



Height, skills, and labor market outcomes in Mexico [☆]



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ABSTRACT

Taller workers are paid higher wages. A prominent explanation for this pattern is that physical growth and cognitive development share childhood inputs, inducing a correlation between adult height and two productive skills: strength and intelligence. This paper explores the relative roles of strength and intelligence in explaining the labor market height premium among Mexican men. While cognitive test scores account for a limited share of the height premium, roughly half of the premium can be attributed to the educational and occupational choices of taller workers. Taller workers obtain more education and sort into occupations with greater intelligence requirements and lower strength requirements, suggesting a possible role for cognitive skill.

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1. Introduction

In a wide range of economies—rich and poor, historical and contemporary—taller workers earn more than their shorter counterparts.¹ Given the ubiquity of this relationship, researchers have devoted considerable effort to determining its origins, setting forth numerous hypotheses. One theory, popular for developing economies, posits that the returns to stature derive from the greater strength (and health) of taller individuals, which leads to a productivity advantage in economies that rely heavily on manual labor (Haddad and Bouis, 1991; Thomas and Strauss, 1997). For industrialized economies, explanations have been more varied, typically involving social–psychological pathways such as self esteem (Freedman, 1979), social dominance (Hensley, 1993), discrimination (Hamermesh and Biddle, 1994; Loh, 1993), and the social consequences of being short in adolescence (Persico et al., 2004). However, more recent research on the U.K. (Case and Paxson,

2008) suggests that the height premium has much to do with a correlation between height and cognitive skill. Like the strength-based explanation, the cognitive skill theory is rooted in the idea that physical growth and skill development share many inputs—such as health, nutrition, and care in early life—so that for a given genetic height potential, people who achieve greater stature also tend to achieve greater skill.

The extent to which cognitive skill (and human capital more generally) explains the height premium in contemporary developing economies is an open question. The reliance of these economies on manual labor does not necessarily bias them towards a solely strength-based height premium. Cognitive capacity improves entrepreneurship, the capacity to adapt to shocks, and general problem-solving skills, which may be valuable even entirely agrarian economies. For example, the literature on technology adoption in developing countries has emphasized the abilities of farmers to learn about the optimal uses of new seed varieties and fertilizers (Duflo, 2001; Foster and Rosenzweig, 1995). Along these lines, Hanushek and Woessmann (2008) argue that cognitive skill is a fundamental determinant of individual income, the income distribution, and the rate of economic growth in developing countries.

This paper examines the relative roles of strength and intelligence in forging the link between height and labor market outcomes in Mexico, a country that straddles the line traditionally dividing economies intensive in manual labor from those intensive in skilled labor. The term “strength” is meant to encompass physical health, robustness, and endurance. The analysis takes advantage of rich data from the Mexican Family Life Survey (MxFLS), which includes modules on health, anthropometry, cognitive skill, parental characteristics, and labor

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¹ See, for example, Persico et al. (2004) and Case and Paxson (2008) on the U.S. and U.K.; Lundborg et al. (2009) on Sweden; Thomas and Strauss (1997) on Brazil; and Haddad and Bouis (1991) on the Philippines. The return to height was also high historically, for example among slaves in the antebellum American South (Margo and Steckel, 1982) and among 19th century German workers (Komlos, 1990).

market outcomes. As the first nationally representative survey from a developing country to administer cognitive tests to working-age adults, the MxFLS provides a unique opportunity to unpack the height premium in a less industrialized setting.

Several existing studies explore the relative returns to strength and intelligence in developing country labor markets. Pitt et al. (forthcoming) focus on body mass endowments (rather than height) in Bangladesh, showing that larger men are more likely to engage in energy-intensive activities, while larger women are less likely. They argue that these sorting patterns are consistent with a high return to physical skill; body mass is more strongly correlated with strength for men than for women. Rosenzweig and Zhang (2012) complement these results in a study of Chinese twins, finding that female twins with higher birthweight attain more education, while male twins with higher birthweight develop greater adult body mass. On the other hand, Behrmann et al. (2009) use data from Guatemala to argue that brains, not brawn, have significant wage returns.² Both studies follow in the tradition of an earlier paper by Thomas and Strauss (1997), which finds that wages are positively related to height, body mass, and nutrient intake among Brazilian men. Thomas and Strauss document interesting heterogeneity in the elasticity of wages with respect to body size. In the market sector, height and earnings are most strongly correlated among the most educated workers, suggesting a role for cognitive skill. But in the self-employed sector, the correlation is strongest among the illiterate, who primarily engage in physical labor, suggesting a role for strength.³ Note that many of these studies' interesting results concern sectoral affiliation; Pitt et al. (forthcoming) study the sorting of workers across sectors, while Thomas and Strauss (1997) glean their conclusions from effect heterogeneity across sectors.

This paper also devotes much attention to the sectoral affiliations of taller and shorter workers. The paper begins with an exploration of the relationships linking height, cognitive skill, education, and earnings, but it then moves on to its primary contribution, an analysis of height-based occupational sorting. To avoid issues of endogenous labor force participation, the analysis sample only includes male workers, among whom each centimeter of height is associated with 2% higher hourly earnings. This premium is similar to those observed in other developing countries but more than twice those observed in most wealthy countries.⁴ Childhood health conditions and parental socioeconomic status explain a substantial share of this height premium, but the premium remains statistically and economically significant even after adjustment for these background characteristics. However, cognitive test scores account for only a limited part of the height premium. The test instrument is relatively crude, so its coefficient may be attenuated. At the same time, because survey respondents took the test in adulthood, their scores may in part reflect job-related opportunities to practice cognitive tasks, which would tend to (spuriously) inflate the role of cognitive skill. Regardless, the findings do indicate that roughly half of the premium can be attributed to the sorting of workers across skill groups or occupations.

The rest of the paper focuses on this sorting. Based on a new linkage of Mexican occupational categories to job characteristics from the U.S. Dictionary of Occupational Titles (DOT), the paper considers the skill requirements of occupations with greater concentrations of tall workers. In line with the evidence from industrialized countries, taller workers select into occupations with higher intelligence requirements and lower strength requirements. This result is consistent with Roy's (1951) model in which taller workers have a comparative advantage

in intelligence-intensive tasks. Importantly, education mediates nearly all of the relationship between height and occupational choice; taller workers tend to have more education, and educated workers tend to work in skill-intensive occupations. The role of education has two natural interpretations. First, parents' propensities to invest in child health and education may be correlated, a hypothesis raised by both Haddad and Bouis (1991) and Thomas and Strauss (1997) as a caveat to their argument that the height premium reflects a return to strength. Second, the early-life conditions that promote growth in childhood also promote cognitive development, which may raise the productivity of educational investments.

As a consequence, although the paper contributes several new findings to the literature on the correlates of height, these findings do not pin down a single interpretation. Scores on a (crude) cognitive test account for little of the height premium in earnings regressions, suggesting that cognitive skill may matter less in Mexico than in Britain (Case and Paxson, 2008). But taller workers obtain more schooling and sort into skill-intensive occupations, reintroducing a possible role for cognition. These two sorting results may be driven either by shared inputs in the production of physical and cognitive skill or by unobserved heterogeneity in parental investment. In either case, the data suggest an important role for human capital in explaining the earnings premium paid to taller workers.

The paper proceeds as follows. Section 2 reviews of the literature on the early-life determinants of height and skill, which Section 3 fits into a conceptual framework to understand the relationship between height and labor market outcomes. A description of the data sources follows in Section 4. Section 5 reports the results of earnings analyses, while Section 6 reports the results of occupational choice analyses. Section 7 concludes.

2. Growth, cognitive development, and adult achievement

Adult height reflects the interaction of genetic and environmental factors from the womb to adulthood (Tanner, 1979). During this period, an individual experiences two phases of intense growth, the first during gestation and infancy—from ages zero to three—and the second during adolescence. Good nutrition and freedom from infection during these periods, particularly the first, are critical to achieving optimal growth. Apart from its direct effects on growth, nutritional deprivation increases young children's susceptibility to infection. Infection, in turn, inhibits nutrient absorption and appetite, leading to a “synergism” between nutrition and infection (Scrimshaw et al., 1968).

The prenatal and very early postnatal periods appear to be of particular importance for adult height. Early-life adversity may alter tissue differentiation and development in ways that boost short-run survival at the expense of long-run health (Barker, 2001). A growing body of research indicates that deprivation during this period—whether inside or outside the womb—has lasting effects on stature. Among identical twins in Norway, those born with a 10% birthweight advantage over their twins gain an extra 0.6 cm in height by age 18 (Black et al., 2007). Results of this type extend as far as rural Indonesia, where Maccini and Yang (2009) show that women exposed to above average rainfall in their birth years attain significantly greater heights.⁵ In a similar vein, among French soldiers in the 19th and early 20th centuries, childhood exposure to the grape vine parasite *phylloxera* reduced adult height, presumably through a reduction in parental income (Banerjee et al., 2010).

Negative health and nutrition shocks, both in utero and in early childhood, have similarly detrimental effects on cognition and physical

² Importantly, Behrmann et al.'s (2009) conclusions rest on quite strong exclusion restrictions. Their instruments for cognitive skill and body size include childhood proximity to a health post, class size at age 7, birth cohort, and parental characteristics.

³ Thomas and Strauss (1997) also find that the returns to body mass are uniformly stronger among the illiterate.

⁴ See the sources listed in footnote 1.

⁵ Interestingly, Maccini and Yang do not find similar benefits of early-life rainfall for men.

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