Ala-kachuu Husbands and Wives in Kyrgyzstan: Who Kidnaps Whom and Why?

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1

Paper objective

Who Kidnaps Whom and Why

- The empirical results presented in these slides are based on Life in Kyrgyzstan (LIK) survey data. We have used data from the 2011, 2012, 2013 and 2016 survey waves.
- Explore incentives of those who marry via the process of bride abduction (*ala kachuu*) relative to those who marry via arranged or mutual-agreement ("love") marriages.
- Build on Becker and Steiner (2019), who find that those in *ala kachuu* marriages are less positively assorted than those in other marriages. We explore the extent to which personality traits of women in forced marriages depend on the characteristics of their captors.
- We then present a structural model of the Kyrgyz marriage market in an effort to determine which type of marriage arrangement is rational for various socio-economic and personality characteristics.

2

Outline

- Who kidnaps Whom
- Couples' Similarities
- Mental Health and Marriage Types
- Personality and Choice of Marriage
- Structural Model
- Appendix

3

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4

Who Kidnaps Whom

Table: Proportion of different types of marriage among Kyrgyz and non-Kyrgyz

	Non-Kyrgyz		Kyrgyz		Total	
	No.	%	No.	%	No.	%
love marriage	265	46.17	347	25.80	612	31.89
arranged marriage	272	47.39	535	39.78	807	42.05
non-consensual bride kidnapping	31	5.40	399	29.67	430	22.41
consensual bride kidnapping	6	1.05	64	4.76	70	3.65
Total	574	100	1345	100	1919	100

5

Descriptive statistics from LIK 2016 takeaways

- Bride kidnapping is mostly a Kyrgyz-specific social practice.
- Non-consensual bride kidnapping constitutes only 5.4% of all marriages among non-Kyrgyz households – and those are mostly Kazakh – while the proportion is 29.67% among the Kyrgyz.
- However, the proportions of marriages via bride kidnapping, both consensual and non-consensual, are decreasing over time. This is true for both Kyrgyz and general population.
- Kidnapping likelihood diminishes with educational attainment for both men and women, but does not vanish.

6

Who Kidnaps Whom

Time Trend – Kyrgyz only

7

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8

Table 2 Estimation results - Association of profile similarity index and type of marriage

	Identical couples included				Identical couples excluded			
VARIABLES	(1) No controls	(2) Control for demographics	(3) Add district indicators	(4) Kyrgyz only	(5) No controls	(6) Control for demographics	(7) Add district indicators	(8) Kyrgyz only
Arranged marriage	-0.082	-0.128	-0.199**	-0.224*	-0.147**	-0.102*	-0.120**	-0.076
	(0.095)	(0.098)	(0.096)	(0.129)	(0.060)	(0.062)	(0.060)	(0.078)
non-consensual bride kidnapping	-0.227***	-0.212**	-0.191*	-0.168	-0.202***	-0.158**	-0.128*	-0.051
	(0.086)	(0.093)	(0.100)	(0.127)	(0.068)	(0.070)	(0.069)	(0.084)
consensual bride kidnapping	0.157	0.141	0.082	0.044	-0.039	-0.060	-0.047	-0.020
	(0.264)	(0.263)	(0.249)	(0.253)	(0.189)	(0.180)	(0.158)	(0.158)
marriage duration	-0.004*	0.000	0.002	0.003	-0.002	0.003	0.005**	0.007**
	(0.002)	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)
Duration * arranged	0.010***	0.010***	0.008**	0.007	0.007***	0.006**	0.005**	0.002
	(0.004)	(0.004)	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.003)
Duration * nonconsensual	0.008***	0.007**	0.003	0.001	0.007**	0.006**	0.003	-0.001
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)
Duration * consensual	0.001	0.001	-0.001	-0.001	0.005	0.006	0.004	0.001
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)
Spouses are Uzbeks		0.139	-0.128			-0.183***	-0.335***	
		(0.093)	(0.093)			(0.058)	(0.075)	
Spouses are Russians		-0.090	0.009			-0.044	0.006	
		(0.062)	(0.060)			(0.057)	(0.058)	
Spouses are of other, but identical ethnicity		-0.038	0.211***			0.064	0.237***	
		(0.060)	(0.068)			(0.052)	(0.064)	
Spouses are of different ethnicity		-0.053	-0.017			0.005	-0.006	
		(0.078)	(0.074)			(0.074)	(0.072)	
Age of husband		-0.009	-0.002	-0.000		-0.003	-0.001	-0.001
		(0.008)	(0.007)	(0.010)		(0.005)	(0.005)	(0.006)
Age of wife		0.005	0.006	-0.003		-0.004	-0.003	-0.006
		(0.009)	(0.008)	(0.010)		(0.006)	(0.006)	(0.007)
Wife' age * Husband's age		-0.000	-0.000	0.000		0.000	-0.000	0.000
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
Husband education		0.047	0.025	0.045		0.051	0.037	0.062
		(0.048)	(0.045)	(0.056)		(0.039)	(0.037)	(0.045)
Wife education		0.021	0.007	0.018		0.019	0.006	0.026
		(0.055)	(0.052)	(0.065)		(0.038)	(0.037)	(0.045)
Husband education * Wife education		-0.007	-0.002	-0.004		-0.004	-0.001	-0.004
		(0.010)	(0.009)	(0.011)		(0.007)	(0.007)	(0.008)
Constant	0.810***	0.802**	0.253	0.075	0.740***	0.676***	0.429*	-0.063
	(0.060)	(0.362)	(0.309)	(0.415)	(0.044)	(0.228)	(0.226)	(0.291)
District indicators	No	No	Yes	Yes	No	No	Yes	Yes
Observations	1,810	1,793	1,793	1,261	1,769	1,752	1,752	1,241
R-squared	0.013	0.018	0.279	0.225	0.010	0.024	0.183	0.266

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Mental Health

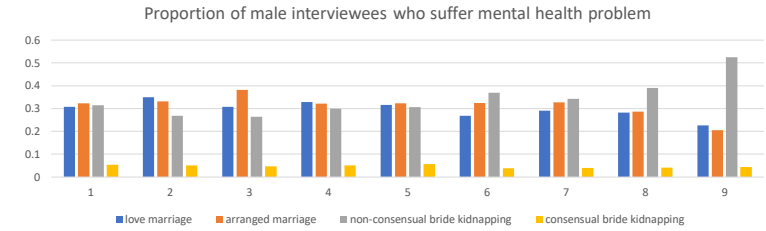
Construct depression indicator

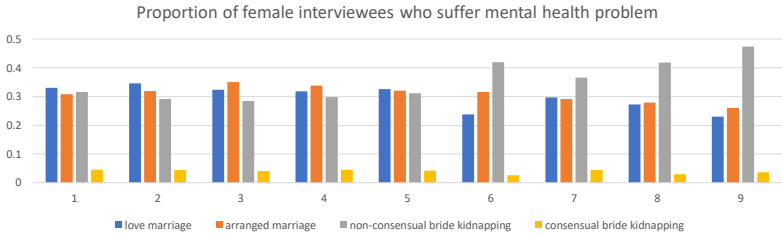
I247	Over the past 2 weeks, how often have you been bothered by any of the following problems?	Not At all	Several Days	More Than Half the Days	Nearly Every Day
1. Little interest or pleasure in doing things		0	1	2	3
2. Feeling down, depressed or hopeless		0	1	2	3
3. Trouble falling asleep, staying asleep, or sleeping too much		0	1	2	3
4. Feeling tired or having little energy		0	1	2	3
5. Poor appetite or overeating		0	1	2	3
6. Feeling bad about yourself - or that you're a failure or have let yourself or your family down		0	1	2	3
7.Trouble concentrating on things, such as reading newspaper or watching TV		0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite - being so fidgety or restless that you have been moving around a lot more than usual		0	1	2	3
9.Thoughts that you would be better off dead or of hurting yourself in some way		0	1	2	3

Mental health & marriage types

- Both men and women in forced marriages have highest prevalence of depression.
- For both men and women, couples in a marriage that was formed by bride capture are more likely to suffer depression, as shown in histogram graphs.
- When age polynomials (correlated with depression) are controlled for; results remain the same
- Education level is significantly negatively associated with depression indicator

Mental Health
Proportion





13

Mental Health
Hazard function

Table: Hazard function on the probability of suffering depression

VARIABLES	(1) Men	(2) Women	(3) Men	(4) Women
Arranged marriage	0.018	-0.062	0.015	-0.057
	(0.052)	(0.053)	(0.053)	(0.054)
Non-consensual bride kidnapping	0.150**	0.163***	0.138**	0.164***
	(0.063)	(0.062)	(0.065)	(0.064)
Consensual bride kidnapping	0.249	0.438***	0.191	0.416***
	(0.158)	(0.142)	(0.165)	(0.142)
Marriage duration	0.009***	0.006***	0.000	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)
Love marriage * marriage duration	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Arranged marriage * marriage duration	0.000	0.003	0.001	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Non-consensual bride kidnapping * marriage duration	-0.001	-0.001	-0.001	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Consensual bride kidnapping * marriage duration	-0.003	-0.008*	-0.002	-0.007
	(0.005)	(0.005)	(0.005)	(0.005)
Household income			0.000	-0.001
			(0.011)	(0.010)

14

Mental Health

Hazard function (cont'd)

Highest degree = primary			-0.531**	-0.493**
			(0.207)	(0.193)
Highest degree = basic			-0.266***	-0.202***
			(0.075)	(0.071)
Highest degree = secondary general			-0.190***	-0.165**
			(0.071)	(0.066)
Highest degree = primary technical			-0.133	-0.027
			(0.091)	(0.084)
Highest degree = secondary technical			-0.154**	-0.158**
			(0.077)	(0.071)
Highest degree = university (bachelor, diploma, master)			-0.156**	-0.117*
			(0.075)	(0.070)
Husband employment status			-0.063**	
			(0.026)	
Husband age			0.002	
			(0.006)	
Husband age^2			0.000	
			(0.000)	
Wife employment status				-0.017
				(0.025)
Wife age				0.001
				(0.006)
Wife age^2				0.000
				(0.000)
Constant	0.282***	0.394***	0.448***	0.511***
	(0.038)	(0.040)	(0.150)	(0.139)
Observations	1,827	1,827	1,794	1,794
R-squared	0.065	0.065	0.082	0.076

Mental health & marriage types: Kyrgyz only

- When using Kyrgyz sample only, the coefficients of non-consensual bride kidnapping are no longer significant! Specifically, for woman, the coefficients on non-consensual bride kidnapping are marginally significant while the coefficients on consensual-bride kidnapping are significant.
- Possible explanation: as bride kidnapping is perceived as a social norm for Kyrgyz people, women who are kidnapped might consider the event as a fate or destiny and they may not be as reluctant as other ethnicities.
- Meanwhile, since in the data set we notice that there are cases in which husband and wife report different types of marriage, there might be measurement error in differentiating two types of bride kidnapping marriage (prior to LIK 2016 data, the survey didn't differentiate the two types of marriage).
- Once we combine the two types of bride kidnapping into one, the coefficient becomes marginally significant. We need to consider further why this would be the pattern for Kyrgyz people.

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17

Personality and marriage type

Personalities and eras

- These regressions are from a multi-logit model that tries to explain the choice of types of marriage using personalities. The base group here is arranged marriage. It will increase the probability of choosing this type of marriage if the coefficient is positive significant and vice versa.
- The general pattern (all years) of this set of regressions shows that the choice of types of marriage are strongly associated with ethnicities in all different eras. Meanwhile, when adding controls, women with higher education will be more likely to choose love marriage.
- In the Soviet era, personalities are not a strong determinant of types of marriage.
- **In the transition era, open, conscientious, agreeable women are more likely to be targets of forced kidnapping.**
- **These effects vanish in the post-transition era.**

18

Personality and Choice of Marriage

All Times

Table: Couple's Personalities and Choice of Types of Marriage

VARIABLES	(1) Love marriage	(3) Non-consensual bride kidnapping	(4) Consensual bride kidnapping	(5) Love marriage	(7) Non-consensual bride kidnapping	(8) Consensual bride kidnapping
w_conscientiousness	0.035	0.304**	0.100	-0.102	0.326**	0.186
	(0.120)	(0.136)	(0.327)	(0.139)	(0.149)	(0.363)
h_conscientiousness	0.224*	0.049	-0.188	0.141	0.009	-0.255
	(0.125)	(0.129)	(0.280)	(0.149)	(0.143)	(0.305)
w_openness	0.262*	0.089	0.084	0.107	0.020	0.029
	(0.137)	(0.148)	(0.326)	(0.156)	(0.163)	(0.364)
h_openness	0.173	-0.228	0.158	0.249	-0.252	0.092
	(0.143)	(0.147)	(0.329)	(0.163)	(0.162)	(0.357)
w_agreeableness	-0.302***	0.262**	0.300	-0.265**	0.271**	0.361
	(0.111)	(0.115)	(0.222)	(0.126)	(0.127)	(0.235)
h_agreeableness	-0.210**	-0.222**	0.034	-0.188	-0.248**	-0.039
	(0.101)	(0.110)	(0.203)	(0.117)	(0.119)	(0.218)
w_extraversion	-0.058	-0.220	0.046	-0.118	-0.154	0.089
	(0.148)	(0.152)	(0.327)	(0.171)	(0.169)	(0.355)
h_extraversion	0.037	-0.080	0.325	-0.107	-0.054	0.440
	(0.145)	(0.151)	(0.310)	(0.167)	(0.170)	(0.343)
w_neuroticism	0.496***	-0.020	0.129	0.403***	0.085	0.170
	(0.108)	(0.124)	(0.288)	(0.129)	(0.135)	(0.313)
h_neuroticism	0.424***	0.064	-0.188	0.341**	0.041	-0.176
	(0.113)	(0.126)	(0.203)	(0.135)	(0.131)	(0.212)
ethn_uzbeks				-2.906***	1.311	12.564***
				(0.294)	(1.041)	(0.627)
ethn_russian				3.116***	-0.350	-13.622***
				(0.489)	(0.710)	(1.589)
ethn_other				1.664***	-3.528***	-14.845***
				(0.231)	(1.015)	(0.253)
diff_ethn				2.415***	-0.875	-14.000***
				(0.656)	(1.134)	(0.634)
husband education				0.111**	-0.103*	-0.021
				(0.055)	(0.058)	(0.111)
wife education				0.252***	-0.057	-0.107
				(0.055)	(0.061)	(0.129)
Constant	-3.425***	-0.397	-4.987**	-3.069***	1.431	-4.006*
	(0.860)	(0.881)	(2.113)	(1.155)	(1.197)	(2.389)
Age, Age^2	No	No	No	Yes	Yes	Yes
Observations	1,881	1,881	1,881	1,814	1,814	1,814

Personality and Choice of Marriage

Soviet Era

Table: Couple's Personalities and Choice of Types of Marriage (Soviet Era)

VARIABLES	(1) Love marriage	(3) Non-consensual bride kidnapping	(4) Consensual bride kidnapping	(5) Love marriage	(7) Non-consensual bride kidnapping	(8) Consensual bride kidnapping
w_conscientiousness	0.238	0.213	0.012	0.160	0.307	0.220
	(0.179)	(0.190)	(0.393)	(0.227)	(0.215)	(0.467)
h_conscientiousness	0.059	0.088	-0.747**	0.027	0.053	-0.880**
	(0.190)	(0.181)	(0.364)	(0.246)	(0.207)	(0.441)
w_openness	0.155	0.055	0.432	-0.150	-0.061	0.313
	(0.214)	(0.211)	(0.386)	(0.259)	(0.233)	(0.442)
h_openness	0.240	-0.089	0.170	0.407	-0.080	0.157
	(0.224)	(0.207)	(0.435)	(0.278)	(0.234)	(0.490)
w_agreeableness	-0.325*	0.239	0.353	-0.311	0.268	0.484
	(0.166)	(0.162)	(0.279)	(0.197)	(0.185)	(0.314)
h_agreeableness	-0.030	-0.147	0.127	0.029	-0.173	0.096
	(0.154)	(0.156)	(0.243)	(0.187)	(0.173)	(0.269)
w_extraversion	-0.151	-0.198	0.511	-0.227	-0.217	0.469
	(0.231)	(0.229)	(0.453)	(0.292)	(0.260)	(0.516)
h_extraversion	-0.241	-0.289	0.334	-0.369	-0.274	0.634
	(0.227)	(0.218)	(0.409)	(0.276)	(0.263)	(0.497)
w_neuroticism	0.536***	0.040	0.208	0.462**	0.112	0.201
	(0.159)	(0.177)	(0.349)	(0.204)	(0.192)	(0.373)
h_neuroticism	0.353**	0.026	-0.045	0.296	-0.011	-0.029
	(0.172)	(0.187)	(0.268)	(0.217)	(0.196)	(0.290)
ethn_uzbeks				-2.671***	1.096	12.850***
				(0.461)	(1.054)	(0.719)
ethn_russian				3.333***	-2.653***	-13.651***
				(0.628)	(0.802)	(0.677)
ethn_other				1.525***	-2.974***	-14.723***
				(0.342)	(1.015)	(0.347)
diff_ethn				3.323***	0.148	-13.727***
				(1.183)	(1.405)	(1.106)
husband education				-0.072	-0.191**	-0.181
				(0.091)	(0.088)	(0.144)
wife education				0.422***	0.044	0.079
				(0.094)	(0.096)	(0.163)
Constant	-2.476*	0.073	-6.354**	-2.278	1.781	-8.287**
	(1.320)	(1.277)	(2.836)	(1.940)	(1.916)	(3.807)
Age, Age^2	No	No	No	Yes	Yes	Yes
Observations	877	877	877	824	824	824

Personality and Choice of Marriage

Transition Era

Table: Couple's Personalities and Choice of Types of Marriage (Transition Era)

VARIABLES	(1) Love marriage	(3) Non-consensual bride kidnapping	(4) Consensual bride kidnapping	(5) Love marriage	(7) Non-consensual bride kidnapping	(8) Consensual bride kidnapping
w_conscientiousness	-0.574*	0.885**	-0.796	-0.542	0.866**	-0.706
	(0.321)	(0.384)	(0.610)	(0.348)	(0.393)	(0.592)
h_conscientiousness	0.678**	-0.126	0.098	0.537	0.065	0.376
	(0.335)	(0.316)	(0.297)	(0.394)	(0.352)	(0.396)
w_openness	0.898***	-0.369	0.494	0.676*	-0.583	0.219
	(0.347)	(0.403)	(0.783)	(0.391)	(0.487)	(0.938)
h_openness	0.110	-0.009	0.658	0.095	-0.246	0.340
	(0.355)	(0.350)	(0.477)	(0.402)	(0.396)	(0.559)
w_agreeableness	-0.083	0.570**	0.644	-0.132	0.635**	0.666
	(0.274)	(0.263)	(0.530)	(0.321)	(0.285)	(0.663)
h_agreeableness	-0.413*	-0.253	-0.702	-0.526*	-0.453	-0.861
	(0.240)	(0.238)	(0.570)	(0.311)	(0.280)	(0.546)
w_extraversion	0.185	-0.645*	0.160	0.346	-0.443	0.587
	(0.343)	(0.382)	(0.818)	(0.398)	(0.412)	(0.932)
h_extraversion	0.297	0.143	-0.427	-0.037	0.107	-0.708
	(0.336)	(0.356)	(0.738)	(0.395)	(0.437)	(0.716)
w_neuroticism	0.829***	-0.213	1.426**	0.876**	-0.221	1.526**
	(0.276)	(0.289)	(0.651)	(0.349)	(0.324)	(0.691)
h_neuroticism	0.522*	0.265	-0.347	0.277	0.329	-0.363
	(0.283)	(0.271)	(0.488)	(0.356)	(0.289)	(0.461)
ethn_uzbeks				-3.682***	11.315***	-1.586
				(0.783)	(1.182)	(1.036)
ethn_russian				4.397***	2.398	-13.562***
				(1.499)	(1.638)	(4.890)
ethn_other				1.987***	-15.020***	-14.670***
				(0.572)	(0.591)	(1.062)
diff_ethn				0.589	-15.257***	-13.506***
				(0.909)	(1.239)	(1.239)
husband education				0.328**	-0.257*	0.073
				(0.129)	(0.144)	(0.341)
wife education				0.138	-0.166	-0.375
				(0.132)	(0.147)	(0.349)
Constant	-7.706***	-0.990	-6.246	-11.359***	-8.093	-14.593
	(2.121)	(2.220)	(5.816)	(4.085)	(5.493)	(20.645)
Age, Age^2	No	No	No	Yes	Yes	Yes
Observations	374	374	374	373	373	373

Personality and Choice of Marriage

Post-Transition Era

Table: Couple's Personalities and Choice of Types of Marriage (Post-Transition Era)

VARIABLES	(1) Love marriage	(3) Non-consensual bride kidnapping	(4) Consensual bride kidnapping	(5) Love marriage	(7) Non-consensual bride kidnapping	(8) Consensual bride kidnapping
w_conscientiousness	-0.007	0.209	0.634	-0.200	0.091	0.738
	(0.201)	(0.246)	(0.771)	(0.222)	(0.267)	(0.845)
h_conscientiousness	0.235	0.040	1.272**	0.079	-0.036	0.848
	(0.205)	(0.246)	(0.609)	(0.238)	(0.265)	(0.602)
w_openness	0.204	0.369	-0.651	0.077	0.349	-0.803
	(0.219)	(0.270)	(0.660)	(0.246)	(0.305)	(0.776)
h_openness	0.045	-0.564**	-0.431	0.213	-0.506	0.074
	(0.231)	(0.281)	(0.708)	(0.262)	(0.311)	(0.744)
w_agreeableness	-0.362*	0.107	-0.326	-0.239	0.067	-0.442
	(0.186)	(0.213)	(0.473)	(0.203)	(0.226)	(0.425)
h_agreeableness	-0.353**	-0.229	0.600	-0.300	-0.180	0.793
	(0.172)	(0.209)	(0.420)	(0.189)	(0.218)	(0.562)
w_extraversion	0.057	0.008	-1.152**	-0.114	0.096	-1.445*
	(0.240)	(0.263)	(0.539)	(0.265)	(0.321)	(0.786)
h_extraversion	0.207	0.008	0.342	0.062	0.080	0.478
	(0.232)	(0.279)	(0.554)	(0.260)	(0.297)	(0.802)
w_neuroticism	0.353*	-0.076	-0.935	0.096	0.052	-0.897
	(0.187)	(0.219)	(0.766)	(0.210)	(0.245)	(0.857)
h_neuroticism	0.434**	-0.041	-0.299	0.432**	-0.076	-0.285
	(0.184)	(0.231)	(0.384)	(0.207)	(0.246)	(0.400)
ethn_uzbeks				-2.881***	14.013***	-2.782***
				(0.447)	(0.563)	(0.804)
ethn_russian				2.885***	0.373	-12.701***
				(1.025)	(1.419)	(1.224)
ethn_other				1.714***	-16.412***	-13.745***
				(0.385)	(0.345)	(0.641)
diff_ethn				2.315**	-16.467***	-11.111***
				(1.077)	(1.083)	(1.406)
husband education				0.228**	-0.034	0.162
				(0.093)	(0.099)	(0.294)
wife education				0.113	-0.038	0.078
				(0.090)	(0.099)	(0.331)
Constant	-2.836**	-0.447	-1.002	-2.580	-2.975	6.830
	(1.376)	(1.556)	(3.278)	(2.305)	(3.099)	(4.780)
Age, Age^2	No	No	No	Yes	Yes	Yes
Observations	630	630	630	617	617	617

Outline

- Who kidnaps Whom
- Couple's Similarities
- Mental Health and Marriage Types
- Personality and Choice of Marriage
- Structural Model

Intuition

- A structural model that explains the shift of taste of the marriage market
- Intuition: men or women with the same characteristics may be valued differently in different marriage markets
  - "Marriage market" is by marriage type, location and time
  - For example, personal charm may be valued more in the love marriage market
- These market tastes influence men and women's choice of marriage type
  - "Given my characteristics, I might be valued more in an arranged marriage market, so I prefer an arranged marriage"

Structural Model

- Idea: the expected utility of a man or woman choosing a specific marriage type is determined by the market tastes

$$u_{ijkt}^{s} = V_{ijkt}^{s} + \epsilon_{ijkt}$$

$$V_{ijkt}^{s} = X_i\left(\beta^{s} + \gamma_j^{s} + \delta_k^{s} + \lambda_t^{s}\right) + \xi_k + \theta_t$$

- Notation:
  - i: individual
  - j: marriage types
  - k: location
  - t: period
  - s: gender

Structural Model

Identification

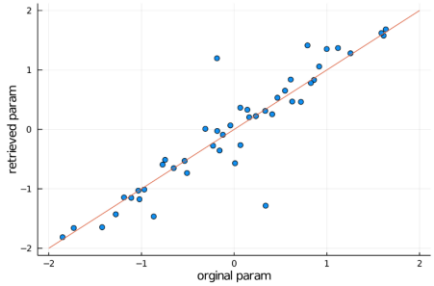
$$u_{ijkt}^{s} = X_i\left(\beta^{s} + \gamma_j^{s} + \delta_k^{s} + \lambda_t^{s}\right) + \xi_k + \theta_t + \epsilon_{ijkt}$$

- Need to set base case for marriage type, location and period
  - … which are love marriage, urban area and period 1966-1971
- Need also an outside option that has zero utility to point identify all the parameters
  - Problem: We rarely observe men and women who are not married, especially those who came of age prior to the 1990s
  - Solution: In each period, assume that men and women who are between 18 to 28 at that time and not married in previous periods have chosen the outside option

Structural Model
Estimation

$$u_{ijkt}^{s} = X_i\left(\beta^s + \gamma_j^s + \delta_k^s + \lambda_t^s\right) + \xi_k + \theta_t + \epsilon_{ijkt}$$

- Assume $\epsilon_{ijkt} \sim EVT1(1,1)$
- Use MLE to estimate parameters.
- Works well on simulated data!



Structural Model
Result - Men

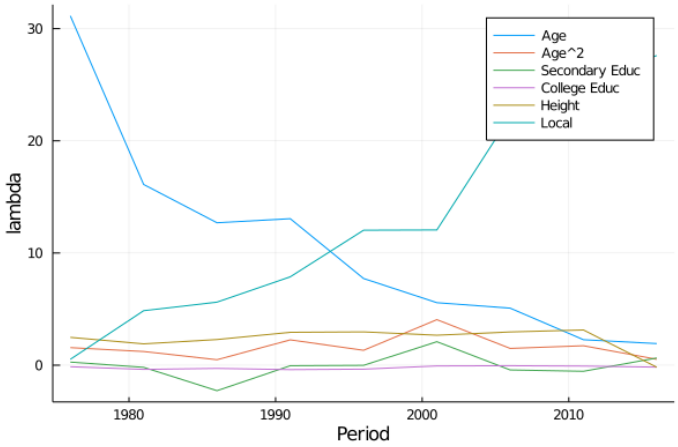
Table 1: MLE estimation results for male's marriage choice model

	Age/100	Age/100 Sq.	Secondary Educ	College Educ	Height	Local Family
β	-38.746***	56.609	0.786	1.534	0.49*	-1.509***
	(43.539)	(97.05)	(1.059)	(1.18)	(0.29)	(0.906)
γ- Arranged marriage	3.345***	28.972	-0.815***	0.316	-0.24***	1.815
	(41.524)	(86.717)	(0.93)	(1.022)	(0.207)	(0.667)
γ- Non-consensual bride kidanapping	9.086	19.87	-0.759***	-0.066***	-0.126***	-0.381***
	(41.493)	(86.626)	(0.909)	(1.0)	(0.203)	(0.684)
γ- Consensual Bride kidnapping	11.205	12.614	-1.035***	-0.846***	-0.164***	-0.835***
	(41.501)	(86.675)	(0.908)	(1.005)	(0.205)	(0.712)
δ- Rural area	-8.161***	36.214	0.362	0.514	-0.11***	-0.273***
	(40.935)	(85.09)	(0.333)	(0.377)	(0.108)	(0.346)

- Interpretation of parameters: how the market values a man with different characteristics and settings compared to the base case

Structural Model

Result - Men



29

Structural Model

Result - Women

Table 1: MLE estimation results for women's marriage choice model

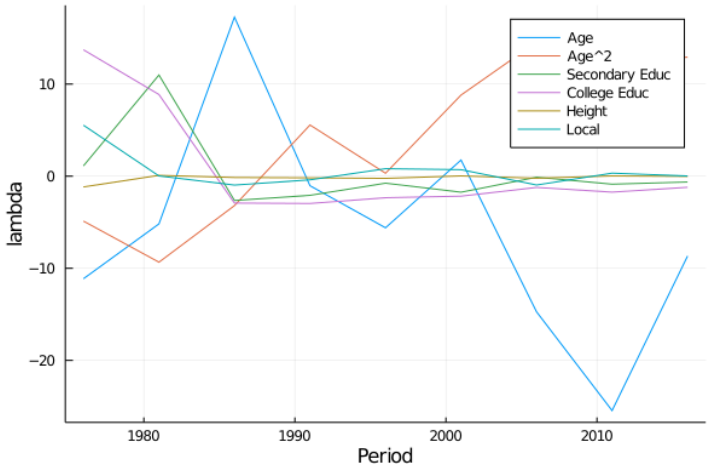
	Age/100	Age/100 Sq.	Secondary Educ	College Educ	Height	Local Family
β	-29.843***	70.346	5.708	4.577	0.601*	-1.28***
	(39.232)	(87.751)	(1.704)	(1.79)	(0.314)	(0.768)
γ- Arranged marriage	-16.218***	17.713	-2.379***	-0.77***	-0.336***	2.084
	(37.423)	(79.486)	(1.302)	(1.377)	(0.207)	(0.516)
γ- Consensual Bride kidnapping	-15.751***	23.262	-1.811***	-0.753***	-0.315***	0.526
	(37.276)	(78.791)	(1.295)	(1.371)	(0.206)	(0.522)
δ- Rural area	-42.124***	64.14	-0.262***	0.637	-0.229***	0.68**
	(36.062)	(76.699)	(0.452)	(0.487)	(0.134)	(0.336)

- Notice that for women non-consensual bride kidnapping by definition is NOT a result from choice, we thus estimate model with only the rest of the marriage types for women
- In equilibrium, the frequency of being non-consensually kidnapped is equal to proportion of men who rationally choose this type

30

Structural Model

Result - Women



31

Structure Model

Take-Aways

- Carefully explain the parameters
  - The optimizer uses random gradient descent. With real data it didn't fully converge, so parameters may be different in different rounds of optimization
- Main Take-aways
  - Love marriage market appreciates personal attractiveness (as proxied by height) more than other types
  - Higher education (both secondary and college) is valued less in both bride kidnapping markets for both men and women
  - Compared with love marriages, increasing age is valued more for men but is valued less for women in other markets
  - Who are likely to involve in bride kidnapping: those less attractive and well-educated

32

Structural Model Next Steps

Counterfactual & robustness

- Counterfactual: what if bride kidnapping is not an option?
  - Estimate the welfare gain/loss for men and women who are involved in bride kidnapping
- Is cosmopolitan Bishkek totally different? Alternate estimates excluding Bishkek.
- Adding more personal characteristics (personality, social values, attractiveness, wealth); to make model tractable use principal components.
- Add a non-consensual bride kidnapping option for women; its value (which could well be negative relative to outside option) then affects other choices according to hazard faced.

Outline

- Who kidnaps Whom
- Couple's Similarities
- Mental Health and Marriage Types
- Personality and Choice of Marriage
- Structural Model
- Appendix: supplemental tables

Who Kidnaps Whom
Husband's education

Table: Husband's education and types of marriage

husband education	love marriage		arranged marriage		non-consensual bride kidnapping		consensual bride kidnapping		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
illiterate	3	0.49	2	0.26	1	0.24	2	3.03	8	0.43
primary	2	0.33	2	0.26	1	0.24	0	0	5	0.27
basic	53	8.66	68	8.87	37	8.75	3	4.55	161	8.62
secondary general	234	38.24	458	59.71	248	58.63	34	51.52	974	52.14
primary technical	50	8.17	41	5.35	36	8.51	8	12.12	135	7.23
secondary technical	107	17.48	92	11.99	45	10.64	11	16.67	255	13.65
university (bachelor, diploma, master)	162	26.47	103	13.43	55	13	8	12.12	328	17.56
kandidate or doctor nauk	1	0.16	1	0.13	0	0	0	0	2	0.11
Total	612	100	767	100	423	100	66	100	1868	100

35

Who Kidnaps Whom
Wife's Education

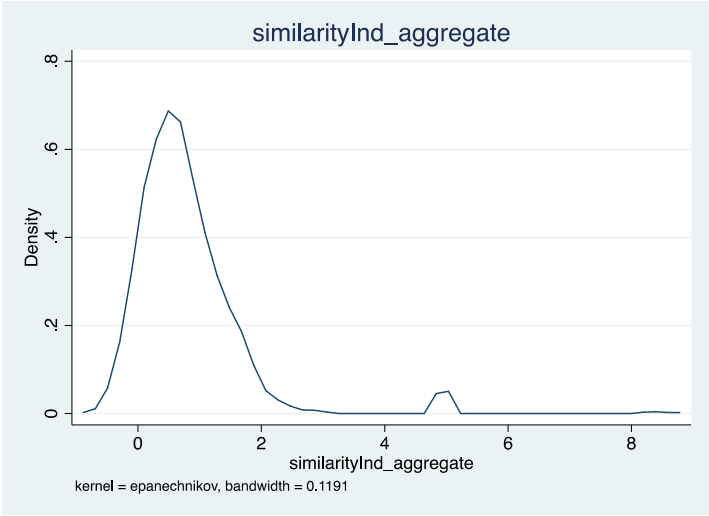
Table: Wife's education and types and marriage

wife education	love marriage		arranged marriage		non-consensual bride kidnapping		consensual bride kidnapping		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
illiterate	1	0.16	1	0.13	4	0.94	1	1.49	7	0.37
primary	2	0.33	4	0.52	1	0.24	1	1.49	8	0.43
basic	61	9.98	84	10.91	27	6.37	3	4.48	175	9.35
secondary general	232	37.97	492	63.9	265	62.5	43	64.18	1032	55.13
primary technical	22	3.6	14	1.82	26	6.13	4	5.97	66	3.53
secondary technical	116	18.99	67	8.7	50	11.79	7	10.45	240	12.82
university (bachelor, diploma, master)	177	28.97	108	14.03	51	12.03	8	11.94	344	18.38
Total	611	100	770	100	424	100	67	100	1872	100

36

Couples' Similarities

Distribution of similarity indices

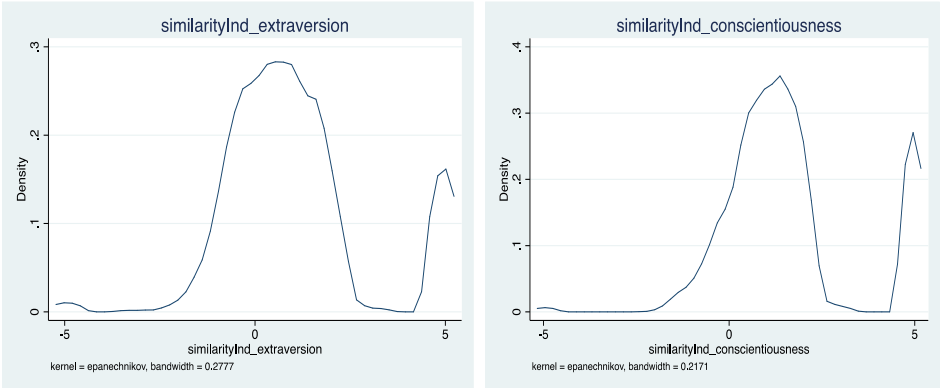


Kernel Density of Similarity Index (all population)

37

Couples' Similarities

Distribution of similarity indices

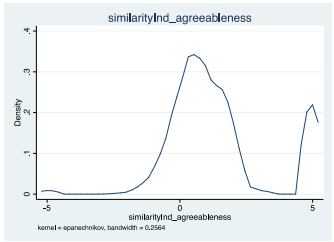


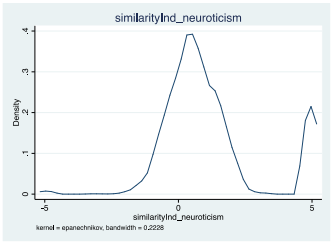
Kernel Density of Similarity Index (all population)

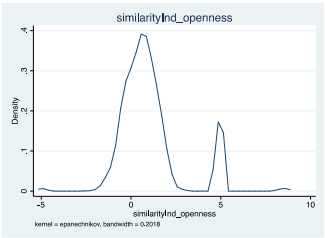
38

Couples' Similarities

Distribution of similarity indices







Kernel Density of Similarity Index (all population)

39

Mental Health

Hazard function – Kyrgyz only

Table: Hazard function on the probability of suffering depression (Kyrgyz only)

VARIABLES	(1) Men	(2) Women	(3) Men	(4) Women
Arranged marriage	0.044	-0.108	0.041	-0.086
	(0.069)	(0.069)	(0.071)	(0.072)
Non-consensual bride kidnapping	0.091	0.106	0.082	0.121
	(0.074)	(0.072)	(0.076)	(0.074)
Consensual bride kidnapping	0.155	0.349**	0.089	0.336**
	(0.162)	(0.149)	(0.170)	(0.149)
Marriage duration	0.009***	0.005**	0.004	0.002
	(0.002)	(0.002)	(0.003)	(0.004)
Love marriage * marriage duration	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Arranged marriage * marriage duration	-0.000	0.004	-0.001	0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Non-consensual bride kidnapping * marriage duration	-0.001	0.000	-0.001	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)
Consensual bride kidnapping * marriage duration	-0.001	-0.006	-0.000	-0.007

40

Mental Health

Hazard function – Kyrgyz only (cont'd)

Highest degree = primary			-0.680***	-0.660***
			(0.260)	(0.250)
Highest degree = basic			-0.249***	-0.161**
			(0.079)	(0.075)
Highest degree = secondary general			-0.181***	-0.170**
			(0.068)	(0.067)
Highest degree = primary technical			-0.107	-0.042
			(0.092)	(0.087)
Highest degree = secondary technical			-0.160**	-0.182**
			(0.076)	(0.074)
Highest degree = university (bachelor, diploma, master)			-0.170**	-0.143**
			(0.074)	(0.071)
Husband employment status			-0.101***	
			(0.031)	
Husband age			0.006	
			(0.008)	
Husband age^2			-0.000	
			(0.000)	
Wife employment status				-0.040
				(0.029)
Wife age				0.001
				(0.007)
Wife age^2				0.000
				(0.000)
Constant	0.335***	0.475***	0.450**	0.610***
	(0.053)	(0.054)	(0.181)	(0.165)
Observations	1,289	1,289	1,265	1,265
R-squared	0.056	0.057	0.073	0.066

41

Mental Health

Hazard function

with personality controls

Table: Hazard function with personality controls

VARIABLES	(1) Men (all population)	(2) Women (all population)	(3) Men (Kyrgyz only)	(4) Women (Kyrgyz only)
Arranged marriage	-0.011	-0.080	0.019	-0.115
	(0.053)	(0.054)	(0.071)	(0.071)
Non-consensual bride kidnapping	0.112*	0.150**	0.061	0.100
	(0.065)	(0.064)	(0.075)	(0.074)
Consensual bride kidnapping	0.152	0.373**	0.055	0.284*
	(0.162)	(0.146)	(0.170)	(0.153)
Marriage duration	0.000	-0.002	0.004	0.002
	(0.003)	(0.003)	(0.003)	(0.004)
Love marriage * marriage duration	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Arranged marriage * marriage duration	0.001	0.004*	-0.000	0.003
	(0.002)	(0.002)	(0.003)	(0.003)
Non-consensual bride kidnapping * marriage duration	-0.001	-0.000	-0.001	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)
Consensual bride kidnapping * marriage duration	-0.001	-0.006	-0.000	-0.006
	(0.005)	(0.005)	(0.006)	(0.005)
Household income	-0.005	-0.006	0.005	-0.008
	(0.011)	(0.010)	(0.012)	(0.012)
Highest degree = primary	-0.596***	-0.543***	-0.743***	-0.738***
	(0.208)	(0.200)	(0.265)	(0.255)
Highest degree = basic	-0.285***	-0.225***	-0.295***	-0.232***
	(0.082)	(0.077)	(0.079)	(0.083)
Highest degree = secondary general	-0.210***	-0.194***	-0.234***	-0.248***
	(0.078)	(0.072)	(0.069)	(0.075)
Highest degree = primary technical	-0.150	-0.050	-0.155*	-0.111
	(0.097)	(0.089)	(0.092)	(0.093)
Highest degree = secondary technical	-0.178**	-0.188**	-0.211***	-0.250***
	(0.083)	(0.077)	(0.077)	(0.081)
Highest degree = university (bachelor, diploma, master)	-0.173**	-0.141*	-0.220***	-0.212***
	(0.082)	(0.075)	(0.075)	(0.078)
Husband employment status	-0.057**		-0.100***	
	(0.026)		(0.032)	
Wife employment status		-0.017		-0.040
		(0.025)		(0.029)

42

Mental Health

Hazard function (Kyrgyz only, combine bride kidnapping types)

Table: Hazard function on the probability of suffering depression
(Kyrgyz only, combine bride kidnapping types)

VARIABLES	(1) Men	(2) Women	(3) Men	(4) Women
Arranged marriage	0.044	-0.108	0.042	-0.086
	(0.069)	(0.069)	(0.071)	(0.071)
Bride kidnapping	0.096	0.130*	0.082	0.141*
	(0.072)	(0.071)	(0.074)	(0.073)
Marriage duration	0.009***	0.005**	0.004	0.002
	(0.002)	(0.002)	(0.003)	(0.004)
Arranged marriage * marriage duration	-0.000	0.004	-0.001	0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Bride kidnapping * marriage duration	-0.001	-0.000	-0.001	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Household income			0.011	0.000
			(0.012)	(0.011)
Highest degree = primary			-0.677**	-0.676***
			(0.264)	(0.254)
Highest degree = basic			-0.255***	-0.160**
			(0.077)	(0.074)
Highest degree = secondary general			-0.186***	-0.164**
			(0.064)	(0.065)
Highest degree = primary technical			-0.112	-0.040
			(0.090)	(0.086)
Highest degree = secondary technical			-0.165**	-0.177**
			(0.073)	(0.073)
Highest degree = university (bachelor, diploma, master)			-0.175**	-0.138**

Mental Health with Personality Controls

Hazard function (cont'd)

w_agreeableness	0.051**	0.041*	0.046*	0.053**
	(0.022)	(0.022)	(0.026)	(0.025)
w_openness	0.013	-0.005	0.009	-0.031
	(0.027)	(0.027)	(0.034)	(0.033)
w_conscientiousness	0.015	-0.005	0.004	0.004
	(0.025)	(0.025)	(0.031)	(0.031)
w_extraversion	-0.001	0.009	0.027	0.023
	(0.029)	(0.029)	(0.036)	(0.035)
w_neuroticism	-0.012	-0.016	-0.015	-0.036
	(0.023)	(0.023)	(0.027)	(0.027)
h_agreeableness	0.044**	0.060***	0.051**	0.075***
	(0.020)	(0.020)	(0.024)	(0.024)
h_openness	-0.018	0.015	-0.049	-0.037
	(0.029)	(0.028)	(0.035)	(0.033)
h_conscientiousness	-0.027	0.000	-0.000	0.011
	(0.026)	(0.025)	(0.030)	(0.029)
h_extraversion	-0.000	-0.005	0.034	0.046
	(0.030)	(0.029)	(0.036)	(0.035)
h_neuroticism	-0.022	-0.023	-0.016	-0.018
	(0.023)	(0.023)	(0.027)	(0.027)
Constant	0.393*	0.354*	0.245	0.434*
	(0.224)	(0.214)	(0.266)	(0.253)
Observations	1,794	1,794	1,265	1,265
R-squared	0.093	0.088	0.085	0.086

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Social values by marriage type
(Kyrgyz women only)

	you had agreed on capture (kidnapping) in advance with your spouse	you hadn't agreed on capture in advance but you had discussed the possibility of marriage	you hadn't discussed possibility of marriage, but were acquainted with your spouse	you married through bride kidnapping and didn't know each other before	your marriage was arranged	you had love marriage
important decisions should be made by the husband rather than the wife.						
Disagree	4.41	5.00	11.39	15.94	35.42	27.85
Agree	5.15	6.24	9.20	14.79	41.62	23.00
Total	4.71	5.50	10.51	15.48	37.91	25.90
A man's job is to earn money; a woman's job is to look after the home & family						
Disagree	4.46	5.58	11.56	14.97	38.87	24.56
Agree	5.10	6.01	8.24	16.60	35.03	29.02
Total	4.68	5.73	10.45	15.52	37.59	26.05
a woman is really fulfilled only when she becomes a mother.						
Disagree	5.17	6.51	11.30	13.21	36.76	27.06
Agree	3.61	3.47	8.96	20.81	40.61	22.54
Total	4.69	5.58	10.58	15.54	37.94	25.68

45

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	you had agreed on capture (kidnapping) in advance with your spouse	you hadn't agreed on capture in advance but you had discussed the possibility of marriage	you hadn't discussed possibility of marriage, but were acquainted with your spouse	you married through bride kidnapping and didn't know each other before	your marriage was arranged	you had love marriage
a university education is more important for a boy than for a girl.						
Disagree	4.55	5.26	11.84	17.21	33.70	27.43
Agree	4.93	6.03	9.39	14.32	40.92	24.41
Total	4.77	5.69	10.46	15.58	37.78	25.73
both the husband and the wife should contribute to the household income.						
Disagree	5.09	6.04	10.24	15.89	35.22	27.52
Agree	3.27	4.36	11.76	14.16	46.62	19.83
Total	4.72	5.70	10.55	15.54	37.53	25.96
woman should not work outside her home due to religious considerations						
Disagree	5.17	6.93	11.33	17.82	34.10	24.64
Agree	4.55	4.71	9.90	14.46	41.77	24.60
Total	4.81	5.65	10.50	15.87	38.55	24.62

46

Social values by marriage type

(Kyrgyz women only)

	you had agreed on capture (kidnapping) in advance with your spouse	you hadn't agreed on capture in advance but you had discussed the possibility of marriage	you hadn't discussed possibility of marriage, but were acquainted with your spouse	you married through bride kidnapping and didn't know each other before	your marriage was arranged	you had love marriage
	%	%	%	%	%	%
A good spouse .. consults with you						
Disagree	3.96	8.91	12.87	26.73	30.69	16.83
Agree	4.74	5.51	10.30	15.00	38.08	26.38
Total	4.71	5.66	10.41	15.51	37.75	25.96
beautiful/handsome						
Disagree	4.19	7.23	12.15	15.08	40.63	20.73
Agree	5.07	4.56	9.19	15.81	35.74	29.63
Total	4.71	5.66	10.41	15.51	37.75	25.96
good parent						
Disagree	8.92	6.57	12.68	23.94	34.27	13.62
Agree	4.28	5.57	10.18	14.65	38.11	27.21
Total	4.71	5.66	10.41	15.51	37.75	25.96
respectful, doesn't complain and criticize						
Disagree	4.56	4.83	11.80	24.13	40.75	13.94
Agree	4.74	5.82	10.14	13.85	37.18	28.27
Total	4.71	5.66	10.41	15.51	37.75	25.96
doesn't drink alcohol						
Disagree	7.95	8.41	13.64	15.00	45.23	9.77
Agree	3.95	5.01	9.65	15.63	36.00	29.76
Total	4.71	5.66	10.41	15.51	37.75	25.96
comes from a respected family						
Disagree	6.12	7.19	14.22	14.22	36.70	21.56
Agree	4.15	5.06	8.91	16.01	38.17	27.69
Total	4.71	5.66	10.41	15.51	37.75	25.96