The Agricultural Origins of Gender Norms Economist Club – Master Thesis Event

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The past is latent, is submerged, but still there, capable of rising to the surface once the later imprinting unfortunately – and against ordinary experience – vanished. The man contains – not the boy – but earlier men.

Philip K. Dick, Ubik

- We use genetic data at population level to construct a proxy of agricultural ancestry
 - This version focuses on agricultural ancestry only
 - No effect of language on gender found in older version
- No direct effect of genes on norms is implied
- The proxy for agricultural ancestry tracks how widespread sedentary agriculture was and how long it was practiced
- Higher agricultural ancestry → lower female participation in labor market and politics & male-favoring gender norms
- Results robust to variety of controls and alternative measures of agricultural ancestry (other genetic data)

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Introduction

- Gender inequality key in research and policy agendas
- Female participation in political and economic life is still stunted, formally and informally
- Female underrepresentation in societal functions has adverse economic effects:
 - Income inequality (Gay et al. 2018),
 - Economic slowdown (Klasen 2018),
 - Financial instability (Sahay 2018).
- Male-favoring gender norms
 - Propagate gender inequality in general,
 - Drive women out of economic and political life in particular

Female Labor Force Participation

Female LF Participation in 2000



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Definition 1

Gender norms are standards and expectations to which women and men generally conform, within a range that defines a particular society, culture and community at that point in time

- Gender norms vary across countries and cultures and are linked to the variation in gender inequality
- Why does this variation appear?

Gender norms and labor specialization

- Women used to be less effective at physically demanding activities, resulting in a gender-based division of labor
- Women came to be seen as less suited for the type of out-of-household labor requiring physical strength
 - Oil production (Ross 2008),
 - Warfare involvement (Whyte 1978),
 - Agriculture (Alesina et al. 2013, Hansen 2015).

Agricultural ancestry and gender norms

- Sedentary agricultural practices conducive to emergence of gender-based labor specialization (Boserup 1970)
 - Adoption of the plough drove women out of the labor force (Alesina et al. 2013)
 - Other physically demanding agricultural activities (herding) contributed to exclusion of women from the labor force
 - Longer history of such division results in more strict and rigid gender norms (Hansen 2015)
- These norms were even internalized in the language and culture of sedentary societies (Galor et al. 2018)
- Societies with more gendered languages are more discriminating towards women (Gay et al. 2013)
- Our older results suggest that the effect of language becomes insignificant once we account for agricultural ancestry

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Haplogroups and the spread of agriculture

- The spread of agriculture ~ migrations of Neolithic farmers and herders from Africa and the Fertile Crescent (Haak 2010, Balaresque et al. 2010, Arroyo-Pardo 2014)
- Many haplogroups appeared at the same place and time where the Neolithic revolution started
- Certain genetic markers Y-DNA haplogroups enable us to track the ancestral history of a region or a person
- Regions where these haplogroups are more common
 - were more exposed to Neolithic migrations
 - thus more exposed to the adoption of agriculture
 - thus more exposed to the corresponding gender norms.

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Haplogroups and the spread of agriculture

Definition 2 (International Society of Genetic Genealogy)

A Y-DNA (*mtDNA*) haplogroup (Hg) is a sustainable combination of genetic mutations that are inherited unchanged from father (mother) to son (daughter)

- Y-DNA Hgs less dispersed geographically due to mostly patrilineal inheritance of property in Neolithic societies
- Major Neolithic Hgs can be divided into two groups based on the features of Neolithic sites where they were found (Lazaridis et al. 2013, Gignoux et al. 2011):
 - Agricultural Hgs: J1, J2, E1b1b, G, T, and I2a
 - Hunting-Gathering Hgs: Q, R1b, R1a, I2b, and I1
- Generally, agricultural ancestry is more common in regions with higher frequencies of agricultural Hgs

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Proposed mechanism

- Parents pass not only their genes (*nature*) but their values as well (*nurture*)
- Neolithic farmers/herders were more likely to pass gender-biased norms and values than hunter-gatherers
- Therefore, a bearer of the agricultural Y-DNA Hgs is more likely to have biased attitudes towards women
- These Hgs still reflect the ancestral way of life of modern populations.
- No direct effect of genes on norms implied!

Hypothesis 1

Countries and regions with more spread agricultural ancestry have lower female agency, and individuals from these regions are more likely to exhibit gender-biased attitudes and to have male-favoring gender norms

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Data and Methodology

- The data contain frequencies of major Neolithic Hgs for more than 100 countries (Family Tree DNA Project)
- Country-level OLS:

 $y_{c} = \beta A gricultural ancestry_{c} + X_{c}\Gamma_{c} + \varepsilon_{c},$

Individual-level OLS:

 $y_{i,c} = \beta A gricultural ancestry_{c} + X_{i}\Gamma_{i} + X_{c}\Gamma_{c} + \varepsilon_{i};$

- Agricultural ancestry_c = first principal component of Hgs' frequencies in country c, standardized and multiplied by -1
- Higher values of *Agricultural ancestry_c* correspond to the agricultural Hgs being more frequent within a country

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Agricultural ancestry

Table 1. Agricultural ancestry correlation with major Neolithic Hgs

Agr. anc.								
Hunting	Hunting-gathering Hgs:							
11	-0.45***							
l2b	-0.31***							
R1a	-0.14							
R1b	-0.46***							
Q	-0.13							
Agricultu	ural Hgs:							
l2a	-0.08							
J1	0.66***							
J2	0.60***							
G	0.36***							
E1b1b	0.56***							
Т	0.67***							

Agricultural ancestry

FTDNA Agricultural Ancestry



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Results Country level



(a) Share of women in parliament

Agricultural ancestry and FLFP

Countries with more than 50 person tested



(b) Female labor force participation

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Agricultural Ancestry

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Results

Country-level

	% Women	in Parliament	Female Lat	male Labor Participation			
Historical and Contemporary controls		X_c^H, X_c^C					
Only constant	-5.84^{***}	(1.39)	-8.06^{***}	(1.35)			
Only continent FE	-4.45^{***}	(1.52)	-9.65^{***}	(1.78)			
Political complexity	-4.29^{***}	(1.46)	-9.48^{***}	(1.71)			
Agr. suitability and crop yield	-4.56^{***}	(1.44)	-8.92^{***}	(1.88)			
Tropical climate	-4.23^{***}	(1.45)	-8.09^{***}	(1.84)			
$ln(GDP_{PC})$ and $ln(GDP_{PC})^2$	-4.72^{***}	(1.12)	-8.12^{***}	(1.54)			
Communist past	-3.99^{***}	(1.45)	-9.84^{***}	(1.51)			
Religion	-2.36^{*}	(1.30)	-5.07^{***}	(1.70)			
All X_c^H , X_c^C	-5.39^{**}	(2.04)	-4.13^{**}	(1.90)			
Geo-climatic controls X ^G _c							
Terrain slope	-5.43^{**}	(2.41)	-3.98^{**}	(1.79)			
Soil depth	-5.07^{**}	(2.40)	-2.95	(1.92)			
Average temperature	-5.23^{**}	(2.05)	-3.90^{**}	(1.89)			
Average precipitation	-5.85^{**}	(2.18)	-4.38^{*}	(2.22)			
All geo-climatic X_c^G	-5.59^{**}	(2.23)	-3.86^{*}	(2.00)			
All geo-climatic X ^G _c squared	-5.53^{**}	(2.22)	-3.63^{*}	(1.95)			
All geo-climatic X_c^G interactions	-4.37	(2.48)	-3.94^{*}	(2.09)			
Alternative controls X_c^A		All X ^H _c , λ	K ^C included				
Oil production _{PC}	-5.45^{***}	(2.18)	-5.21^{**}	(2.40)			
Years civil conflict	-5.50^{***}	(2.17)	-4.83^{**}	(2.54)			
Years interstate conflict	-5.77^{***}	(2.06)	-4.92^{**}	(2.41)			
Trade GDP	-5.79^{***}	(2.02)	-4.81^{**}	(2.38)			
<i>Note:</i> log-weighted OLS. * $p < 0.1$, ** p	$< 0.05,^{***} p$	< 0.01	• • • • • • • • • • • • • • • • • • •	₽ × < E > < E >			
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Results

Individual-level (WVS/EVS data)

	Men hav a iob tha	ve more right to an women (v/n)	Female employment (v/n)		
Individual X ^C _i	,	All X_c^H , X_c^C in	cluded		
Only year FE and continent FE	0.10***	(0.02)	-0.12^{***}	(0.03)	
Only X_{C}^{H}, X_{C}^{C} and FEs	0.07^{**}	(0.01)	-0.11^{***}	(0.03)	
Age, age ²	0.07^{***}	(0.01)	-0.11^{***}	(0.03)	
Marital status	0.07^{***}	(0.01)	-0.10^{***}	(0.03)	
Education	0.07^{***}	(0.01)	-0.11^{***}	(0.03)	
Income	0.08^{***}	(0.02)	-0.10^{***}	(0.03)	
Religion	0.07*** (0.02)		-0.10^{***}	(0.03)	
All X ^C	0.07^{***}	(0.02)	-0.10^{***}	(0.03)	
Geo-climatic controls X_c^G	All X_c^H , X_c^C , X_i^C included				
Terrain slope	0.08***	(0.02)	-0.10^{***}	(0.03)	
Soil depth	0.08^{***}	(0.02)	-0.07^{**}	(0.03)	
Average temperature	0.08^{***}	(0.02)	-0.10^{***}	(0.03)	
Average precipitation	0.04^{**}	(0.02)	-0.07^{**}	(0.03)	
All geo-climatic X ^G	0.05^{**}	(0.02)	-0.06^{*}	(0.03)	
All geo-climatic X ^G squared	0.07^{***}	(0.02)	-0.06^{**}	(0.03)	
All geo-climatic X_c^{G} interactions	0.07^{***}	(0.02)	-0.06	(0.03)	
Alternative controls X_c^A	All X_c^H , X_c^C included				
Oil production _{PC}	0.07***	(0.02)	-0.10^{***}	(0.03)	
Years civil conflict	0.07^{***}	(0.02)	-0.10^{***}	(0.02)	
Years interstate conflict	0.07^{***}	(0.02)	-0.10^{**}	(0.03)	
Trade GDP	0.07^{***}	(0.02)	-0.10^{***}	(0.03)	

Note: log-weighted OLS. *p < 0.1, **p < 0.05,*** p < 0.01

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- Similar results with weighted and unweighed OLS
- Similar results with alternative datasets and measures:
 - Eupedia and NevGen haplogroup data,
 - Early European farmers' admixture (Lazaridis et al. 2013).
- The results for male-favoring gender norms hold in a subsample of second-generation migrants
- Machine-learning CART algorithm selects agricultural ancestry among the most important variables

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Results

Second-generation migrants (ESS data)

	Men hav	e more right to	Female				
	a job tha	an women (y/n)	employment (y/n)				
Agricultural ancestry	Father's country of birth						
Individual X_i^C		All X_c^H , X_c^C in	cluded				
Only year FE and continent FE	0.03^{**}	(0.01)	-0.03^{**}	(0.01)			
Only X_c^H, X_c^C and FEs	0.05^{***}	(0.01)	-0.03	(0.02)			
Age, age ²	0.05^{***}	(0.01)	-0.03^{**}	(0.01)			
Marital status	0.05^{***}	(0.01)	-0.02	(0.02)			
Education	0.04^{***}	(0.01)	-0.02	(0.02)			
Income	0.04^{**}	(0.01)	-0.03^{*}	(0.02)			
Religion	0.05^{***}	(0.02)	-0.01	(0.01)			
All X ^C _i	0.03^{*}	(0.02)	-0.01	(0.01)			
Agricultural ancestry	Mother's country of birth						
Individual X_i^C	All X_c^H , X_c^C included						
Only year FE and continent FE	0.04^{***}	(0.01)	-0.03^{**}	(0.01)			
Only X_c^H, X_c^C and FEs	0.07^{***}	(0.01)	-0.02	(0.02)			
Age, age ²	0.07^{***}	(0.01)	-0.03^{*}	(0.01)			
Marital status	0.07^{***}	(0.01)	-0.02	(0.02)			
Education	0.06^{***}	(0.01)	-0.01	(0.02)			
Income	0.08^{***}	(0.01)	-0.03	(0.02)			
Religion	0.07^{***}	(0.02)	-0.01	(0.02)			
All X_i^C	0.06^{***}	(0.02)	0.00	(0.02)			

Note: log-weighted OLS. *p < 0.1, **p < 0.05,***p < 0.01

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Men have more right to a job CART

(b) Variable importance

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(a) Jobs are scarce	CART
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Results CART Trees



(a) Female employment CART





(b) Variable importance

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Agricultural Ancestry

Variable name

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Thank you for your attention!

The Agricultural Origins of Gender Norms

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