Genetic factors and preferences for redistribution.

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- This is a candidate gene association study linking individual preferences toward redistribution of income and the 5HTT gene that regulates the metabolism of neurotransmitter serotonin
- We find that the LL genotype of 5HTT is associated with more positive attitudes toward income redistribution

Do you believe that

1. Incomes should be made more equal vs. we need larger income differences as incentives
2. Private ownership of business should be increased vs. Government ownership should be increased
3. People should take more responsibiity to provide for themselves vs. the government should take more responsibility
4. Competition is good vs. competition is harmful
5. Hard work brings a better life vs. It's a matter of luck and connections
6. People can only get rich at the expense of others vs. wealth can grow so there is enough for everyone

1. Very important in economics. On country/state level it is correlated with the size of the social sector: Alesina and Angeletos (2005), Guiso, Sapienza, and Zingales (2006)

2. Income is the single most important factor. Meltzer and Richards (1981), all individual-level studies

3. Religion and ethnic origin: GSZ (2006)

4. Racial and ethnic animosity: Alsina, Glazer, and Sacerdote (2000), AA (2005)

5. Exposure to Communist society: Ignacz (2013)

6. Causality runs both ways: Benabou and Tirole (2006)
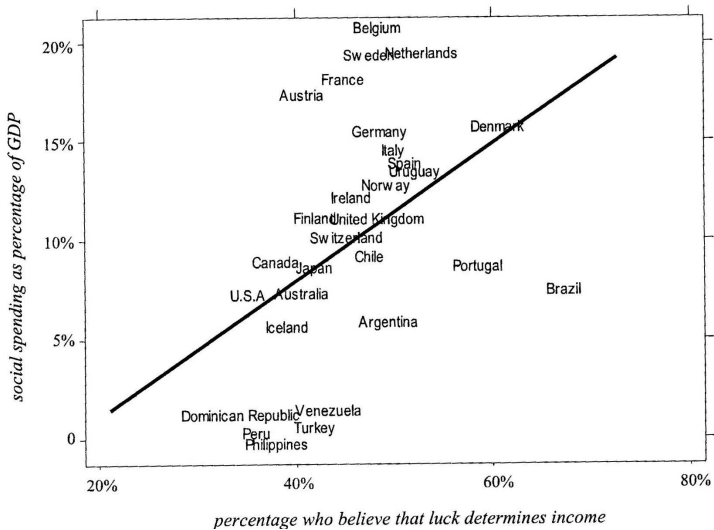
percentage who believe that luck determines income

- Alesina and Guiliano (2009): Adverse economic experiences, political ideology, occupational prestige relative to parents, preferences in the country of origin
- It matters whether the income is perceived as having been obtained through effort or through luck
- AGS (2000): number of children, education, church attendance, support for capital punishment

- Gene: A piece of DNA that contains information how to produce a specific protein
- Allele: A version of a gene
- Generally, a person has two copies of each gene in each body cell
- Genotype: The combination of alleles for a particular gene
- Example: Suppose that for a gene, two alleles exist, **A** and **a**. There are three possible genotypes: **AA**, **Aa**, **aa**
- A trait may depend on the genotype of one gene, several genes, or a large number of genes, and/or be determined environmentally

- Is responsible for the metabolism of a brain chemical serotonin
- One of the genes regulating emotions and social behavior
- Two types of alleles: L and S
- Carriers of one or two S alleles have
    - Higher harm avoidance scores (Mufano et. al. 2005)
    - Higher neuroticism score (Sen et. al. 2004)
    - Smaller propensity to risk taking in experiments (Kuhnen and Chiao 2009)
    - Greater response to fear conditioning, emotion tasks (Lonsdorf et. al. 2004, Hariri et. al. 2002, 2005, Bertolino et. al. 2005)
    - More depressive symptoms in response to stressful events (Caspi et. al. 2011)
    - More agressive social behavior in monkeys (Suomi 2003)

Candidate gene studies of political/economic behavior

- Partisan attachment: Dawes and Fowler (2009): D2 dopamine receptor gene
- Political ideology. Settle, Dawes, Christakis, Fowler (2010): D4 dopamine receptor gene, mediated by socialization in adolescence
- Voter turnout. Dawes and Fowler (2008): 5HTT and MAOA genes, mediated by social environment (disputed by Charney and English 2012, 2013)
- Behavior in dictator games. Knafo et. al. (2008): AVPR1a gene. Israel et. al. (2009): OXTR gene
- Risk-taking. Dreber et. al. (2009): DRD4 gene. Kuhnen and Chiao (2009): 5HTT gene
- Public good game. Metrins et. al. (2011): MAOA
- Punishment after provocation. McDermott et. al. (2009): MAOA
- Credit card debt. De Neve and Fowler (2011): MAOA

Heritability studies

Twin studies: Monozygotic vs. dizygotic twins

- Some political attutudes are genetically transmitted: Tessler (1993), Hatemi et. al. (2007, 2010), Alford, Funk, and Hibbing (2005), Eaves and Hatemi (2008)

- AFH (2005): attitudes toward "property tax", "capitalism", and "socialism" are heritable

- Risk taking and prosocial behavior in dictator games is heritable: Cesarini el. al. (2009)

- Attitudes toward economic equality: Bell, Schermer, and Vernon (2009)

- Voter turnout, partisan attachment: Fowler, Baker and Dawes (2008), Settle, Dawes, Fowler (2009), Hatemi et. al. (2009, 2010)

- Left-right voter preference. BSV (2009), but not other studies

- Study conducted in 6 Russian regions: St. Petersburg, Leningrad oblast, Chuvashia, Bashkiria, Altai Republic, and the Kabardin-Balkar republic
- Survey questions similar to WVS
- Genotyped for COMT, MAOA and 5HTT genes
- Full data for 2283 individuals

Calculated using PCA. Factor loadings:

|	
Incomes should be made more equal	-0.60
Private ownership of business should be increased	0.37
The government should take more responsibility	-0.58
Competition is good	-0.18
In the long run, hard work usually brings a better life	0.02
People can only get rich at the expense of others	-0.38

26% of variance is explained by the first component.

Redistribution preference index by 5HTT genotype
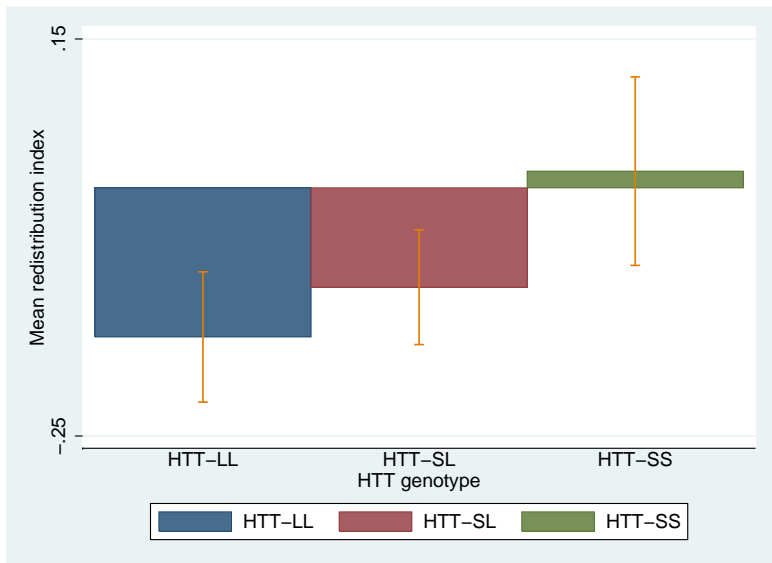
- Place of birth and ethnic identification were used to identify populations
- Ukrainian, Tatar, Bashkir, Chuvash, Kabardin
- Russians born in Bashkiria, Tatarstan, Chuvashia, Altai Republic, Lenigrad Oblast, and St. Petersburg
- Three residual categories: Other nationalities, Russians born in other regions, and Russians with no information on the place of birth

Redistribution preference index by 5HTT genotype and population
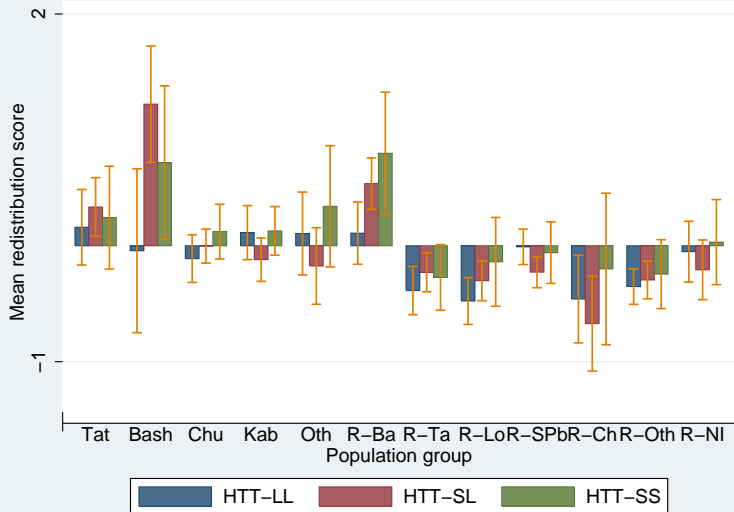
- For 5HTT-LL vs. 5HTT-SS, the average redistribution index is lower (more redistribution) in all populations but 1. The difference is signficant for 2 populations.
- Hardy-Weinberg hypothesis:
  - 5HTT: not rejected for all populations, although $p = 0.135$ (Russians born in St. Peterburg), $p = 0.120$ (Kabardins), $p = 0.162$ (Russians born in Chuvashia)
  - COMT: Rejected $p = 0.064$ for Russians born in Altai, $p = 0.054$ for Ukrainians

Control variables

- Education (1-9)
- Self-reported income decile
- Age
- Size of township dummies: town or urban settlement
- Gender

The effect of genotype on the redistrbution index

| | Unrestricted sample | | | 12 populations |
	Model 1	Model 3	Model 4	Model 5
Education	0 (0.946)	0 (0.876)	0 (0.955)	0 (0.767)
Income	0.14 (0.000)	0.13 (0.000)	0.14 (0.000)	0.12 (0.000)
5HTT-LL	-0.16 (0.022)	-0.14 (0.036)	-0.16 (0.014)	-0.18 (0.032)
5HTT-SL	-0.11 (0.097)	-0.11 (0.067)	-0.12 (0.054)	-0.11 (0.142)
COMT-GA	-0.01 (0.898)			-0.02 (0.761)
COMT-GG	0.04 (0.584)			0.04 (0.593)
MAOA-4	-0.04 (0.646)			-0.08 (0.407)
MAOA-34	-0.05 (0.536)			-0.11 (0.243)
MAOA-44	-0.09 (0.298)			-0.1 (0.333)
Female	0.07 (0.494)	0.03 (0.584)	0.04 (0.392)	0.08 (0.454)
Age	-0.02 (0.011)	-0.03 (0.002)	-0.03 (0.002)	-0.01 (0.173)
Age^2	0 (0.166)	0 (0.049)	0 (0.045)	0 (0.731)
Pop. FE	Yes	Yes	No	Yes
Adjusted R^2	0.1122	0.1052	0.0731	0.1097
N	2230	2568	2568	1716

	5HTT-LL	5HTT-SL
Marital status and number of children	-.16 (0.026)	-.11 (0.104)
Religion	-.17 (0.017)	-.11 (0.099)
Mixed-effects, intercept only	-.17 (0.016)	-.12 (0.087)
Mixed-effects for 5HTT coefficients	-.17 (0.018)	-.094 (0.299)
Corr. mixed-effects for 5HTT-LL and int.	-.21 (0.034)	-.12 (0.087)
Trust other nationalities	-.16 (0.031)	-.10 (0.129)
Other nationalities as neighbors	-.16 (0.023)	-.11 (0.101)
Non-Russian populations only	-.20 (0.014)	-.12 (0.104)
Ideology	-.16 (0.024)	-.11 (0.112)
People will use you	.17 (0.019)	-.12 (0.79)
Food shortages last 12 months	-.15 (0.037)	-.12 (0.072)

- Population stratification and genetic drift
- Linkage disequilibrium
- Heterogeneity of 5HTT-LL and 5HTT-SL effects across populations
  - Significant at $p < 0.1$ in 2 populations and 1 catch-all group
  - Significant at $p < 0.2$ in 3 populations
  - Opposite and significant effect of SL in 2 populations (Bashkirs, $N = 42$ and $p = 0.062$, Balkars, $N = 28$ and $p = 0.110$)

- Chiao and Blizinsky (2010): on a country level, frequency of 5HTT-SS correlates with the country collectivism index
- But we find that 5HTT-SS is associated with a more *negative* attitude toward redistribution of income
- Collectivism index:
    - Low emphasis on workplace freedom and achievement
    - High emphasis on skill acquisition and skill use

- We find that the 5HTT gene has an effect on redistribution preferences
- More work is needed to address the issue of population stratificaton
- Findings must be replicated with other data sets
- More work is needed to look for country-level effects
- More candidate genes