two kind of models were considered: (1) a dummy of marital status (married versus never married), BMI, and an interaction between the marital status dummy and BMI plus individual characteristics; (2) rather than using a dummy of marital status (married versus never married), we replace the dummy by the spouse's characteristics

whenever possible (for never married individuals each of the spouse variable takes the value of zero), BMI, and an interaction between the marital status dummy (as defined previously in (1)) and BMI plus individual characteristics. The results from both types of models (not reported here but available upon request) show a positive statistically significant effect of the interaction term only for men: *heavier married men work more hours*.

5.3. Alternative anthropometric measures

We have focused on BMI as our comprehensive measure of body size and physical attractiveness. We can also disentangle the weight component present in the BMI and run our regression specifications controlling separately for the two anthropometric traits of weight and height. The corresponding estimates yield the same pattern of positive significant relationships between weight and hours worked (earnings) of married men, while no effects of weight on hours/earnings are found for unmarried men or women.

5.4. Measurement error in BMI

In principle we can adjust the husband's self-reported anthropometric variables (Cawley, 2004), but it is not clear what we can do with wife's anthropometric variables which are reported by the husband. Perhaps, we can assume that they are measured with classical measurement error. This is an issue we are still working on.

5.5. Earlier years

Our findings are robust to considering earlier years in the PSID sample as our period of reference. For instance, samples of married and unmarried men and women in 1986 (the earliest survey year in which the information on weight and height was collected in the PSID) exhibit the same positive significant relationships between BMI and hours worked (earnings) of married men, while no effects of weight on hours/earnings are found for unmarried men or women.

5.6. Sorting and selection into marriage

Finally, the role of sorting and selection into marriage should be discussed in light of our findings. In our current analysis, we do not account for selection bias. However, we argue that, if anything, ***those individuals married to heavier spouses should have a lower distaste for their spouse's BMI***. Therefore, if there is such a positive relationship between husband's BMI and earnings, it should be found without accounting for sample selection. Our initial guess is that controlling for selection into marital status should decrease the effect of BMI on hours of work. To understand why, notice that the average BMI is higher for married men than for unmarried men, while it is lower for married women than for unmarried women. Given these means, and assuming that ***own BMI is negatively related to distaste for the spouse's BMI,*** married men should have a lower distaste for heavier women than those who are unmarried, while unmarried women should have a lower distaste for heavier men than those who are married. The counterfactual marginal disutility should be $\frac{\partial U_{men}}{\partial b_{woman}} \to -\infty, \quad \frac{\partial U_{woman}}{\partial b_{man}} = -d,$ with $d < c$. Hence, ceteris paribus accounting for selection into marital status should decrease the effect of BMI on hours of work.

6. Conclusions

We examine a marriage market mechanism through which body size (BMI) and labor supply and earnings may be positively related for married individuals, analyzing the extent to which spouses trade-off anthropometric (BMI) and economic characteristics, using income to compensate for their poor physical trait (high BMI). We investigate whether this compensation exists, estimate its magnitude and assess whether it varies by gender. Using data from the Panel Study of Income Dynamics (PSID) on heads and wives from 1986 to 2005, and on unmarried male and female heads as comparison groups, we find that the marriage market reinforces the negative effects of weight by inducing heavier married men to work more hours and earn more income to compensate their spouses for their defect. No relationship is found for wives, and unmarried individuals.

These findings represent the first study analyzing the effects of marriage market forces on the relationship between BMI, labor supply and earnings. We also highlight an additional aspect of the actual marriage market impact that body size have on individuals, showing that female weight plays a more relevant role in the marriage market than men's. Indeed, only married men, whose weight is less valuable in the couple than the female one, achieve to compensate their spouse by working more and earning more income.

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TABLES

Table 1: Descriptive Statistics – Means and (Standard Deviations), PSID 2005.

	Married		Unmarried	
	Husband	Wife	Male	Female
Hours of work (annual)	2,266	1,713	2,000	1,856
	(579.1)	(717.1)	(677)	(617)
Labor income (annual)	48,414	30,273	38,365	31,630
	(27,007)	(19,917)	(29,035)	(23,452)
BMI	27.89	25.65	26.86	27.29
	(4.39)	(6.11)	(4.43)	(6.71)
Age	34.85	32.76	39.93	43.90
	(6.07)	(4.49)	(13.55)	(14.30)
Education	13.62	14.11	13.54	13.50
	(2.33)	(2.19)	(2.33)	(2.31)
Children	1.38		.11	.42
	(1.09)		(.42)	(.84)
Good Health	.97	.96	.91	.87
	(.17)	(.20)	(.29)	(.34)
Hourly wage	21.83	17.87	19.23	16.59
	(11.64)	(9.91)	(12.38)	(10.47)
Non-labor income (annual)	5,035.2		9,709.0	13,618
	(1,855.4)		(2,234.3)	(35,438)

Note: Family weights are used.

Table 2: Determinants of male labor supply (log of annual hours of work). PSID 2005.

	(1)		(2)		(3)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	–.006	.008***	–.004	.007**	–.004	.007*
	(.006)	(.003)	(.006)	(.003)	(.006)	(.003)
Age	--	--	–.004**	.001	–.004*	.001
			(.002)	(.005)	(.002)	(.004)
Education	--	--	.031***	–.007	.029**	–.008
			(.012)	(.007)	(.012)	(.006)
Number of Children	--	--	.093***	.004	.099***	.003
			(.032)	(.011)	(.034)	(.011)
Good Health	--	--	--	--	.089	.137
					(.077)	(.115)
Log(hourly wage)	--	--	--	--	--	--
Log(non-labor income)	--	--	--	--	--	--
Wife's BMI	--	--	--	–.003	--	–.003
				(.003)		(.003)
Wife's Age	--	--	--	.008	--	.008
				(.005)		(.005)
Wife's Education	--	--	--	–.007	--	–.007
				(.007)		(.007)
Wife's Good Health	--	--	--	--	--	.002
						(.075)
Wife's Log(hourly wage)	--	--	--	--	--	--
Occupation dummies?	NO	NO	NO	NO	NO	NO
Wife's occupation dummies?	--	NO	--	NO	--	NO
R^2	.10	.09	.13	.09	.14	.10
N	494	783	473	674	473	674

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 2 (cont'): Determinants of male labor supply (log of annual hours of work). PSID 2005.

	(4)		(5)		(6)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	–.004	.007**	–.005	.006*	–.004	.006*
	(.006)	(.003)	(.006)	(.003)	(.006)	(.003)
Age	–.003*	.001	–.003	.002	–.003	.002
	(.002)	(.005)	(.002)	(.005)	(.002)	(.005)
Education	.030**	–.004	.031**	–.003	.024*	–.003
	(.013)	(.007)	(.013)	(.007)	(.014)	(.008)
Number of Children	.101***	.004	.111***	.004	.119***	.005
	(.034)	(.010)	(.035)	(.011)	(.036)	(.011)
Good Health	.089	.139	.094	.135	.097	.131
	(.076)	(.116)	(.077)	(.116)	(.077)	(.116)
Log(hourly wage)	–.022	–.055	–.022	–.063*	–.049	–.065*
	(.042)	(.036)	(.042)	(.036)	(.043)	(.036)
Log(non-labor income)	--	--	–.012**	–.007*	–.013**	–.008**
			(.006)	(.004)	(.006)	(.004)
Wife's BMI	--	–.004	--	–.004	--	–.004
		(.003)		(.003)		(.003)
Wife's Age	--	.008*	--	.009*	--	.008
		(.005)		(.005)		(.005)
Wife's Education	--	–.006	--	–.006	--	–.015*
		(.007)		(.007)		(.008)
Wife's Good Health	--	.004	--	–.002	--	–.011
		(.075)		(.007)		(.079)
Wife's Log(hourly wage)	--	.008	--	.007	--	.006
		(.023)		(.024)		(.025)
Occupation dummies?	NO	NO	NO	NO	YES	YES
Wife's occupation dummies?	--	NO	--	NO	--	YES
R^2	.14	.10	.15	.11	.18	.14
N	473	674	471	670	471	670

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 3: Determinants of male earnings (log of annual labor income). PSID 2005.

	(1)		(2)		(3)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	–.001	–.001	–.001	.014***	–.001	.013***
	(.008)	(.005)	(.008)	(.005)	(.008)	(.005)
Age	--	--	.002	.008	.003	.009
			(.003)	(.007)	(.003)	(.007)
Education	--	--	.087***	.062***	.085***	.061***
			(.019)	(.012)	(.019)	(.012)
Number of Children	--	--	.160***	.015	.165***	.013
			(.062)	(.020)	(.062)	(.020)
Good Health	--	--	--	--	.086	.178
					(.121)	(.173)
Log(non-labor income)	--	--	--	--	--	--
Wife's BMI	--	--	--	–.016***	--	–.015***
				(.004)		(.004)
Wife's Age	--	--	--	.020**	--	.020**
				(.009)		(.009)
Wife's Education	--	--	--	.011	--	.011
				(.013)		(.013)
Wife's Good Health	--	--	--	--	--	.101
						(.106)
Occupation dummies?	NO	NO	NO	NO	NO	NO
Wife's occupation dummies?	--	NO	--	NO	--	NO
R^2	.12	.09	.18	.25	.19	.25
N	494	783	473	674	473	674

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 3 (cont'): Determinants of male earnings (log of annual labor income). PSID 2005.

	(4)		(5)	
	Unmarried	Married	Unmarried	Married
BMI	–.002	.011**	–.000	.011**
	(.008)	(.005)	(.008)	(.005)
Age	.004	.010	.003	.010
	(.003)	(.007)	(.003)	(.007)
Education	.085***	.064***	.048**	.055***
	(.020)	(.012)	(.023)	(.014)
Number of Children	.175***	.014	.199***	.020
	(.063)	(.020)	(.066)	(.020)
Good Health	.092	.164	.082	.182
	(.120)	(.168)	(.116)	(.167)
Log(non-labor income)	–.011	–.021***	–.013	–.021***
	(.010)	(.006)	(.010)	(.006)
Wife's BMI	--	–.015***	--	–.014***
		(.004)		(.004)
Wife's Age	--	.022**	--	.021**
		(.009)		(.009)
Wife's Education	--	.010	--	–.001
		(.013)		(.014)
Wife's Good Health	--	.079	--	.083
		(.107)		(.106)
Occupation dummies?	NO	NO	YES	YES
Wife's occupation dummies?	--	NO	--	YES
R^2	.19	.27	.26	.29
N	471	670	471	670

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 4: Determinants of female labor supply (log of annual hours of work). PSID 2005.

	(1)		(2)		(3)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	.002	–.003	.003	–.002	.003	.002
	(.003)	(.006)	(.003)	(.006)	(.003)	(.006)
Age	--	--	–.004**	.006	–.004**	.008
			(.002)	(.011)	(.002)	(.011)
Education	--	--	.014	–.007	.013	–.010
			(.008)	(.021)	(.008)	(.021)
Number of Children	--	--	–.024	–.168***	–.025	–.169***
			(.020)	(.027)	(.020)	(.027)
Good Health	--	--	--	--	.004	.079
					(.060)	(.235)
Log(hourly wage)	--	--	--	--	--	--
Log(non-labor income)	--	--	--	--	--	--
Husband's BMI	--	--	--	.002	--	.001
				(.007)		(.007)
Husband's Age	--	--	--	–.004	--	–.003
				(.008)		(.008)
Husband's Education	--	--	--	–.020	--	–.021
				(.018)		(.017)
Husband's Good Health	--	--	--	--	--	.457
						(.198)
Husband's Log(hourly wage)	--	--	--	--	--	--
Occupation dummies?	NO	NO	NO	NO	NO	NO
Husband's occupation dummies?	--	NO	--	NO	--	NO
R^2	.07	.09	.09	.15	.09	.17
N	683	783	652	674	651	674

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 4 (cont'): Determinants of female labor supply (log of annual hours of work). PSID 2005.

	(4)		(5)		(6)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	.003	–.000	.002	–.001	.002	–.000
	(.003)	(.006)	(.003)	(.006)	(.003)	(.006)
Age	–.006***	.009	–.004**	.010	–.005***	.012
	(.002)	(.011)	(.002)	(.011)	(.002)	(.010)
Education	–.003	–.013	.006	–.016	.001	–.035
	(.009)	(.023)	(.009)	(.021)	(.009)	(.026)
Number of Children	–.029	–.164***	.003	–.166***	–.009	–.173***
	(.020)	(.027)	(.021)	(.027)	(.022)	(.098)
Good Health	–.008	.085	–.024	.081	–.022	.131
	(.060)	(.231)	(.059)	(.231)	(.058)	(.227)
Log(hourly wage)	.203***	.074	.183***	.087	.145***	.031
	(.043)	(.075)	(.041)	(.076)	(.045)	(.081)
Log(non-labor income)	--	--	–.025***	–.006	–.023***	–.007
			(.005)	(.008)	(.005)	(.008)
Husband's BMI	--	.002	--	.001	--	–.000
		(.007)		(.007)		(.007)
Husband's Age	--	–.001	--	–.001	--	–.003
		(.007)		(.007)		(.007)
Husband's Education	--	–.009	--	–.023	--	–.001
		(.017)		(.017)		(.019)
Husband's Good Health	--	.452**	--	–.439**	--	–.403**
		(.200)		(.202)		(.197)
Husband's Log(hourly wage)	--	–.202***	--	–.214***	--	–.200***
		(.071)		(.074)		(.073)
Occupation dummies?	NO	NO	NO	NO	YES	YES
Husband's occupation dummies?	--	NO	--	NO	--	YES
R^2	.15	.18	.19	.17	.23	.23
N	651	674	651	670	651	670

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 5: Determinants of female earnings (log of annual labor income). PSID 2005.

	(1)		(2)		(3)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	.003	–.016**	.003	–.007	.003	.000
	(.006)	(.008)	(.006)	(.008)	(.006)	(.007)
Age	--	--	.003	.020	.003	.023
			(.003)	(.013)	(.003)	(.013)
Education	--	--	.094***	.085***	.092***	.080***
			(.014)	(.026)	(.014)	(.025)
Number of Children	--	--	–.001	–.203***	–.003	–.205***
			(.032)	(.033)	(.032)	(.033)
Good Health	--	--	--	--	.064	.112
					(.108)	(.271)
Log(non-labor income)	--	--	--	--	--	--
Husband's BMI	--	--	--	.008	--	.006
				(.010)		(.009)
Husband's Age	--	--	--	–.005	--	–.003
				(.009)		(.009)
Husband's Education	--	--	--	.006	--	.006
				(.022)		(.021)
Husband's Good Health	--	--	--	--	--	.804***
						(.217)
Occupation dummies?	NO	NO	NO	NO	NO	NO
Husband's occupation dummies?	--	NO	--	NO	--	NO
R^2	.11	.10	.19	.20	.19	.23
N	683	783	652	674	651	674

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 5 (cont'): Determinants of female earnings (log of annual labor income). PSID 2005.

	(4)		(5)	
	Unmarried	Married	Unmarried	Married
BMI	.002	–.000	.000	.001
	(.006)	(.007)	(.005)	(.007)
Age	.006**	.022*	.004	.029**
	(.003)	(.013)	(.003)	(.011)
Education	.105***	.083***	.044***	.041
	(.014)	(.025)	(.014)	(.030)
Number of Children	.053	–.205***	.030	–.209***
	(.036)	(.033)	(.035)	(.033)
Good Health	.034	.109	.014	.192
	(.102)	(.272)	(.091)	(.270)
Log(non-labor income)	–.044***	–.014	–.034***	–.013
	(.009)	(.010)	(.008)	(.010)
Husband's BMI	--	.005	--	.001
		(.009)		(.009)
Husband's Age	--	–.001	--	–.006
		(.009)		(.009)
Husband's Education	--	.004	--	.006
		(.022)		(.024)
Husband's Good Health	--	.785***	--	.674***
		(.219)		(.199)
Occupation dummies?	NO	NO	YES	YES
Husband's occupation dummies?	--	NO	--	YES
R^2	.23	.23	.37	.30
N	651	670	651	670

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 6: Determinants of male's hourly wage (log of hourly wage). PSID 2005.

	(1)		(2)		(3)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	.003	–.000	.003	–.001	.004	.001
	(.008)	(.004)	(.008)	(.004)	(.008)	(.004)
Age	.006***	.014***	.006***	.014***	.006***	.014***
	(.002)	(.003)	(.002)	(.003)	(.002)	(.003)
Education	.055***	.086***	.055***	.085***	.026	.075***
	(.015)	(.008)	(.015)	(.008)	(.016)	(.011)
Number of Children	.066	.004	.066	.004	.084	.006
	(.056)	(.017)	(.057)	(.017)	(.055)	(.017)
Good Health	--	--	–.003	.065	–.017	.065
			(.108)	(.120)	(.107)	(.114)
Occupation dummies?	NO	NO	NO	NO	YES	YES
R^2	.20	.28	.20	.28	.25	.30
N	473	722	473	722	473	722

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

Table 7: Determinants of female's hourly wage (log of hourly wage). PSID 2005.

	(1)		(2)		(3)	
	Unmarried	Married	Unmarried	Married	Unmarried	Married
BMI	.000	–.005	.001	–.002	–.001	–.004
	(.004)	(.004)	(.004)	(.004)	(.004)	(.004)
Age	.007***	.013***	.008***	.014***	.007***	.016***
	(.002)	(.005)	(.002)	(.005)	(.002)	(.005)
Education	.080***	.111***	.079	.108***	.034***	.093***
	(.011)	(.012)	(.011)	(.011)	(.011)	(.012)
Number of Children	.023	–.038*	.022	–.038*	.021	–.032
	(.024)	(.021)	(.024)	(.021)	(.022)	(.020)
Good Health	--	--	.060	.328***	.037	.307***
			(.081)	(.107)	(.069)	(.108)
Occupation dummies?	NO	NO	NO	NO	YES	YES
R^2	.26	.29	.26	.30	.41	.33
N	652	694	651	694	651	694

Note: Heteroskedastic robust standard errors are reported in parenthesis. All regressions include state fixed effects. Family weights are used. *** (**) [*] Statistical significance at the 1% (5%) [10%].

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