Wages, intelligence and physical appearance

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Abstract

The paper explores the relation among wages, intelligence and Physical appearance. We find the later to influence the former, but once IQ is accounted for, the effect vanishes, showing that physical appearance may be a signal that actually indicates the cognitive ability possesed by the workers. Small and medium firms, lacking technologies to properly estimate the ability of their applicants, may rely on physical appearance as a substitue. We finnaly disscuse some explanations of the effect found.

JEL code; J3, J7, D3

Introduction

Since the seminal work of Mincer (1974) many economist have regressed wages on different sets of attributes including intelligence (Card, 1992; Arias et. al. 2001; Meghir 2005; Plug 2000), behavioral traits (Bowles, 2001; Kwon et. al. 2001), sibling characteristics and birth order (Dancer, et.at 2004), family influences (Becker 1993; Bound et. al. 1986), gender (Oaxaca, 1973;Blau et. al. 1996; del Rio et. al. 2003), race (Neal, 1996; Heckman 1998), socioeconomic influences (Herrnstein et. al. 1994; Psacharopolous, 2002), health status (Schultz, 1985), public vs. private hiring (Tetaz, 2005a), and so on.

Some scholars have gone even farther. Hamermesh et. al. (1994) found "beauty" to influence wages, Persico et. al. (2004) do the same for "height" but they were not the first; Sargent, et. al. (1994) coupled this with the "obesity effect".

More precisely, Loh et. al. (1993) draw on "The economic effects of physical appearance", but to our knowledge there was no attempt to relate physical attributes to intelligence, and therefore explain why such a premium exist, in a meaningful way.

In this paper we explore the relation between physical appearance and wages. In so doing we will try to find out whether the influence is mediated by cognitive factors.

The paper develops as follow; in the next section we will discusse some theoretical issues in regard to wage settings. Then we will introduce our data base. Section four presents our regressions, the next part is left for disscusing the results. Finnaly we will conclude.

The determination of wages

From a theoretical point of view; wages are settled in the labor market as a result of the interaction between demand and supply of time for working pourposes.

Formally, in a competitive environment there is a demand

$$D = f(\text{Wage; Workers Productivity; Price of the product; etc.}) \quad (1)$$

and a supply

$$S = f(\text{Wage; Amenities of the job; etc.}) \quad (2)$$

Where "Amenities" stands for many non monetary advantages (or disadvantages) asociated with the task due to perform, such as the difficulty of the job, the office environment, the location of the firm, and so on.

As a result, and using the implicit function theorem, we can derive the equilibrium wage as follows

$$W^* = f^*(WP; P; A; \text{etc}) \quad (3)$$

where $(\delta W^*/\delta WP)>0$; $(\delta W^*/\delta P)>0$; $(\delta W^*/\delta A)>$ or < 0, depending on the amenity.

As the reader can realize "Produtivity" is made up of many (some fixed) personal traits, such as ability, education, health status, and in the case of agency problems, personality as well.

Following Mincer original formulation; people would invest in schooling provided that the marginal investment return exceeds (in the equilibrium is equal to) the marginal cost of doing so. If we restrict investment costs to the foregone earnings due to the time spent at schooling, we obtain the, by now, famouse Mincer equation

$$\log(W^*) = \alpha + \beta_1 \text{ Years of schooling} + \beta_2 \text{ Tenure} + \beta_3 \text{ Tenure squared} \qquad (4)$$

where “α” stands for the level of non qualified wage, whereas “β1” is the proportional change in the wage due to one additional year of schooling.

Since Mincer supposed the only cost of schooling was foregone earnings, at the individual level of optimality (from wich we derieved equation 2), “β1” becomes the internal rate of return of one additional year of education.

As Heckman et. al. (2005) have pointed out, if the marginal cost of schooling goes beyond foregone earnings (and it goes indeed), “β1” can no longer be thought as an internal rate of return, but as the mere increment in wages after one additional year of schooling.

Anyway, equation (4) is commonly used in the literature to measure the impact of any change in equation (3), and therefore we will take advantage of that framework here.

The impact of physical appearance

Unfortunatelly there seems to be no place in our formulation to account for the effect of physical appearance on wages.

And we used “seems” because having a closer look at equation 3, we can see that “Amenities” can certainly play a role in the level of wages.

Until now we have supposed that workers effort was not endogenous, but what if it is indeed?.

If this were the case, workers productivity would become endogenous in the following way

Productivity = F(Effort; Ability; Education; Health; Personality; etc.) (5)

In turn, provided that principal has no chance to fully observe the agent level of effort (or she has no acces to incentive instruments, do to Law constraints), there is scope for the agent to decide his level of effort in order to maximize his utility.

Then “effort” may well be fostered giving the workers a better environment. In turn this can be achieved choosing “beauty” peers, so as to raise the exit cost.

Finnaly, to attract the beauty, firms will have to offer them higher wages. The beauty premium being the result of increasing marginally the wage paid to the beauty every time the increase in the cost of that wages is less than the raise in the level of effort excerted by the other workers, times the price of unit of effort, wich correspods with the value of the marginal productivity asociated.

Moreover; if this scenario applies, readers ought to bear in mind that peer’s beautifulness is actually a public good.

On the other hand, and regardless any agengy considerations, it may be the case that workers just consider peer’s beautifulness as an amenity, being therefore willing to supply more time per dollar of wage. As a result firms will marginally pay higher wages to the beauty every time the increase in that bill is less than the sum of the substitution rate between amenities and wages for the other workers (namely, Samuelson’s rule).

Last but not least, physical appearance may not play a role “per se”, but as a signal that shows other personal traits that enters equation 5, such as intelligence or personality, that are not easy to observe straight forward.

For example, while big firms usually have their own human resources department, equipped with the technology needed to somehow measure those traits, small and medium firms may lack that possibility and be obligued to relay on noisy signals.

Physical apearance, in turn, may be correlated with intelligence or personality (Damon et. al., 1996; Gottfredson et. al., 2004; Rushton 2000; Jensen et. al. 1993) so the firms may make wise decisions based on appearance, everything else equal.

In the remainig part of the paper we will see whether the evidence supports any of de preceeding hypothesis.

The data

To our knowledge, there is no data covering cognitive, physical and earnigs aspects at the same time.

To mend that lack of information we run a hosehold survey during the month of april, 2005.

We draw a random sample of 929 subjects covering the area known as "Gran La Plata", namely the cities of La Plata, Berisso and Ensenada. The area is a 600.000 inhabitants located 50 kilometers far from Buenos Aires, the Capital district of Argentina.

To give the readers an idea, La Plata is the Capital of Buenos Aires Province; an administrative city with a big university of almost 100.000 students, whereas Berisso and Ensenada are smaller, but highly industrial.

The survey consisted in 70 cuestions including a short IQ test, years of education, wage per month; tenure; family background; school characteristics; and many usual questions in the literature. On top of that we asked the surveyers (six in total) to provide us with a number ranging from 1 to 10, indicating the physical appearance of the subjects as they show up, before starting the survey. Then, at the end of the interview the surveyers gave another figure, again ranging from 1 to 10, in order to see to what extent they were "well impressed" by the subjects after the interview.

To obtain a comparable measure, we adjusted the wage reported by the subjects when they were working in the formal sector of the economy, since they usually work 11 month a year but perceive 13 wages a year (due to hollydays and complementary anual salary). We did not perform any adjustment to account for pension bonuses, although according to mincer original formulation we should. Briefly, if a worker is promised a pocket wage plus a pension fund when retired, the later is included both in the employer and the employee cost benefit analysis. Unfortunatelly in Argentina there is a mix pension system, and we have no reason to believe that the pension received by the worker when retired is likely to be related to the tax charged by the government, at all. Therefore we are not able to make proper estimations, but we warn the reader to look at our estimates as low bounds of the proper figure.

The IQ test consisted in eight questions (see the methodological apendix), but we droped one due to ambiguity in the legal response (shown to us by an annonimous referee).

With the seven remaining items we performed a factor analysis to find out whether there was a general "latent" factor accounting for the correlations between the items, as described by Spearman (1927). There was no need to rotate the factors since only the first one had a relevant eigenvalue of 1,26 (see Garcia 2004; Cortada de Kohan 1994); the second being of just 0.062.

The results

To begin with, we run (OLS) the usual Mincerian equation (4) using age as proxy of tenure.

Logatithm of the adjusted hourly wage			
Dependent Variables	**Coeficient**	**"t" statistic**	**P>t**
Years of education	0,0511	6.84	0.000
Age	0,0853	7.03	0.000
Age squared	-0,0008	-5.70	0.000
Constant	2,4570	9.91	0.000
Observations	512		
Adjusted R squared	0,2043		

The results are in line with the literature (Psacharopolous op. cit.), though perhaps with a higher than usual prime for tenure.

Now, we add the physical appearance variable in order to see whether there is an impact on wages.

Logatithm of the adjusted hourly wage including physical appearance			
Dependent Variables	**Coeficient**	**"t" statistic**	**P>t**
Years of education	0,0506	6.80	0.000
Age	0,0879	7.24	0.000
Age squared	-0,0009	-5.86	0.000
Physical appearance	0,0292	2.18	0.030
Constant	2,2180	8.21	0.000
Observations	512		
Adjusted R squared	0,2102		

Interestingly enough, every point of physical appearance seems to be rewarded at the market, almost as much as 3/5 the (mincerian) return to one additional year of schooling. Of course, the strength of the relation is rather weak but this can be explained as the result of the low reliability of the proccedure used to measure physical appearance (for reliability and validity, see Cortada de Kohan, 1968).

Finally, we introduce the intelligence factor.

Logatithm of the adjusted hourly wage including physical appearance and a general factor of intelligence			
Dependent Variables	**Coeficient**	**"t" statistic**	**P>t**
Years of education	0,0354	4,67	0.000
Age	0,0756	6,36	0.000
Age squared	-0,0007	-4,98	0.000
Physical appearance	-0,0006	-0,04	0.966
General factor of Intelligence	0,2402	6,19	0.000
Constant	2,8120	10,12	0.000
Observations	512		
Adjusted R squared	0,2643		

As the reader can see from the table above, not only the introduction of “intelligence” as a regressor, increased significantly the R squared, but it ruled out the

effect of physical appearance as well. To give the reader an idea about the size of the effect, one standard deviation of the general factor of intelligence equals 0,78 so the marginal increase in the medium wage due to a one standar deviation in general intelligence is 18,75%.

Of course there was a reduction in the size of the "years of education" coefficient. This effect was broadly discused in the literature (see Rosen 1976, Hartog 2001). Basicaly, it was argued that education achievement worked as a signal, showing the ability of the subjects (Spence 1974), therefore once ability is included in the regressions, part of the effect of education as a signal of that ability, vanishes. Others have replyed (see Heckman et.al. op.cit.) that since education plays a key rol in the determination of intelligence, the introduction of a measure of the later in the regressions, steals the former part of it's effect.

Interesting as it may be, the issue is out of the scope of this paper

On the other hand, the "death" of the "physical appaerance" coefficient, once intelligence was accounted for, shed new light on discrimination arguments, indicating that perhaps physical appearance is used when firms lack the proper technology to elucidate the ability of their applicants. By the way, the Pearson's correlation between intelligence and physical appearance is 0,3307 in our sample, whereas, between physical appearance and the adjusted hourly wage is only 0,0047.

Final comments

We started this paper wondering why some authors had found that beautiful people were better paid.

After analysing the issue using a thoretical framework, we came to the point that physical appearance may be either a job amentity or an incentive to elicit more effort. Besides we considered the chance that appearance was just a signal to indicate workers ability.

We, then draw on a household survey specificaly suited to account for physical appearence effect on wages, coupled with the impact of intelligence.

The most important findings are that physical appearance play no rol in wages determination once intelligence is accounted for.

Nevertheles, if the firm lacks the technology to properly estimate worker's ability, it can relys in physical appearance as a proxy, based on the correlation it shows with the former.

It remains to be explained, why such a correlation exist at all.

To answer this question we have to begin asking how intelligence is determined.

Fortunatelly there is a lot of literature on the issue (see Jensen 1975; Eysenck 1981; Plomin 1991; Lewontin 1996; Gould 1997; Winship et. al. 1997; Carey 2000; Garlick 2002; Tetaz 2005b).

Briefly, it seems that both genes and the environment play important roles in that task. As to the link between environment determination of IQ and physical appearance it may be the case that teacher's pay more attention the more beautiful a student is (see Figlio 2005, for a related discrimination). Moreover, it was found (Harrell 2005) that even parents disciminate among their children giving more atention to the more beautiful ones

With regard to the relation between genes determination of IQ and physical appearance, it could be that more clever subjects were more productive in hunting and collecting many years ago (perhaps one millon or more), and therefore prefered by the women because a "richer" partner could provide more resources to reassure the well being of the children. The most intelligent men, in turn, having a broader list of potential mates, were able to chose the most beatiful among. On top of that, clever people (both men and women), are likley to have been more keen in detecting one of the most

important regualrities of life; that of undestanding the rules of courtship (see Buss et. al., 1993), then they had a plus to win more beautiful mates.

Last but not least, although physical appearance correlates with intelligence, there is a lot of noise in the relation, meaning that the use of such a proxy implyes commiting mistakes from time to time, with the following negative impact on discrimination.

Bibliography

Arias, O; Hallock, K; Sosa Escudero W. Individual heterogeneity in the returns to schooling: instrumental variables quantile regresión using twins data. Empirical Economis. 2001.

Becker, G. Human Capital; a theoretical and empirical analysis with special reference to education. The University of Chicago Press. 1993.

Blau F; Kahn L. Wage structure and gender earnings differentials: An international comparition. Economica, 63. 1996.

Bowles, S; Gintis H. The determinants of earnings; a Behavioral approach . Journal of Economic Literature. 2001

Buss D; Schmitt D. Sexual strategies theory: an evolutionary perspective on human mating. Psychological Review, 100. 1993.

Card D; Krueger, A. Does school quality matter). Returns to education and the characteristics of public schools in the United States. Journal of Political Economy, 100. 1992.

Carey G. Genes; IQ scores, and social status: Genetic epidemiology. Previous draft. 2000.

Chevalier A; Conlon G; Galindo Rueda F; Mc Nally S. The returns to higher education teaching. Centre for the Economics of Education. 2003.

Cortada de Kohan N. Manual para la construcción de test objetivos de rendimiento. Ed. Paidós. 1968.

Cortada de Kohan N. Diseño estadístico. Ed. Eudeba. 1994.

Dancer D; Rammohan A. Gender differences in school attainment: The role of sibling characteristics and birth order effects. The University of Sidney Working Papers. 2004.

del Río C; Gradín C; Cantó O. The measurement of gender wage discrimination: The distributional approach revised. Estudios sobre Economía Española, 192. 2003.

Eysenck H. La desigualdad del hombre. Alianza Universidad. 1981.

Figlio, D. Names, Expectations and the Black White test score gap. NBER Working Papers. 2005.

García R. Inferencia estadística y diseño de experimentos. Ed. Eudeba. 2004.

Gottfredson L; Deary I. Intelligence predicts health and logevity, but why?. Current Directions in Psychological Science. American Psychologic Society, volume 13, number 1. 2004

Gottfredson L. Intelligence: Is it the epidemiologist's elusive "fundamental cause of social class inequalities in health. Journal of Personality and Social Psychology, 84. 2004.

Garlick D. Understanding the nature of the general factor of intelligence: The role of individual differences in neural plasticity as an explanatory mechanism. Psychological Review 109. 2002.

Gould S. La falsa medida del hombre. Ed. Crítica. 1997.

Gustafsson J. Schooling and intelligence: Effects of track of study on level and profile of cognitive abilities. International Education Journal, N° 2. 2001.

Hamermesh D; Biddle J. Beauty and the labor market. American Economic Review, 84. 1994.

Harrell, A. Physical Attractiveness of Children and Parental Supervision in Grocery Stores: An Evolutionary Explanation of the Neglect of Ugly Kids. Warren E. Kalbach Population Conference. The University of Alberta. 2005
Hartog J. On human capital and individual capabilities. Review of Income and Wealth, 4. 2001.
Heckman, J; Cunha F, Lochner, L; Masterov, D. Interpreting the evidence on life cycle skill formation. Forthcoming
Heckman J; Lochner L; Todd P. Earnings functions; rate of return and treatment effects: The Mincer equation and beyond. Forthcoming
Hernstein, R; Murray C. The Bell Curve. New York Simon and Shuster. 1994
Jensen, A. The meaning of heritability in behavioral sciences. Educational Psychologist N° 11. 1975
Jensen A.; Sinha S. Physical correlates of human intelligence. In P.A. Vernon Ed.; Biological approaches to the study of human intelligence. 1993.
Kwon I. Incentives, wages and promotions; theory and evidence. PhD dissertation, University of Michigan. 2001.
Lewontine R; Rose S; Kamin L. No está en los genes. Crítica del racismo biológico. Ed Grijalbo Mondadori. 1996.
Loh E. The economic effects of physical appearance. Social Science Qurterly, 74. 1993.
Meghir C. Dynamic models for policy evaluation. Mimeo, University College London. 2005
Mincer, J. Schooling, experience and earnings. NBER. Columbia University Press. 1974.
Mincer, J; Polachek S. Family investments in human capital. Journal of Political Economy, 82. 1974.
Oaxaca R. Men-Female wage differentials in urban labor markets. International Economic Review, 14. 1973.
Perscio N; Postlewaite A; Silverman D. The effect of adolesent experience on labor market outcomes: The case of height. JPE. 2004.
Plomin R. The nature of nurture: genetic influences on environmental measures. Behavioral and brain sciences, 14. 1991
Plug E. Measuring family effects on future returnes to chilhood ability. NWO Priority program “scholar”. University of Amsterdam. 2000.
Psacharopolous, G. “Returns to investment in education: A further Update. World Bank working papers. 2002
Rosen S. Human Capital; a survey of empirical research. University of Rochester. 1976
Rushton, J. Race, evolution and behavior. A life history perspective. New Brunswick. 1995.
Sargent J; Blanchflower D. Obesity and stature in adolescence and earnings in youth adulthood: Analysis of a British birth cohort. Archieves of Pediatric and Adolescent medicine, 148. 1994.
Spearman C. The abilities of man. The Macmillan Company. 1927.
Tetaz, M. Educación y mercado de trabajo. CEDLAS Documentos de trabajo, n 28. 2005.
Tetaz, M. Inteligencia y educación; Un modelo integrador y un test corto para encuestas de hogares. Anales de la AAEP. 2005.
Winship, C; Korenman, S. Does staying in school make you smarter? The effects of education on IQ in the bell curve. New York Springer. 1997

Appendix

The short intelligence Test

The following are the eight questions (and the expected answers) asked by the surveyers. The reader are remined the the originals, were placed in spanish, therefore the translation may not be fully accurate.

1- “If I tell you; seven...twenty one... thirty five...what’s the next number in the series?” (49).
2- “Long is to short, as wide is to...?” (narrow)
3- “The squared is to the cube as the triangle is to...” (pyramide or Prism)
4- “If some japanese are warriors and some warriors are brave, then one can conclude that some japanese ought to be brave. True or false?” (false)
5- “If I tell you; A...C...E; what’s the next leter in the series (G)
6- “If I tell you; S...M...W; what’s the next leter in the series (T)
7- “Think in the next geometric figures; a triangle, a squared, a cube, a rectangle. Wich one do you think do not belong to the group” (cube)
8- Imagine a squared. Now imagine that you draw the two diagonals, as if it were an “X”. Then...how many triangles can you count in the figure. (8)