



Personality, IQ, and Lifetime Earnings

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Overview

1. Data

2. Direct
Effects

3. Education

4. Return to
Schooling

References

Motivation: Multi-dimensional Human Capital

Human capital can be
... physical abilities, IQ, formal schooling, cultural knowledge,
social skills, character, ...

Personality Traits...

“...are the relatively **enduring patterns of thoughts, feelings, and behaviors** that reflect the tendency to respond in certain ways under certain circumstances.”

Roberts, 2009

Examples:

- Extraversion
- Conscientiousness

.. now part of **data sets** used by economists!

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Personality traits are Human Capital

Personality traits influence **earnings**:

1. They influence **productivity directly**.
May compensate for other skills.
2. They foster further **human capital accumulation**.
Technology of skill formation, cross-fertilization.
3. They influence education, **health**, etc.
⇒ influence **productivity indirectly**
(Almlund et al., 2011; Borghans et al., 2008).

Social skills can be **changed by interventions**,
throughout adolescence!

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What is the return to investments in social skills?

How much of a earnings difference do social skills make?
Over a life time?

How can we know?

1. Study interventions with follow-up data:

- Perry Preschool (Heckman et al., 2010), BigBrother (Grossman and Tierney, 1998), BAM (University of Chicago Crime Lab, 2012)
- typical interventions only have short follow-up

2. Study wages of individuals in relation to their skills

- Mueller and Plug (2004); Nyhus and Pons (2005); Heineck (2007); Heineck and Anger (2010)
- Potential problem with contemporaneous personality measures and wages: reverse causality

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Quantify effects of personality on lifetime earnings.

Preview:

1. Large direct wage effects, but only occur **later in life!**
2. Also **indirect** effect through education:
 - 2.1 Personality affects educational attainment
 - 2.2 Education has a positive return
3. Personality traits can **increase the return** to education substantially!

Terman Data

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- 70-year long prospective cohort study (1922-1991)
- Sample of 1539 boys and girls from California.
- Children had $IQ \geq 140$, born on average in 1910.
- Very rich data:
 - Earnings History covering full working life
 - Education history
 - Marriage history = husband's earnings, tax rates
 - Early health data
 - Detailed family background
 - Personality items and IQ

Personality and IQ in Terman Data

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- **IQ:** Stanford-Binet IQ score (1922)
- Personality traits map into **Big Five** (McCrae and Costa, 1999)
 - Conscientiousness (1940)
 - Extraversion (1922)
 - Agreeableness (1940)
 - Neuroticism (Emotional Stability) (1940)
 - Openness to Experience (1922)
- Early measures (parent/teacher or self-ratings)
- Rely on stability of traits (rank order)
- IQ and Personality generally uncorrelated, except for Openness

Estimation Overview

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References

1. Estimate factor model, predict factor scores.
2. **Direct effects of personality traits and IQ** on earnings; holding fixed education and background (*identification through matching assumption*).
3. Correct for measurement error bias.
4. Estimate effect of traits and IQ on education,
5. combine with returns to education for indirect effect.

Matching Variables

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- father's and mother's background:
education, occupation, social status, financial status, origin
- subject's family background:
number of siblings, age of parents, birth order
- early childhood health:
birthweight, breastfeeding
- health of subject in 1922 (sleep quality)
- participation in WWII combat; cohort.

- Cognitive Ability: IQ score in 1922
- Personality Traits: Factor Scores of Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism.

Results: Lifetime Effects

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Here, focus on effects of 5 personality traits on the **sum of lifetime earnings**, age 18 to 75.

Only results for males for now - women of this cohort had different labor market experience than women today.

Direct Effect of Conscientiousness, Men

1 st.dev Conscientiousness: life earnings \uparrow 7%-17%.

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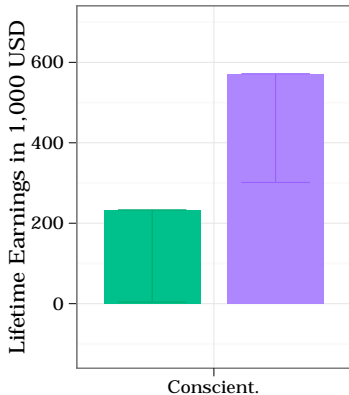
References

Conscientiousness shown to be...

positive for work performance, (Barrick and Mount, 1991; Salgado, 1997; Mount et al., 1998)

incentive-enhancing, (Bowles et al., 2001)

positive for men's earnings. (Judge et al., 1999; Heineck, 2007; Heineck and Anger, 2010; O'Connell and Sheikh, 2011)



Ed.
 Bachelor's or less
 Master's or more

Direct Effect of Extraversion, Men

1 st.dev Extraversion: life earnings \uparrow 8%-21%.

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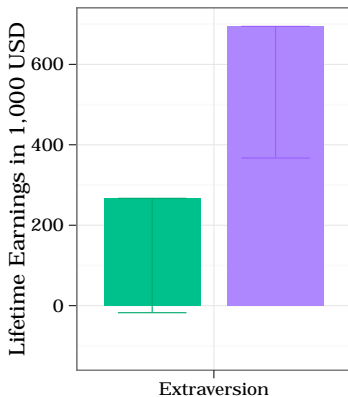
References

Extraversion shown to be...

positive for job performance in management and sales occ's, (Barrick and Mount, 1991)

positive for men's earnings in Judge et al. (1999); Heineck and Anger (2010); O'Connell and Sheikh (2011) but insignificant in Heineck (2007).

Positive interaction with education in Nyhus and Pons (2005).



Ed.
 Bachelor's or less
 Master's or more

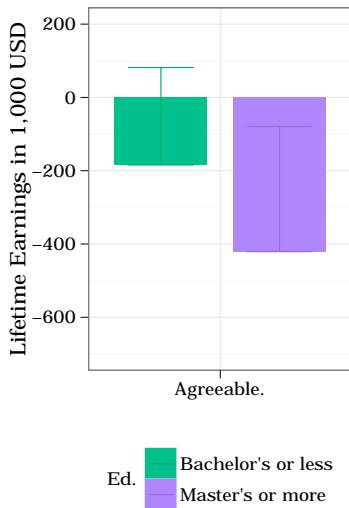
Direct Effect of Agreeableness, Men

1 st.dev Agreeableness: life earnings ↓ 5%-12%.

Agreeableness shown to be...

positive for work performance, esp.
in teamwork situations (Mount et al.,
1998);
but negative for perceived
management potential, promotions,
CEO proximity. (Howard and Bray,
1988; Boudreau et al., 2001)

Antagonism = higher wages (hourly).
(Mueller and Plug, 2004; Boudreau
et al., 2001; Judge et al., 1999;
Heineck, 2007; Heineck and Anger,
2010)



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Why Interaction?

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Hypothesis 1:

- Traits help produce human capital in school
= interaction reflects underlying human capital differences.

Hypothesis 2:

- At higher education, larger choice set from occupations:
Can select into occupations that reward traits more highly.
- Example of Executives: Conscientiousness, Extraversion, Emotional Stability associated with “executive strengths” (Holland et al., 1993).

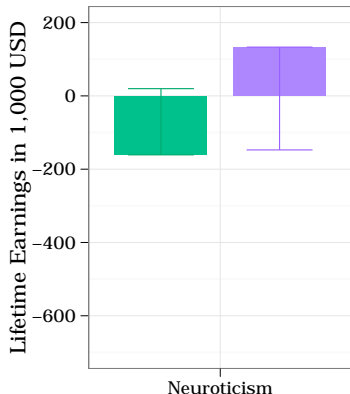
Direct Effect of Neuroticism, Men

Emotional Stability shown to be...

positive for job performance, (Tett et al., 1991; Barrick and Mount, 1991; Salgado, 1997; Mount et al., 1998)

positive for hourly wages. (Mueller and Plug, 2004; Boudreau et al., 2001; Judge et al., 1999; Nyhus and Pons, 2005; Heineck, 2007).

Neuroticism covers facet of "External Locus of Control," which is shown to be negative (Heineck and Anger, 2010; Cobb-Clark and Tan, 2011).



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■ Master's or more

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Direct Effect of Openness, Men

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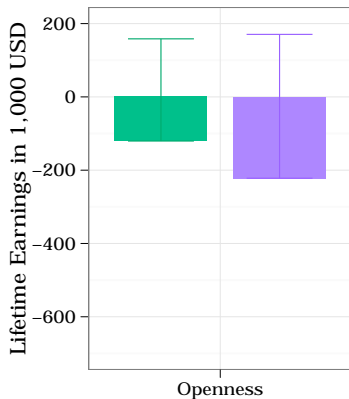
References

Openness shown to be...

positive for earnings, even controlling for IQ, in Mueller and Plug (2004),

negative in Heineck and Anger (2010),

insignificant in Heineck (2007).



Direct Effect of IQ, Men

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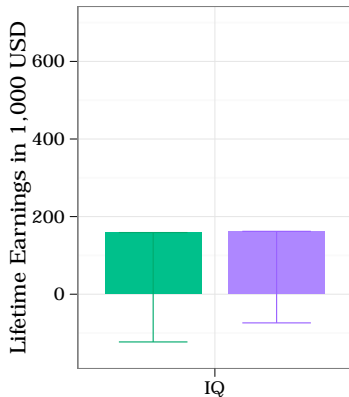
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IQ ...

Not significant with interaction specification, but with simpler model.

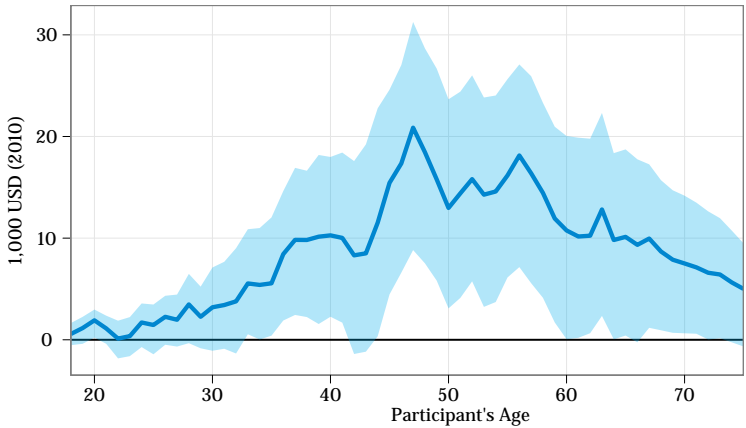
Positive even in high-IQ sample.



Ed. ■ Bachelor's or less
■ Master's or more

Direct Effect, Men, Common Coefficient

Extraversion



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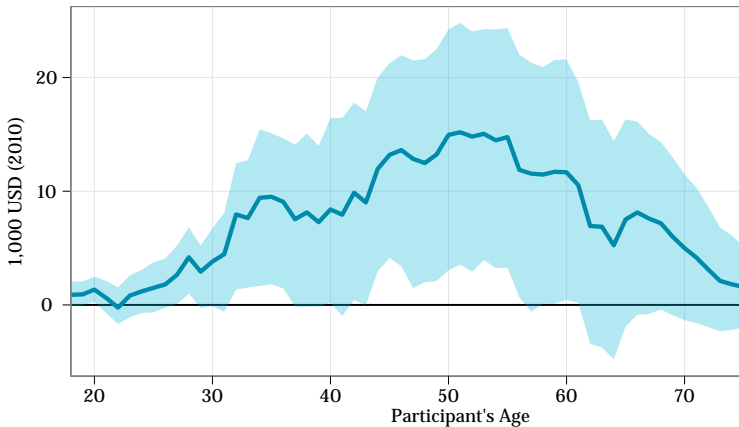
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Direct Effect, Men, Common Coefficient

Conscientiousness



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Educational Sorting

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For Terman men,
Education \uparrow from

- Conscientiousness
- Openness
- IQ

Indirect effect of traits on earnings *through education* –
depends on [return to education](#).

The rate of return to schooling

In Terman cohort, men have substantial rates of return to education:

- **College degree vs HS:** 12.5%, or lifetime sum of 1.1 million USD (2010, undiscounted)
- **Doctorate vs HS:** 9.3%, or lifetime sum of 1.7 million USD

even though small increments have low added value:

- **some college vs HS:** only 340k,
- **MA vs BA:** negative -74k.

⇒ significant indirect returns
from Conscientiousness and Openness

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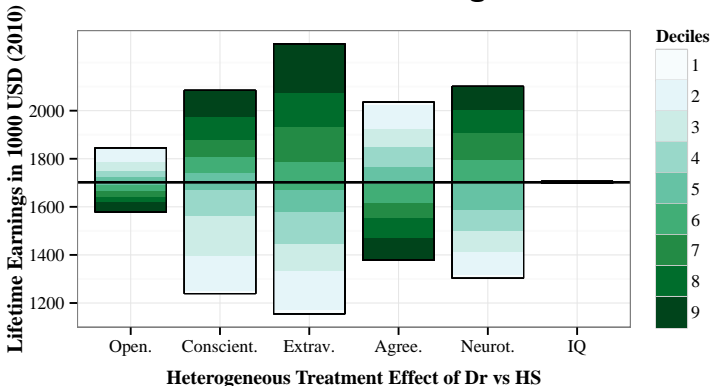
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Heterogeneous Returns, Men

Men, Doctorate over High School



Treatment effect of education on lifetime earnings, by personality traits.

Conclusion

Personality traits have **strong effects** on lifetime earnings, but effects materialize **later in life**.

Because traits have impact on education, **indirect** gains also. Returns to education are increased by some traits.

⇒ By fostering character, increase **earnings, education, and returns to education**.

Extrapolation to regular sample?

Maybe not to exact magnitude estimated. But

Yes to importance of traits, age-profile of effects, interaction with education.

⇒ Great potential to strengthen society's human capital, exclusive focus on hard skills in schools might be misguided!

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Thank You!

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