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# The Noncognitive Determinants of Labor Market and Behavioral Outcomes

## Introduction to the Symposium

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### I. Introduction

Most of the economic literature has focused on the acquisition of and returns to investments in cognitive skills when trying to explain labor market outcomes. Only a few economists have emphasized the importance of noncognitive skills to predict labor market and behavioral outcomes. Until now, it has been rather unclear what noncognitive skills are (and how they can be measured) and how they influence labor market and behavioral outcomes.<sup>1</sup>

For instance, cognitive skills are assessed by language and mathematical composites or by aptitude and ability tests. Most people agree that these tests are useful tools. The literature on cognitive tests and the measurement of intelligence shows that one dominant factor is underlying cognitive processes, which we can label general intelligence, *g*. Noncognitive skills are often defined and measured in terms of work habits, such as effort, discipline, and determination, or in terms of behavioral traits, such as self-confidence, sociability, and emotional stability. No single factor has emerged in the psychological literature and it is unlikely that one will be found, given the diversity of traits subsumed under the category of noncognitive skills. More importantly, it is unclear how to include noncognitive skills in the standard economic model.

From the point of view of economics, the diversity of definitions and measures of noncognitive skills raise questions of whether noncognitive skills can be seen as a set of stable traits, can be invested in like in cognitive skills, or can yield labor market returns. In addition, it is unclear how investment mechanisms work and how noncognitive skills yield labor market returns.

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1. There has been discussion about the term “noncognitive” skills. Throughout this symposium it is used to identify, analyze and measure skills other than the traditional cognitive skills measures applied by economists (e.g., IQ). See Borghans et al. (2008) for a more in-depth discussion.

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Of course, we know that some aspects of ability are not measured or defined by cognitive ability. In the psychological literature, theories of social, (inter)personal, and emotional intelligence or ability have been developed to show that IQ measures only one aspect of intelligence, thereby neglecting other important aspects that explain outcomes. The idea that it is possible to distinguish these forms of ability from cognitive ability is not new and common sense and everyday life tells us that we spend much of our time in social interactions with others. More importantly, some people are more successful in doing so than others, which is likely reflected in labor market outcomes. Hence, theories of interpersonal and emotional intelligence have been developed. Also, the management literature and personal help books stress the importance of social and interpersonal ability as distinct from cognitive ability.

The problem with these theories and arguments is that there are many instances of competence with the social domain, which makes it hard to devise tests that measure non-cognitive ability. Several tests have been developed, but it is unclear how these tests relate to socioeconomic outcomes. Most tests are designed to diagnose the presence of mental diseases and include a threshold, which leads to 0-1 outcomes that are not very useful for the type of analysis economists are looking for. Other tests focus on particular competences or abilities, such as determination, judging, or understanding other people. This makes it hard to find compelling evidence for theories of “general” noncognitive ability.

The aim of this symposium is to shed light on how to incorporate the noncognitive side of ability in economic theory and to empirically assess and explain its role in labor market and behavioral outcomes. To do so, this symposium starts with novel research on the formation of cognitive and noncognitive skills over the life cycle and the identification of sensitive and crucial periods for investment in skills. It also contains an application of how early investments (or a lack of early investments) affect later outcomes.

Second, the symposium includes work that investigates to what extent the assignment of workers is not only determined by traditional cognitive variables but also by personality traits. The application chosen is the importance of different types of people skills in the labor market. The contribution of this research to increasing the body of knowledge about the noncognitive determinants of labor market outcomes is that it shows that people skills are important for understanding individual labor market outcomes.

Third, the symposium includes work on understanding the role of noncognitive skills in explaining the labor market position of underrepresented groups. The work on women and blacks suggests that part of the gender and racial wage gaps can be explained by differences in various noncognitive skills.

Finally, the symposium presents work that integrates the economic and psychological theory and evidence on noncognitive skills. Using a simple economic framework for interpreting the evidence in personality psychology and economics leads to a comprehensive review of what has been done in both fields, how we can integrate the approaches, how to understand the evidence in an economic framework, and what is lacking so far.

## **II. The Symposium**

The symposium consists of seven contributions to understanding the noncognitive determinants of labor market and behavioral outcomes. These contributions are now briefly introduced.

### A. *The Technology of Skill Formation*

The first contribution to this symposium is a new model of skill formation that combines insights from economics and related literatures in psychology, education, and neurosciences. Flavio Cunha and James J. Heckman develop this model to understand the technology of cognitive and noncognitive skill formation (Cunha and Heckman 2008). Using the findings of several literatures, they show that key to understanding optimal investments in skills is understanding the technology and market environments in which agents operate. Cunha and Heckman build a model in which parents play a key role in child development and in which early childhood investments in cognitive and noncognitive skills are complementary and promote the formation of one another. With this model, they estimate critical and sensitive periods for the investment in both cognitive and noncognitive skills. Critical periods are those periods in which investments must take place and sensitive periods are those periods in which investment yield the highest returns. The contribution of this model is that it identifies a technology of cognitive and noncognitive skill formation that explains a variety of findings established in the child development and child intervention literatures. This knowledge is crucial for designing policies such as intervention programs.

The empirical contribution of the paper is that it offers a new way to deal with the endogeneity of inputs in the production function and that it develops a way in which the wealth of indicators of noncognitive development can be measured and estimated. The authors apply this method using a sample of white males (aged 6–13) from the children of the National Longitudinal Survey of Youth of 1979 (CNLSY79). This data set contains, among others, components of behavior problems, which are used as a measure for noncognitive skills.

The estimates first suggest persistence of skills over time and an effect of the accumulation of noncognitive skills in one period on the accumulation of cognitive skills in the next.

Second, investigation of sensitive periods (with the ages of the children split up into four periods: 6–7, 8–9, 9–10, 11–13) reveals that these periods exist and that sensitive periods for parental investments in cognitive skills occur at earlier ages (6–9) than sensitive periods for investments in noncognitive skills (8–13).

Finally, when Cunha and Heckman simulate the effect of a 10 percent increase in investment on high school graduation and earnings at age 23, they find that the strongest effect of this investment on high school graduation is obtained at ages 6–7 operating through cognitive skills with the effect on earnings being the strongest at ages 8–9. This latter effect operates primarily through its effect on noncognitive skills and is equally strong compared to the effect of investment increases in cognitive skills at ages 6–7.

The Cunha-Heckman work is complemented by an empirical paper by Carmit Segal. Segal (2008). Segal investigates the determinants and malleability of noncognitive skills by analyzing the determinants and evolution of classroom misbehavior of eighth- and tenth-grade males. She uses data from the National Educational Longitudinal Survey in 1988 (NELS88) and 1990 (NELS90). Misbehavior is measured by tardiness, inattentiveness, disruptiveness, lack of homework completion, and absenteeism. These five measures of misbehavior are assessed by two teachers in each

of the years. One teacher taught math or science, and the other taught English or social science. The measures of misbehavior are coded as dummy variables and probit models are estimated where the determinants of each of the five indicators of misbehavior consist of family background variables, parental involvement in school and at home, and school characteristics. The latter two are composed of a set of indicators on how strict parents and schools are in disciplining the boys.

The basic estimates suggest that misbehavior is negatively correlated with the socioeconomic status of the family. Having parents with higher education and coming from a family with higher income reduces the probability of misbehavior. Also, boys from single-parent families have a higher probability of misbehavior.

The use of parental involvement and rules and school characteristics in estimating the probability of misbehavior is plagued by endogeneity problems and sorting. The cost of good behavior is different for different boys. Parents whose boys behave well set lenient rules and parents whose boys misbehave set strict rules. But, parents whose boys misbehave extremely set lenient rules because it is not cost-effective to set strict rules that make these boys behave well. Sorting is a problem when well-behaved boys attend schools with strict rules. The probit estimates, when including school and parental investments, suggest that endogeneity is present. This can be observed from the fact that some parental rules improve behavior, while others do not. These findings are consistent with a model in which children and parents experience different costs of behaving well. For school characteristics, it is found that attending a Catholic school improves the probability of good behavior and that schools that emphasize discipline have better-behaved boys.

Finally, the persistence or malleability of misbehavior is addressed by comparing outcomes of the NELS88 to the NELS90. The correlations of misbehavior between the two years suggest that behavior is not independent across the two years. More importantly, the estimates suggest that there is persistence in misbehavior independent of family background characteristics and parental and school incentives to behave well. This last finding is consistent with the findings of Cunha and Heckman (2008) in the first paper, who obtain estimates suggesting that the mother's ability affects the boy's cognitive ability but not his noncognitive ability and the mother's education plays no role in affecting the evolution of ability after controlling for parental investments and ability.

### ***B. Assignment of Workers to Jobs***

Once the technology of investment in noncognitive skills is clear, we can investigate the effects of noncognitive skills on labor market outcomes. To this end, Lex Borghans, Bas ter Weel, and Bruce Weinberg develop a model and present empirical evidence using German and U.K. data to understand the role of interpersonal interactions in the labor market. Alan B. Krueger and David Schkade present evidence for the United States and France that more gregarious types are more likely to be employed in jobs that involve more social interactions.

Borghans, ter Weel, and Weinberg (2008) develop a framework in which they distinguish two types of interpersonal styles: directness and caring. Caring is needed to create a cooperative environment and directness is needed to communicate accurately. The main argument of the model is that the balance between caring and

directness is important for effectively dealing with others in interpersonal settings. Jobs contain both elements, but different jobs emphasize different styles. So, the more caring (direct) people will be assigned to jobs in which caring (directness) is relatively more important. Supply and demand determine prices and allocations. Shortage of a type of interpersonal style will shift people into jobs in which they are less effective, which lowers wages. The framework is brought to the data by relating measures of youth behavior to present occupation.

The data come from several sources. For the United Kingdom, the 1986 British Cohort Survey (BCS) is used to obtain measures of youth behavior at age 16 with regard to sociability. These measures are complemented with labor market and job task information from the 1997 and 2001 wave of the British Skills Survey (BSS) and the 2000 wave of the BCS when the same persons are aged 30. For Germany, four waves (1979, 1985, 1991, and 1998) of the BIBB/IAB data set are used to show the evolution of different interpersonal styles over time. The unique features of these data are that they contain job task measures at a very detailed level, which allows one to distinguish the importance of several interpersonal skills at work.

The main results are the following. First, youth sociability is strongly related to the interpersonal tasks in subsequent occupations. People (age 30) who hold jobs in which caring is more important were significantly more caring when they were 16 years old. Also, people working in jobs in which being direct is more important were more outgoing when they were 16.

Second, a number of reduced-form wage equations are estimated in which the ratio of directness and caring is investigated. The estimates for both Germany and the United Kingdom suggest that directness has a positive return relative to caring. In addition, the importance of relative directness is rising over time. Another finding is that jobs require different mixes of directness relative to caring. Panel estimates, models that control for worker flows and the use of interactions between skills and tasks reveal similar results.

Finally, an assignment model is estimated. The results from estimating a structural model suggest that supply and demand for interpersonal skills explain the correlation between wages and interpersonal tasks.

Krueger and Schkade (2008) investigate a similar question: Do more gregarious workers flock to interactive jobs? To answer this question, they set up a model of equalizing differences in which they focus on the time needed to interact with others. In this model, workers with a preference for interactions will seek jobs in which these traits are emphasized. To answer this question empirically and control for selection bias, Krueger and Schkade use measures on how individuals spend their time while they are not working to infer to what extent people are gregarious. This information is then used to assess the relationship between interpersonal interactions on and off the job.

The data come from several sources. First, the Texas Day Reconstruction Method (DRM) data are used to obtain information on how people spend their time and how they feel about it. Second, two other DRMs are used: Columbus (Ohio) and Rennes (France). The major advantage of DRM is that very detailed information is obtained about time spent during an ordinary working day.

The estimation results are as follows: First, the estimates from Tobit models with dependent variable the proportion of time interacting on the jobs suggest that people

who interact more with others off the job also do so on the job. The results are largest for the Texas sample and smallest for the Rennes sample. The estimates also suggest that sorting in the labor market along the lines of the propensity for interpersonal interactions is equally efficient in France and the United States.

A potential problem with DRM data is that they do not represent an ordinary day. To address this problem, data on the same individual two weeks apart are compared. The results suggest that the comparison does reasonably well.

Finally, the assignment of workers to jobs is addressed. This is done by measuring job satisfaction. People tend to express higher levels of job satisfaction when they are more gregarious and employed in jobs with relatively more interpersonal interactions.

Together the Borghans-ter Weel-Weinberg analysis and the Krueger-Schkade contribution also explain why compensating wage differentials for interpersonal skills are small in previous work. It seems that the failure to account for differences in the returns to various types of interpersonal skills across jobs and the sorting of people to jobs explains these small or zero effects.

### *C. Explaining the Outcomes of Underrepresented Groups*

Nicole M. Fortin and Sergio Urzua focus on the gender and racial wage gaps in the United States. Fortin (2008) investigates the contribution of noncognitive skills in accounting for the gender wage gap among young workers. Urzua (2008) studies to what extent the black-white gap in labor market outcomes and schooling attainment can be explained by noncognitive skills.

Fortin (2008) analyzes the impact of noncognitive traits on the gender wage gap. In particular, she investigates the impact of soft factors on earnings, and to which extent gender differences in these soft factors can explain part of the gender gap in earnings. The soft factors include a variety of measures: self-esteem, locus of control, money versus work, and the importance of family.

The paper assesses whether differences in outcomes are associated with gender roles: Are men breadwinners and women the homemakers and caregivers? The empirical analysis is conducted with a modified Oaxaca-Blinder-Ransom decomposition that addresses a couple of familiar problems in the literature.

The data used to address this issue come from the national Longitudinal Study of the High School Class of 1972 (NLS72) and the National Education Longitudinal Study of 1988 and 1994 (NELS88). The longitudinal character of the data allows for having information about noncognitive skills before individuals enter the labor market and assessing these skills while in the labor market. The data for labor market analysis contain only individuals in their early 30s.

The estimates suggest the following. First, there seem to be gender roles: Men value work and money more than women do and women value family and being with others more than men do. Over time, there is evidence for convergence, with women becoming more focused on work and money.

Second, self-esteem and attaching more value to work and money are associated with higher wages. When these findings are related to the gender wage gap, the modified Oaxaca-Blinder-Ransom decomposition is used. The findings suggest that a small fraction of the gender pay gap (about 2 percent) is due to differences in noncognitive skills between men and women. Especially the different values attached to

work and money are important in explaining this gap. Over time this part of the gap is falling.

Finally, the closing of the gender is mainly due to women's increased educational attainment and cognitive skills. Because these differences among young male and female workers are almost equalized, the importance of noncognitive skills in explaining gender wage differentials is likely to become more important in future studies.

Urzua (2008) estimates a model of schooling and labor market outcomes with unobserved cognitive and noncognitive abilities in order to explain the racial wage gap. His analysis integrates schooling decisions and labor market outcomes to study whether the observed racial gaps in labor market outcomes can be interpreted as a manifestation of racial differentials in unobserved abilities. Both cognitive and non-cognitive abilities are considered in the analysis. The estimation of the model and the empirical analysis are carried out using representative samples of white and black males from the NLSY79.

The results provide evidence of differences in the distributions of unobserved abilities between blacks and whites. The effects of these abilities on schooling decisions, hourly wages, and annual hours worked also differ by race. In particular, the effects of noncognitive ability are uniformly stronger for blacks than whites. This pattern is not observed for cognitive ability, and depending on the age range and outcome, the effect of cognitive ability can be stronger for either blacks or whites.

Additionally, Urzua shows that unobserved cognitive ability is the most important variable explaining racial gaps in schooling attainment and labor market outcomes. When blacks are assumed to have the white distribution of unobserved cognitive ability, they achieve equal (or greater) education levels as whites. The overall racial gaps in wages and earnings fall by approximately 40 percent after this compensation. However, this is smaller than expected compared to previous evidence, which reports reductions in the range of 50-75 percent when black-white gaps in observed cognitive ability (achievement test scores) are controlled for. Racial differences in family background and schooling at the time of the tests are the determinants of the larger explanatory power of observed cognitive ability. The standard practice of equating cognitive test scores overcompensates for differentials in ability, resulting in underestimates of unexplained racial gaps.

On the other hand, even though the results indicate that unobserved noncognitive ability is an important determinant of schooling decisions and labor market outcomes, its role in explaining the black-white gaps in labor market outcomes is negligible. Nevertheless, unobserved noncognitive ability does play an important role in closing the black-white gaps in incarceration rates, which is a behavior also incorporated in the analysis.

#### ***D. Overview and Future Research***

Lex Borghans, Angela Lee Duckworth, James J. Heckman, and Bas ter Weel conclude this symposium with an overview study linking the evidence from psychology to economics. Borghans et al. (2008) focus on several areas where progress has been made but also address a number of issues that need future study.

First, the concept of noncognitive skills is an important area of study. The papers in this symposium are heterogeneous in their definitions and treatment of

noncognitive skills. Some are theoretically precise in their definitions, others rather loose. All apply different measures of noncognitive skills, which apply to different dimensions at least. The first important questions to address are therefore whether it is possible to define noncognitive skills and separate it from cognitive skills. Borghans et al. do so by focusing on personality traits (the “OCEAN traits: Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism) and show how noncognitive skills can be defined, measured, and separated from cognitive skills. Also, the differences in how the two literatures collect data is addressed to see how they compare and where gaps exist. The aim of this analysis is to review economic measures and psychological measures and compare them to come to an integrated approach.

Second, the predictive power and stability over time of noncognitive skills is reviewed. For cognitive skills a general factor,  $g$ , has been found, but for noncognitive this is not the case. Nevertheless, this symposium has shown that noncognitive skills are able to explain several outcomes, including schooling, misbehavior, and (gaps in) wages. Borghans et al. first review the economic and psychological literature and use factor models and the concept of comparative advantage to organize its predictive power. The findings from this exercise suggest that the relative importance of noncognitive skills varies with tasks with conscientiousness and emotional stability being most important. These personality traits are also most closely related with the economic preference parameters (discount rate and risk preference). Second, the stability of noncognitive traits is investigated over the life cycle by reviewing the evidence. There is a large difference between the stability of cognitive and noncognitive skills over the life cycle. Cognitive skills sharply increase during childhood and peak in late adolescence. Noncognitive skills increase until late adulthood and for some personality traits, it peaks after age 50. The expression and development of these traits seems to be more context related than the development of cognitive traits.

Finally, Borghans et al. consider whether the economic model needs to be modified. The answer to this question seems yes. The motivation for this answer lies in the fact that personality traits apparently impose restrictions on individual behavior and choices. The observed behavior of individuals can therefore be the result of these constraints, which implies that the analysis and definition of the economic preference parameters needs to take notion of these constraints. Some suggestions of how to incorporate these notions into the standard economic model are developed and interpreted. However, much needs to be done, which is why the paper ends with a challenging agenda for future research.

### **III. Conclusion**

The economic literature has been silent on the importance of noncognitive skills for explaining socioeconomic outcomes. There was some awareness, a few early contributions some time ago but little fundamental theoretical analysis and hardly any serious empirical work until a couple of years ago. Recently, attention is growing, and this symposium is a result of the growing awareness of the importance of noncognitive determinants of labor market and behavioral outcomes. I believe this symposium convinces researchers that we already know a lot about the

issue, but that there is also a huge research agenda eagerly waiting to be taken up. This requires joint effort by scientists from many fields, with an important role for economists in helping build models and build, collect, and analyze data.

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