Physical Attractiveness and Household Income:

Trading Height for Education in the Marriage Market

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We analyze to what extent physical attractiveness is related to lifetime economic outcomes through the marriage market, investigating whether individual height and weight affect the probability of marrying with a "high quality partner", measuring quality with the partner's educational attainment. Using a large dataset of Italian couples, we find that taller individuals tend to mate with more educated partners (controlling for the own educational level and other personal traits). This effect is valid both for males and females, but it is more pronounced for males. These findings are robust to a number of checks.

JEL classification: J12; D1; J16; J24.

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1. Introduction

Physical attributes, such as height, weight, beauty, tend to affect directly labor market outcomes of individuals. Hamermesh and Biddle (1994) show that physical attractiveness is a significant determinant of wage levels. Persico, Postlewaite and Silverman (2004), as well as Case and Paxson (2008), find that taller individuals earn higher wages. Averett and Korenman (1996) argue that obese women receive lower earnings.

Physical attributes may affect lifetime economic perspectives also through their impact on the selection of a partner. The physical characteristics that an individual brings to the marriage market influences the outcome on this market, that is, the socio-economic characteristics of the partner he/she mates. Through this channel, the impact of physical attributes on the labor market might be reinforced on the marriage market, with further perverse effects on income inequality and social mobility.

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Using a large Italian dataset of married (and cohabiting) couples – the 2005 Italian Health Conditions Survey which provides information on health conditions, individual characteristics and socio-economic variables – we aim to investigate whether taller and thinner individuals tend to marry with higher educated partners.

Preliminarily, we show that both Body Mass Index (hereafter BMI) and height have an impact on the educational attainment of the partner. Since weight might be endogenously determined, to avoid any estimation bias we estimate a reduced form equation in which predetermined height affects directly and indirectly (through BMI) physical attractiveness and, as a consequence, the choice of a partner with a given educational attainment.

Taking into account the tendency for assortative mating by controlling for the own educational level, we find strong evidence that taller men and women (controlling for a large number of individual and partner characteristics) tend to be married with higher educated individuals.

Our paper is related to a few studies, all for US, showing that physical attributes are important determinants of the partner's economic characteristics. Hamermesh and Biddle (1994) find some evidence that physically unattractive women are married with lower educated husbands. Averett and Korenman (1996) find that obese women are married to husbands earning lower incomes. In contrast, men do not seem to be penalized in terms of wife's education or income if they are less attractive or obese. Oreffice and Quintana-Domeque (2010) show that heavier women are married with less educated husbands, while shorter men are married with less educated wives.

We share some similarities also with some studies on marriage markets and the prevalence of assortative mating (Becker, 1991; Choo and Siow, 2006). Assortative mating along a variety of physical attributes and socio-economic status is well documented in the literature: individuals tend to match with partners with similar attributes in terms of age, race, education, physical appearance (see, among others, Weiss, 1997; Choo and Siow, 2006). In general, positive sorting in mating can arise because of aligned or agreed-upon preferences – whereby everyone values the same attributes ("vertical mate preferences") – or people's preferences for partners who are similar to themselves along various characteristics ("horizontal preferences") or, alternatively, because of search frictions, independent of preferences, since people tend to meet (at school, college, job and so on) individuals who are similar to themselves.

A more recent bunch of papers investigates partner selection and the nature of mating preferences through on-line dating services: Fisman, Iyengar, Kamenica and Simonson (2006); Hitsch, Hortacsu and Ariely (2010); Belot and Francesconi (2010); Lee (2009). These studies show that individuals typically consider a large number of traits when choosing a mate but emphasize the relevance of physically observable attributes such as age, height and weight on desirability and on mate selection.

Belot and Francesconi (2010) find that both women and men value physical attributes: women prefer men who are tall, while men are more attracted to women who are slim. Partner's education and occupation have also an impact on desirability of both men and women. The authors find evidence of positive assortative preferences in that men and women prefer partners of similar age, height, and education. Finally, exploiting the fact that search frictions in online dating markets are minimal, they argue that meeting opportunities play a dominant role in determining matching.

Fisman et al. (2006) analyzing a sample of 400 students at Columbia University find that men put more attention on physical attractiveness while women respond more to intelligence and exhibit a preference for men who grew up in affluent neighborhoods. They find some evidence of positive sorting, with male subjects valuing women's intelligence or ambition only if it does not exceed their own.

Hitsch, Hortacsu, and Ariely (2009) use data from a major on-line dating service in Boston and San Diego to analyze how individual characteristics affect the likelihoods of being contacted. Looks and physique are important determinants of preferences: men and women have a stronger preference for mates with "above average" looks. Women have a preference for tall men, while men typically avoid tall women and have a strong distaste for women with a large BMI. Women place about twice as much weight on income than men. Regarding education, women have an overall strong preference for an educated partner. They also find that in on-line dating assortative mating arises in the absence of search frictions, due primarily to preferences and they conclude that sorting in marriages is not due to search frictions.

Lee (2009) also uses data from an on-line dating service in Korea, finding more sorting along age and less sorting along socio-economic attributes among daters than among individuals in the general population, and argues that on-line dating services may alleviate constraints on people's choice sets. Lee finds that both men and women prefer someone who possesses income and attractiveness in abundance, regardless of their own traits, while individuals prefer marrying a person who is similar to themselves in terms of age, height, religion, geographical location, and the industry in which one works.

The paper is organized as follows. Section 2 describes the dataset we use and presents summary statistics for our sample. In Section 3 we show the empirical results. Section 4 carries out some robustness exercises. Section 5 concludes.

2. The Data

The dataset we use for our empirical analysis is the latest available wave (2004-2005) of the Italian Health Conditions Survey provided by the Italian National Statistical Office (ISTAT). This survey is conducted on a nationally representative sample of 50,474 households for a total of 128,040 individuals and provides information on health conditions, individual and socio-economic characteristics. All household members have been interviewed. Individuals were also asked to evaluate their height and weight, in addition to standard socio-economic information (age, gender, education, marital status, health conditions, household wealth).

We restrict our sample to individuals who are currently married or cohabiting, when both partners are present (to gather individual information on each of them), whose age is between 25 and 60 years old. We discard all the other individuals not in a couple. This leaves us with a sample of 40,012 observations (20,006 for gender).

Summary statistics of the main variables used in the analysis are separately reported for females and males in Table 1. Males tend to be older than females, 45.6 against 42.4. Females and males have almost the same level of education (10.3 and 10.2 years of education, respectively, for females and males).[1] Average height is 162.8 centimeters for females and 174.1 for males. Body Mass Index (BMI)[2] is 23.8 for females, while BMI is 26.2 for males.

Table 1. Descriptive Statistics

Panel A. Summary Statistics

Females

Variable	Obs	Mean	Std. Dev.	Min	Max
Education (years)	20006	10.336	3.977	0	21
Height	20006	162.832	6.024	140	190
Age	20006	42.363	8.472	25	60
BMI	20006	23.789	3.924	15.570	41.914

Males

Variable	Obs	Mean	Std. Dev.	Min	Max
Education (years)	20006	10.248	3.946	0	21
Height	20006	174.083	6.844	137	204
Age	20006	45.584	8.603	25	60
BMI	20006	26.201	3.299	16.406	41.743

Panel B. Correlation among individual traits in couples

	Education	Height	Age	BMI
Correlation Males-Females	0.618	0.266	0.902	0.235

At the bottom of Table 1 we show the degree of correlation of some personal traits among partners. Couples exhibit a strong degree of sorting in age (ρ=0.90) and in years of education (ρ=0.62) suggesting selection of a partner based on similar traits. There is also a positive correlation among partners between height (0.27) and BMI (0.24), although the correlation is less remarkable.

3. Empirical Results

We consider individual height and body mass index as traits that determine physical attractiveness of an individual. Swamy (2008) shows that BMI is fundamental for female physical attractiveness; Wells et al. (2007) argue that BMI is a good proxy for male physical attractiveness; Oreffice and Quintana-

[1] Education (years) is set at zero for no educational qualification; 5 for elementary school; 8 for middle school; 11 for some High School; 13 for High School; 16 for First Level Degree, 18 for Second Level Degree and 21 for postgraduate qualification.

[2] Body Mass Index (BMI) is defined as an individual body weight in kilograms divided by the square of his/her height in meters.

Domeque (2010) point out the validity of BMI as a measure of physical attractiveness for both men and women.

Our aim is to analyze whether a more attractive individual has a higher probability of "marrying up", that is, of mating with a partner with a high educational attainment, given his/her own educational level. We examine the effect of individual height and body mass index on the educational attainment of the partner by estimating the following equation:

$$Partner\_Education_i = \beta_0 + \beta_1 Height_i + \beta_2 BMI_i + \beta_3 Education_i + \beta_4 X_i + u_i \qquad (1)$$

where $Partner\_Education_i$ represents the educational level of i's partner, $Height_i$ and BMI_i represent, respectively, the height and the Body Mass Index of individual *i*, $Education_i$ is the educational level of *i* and X_i is a vector of other demographic and personal traits (age, health problems,[3] geographical areas, city sizes), u_i is an error term capturing idiosyncratic shocks or unobserved individual characteristics.

We preliminarily estimate equation (1). However, whereas height and education are characteristics that are predetermined or typically acquired before marriage, the weight tends to vary in response to several factors. Therefore, since body mass index might be endogenously determined, we exploit the fact that height contributes to determine the body mass index: $BMI_i = f(Height_i)$.

By substituting the latter in (1), we estimate:

$$Partner\_Education_i = \beta_0 + \beta_1 Height_i + \beta_2 f(Height_i) + \beta_3 Education_i + \beta_4 X_i + u_i \qquad (2)$$

in which $Partner\_Education_i$ is some non-linear function of Height. Equation (2) can be thought as a reduced form equation of the impact of Height on partner education, catching both the direct effect of height on desirability and the indirect effect through BMI. However, we take into account the tendency for assortative mating by controlling for the level of education of individual *i*.

We estimate separate OLS regressions for females (Table 2) and males (Table 3) since the level of height considered "optimal" is probably different for men and women and also the impact of height may differ by gender. In the first specification of Table 2 (column 1) we regress the husband educational level on female height and body mass index, controlling for the female's own educational level. Results show that taller women tend to be mated with more educated partners: females 10 centimeters taller are married with males with 0.18 more years of education (*t*-stat=4.88). On the

[3] We include two dummy variables taking into account permanent health problems: *Health Problems* is equal to one if the individual suffers from serious health problems (disability, blindness, deafness and so on) while *Some Health Problems* is set equal to 1 if the individual suffers from less serious health problems.

contrary, females with higher BMI are married with males having lower level of education: one more standard deviation in BMI reduces of 0.29 the educational level of her partner.[4]

Furthermore, we find evidence of strong assortative mating, as the own educational level has a strong impact on the partner educational level (the coefficient is 0.59 and *t*-stat=94.7). Since we are controlling for the female' own level of education, the higher educational attainment of the partner of taller women can be interpreted as due to the direct effect of height.

In column (2) we test for nonlinear effects of height by adding *Height Squared*. Results show that taller women tend to mate with better educated partner, but also that a concave relationship exists between tallness and partner educational attainment, with an optimal level of female height around 169 cm. Females taller than this threshold seem to be less successful on the marriage market.

Table 2. Female Height and Husband's Education. OLS Estimates. Dependent variable: Husband's Education

	(1)	(2)	(3)	(4)	(5)
Height	0.0182***	0.5118***	0.5798***	0.5977***	0.6163***
	(0.0037)	(0.1411)	(0.1424)	(0.1413)	(0.1411)
Height Squared		-0.0015***	-0.0017***	-0.0018***	-0.0018***
		(0.0004)	(0.0004)	(0.0004)	(0.0004)
Body Mass Index	-0.0732***	-0.0725***			
	(0.0058)	(0.0058)			
Education	0.5924***	0.5923***	0.6071***	0.5966***	0.5863***
	(0.0063)	(0.0063)	(0.0061)	(0.0063)	(0.0064)
Age				0.0162***	0.0194***
				(0.0027)	(0.0027)
North-East				0.1169*	0.0804
				(0.0699)	(0.0697)
Centre				0.1064	0.1012
				(0.0734)	(0.0730)
South				-0.0498	0.0253
				(0.0622)	(0.0622)
Islands				-0.2363***	-0.1364*
				(0.0799)	(0.0801)
Some Health Problems				-0.2632***	-0.2488***
				(0.0796)	(0.0792)
Health Problems				-0.5164***	-0.4787***
				(0.1557)	(0.1556)
Height (Husband)					0.0373***
					(0.0034)
Constant	2.8975***	-37.2584***	-45.2410***	-47.8226***	-55.1811***
	(0.6412)	(11.5028)	(11.5937)	(11.5058)	(11.5029)
Observations	20006	20006	20006	20006	20006
Adjusted R-squared	0.388	0.389	0.384	0.393	0.397

Notes: The Table reports OLS estimates. Standard errors (reported in parentheses) are corrected for heteroskedasticity. All regressions include (6) city size dummies. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

[4] We also estimate including – instead of the variable BMI – the dummy "overweight" (equal to one if BMI ranges between 25 and 29) and the dummy "obese" (equal to one if BMI is 30 or over). We find a strong negative effect on the partner's education both for men and women.

In column (3), we omit BMI since, as explained above, it may be endogenously determined, and we exploit only the variations of BMI determined by different levels of height (see equation 2). Results on the strong effect of height on the partner's educational level are confirmed.

In order to avoid biases deriving from the omission of variables related to both height and educational level, in column (4) we include a number of controls for age, health problems, dummies for geographical areas and city size.[5] The impact of height on partner's educational level is confirmed: taller women marry with more educated partner (until 171 cm, corresponding to the 90th percentile: after this level female height influences negatively partner's education). At the sample mean level of female height, 6 cm more (1 SD) of height implies 0.16 more years of education in her husband (*t*-stat=7.36). We also find evidence that individuals with health problems are married with lower educated men and educational levels are lower in southern regions and in small cities.

In column (5) controlling also for husband's height, we find that the latter is highly correlated to male educational level: taller individuals attain more education. Nonetheless, the effect of female height on the husband educational level remains almost unchanged also when we control for the husband's height.

In Table 3 we estimate the same specifications for males, using as dependent variable their wife's educational level. In column (1) we find that taller men marry better educated females, while men with higher BMI are married with women with lower education. Consistent with previous findings in the literature, the negative effect of weight is much lower for males than for females. The effect of height, on the other hand, seems to be more relevant for men. Similar results are obtained in columns (2) and (3), replicating the respective specifications for females.

In column (4), with height in quadratic form and with all the controls, we find that taller men are married with better educated women. The relationship is again concave, increasing until a maximum at 197 cm. At the sample mean of male height, 6 cm more in male height increase the partner's educational level of about 0.26 years of education (*t*-stat=12.92). Therefore, it seems that male height plays a more relevant role in the selection of a highly educated partner. Other findings are similar to the results obtained for females.

In column (5), controlling also for wife's height, we find that the effect of male height on his wife's educational level remains more or less unchanged. Similarly to males, we find that also for females tallness is associated with higher levels of education.

[5] We also tested for nonlinear age effects in each model but we do not find any evidence for them (results not reported).

Table 3. Male Height and Wife's Education. OLS Estimates. Dependent variable: Wife's Education

	(1)	(2)	(3)	(4)	(5)
Height	0.0606***	0.4517***	0.4678***	0.3697***	0.3474***
	(0.0033)	(0.1066)	(0.1065)	(0.1054)	(0.1052)
Height Squared		-0.0011***	-0.0012***	-0.0009***	-0.0009***
		(0.0003)	(0.0003)	(0.0003)	(0.0003)
Body Mass Index	-0.0492***	-0.0488***			
	(0.0067)	(0.0067)			
Education	0.5962***	0.5955***	0.5992***	0.5784***	0.5761***
	(0.0061)	(0.0061)	(0.0061)	(0.0062)	(0.0063)
Age				-0.0621***	-0.0606***
				(0.0027)	(0.0027)
North-East				-0.1764***	-0.1832***
				(0.0684)	(0.0683)
Centre				0.0488	0.0513
				(0.0729)	(0.0728)
South				-0.3342***	-0.3296***
				(0.0621)	(0.0621)
Islands				-0.1478*	-0.1217
				(0.0805)	(0.0806)
Some Health Problems				-0.2097**	-0.2055**
				(0.0832)	(0.0831)
Health Problems				-0.4623***	-0.4581***
				(0.1417)	(0.1416)
Height (Wife)					0.0221***
					(0.0038)
Constant	-5.0277***	-39.0982***	-41.9968***	-28.6359***	-29.9816***
	(0.6027)	(9.2804)	(9.2616)	(9.1812)	(9.1787)
Observations	20006	20006	20006	20006	20006
Adjusted R-squared	0.395	0.395	0.393	0.414	0.415

Notes: See Table 2.

In Figure 1, based on column (4) of Tables 2 and 3, we show the relationship between height and the predicted partner's educational level (for females and males, respectively).

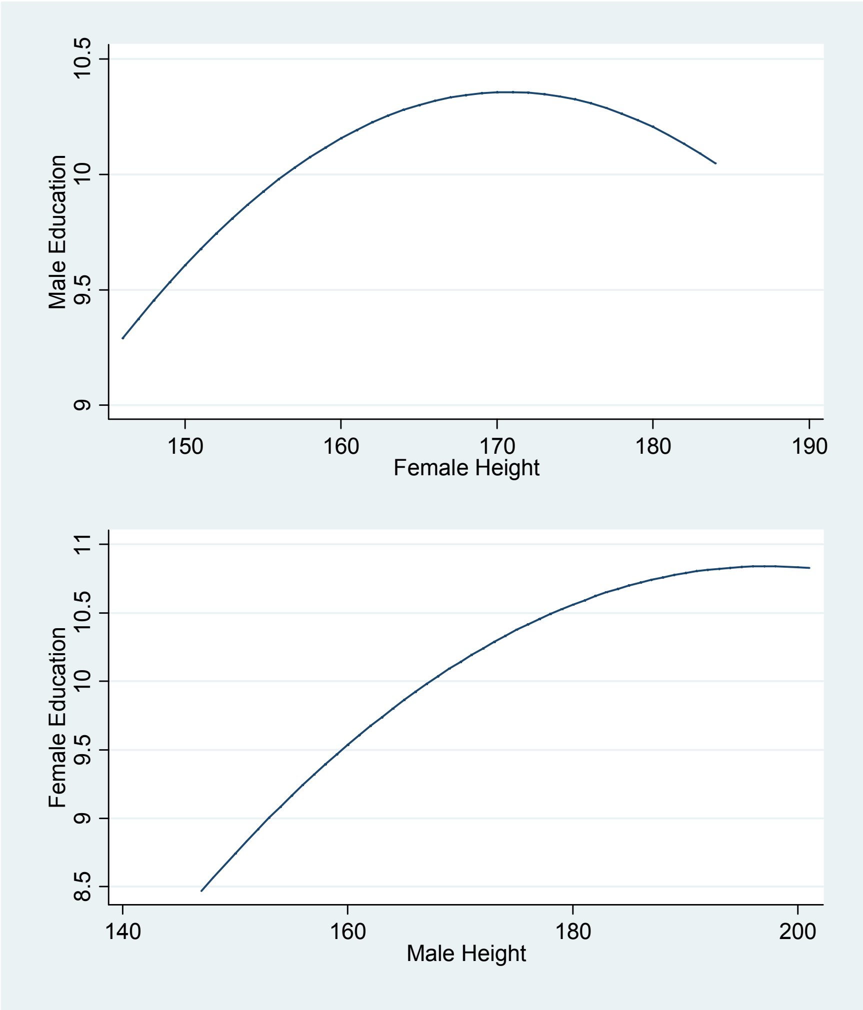

Figure 1. Own Height and Predicted Partner's Education

4. Some Robustness Checks

In order to check the robustness of our results, in this section we firstly consider the partner's educational level as an ordinal variable and we estimate separate ordered probit regressions for women and men of the most complete specification (Tables 2 and 3, col. 4). Results are reported in Table 4.

Ordered Probit estimates show, similar to OLS estimates, that for both females and males an increase in height is associated with a positive and significant increase in the educational attainment of the partner.

Table 4. Own Height and Partner's Education. Ordered Probit Estimates

	(1)	(2)	(3)	(4)
	Husband's Education	Husband's Education	Wife's Education	Wife's Education
Body Mass Index	-0.0282***		-0.0080***	
	(0.0021)		(0.0023)	
Height	0.2029***	0.2305***	0.1492***	0.1510***
	(0.0493)	(0.0496)	(0.0377)	(0.0377)
Height Squared	-0.0006***	-0.0007***	-0.0004***	-0.0004***
	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Observations	20006	20006	20006	20006
Pseudo R-squared	0.163	0.160	0.169	0.168

Notes: see Table 2.

Secondly, to avoid any spurious correlation between the own level of education and the partner's educational level, we estimate four separate regressions, one for each educational level of individual i (primary school; middle school; high school; college or postgraduate qualification). Given the own educational level, we evaluate the impact of own height on the partner educational attainment. Panel (a) of Table 5 shows OLS estimates for females, while panel (b) reports the corresponding estimates for males.

In column (1) we focus on the sample of females with 5 or less years of education: we find that height has an impact on the partner's educational level according to a concave function. This is also true in columns (2), (3), (4), in which we focus, respectively, on females with 8, 13 and 16 (or more) years of education.

The same pattern emerges for men. Men who have reached a given educational attainment are married with higher educated wives if the former are taller.[6] [7]

[6] For females, in column (2) coefficients are marginally significant. Estimating without Height Squared, we find a highly significant effect of Height (t-stat=3.36). For males, in column (4) coefficients on height are not significant. Estimating without Height Squared, we find a highly significant effect of Height (t-stat=2.80).

[7] To evaluate the influence of outliers, we also estimate previous specifications discarding observations for females whose height is below 145 or above 185 centimeters and for males whose height is below 150 or above 200 centimeters (56 observations deleted). The estimation results are almost identical.

Table 5. Separate regressions for each educational level. OLS Estimates.

Panel (a)

	Females (1)	Females (2)	Females (3)	Females (4)
Height	0.7156**	0.3987*	0.6271**	2.0981***
	(0.2880)	(0.2198)	(0.2646)	(0.5468)
Height Squared	-0.0022**	-0.0012*	-0.0018**	-0.0063***
	(0.0009)	(0.0007)	(0.0008)	(0.0017)
Sample	<=5 years of education	8 years of education	11-13 years of education	>=16 years of education
Observations	2959	7360	7438	2249
Adjusted R-squared	0.008	0.018	0.033	0.055

Panel (b)

	Males (1)	Males (2)	Males (3)	Males (4)
Height	0.8311***	0.4922***	0.3808*	0.0111
	(0.2723)	(0.1552)	(0.2256)	(0.4254)
Height Squared	-0.0024***	-0.0013***	-0.0009	0.0001
	(0.0008)	(0.0004)	(0.0006)	(0.0012)
Sample	<=5 years of education	8 years of education	11-13 years of education	>=16 years of education
Observations	2867	7953	7034	2152
Adjusted R-squared	0.035	0.077	0.055	0.030

Notes: See Table 2.

4.1. Partner's Labor Income and Height

Unfortunately, we do not observe directly individuals' labor earnings in the dataset Health Conditions Survey, but we have information on the type of occupation (blue-collar, white-collar, middle manager, professional and so on) and the sector in which one works.

To overcome the problem of missing information on labor income, we use the Survey on Household Income and Wealth (SHIW) of the Bank of Italy (five waves: 2002, 2004, 2006, 2008, 2010) and we calculate the average labor income for each type of job qualification (11), sector (8), geographical residence (5) and gender (2).

Then, we impute to each individual in our sample from the Health Conditions Survey a predicted level of income on the basis of his/her job, sector, geographical area and gender. Income is set to zero for individuals without a job.

We estimate specifications 1, 2 and 4 of Tables 2 and 3 using as a dependent variables the labor income of the partner. Results are reported in Table 6.[8]

[8] We preliminarily verify to what extent the imputed labor earnings are related to an individual level of education: we find that for each year of education, earnings increase of about 6.7%, in line with standard estimates of returns to education, reassuring us that the imputation of income does not produce unreliable results.

Table 6. Own Height and Partner's Labor Income. OLS Estimates

	(1) Husband's Income	(2) Husband's Income	(3) Husband's Income	(4) Wife's Income	(5) Wife's Income	(6) Wife's Income
Height	0.0018*	0.0024**	0.0917**	0.0090***	0.0091***	0.0206
	(0.0010)	(0.0010)	(0.0376)	(0.0014)	(0.0014)	(0.0441)
Height Squared			-0.0003**			-0.0000
			(0.0001)			(0.0001)
Body Mass Index	-0.0084***			-0.0047*		
	(0.0016)			(0.0028)		
	Females	Females	Females	Males	Males	Males
Observations	20006	20006	20006	20006	20006	20006
Adjusted R-squared	0.054	0.053	0.053	0.153	0.153	0.153

Notes: Labor income is imputed on the basis of the SHIW-Bank of Italy dataset. The reported regressions include controls as in Table 2.

Although these estimates are only suggestive because labor income is not predetermined and could be affected by many factors, creating several threats to the internal validity of estimations, we find that taller females and males tend to be married with partners gaining higher labor income, confirming an effect on the desirability of height that represents an asset on the marriage market. On the other hand, female and male individuals with higher body mass tend to mate with partners earning lower incomes.

5. Concluding remarks

We have investigated whether individual attractiveness (measured with BMI and height) affects the choice of a mate with a higher level of education. Our findings suggest that height is a desirable trait in mating selection affecting the partner's socio-economic characteristics: physical attractiveness is exchanged in the marriage market for the ability to earn a high income.

The results also provide evidence of non-linearity in the relationship between height and educational attainment of the partner. These findings are confirmed for both males and females but height seems to be more relevant for males.

Our findings show that heavier and shorter individuals are penalized not only on the labor market but tend to obtain lower economic perspectives also on the marriage market.

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