

Van Winkle, Zachary

**Article — Accepted Manuscript (Postprint)**

## Family Trajectories Across Time and Space: Increasing Complexity in Family Life Courses in Europe?

Demography

**Provided in Cooperation with:**

WZB Berlin Social Science Center

*Suggested Citation:* Van Winkle, Zachary (2018) : Family Trajectories Across Time and Space: Increasing Complexity in Family Life Courses in Europe?, Demography, ISSN 1533-7790, Springer, New York, NY, Vol. 55, Iss. 1, pp. 135-164,  
<https://doi.org/10.1007/s13524-017-0628-5>

This Version is available at:

<https://hdl.handle.net/10419/209581>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

Family Trajectories Across Time and Space:  
Increasing Complexity in Family Life Courses in Europe?

Zachary Van Winkle

**Online Supplement**

## Table of Contents

<i>1. Models on Transformed Complexity Indicators .....</i>	<i>2</i>
<i>2. Models on Complex Indices Weighted by State Durations.....</i>	<i>6</i>
<i>3. Model Sensitivity to Variations in Birth Cohort Width .....</i>	<i>14</i>
<i>4. Unconditional Models with Generations &amp; Gender Programme Data.....</i>	<i>18</i>
<i>5. Model Sensitivity to the Omission of Birth Cohorts &amp; Countries .....</i>	<i>20</i>
<i>6. Model Assumptions.....</i>	<i>36</i>
<i>7. Combined Two-Level Country-Cohort Random Effects Model.....</i>	<i>40</i>
<i>8. Cluster Solution Quality Measures .....</i>	<i>43</i>

## ***1. Models on Transformed Complexity Indicators***

The results of cross-classified random effects regressions on normalized entropy, normalized number of transitions, log complexity, log normalized entropy, and log normalized number of transitions are displayed below. Unconditional additive and interacted models are displayed in Table A1.1 and conditional interacted models are displayed in Table A1.2. While complexity is not as positively skewed as e.g. income distributions (see section 6 below), the distribution of log complexity is slightly more symmetric and has lower positive excess kurtosis. Note that the coefficients of covariates for log dependent variables in Table A1.2 are exponentiated and interpreted as multiplicative effects. As an example, sequence entropy of respondents with a post-secondary education is 0.031 points higher than those with a secondary education (column 1, Table A1.2) or 17.1% higher (column 4).

The results of models on the components of the complexity index as well as log complexity and its components are substantively equivalent to the results reported in the manuscript and lead to the same conclusions. With the exception of the normalized number of transitions, intraclass correlations are smaller than those estimated using the complexity index. The negative effect of gender is only significant for entropy and log entropy, which indicates that men and women differ more in the timing rather than the number of transitions. A higher proportion of entropy and log entropy variance can be accounted for by individual characteristics compared to the complexity index and the normalized number of transitions as well as their logs.

Table A1.1 Unconditional Cross-Classified Random Effects Regressions on Sequence Complexity Components and their Logarithms

	Entropy		Transitions		Log Complexity	
Constant	0.369*** (0.009)	0.369*** (0.009)	0.063*** (0.003)	0.063*** (0.003)	209.159*** (11.580)	209.317*** (10.955)
var(Cohort)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.002*** (0.001)	0.001*** (0.001)
var(Country)	0.001*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.009*** (0.003)	0.008*** (0.003)
var(Interaction)		0.000*** (0.000)		0.000*** (0.000)		0.001*** (0.000)
var(Residual)	0.014*** (0.000)	0.014*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.106*** (0.001)	0.105*** (0.001)
$\rho_{\text{Cohort}}$	0.90	0.75	2.68	2.50	1.43	1.26
$\rho_{\text{Country}}$	6.43	5.83	9.79	8.50	7.29	6.49
<i>N</i>	22,272	22,272	22,272	22,272	21,944	21,944
R Log Lik.	15,689	15,732	47,892	47,979	-6,609	-6,559

Table A1.1 Continued

	Log Entropy		Log Transitions	
Constant	0.128*** (0.005)	0.128*** (0.005)	0.003*** (0.000)	0.003*** (0.000)
var(Cohort)	0.000*** (0.000)	0.000*** (0.000)	0.004*** (0.002)	0.003*** (0.002)
var(Country)	0.005*** (0.002)	0.005*** (0.002)	0.014*** (0.005)	0.012*** (0.005)
var(Interaction)		0.001*** (0.000)		0.002*** (0.000)
var(Residual)	0.100*** (0.001)	0.099*** (0.001)	0.155*** (0.001)	0.153*** (0.001)
$\rho_{\text{Cohort}}$	0.47	0.36	2.19	2.03
$\rho_{\text{Country}}$	5.15	4.75	7.94	7.05
<i>N</i>	21,944	21,944	21,944	21,944
R Log Lik.	-5,921	-5,894	-10,703	-10,650

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

Table A1.2 Conditional Cross-Classified Random Effects Regressions on Sequence Complexity Components and their Logarithms

	Entropy	Transitions	Log Complexity	Log Entropy	Log Transitions
Female	-0.028*** (0.002)	0.000 (0.000)	0.910*** (0.008)	0.826*** (0.007)	1.002 (0.011)
Education (Ref. Secondary)					
None	-0.025*** (0.005)	-0.002 (0.001)	0.896*** (0.023)	0.861*** (0.021)	0.937* (0.030)
Pre-Primary	-0.025*** (0.002)	-0.003*** (0.001)	0.881*** (0.011)	0.859*** (0.011)	0.906*** (0.014)
Primary	-0.015*** (0.002)	-0.002** (0.001)	0.936*** (0.013)	0.922*** (0.012)	0.950** (0.016)
Post-Secondary	0.031*** (0.002)	0.004*** (0.001)	1.157*** (0.015)	1.171*** (0.014)	1.143*** (0.018)
Public Sector	0.004 (0.003)	0.000 (0.001)	1.029 (0.017)	1.032* (0.016)	1.025 (0.021)
Occupation of Breadwinner (Ref. Agriculture)					
Senior Prof.	0.025*** (0.004)	0.007*** (0.001)	1.136*** (0.026)	1.117*** (0.024)	1.156*** (0.032)
Prof.	0.024*** (0.004)	0.005*** (0.001)	1.114*** (0.027)	1.124*** (0.026)	1.106*** (0.033)
Technician	0.023*** (0.004)	0.005*** (0.001)	1.126*** (0.025)	1.125*** (0.024)	1.127*** (0.031)
Clerk	0.020*** (0.004)	0.005*** (0.001)	1.121*** (0.023)	1.110*** (0.022)	1.132*** (0.028)
Service	0.011*** (0.003)	0.003*** (0.001)	1.061** (0.019)	1.051** (0.018)	1.071** (0.024)
Craftsman	0.003 (0.002)	0.002*** (0.001)	1.023 (0.013)	1.008 (0.013)	1.039* (0.017)
Industry	0.002 (0.004)	0.003** (0.001)	1.035 (0.022)	1.002 (0.021)	1.070** (0.028)
Unskilled	-0.001 (0.002)	0.002** (0.001)	1.003 (0.014)	0.978 (0.013)	1.028 (0.017)
Armed Services	0.010 (0.006)	0.003* (0.002)	1.042 (0.037)	1.022 (0.035)	1.063 (0.046)
None	0.017** (0.006)	0.005*** (0.002)	1.112** (0.039)	1.083* (0.037)	1.141** (0.049)
Constant	0.381*** (0.007)	0.061*** (0.003)	215.566*** (9.782)	0.141*** (0.005)	0.003*** (0.000)

Table A1.2 Continued

var(Cohort)	0.000*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.002*** (0.001)
var(Country)	0.001*** (0.000)	0.000*** (0.000)	0.006*** (0.002)	0.004*** (0.002)	0.010*** (0.004)
var(Interacted)	0.000*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.002*** (0.000)
var(Residual)	0.013*** (0.000)	0.001*** (0.000)	0.102*** (0.001)	0.093*** (0.001)	0.151*** (0.001)
$\rho_{\text{Cohort}}$	0.31	1.81	0.63	0.13	1.35
$\rho_{\text{Country}}$	4.54	7.26	5.18	3.87	5.86
$R^2_{\text{Cohort}}$	61.82	29.87	52.85	65.47	35.76
$R^2_{\text{Country}}$	27.59	17.57	24.48	25.24	19.67
$R^2_{\text{Total}}$	7.01	3.50	5.47	7.62	3.43
$N$	22,272	22,272	21,944	21,944	21,944
R Log Lik.	16,275	48,052	-6,214	-5,202	-10,532

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

## ***2. Models on Complex Indices Weighted by State Durations***

The results of cross-classified random effects regressions on the complexity index weighted by durations with single states are displayed below. Unconditional additive and unconditional interacted models are displayed in Table A2.1 and conditional interacted models are displayed in Table A2.2. The complexity index was weighted by 1) calculating the number of years a respondent spent in a given state, 2) adding one to the respective duration, and 3) multiplying the complexity index by the square root of said duration. It is necessary to add one to ensure that complexity does not become zero if respondents' didn't enter states. Further durations are transformed using the square root to reduce the number of outliers produced by multiplying complexities of large factors. Weighting by state durations will emphasize the impact certain states have on respondent's family trajectory complexity, which helps disentangle the role certain family statuses play when accounting for cross-national and cross-temporal variation in family formation complexity.

The results of the weighted complexity index variables are substantively similar and lead to the same conclusions as reported in the manuscript. Generally intraclass correlations are smaller compared to the unweighted complexity index, with the exception of the complexity index weighted by durations spent single without children. In this case, over 13% of the weighted complexity variance can be accounted for by country differences (see columns 5 and 6 in Table A2.1); ca. 4 percentage points more than the unweighted complexity index. This highlights the fact that typical transitions out of the parental home vary to a large extent across European countries: while Swedish and Danish young adults are more likely to live independently before marriage, young adults in Italy and Spain likely entry directly into marriage after leaving the parental home.

The effects of some covariates on weighted complexity does differ their effect on unweighted complexity. Note that differences in effect sizes may be related to differences in variance of the respective complexity index rather than indicating different effect strengths. The effect of gender varies considerably across the weighted complexity variables (see row 1 in Table A2.2). Women have significantly less complex trajectories when weighted by durations in the parental home without children, in the parental home with children, in single households without children, in cohabitation without children, and in marriage without children. This effect is however most pronounced for complexity weighted by duration within the parental home without children, which reflects the tendency of women to leave the parental household earlier into marriage compared to men. Interestingly, women have more complex trajectories when weighted by living in independent households with children. This indicates that women are not only considerably more likely to enter into parenthood before marriage, but especially that women live with their children following divorce or the death of a partner.

While the negative effects of low education on sequence complexity are more pronounced when weighted for duration in the parental home without children, the positive effects of higher education are most pronounced when weighted for durations spent single without children. This indicates that lower educated individuals leave the parental home early into marriage, while higher educated individuals are more likely to form independent households before entering marriage. The positive effect of the main breadwinner not having an occupation during



childhood on complexity is considerably stronger when weighted by living single with children. This highlights the fact that disadvantaged individuals, especially disadvantaged women, are most likely to enter parenthood before marriage or experience a divorce.

Table A2.1 Unconditional Cross-Classified Random Effects Regressions on Sequence Complexity Weighted by State Durations

	PNC		PC		SNC	
Constant	43.530*** (0.765)	43.513*** (0.751)	15.557*** (0.506)	15.561*** (0.478)	24.157*** (2.164)	24.177*** (2.121)
var(Cohort)	0.324*** (0.222)	0.161 (.)	0.522*** (0.244)	0.444*** (0.225)	4.720*** (2.205)	4.508** (2.219)
var(Country)	7.554*** (3.055)	7.098 (.)	2.892*** (1.145)	2.553** (1.030)	59.284*** (23.346)	56.647*** (22.440)
var(Interaction)		3.893 (.)		0.464*** (0.098)	3.213*** (0.774)	3.213*** (0.774)
var(Residual)	308.099*** (2.921)	304.796 (.)	42.130*** (0.399)	41.759*** (0.397)	380.951*** (3.612)	378.421*** (3.598)
ρCohort	0.10	0.05	1.14	0.99	1.06	1.01
ρCountry	2.39	2.24	6.34	5.70	13.32	12.79
<i>N</i>	22,272	22,272	22,272	22,272	22,272	22,272
R Log Lik.	-95,447	-95,393	-97,832	-97,807	-97,832	-97,807

Table A2.1 Continued

	SC		CNC		CC	
Constant	19.980*** (1.460)	19.978*** (1.409)	16.159*** (0.902)	16.183*** (0.828)	16.768*** (1.080)	16.812*** (1.013)
var(Cohort)	8.438*** (3.880)	8.087*** (3.821)	2.934*** (1.339)	2.645*** (1.295)	4.164*** (1.912)	3.788*** (1.847)
var(Country)	18.774*** (7.461)	16.933*** (6.856)	7.560*** (2.993)	5.920*** (2.447)	10.886*** (4.316)	9.118*** (3.741)
var(Interaction)		2.858*** (0.702)		2.591*** (0.427)		3.098*** (0.570)
var(Residual)	407.429*** (3.863)	405.031*** (3.850)	108.089*** (1.025)	105.978*** (1.008)	195.190*** (1.851)	192.659*** (1.832)
ρCohort	1.94	1.86	2.47	2.25	1.98	1.81
ρCountry	4.31	3.91	6.37	5.05	5.17	4.36
<i>N</i>	22,272	22,272	22,272	22,272	22,272	22,272
R Log Lik.	-98,575	-98,552	-83,803	-83,675	-90,382	-90,310

Table A2.1 Continued

	MNC		MC	
Constant	16.159*** (0.902)	16.183*** (0.828)	16.768*** (1.080)	16.812*** (1.013)
var(Cohort)	2.934*** (1.339)	2.645*** (1.295)	4.164*** (1.912)	3.788*** (1.847)
var(Country)	7.560*** (2.993)	5.920*** (2.447)	10.886*** (4.316)	9.118*** (3.741)
var(Interaction)		2.591*** (0.427)		3.098*** (0.570)
var(Residual)	108.089*** (1.025)	105.978*** (1.008)	195.190*** (1.851)	192.659*** (1.832)
$\rho$ Cohort	1.49	1.37	0.65	0.57
$\rho$ Country	6.23	5.32	3.52	3.33
<i>N</i>	22,272	22,272	22,272	22,272
R Log Lik.	-83,803	-83,675	-90,382	-90,310

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses; No standard errors of random parameters estimated for the interacted PNC model as the REML estimation did not converge.

Table A2.2 Conditional Cross-Classified Random Effects Regressions on Sequence Complexity Weighted by State Durations

	PNC	PC	SNC	SC
Female	-6.511*** (0.228)	-0.369*** (0.087)	-2.739*** (0.258)	1.799*** (0.272)
Education (Ref. Secondary)				
None	-5.037*** (0.675)	-0.523* (0.258)	-1.821* (0.765)	-0.341 (0.806)
Pre-Primary	-4.031*** (0.337)	-0.595*** (0.129)	-2.663*** (0.383)	-1.308** (0.404)
Primary	-2.326*** (0.350)	-0.402** (0.134)	-1.597*** (0.396)	-0.569 (0.418)
Post-Secondary	3.258*** (0.331)	1.006*** (0.126)	6.921*** (0.375)	0.857* (0.395)
Public Sector	0.457 (0.438)	0.184 (0.167)	1.297** (0.495)	-0.241 (0.522)
Occupation of Breadwinner (Ref. Agriculture)				
Senior Prof.	4.235*** (0.593)	1.269*** (0.226)	3.276*** (0.670)	3.877*** (0.707)
Prof.	3.702*** (0.637)	1.356*** (0.243)	3.552*** (0.719)	3.609*** (0.759)
Technician	3.754*** (0.589)	1.248*** (0.225)	0.913 (0.666)	3.743*** (0.702)
Clerk	4.123*** (0.532)	0.834*** (0.203)	0.270 (0.601)	3.747*** (0.634)
Service	1.936*** (0.474)	0.678*** (0.181)	-0.523 (0.535)	2.938*** (0.565)
Craftsman	1.210*** (0.344)	0.420** (0.131)	-1.356*** (0.389)	2.214*** (0.410)
Industry	0.905 (0.563)	0.419 (0.215)	-1.600* (0.636)	1.785** (0.671)
Unskilled	-0.188 (0.362)	0.131 (0.138)	-1.522*** (0.409)	1.798*** (0.432)
Armed Services	1.569 (0.930)	0.817* (0.355)	0.060 (1.051)	1.993 (1.109)
None	0.959 (0.927)	1.290*** (0.354)	1.076 (1.047)	5.265*** (1.105)
Constant	46.544*** (0.863)	15.344*** (0.431)	25.458*** (1.906)	17.420*** (1.303)
var(Cohort)	0.169*** (0.308)	0.270*** (0.147)	2.324*** (1.238)	6.133*** (2.961)
var(Country)	8.438*** (3.531)	2.008*** (0.817)	45.765*** (18.173)	13.625*** (5.570)
var(Interacted)	3.523*** (0.694)	0.461*** (0.097)	3.160*** (0.757)	2.994*** (0.720)
var(Residual)	282.582*** (2.688)	41.127*** (0.391)	360.756*** (3.432)	401.979*** (3.822)

Table A2.2 Continued

$\rho_{\text{Cohort}}$	0.05	0.61	0.56	1.44
$\rho_{\text{Country}}$	2.86	4.57	11.10	3.20
$R^2_{\text{Cohort}}$	5.02	39.16	48.43	24.16
$R^2_{\text{Country}}$	-0.18	21.34	19.20	19.53
$R^2_{\text{Total}}$	6.72	2.99	6.95	1.88
$N$	22,272	22,272	22,272	22,272
R Log Lik.	-94,540	-73,099	-97,260	-98,454

Table A2.2 Continued

	CNC	CC	MNC	MC
Female	-0.996*** (0.139)	-0.125 (0.188)	-1.443*** (0.232)	-0.234 (0.379)
Education (Ref. Secondary)				
None	-0.688 (0.413)	0.270 (0.560)	-2.225** (0.688)	-2.582* (1.117)
Pre-Primary	-0.995*** (0.206)	-0.769** (0.280)	-2.001*** (0.344)	-2.853*** (0.560)
Primary	-0.669** (0.213)	-0.128 (0.289)	-1.337*** (0.355)	-1.823** (0.581)
Post-Secondary	1.461*** (0.201)	1.056*** (0.273)	3.243*** (0.336)	2.657*** (0.550)
Public Sector	0.039 (0.266)	0.160 (0.361)	0.018 (0.444)	0.680 (0.726)
Occupation of Breadwinner (Ref. Agriculture)				
Senior Prof.	2.920*** (0.360)	2.489*** (0.489)	3.899*** (0.602)	1.362 (0.984)
Prof.	2.532*** (0.387)	0.808 (0.525)	4.716*** (0.645)	0.088 (1.056)
Technician	1.853*** (0.358)	1.593** (0.486)	4.969*** (0.597)	0.930 (0.977)
Clerk	1.275*** (0.323)	1.825*** (0.438)	3.767*** (0.539)	1.007 (0.882)
Service	1.071*** (0.288)	1.216** (0.391)	2.357*** (0.480)	0.984 (0.786)
Craftsman	0.562** (0.209)	0.568* (0.284)	1.276*** (0.349)	0.166 (0.570)
Industry	0.741* (0.342)	0.555 (0.464)	1.878*** (0.571)	1.025 (0.934)
Unskilled	0.145 (0.220)	0.903** (0.299)	1.081** (0.367)	0.171 (0.601)
Armed Services	1.177* (0.565)	0.919 (0.767)	3.737*** (0.943)	0.351 (1.543)
None	0.926 (0.563)	2.291** (0.764)	2.632** (0.940)	2.163 (1.537)
Constant	16.112*** (0.760)	16.092*** (0.982)	27.206*** (1.133)	65.910*** (1.466)
var(Cohort)	1.991*** (1.001)	3.138*** (1.558)	2.619*** (1.413)	2.588*** (1.571)
var(Country)	4.790*** (2.002)	8.236*** (3.394)	12.672*** (5.253)	22.486*** (9.164)
var(Interacted)	2.520*** (0.416)	3.020*** (0.560)	5.165*** (0.941)	3.464*** (1.143)
var(Residual)	104.097*** (0.990)	191.899*** (1.825)	290.127*** (2.760)	779.029*** (7.409)

Table A2.2 Continued

$\rho_{\text{Cohort}}$	1.75	1.52	0.84	0.32
$\rho_{\text{Country}}$	4.22	3.99	4.08	2.78
$R^2_{\text{Cohort}}$	24.70	17.15	41.19	44.56
$R^2_{\text{Country}}$	19.09	9.68	26.49	17.50
$R^2_{\text{Total}}$	3.19	1.13	4.13	1.23
$N$	22,272	22,272	22,272	22,272
R Log Lik.	-83,471	-90,256	-94,859	-10,5795

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

### 3. Model Sensitivity to Variations in Birth Cohort Width

Unconditional additive and interacted as well as conditional interacted cross-classified regressions on sequence complexity with varying birth cohort widths are displayed in Table A3.1 and A3.2 below, respectively. Models are estimated using birth cohorts comprised of single years, two years, four years and five years were estimated. The results are substantively equivalent to the results reported in the manuscript and lead to the same conclusions.

Table 3.1 Unconditional Cross-Classified Random Effects Regressions on Sequence Complexity with Varying Birth Cohort Width

	1 Year		2 Years	
Constant	15.076*** (0.479)	15.080*** (0.462)	15.105*** (0.794)	15.099*** (0.752)
var(Cohort)	0.618*** (0.167)	0.569*** (0.163)	0.843*** (1.196)	0.764*** (1.141)
var(Country)	2.934*** (1.158)	2.714*** (1.077)	2.911*** (1.149)	2.277*** (1.018)
var(Interaction)		0.432*** (0.071)		0.556*** (0.233)
var(Residual)	28.756*** (0.273)	28.370*** (0.271)	28.911*** (0.274)	28.661*** (0.272)
$\rho_{\text{Cohort}}$	1.91	1.77	2.58	2.36
$\rho_{\text{Country}}$	9.08	8.45	8.91	7.06
<i>N</i>	22,272	22,272	22,272	22,272
R Log Lik.	-69,084	-69,042	-69,104	-69,024



Table 3.1 Continued

	4 Years		5 Years	
Constant	15.082*** (0.631)	15.087*** (0.594)	15.050*** (0.594)	15.056*** (0.556)
var(Cohort)	0.746*** (0.614)	0.666*** (0.580)	0.705*** (0.503)	0.636*** (0.480)
var(Country)	2.940*** (1.160)	2.447*** (1.022)	2.938*** (1.160)	2.429*** (1.001)
var(Interaction)		0.542*** (0.142)		0.502*** (0.118)
var(Residual)	28.795*** (0.273)	28.447*** (0.270)	28.772*** (0.273)	28.405*** (0.270)
$\rho_{\text{Cohort}}$	2.29	2.07	2.17	1.98
$\rho_{\text{Country}}$	9.05	7.62	9.06	7.59
<i>N</i>	22,272	22,272	22,272	22,272
R Log Lik.	-69,064	-68,968	-69,057	-68,960

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

Table 3.2 Conditional Cross-Classified Random Effects Regressions on Sequence Complexity with Varying Birth Cohort Width

	1 Year	2 Years	4 Years	5 Years
Female	-0.577*** (0.071)	-0.549*** (0.071)	-0.554*** (0.071)	-0.564*** (0.071)
Education (Ref. Secondary)				
None	-0.727*** (0.211)	-0.930*** (0.212)	-0.872*** (0.212)	-0.872*** (0.212)
Pre-Primary	-0.900*** (0.106)	-0.965*** (0.106)	-0.909*** (0.106)	-0.923*** (0.106)
Primary	-0.531*** (0.110)	-0.529*** (0.110)	-0.517*** (0.109)	-0.534*** (0.109)
Post-Secondary	1.183*** (0.104)	1.176*** (0.104)	1.160*** (0.103)	1.149*** (0.103)
Public Sector	0.153 (0.137)	0.125 (0.137)	0.145 (0.137)	0.145 (0.137)
Occupation of Breadwinner (Ref. Agriculture)				
Senior Prof.	1.308*** (0.186)	1.305*** (0.185)	1.290*** (0.185)	1.288*** (0.185)
Prof.	1.114*** (0.199)	1.117*** (0.199)	1.127*** (0.199)	1.102*** (0.198)
Technician	1.064*** (0.184)	1.067*** (0.184)	1.050*** (0.184)	1.041*** (0.184)
Clerk	0.940*** (0.166)	0.954*** (0.166)	0.979*** (0.166)	0.967*** (0.166)
Service	0.575*** (0.148)	0.574*** (0.148)	0.575*** (0.148)	0.583*** (0.148)
Craftsman	0.288** (0.108)	0.286** (0.108)	0.299** (0.107)	0.293** (0.107)
Industry	0.365* (0.176)	0.371* (0.176)	0.346* (0.176)	0.350* (0.176)
Unskilled	0.136 (0.113)	0.149 (0.113)	0.130 (0.113)	0.129 (0.113)
Armed Services	0.583* (0.291)	0.574* (0.291)	0.582* (0.290)	0.588* (0.290)
None	0.908** (0.290)	0.902** (0.290)	0.945** (0.289)	0.924** (0.289)
Constant	15.107*** (0.414)	15.113*** (0.594)	15.096*** (0.495)	15.092*** (0.470)
var(Cohort)	0.324*** (0.102)	0.405*** (0.634)	0.370*** (0.339)	0.359*** (0.285)
var(Country)	2.107*** (0.840)	1.687*** (0.787)	1.863*** (0.793)	1.849*** (0.774)
var(Interacted)	0.428*** (0.070)	0.550*** (0.230)	0.538*** (0.140)	0.504*** (0.117)
var(Residual)	27.498*** (0.263)	27.746*** (0.263)	27.567*** (0.262)	27.525*** (0.261)

Table 3.2 Continued

$\rho_{\text{Cohort}}$	1.06	1.33	1.21	1.18
$\rho_{\text{Country}}$	6.94	5.55	6.14	6.11
$R^2_{\text{Cohort}}$	43.12	46.90	44.42	43.49
$R^2_{\text{Country}}$	22.35	25.94	23.87	23.87
$R^2_{\text{Total}}$	5.38	5.79	5.49	5.42
$N$	22,272	22,272	22,272	22,272
R Log Lik.	-68,697	-68,670	-68,625	-68,616

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

#### ***4. Unconditional Models with Generations & Gender Programme Data***

Unconditional cross-classified random effects models on sequence complexity are displayed below using data from the Generations and Gender Programme (GGP) in Table A4 and combined GGS and SHARELIFE data. The GGS models includes 13 countries (Sweden, Norway, West Germany, France, Belgium, Italy, the Czech Republic, Poland, East Germany, Bulgaria, Estonia, Lithuania and Romania) and 12 birth cohorts from 1924-1960. The models with GGP and SHARELIFE data include 19 countries and 12 birth cohorts from 1924-1960. Please note that only seven GGP countries have respondents born before 1927 and only four have respondents born after 1956. There are therefore non-random empty cohort and country-cohort cells in the cross-classified regression models for early cohorts and late cohorts. A balanced panel would be restricted to individuals born between 1933 and 1955. The results of the models with GGP data are substantively similar; however both intraclass correlations for countries and birth cohorts are larger.

Additionally, I replicated the analyses using short family trajectories from age 15-35 with cohorts born between 1939 and 1971 with GGP data. The results are displayed in Table A4.1. The results solidify my findings that family trajectories vary more across countries than across cohorts. While only 0.6% of the complexity variation can be attributed to birth cohorts, a substantial 18% is accounted for by country differences. These results are likely driven by two processes. The increase in the country intraclass coefficient may be driven by the selection of GGP countries. While all regions of Europe are covered in GGP, there are fewer Western European countries that are similar with regard to their dominant family formation patterns, therefore increasing cross-national differences. The cohort intraclass coefficient likely decreased, because later life course events, such as divorce and remarriage as well as marriage and parenthood postponed past age 35, are not observed. These results indicate the importance of analyzing long family life courses when describing change in family formation across birth cohorts.

Table 4 Unconditional Cross-Classified Random Effects Regression on Sequence Complexity with GGS Data and Unbalanced Birth Cohort Design

	GGS		GGS & SHARELIFE	
Constant	16.549*** (0.733)	16.551*** (0.725)	15.990*** (0.589)	16.017*** (0.580)
var(Cohort)	1.069*** (0.463)	1.365*** (0.642)	1.238*** (0.533)	1.552*** (0.720)
var(Country)	5.815*** (2.378)	5.261*** (2.191)	4.615*** (1.542)	3.846*** (1.309)
var(Interaction)		0.735*** (0.115)		0.745*** (0.093)
var(Residual)	37.084*** (0.230)	36.392*** (0.226)	34.288*** (0.174)	33.622*** (0.170)
$\rho_{\text{Cohort}}$	2.43	2.08	3.08	1.91
$\rho_{\text{Country}}$	13.22	11.90	11.49	9.98
<i>N</i>	51,929	51,929	78,136	78,136
R Log Lik.	-167,564	-167,185	-249,054	-248,468

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

Table 4.1 Unconditional Cross-Classified Random Effects Regression on Short Sequence Complexity with GGS Data

	Short GGS	
Constant	23.032*** (1.163)	22.978*** (1.137)
var(Cohort)	0.554*** (0.253)	0.506*** (0.326)
var(Country)	15.603*** (6.658)	14.740*** (6.388)
var(Interaction)		2.416*** (0.343)
var(Residual)	66.797*** (0.359)	64.570*** (0.347)
$\rho_{\text{Cohort}}$	0.66	0.61
$\rho_{\text{Country}}$	18.80	17.92
<i>N</i>	51,929	51,929
R Log Lik.	-167,564	-167,185

## 5. Model Sensitivity to the Omission of Birth Cohorts & Countries

The results of cross-classified random effects regressions on sequence complexity with the omission of single countries and birth cohorts are displayed below. The results of unconditional additive and interacted models as well as conditional interacted models omitting single birth cohorts are displayed in Tables A5.1 and A5.2, respectively. The results omitting single countries are displayed in Tables A5.3 and A5.4. The results of all models are substantively equivalent and lead to the same conclusions reported in the manuscript.

Table 5.1 Unconditional Cross-Classified Random Effects Regression on Sequence Complexity with Single Birth Cohort Omissions

	1924-1926		1927-1929		1930-1932	
Constant	15.122*** (0.535)	15.123*** (0.507)	15.165*** (0.531)	15.164*** (0.508)	15.147*** (0.538)	15.155*** (0.510)
var(Cohort)	0.682*** (0.329)	0.612*** (0.313)	0.587*** (0.284)	0.538*** (0.276)	0.633*** (0.307)	0.563*** (0.289)
var(Country)	3.023*** (1.193)	2.668*** (1.073)	3.106*** (1.226)	2.789*** (1.119)	3.143*** (1.241)	2.779*** (1.116)
var(Interaction)		0.472*** (0.089)		0.422*** (0.082)		0.427*** (0.084)
var(Residual)	28.954*** (0.280)	28.573*** (0.277)	29.161*** (0.283)	28.813*** (0.281)	29.442*** (0.289)	29.098*** (0.286)
$\rho_{\text{Cohort}}$	2.08	1.89	1.78	1.65	1.90	1.71
$\rho_{\text{Country}}$	9.25	8.25	9.45	8.56	9.46	8.45
$N$	21,474	21,474	21,208	21,208	20,823	20,823
R Log Lik.	-66,660	-66,588	-65,910	-65,847	-64,814	-64,755

Table 5.1 Continued

	1933-1935		1936-1938		1939-1941	
Constant	15.120*** (0.542)	15.130*** (0.510)	15.095*** (0.545)	15.101*** (0.510)	15.097*** (0.542)	15.105*** (0.510)
var(Cohort)	0.686*** (0.332)	0.606*** (0.311)	0.719*** (0.347)	0.638*** (0.327)	0.711*** (0.344)	0.635*** (0.324)
var(Country)	3.126*** (1.234)	2.715*** (1.093)	3.120*** (1.232)	2.671*** (1.077)	3.087*** (1.219)	2.674*** (1.076)
var(Interaction)		0.472*** (0.091)		0.495*** (0.094)		0.463*** (0.089)
var(Residual)	29.362*** (0.290)	28.986*** (0.287)	29.285*** (0.293)	28.886*** (0.289)	29.174*** (0.289)	28.796*** (0.286)
$\rho_{\text{Cohort}}$	2.06	1.84	2.17	1.95	2.15	1.95
$\rho_{\text{Country}}$	9.42	8.28	9.41	8.21	9.36	8.17
<i>N</i>	20,553	20,553	20,063	20,063	20,365	20,365
R Log Lik.	-63,947	-63,881	-62,397	-62,326	-63,297	-63,229

Table 5.1 Continued

	1942-1944		1945-1947		1948-1950	
Constant	15.047*** (0.537)	15.053*** (0.502)	15.013*** (0.528)	15.018*** (0.494)	14.996*** (0.511)	15.003*** (0.480)
var(Cohort)	0.725*** (0.350)	0.645*** (0.330)	0.707*** (0.341)	0.622*** (0.319)	0.677*** (0.327)	0.602*** (0.307)
var(Country)	2.995*** (1.183)	2.545*** (1.028)	2.890*** (1.142)	2.463*** (0.995)	2.686*** (1.061)	2.317*** (0.936)
var(Interaction)		0.525*** (0.097)		0.505*** (0.094)		0.454*** (0.087)
var(Residual)	28.966*** (0.291)	28.535*** (0.288)	28.426*** (0.288)	28.003*** (0.284)	27.964*** (0.284)	27.583*** (0.281)
$\rho_{\text{Cohort}}$	2.21	1.99	2.20	1.96	2.16	1.94
$\rho_{\text{Country}}$	9.16	7.89	9.02	7.79	8.57	7.48
<i>N</i>	19,797	19,797	19,518	19,518	19,422	19,422
R Log Lik.	-61,462	-61,383	-60,412	-60,334	-59,956	-59,887

Table 5.1 Continued

	1951-1953		1954-1956	
Constant	14.954 <sup>***</sup> (0.489)	14.956 <sup>***</sup> (0.461)	14.931 <sup>***</sup> (0.493)	14.942 <sup>***</sup> (0.466)
var(Cohort)	0.578 <sup>***</sup> (0.280)	0.510 <sup>***</sup> (0.260)	0.503 <sup>***</sup> (0.244)	0.457 <sup>***</sup> (0.238)
var(Country)	2.507 <sup>***</sup> (0.991)	2.203 <sup>***</sup> (0.887)	2.680 <sup>***</sup> (1.059)	2.334 <sup>***</sup> (0.941)
var(Interaction)		0.346 <sup>***</sup> (0.072)		0.434 <sup>***</sup> (0.084)
var(Residual)	27.675 <sup>***</sup> (0.280)	27.384 <sup>***</sup> (0.278)	27.805 <sup>***</sup> (0.278)	27.446 <sup>***</sup> (0.276)
$\rho_{\text{Cohort}}$	1.88	1.67	1.62	1.49
$\rho_{\text{Country}}$	8.14	7.23	8.64	7.60
<i>N</i>	19,518	19,518	19,979	19,979
R Log Lik.	-60,149	-60,102	-61,616	-61,551

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses



Table 5.2 Conditional Cross-Classified Random Effects Regression on Sequence Complexity with Single Birth Cohort Omissions

	1924-1926	1927-1929	1930-1932	1933-1935	1936-1938	1939-1941
Female	-0.570*** (0.073)	-0.558*** (0.074)	-0.543*** (0.075)	-0.542*** (0.075)	-0.565*** (0.075)	-0.538*** (0.076)
Education (Ref. Secondary)						
None	-0.821*** (0.220)	-0.789*** (0.225)	-0.846*** (0.230)	-0.891*** (0.231)	-0.703** (0.226)	-0.790*** (0.225)
Pre-Primary	-0.920*** (0.108)	-0.883*** (0.110)	-0.927*** (0.111)	-0.957*** (0.112)	-0.840*** (0.112)	-0.872*** (0.113)
Primary	-0.516*** (0.111)	-0.555*** (0.112)	-0.521*** (0.114)	-0.540*** (0.115)	-0.521*** (0.115)	-0.507*** (0.116)
Post-Secondary	1.171*** (0.105)	1.177*** (0.106)	1.142*** (0.107)	1.139*** (0.108)	1.218*** (0.108)	1.120*** (0.110)
Public Sector	0.163 (0.139)	0.137 (0.141)	0.160 (0.142)	0.147 (0.142)	0.156 (0.144)	0.165 (0.146)
Occupation of Breadwinner (Ref. Agriculture)						
Senior Prof.	1.293*** (0.189)	1.312*** (0.191)	1.374*** (0.193)	1.348*** (0.193)	1.399*** (0.193)	1.371*** (0.199)
Prof.	1.118*** (0.203)	1.165*** (0.205)	1.181*** (0.206)	1.077*** (0.207)	1.255*** (0.210)	1.272*** (0.211)
Technician	1.051*** (0.188)	1.101*** (0.189)	1.060*** (0.191)	1.062*** (0.192)	1.067*** (0.192)	1.099*** (0.194)
Clerk	0.956*** (0.169)	0.965*** (0.171)	0.977*** (0.173)	0.925*** (0.174)	0.968*** (0.174)	1.024*** (0.176)
Service	0.607*** (0.151)	0.607*** (0.152)	0.687*** (0.155)	0.584*** (0.156)	0.619*** (0.156)	0.679*** (0.159)
Craftsman	0.266* (0.110)	0.333** (0.111)	0.319** (0.112)	0.308** (0.113)	0.323** (0.113)	0.362** (0.114)
Industry	0.305 (0.179)	0.359* (0.181)	0.321 (0.183)	0.290 (0.184)	0.357 (0.184)	0.543** (0.187)
Unskilled	0.112 (0.116)	0.173 (0.117)	0.148 (0.119)	0.150 (0.120)	0.168 (0.120)	0.202 (0.120)
Armed Services	0.572 (0.294)	0.613* (0.298)	0.669* (0.304)	0.729* (0.311)	0.503 (0.304)	0.432 (0.307)
None	0.992*** (0.295)	0.973** (0.300)	0.987** (0.303)	1.037*** (0.309)	0.918** (0.310)	0.961** (0.314)
Constant	15.135*** (0.443)	15.135*** (0.445)	15.134*** (0.445)	15.146*** (0.443)	15.067*** (0.445)	15.054*** (0.445)
var(Cohort)	0.355*** (0.192)	0.306*** (0.167)	0.311*** (0.170)	0.335*** (0.183)	0.363*** (0.196)	0.353*** (0.192)
var(Country)	2.059*** (0.835)	2.157*** (0.872)	2.135*** (0.864)	2.076*** (0.843)	2.066*** (0.838)	2.067*** (0.840)
var(Interacted)	0.470*** (0.088)	0.431*** (0.083)	0.434*** (0.085)	0.476*** (0.091)	0.458*** (0.088)	0.489*** (0.093)
var(Residual)	27.679*** (0.268)	27.927*** (0.272)	28.201*** (0.277)	28.099*** (0.278)	27.897*** (0.277)	28.045*** (0.281)

Table 5.2 Continued

$\rho_{\text{Cohort}}$	1.16	0.99	1.00	1.08	1.17	1.14
$\rho_{\text{Country}}$	6.73	6.99	6.86	6.70	6.71	6.67
$R^2_{\text{Cohort}}$	42.08	43.21	44.71	44.73	42.91	44.68
$R^2_{\text{Country}}$	22.79	22.65	23.18	23.51	22.75	22.60
$R^2_{\text{Total}}$	5.45	5.34	5.43	5.46	5.48	5.13
$N$	21,474	21,208	20,823	20,553	20,365	20,063
R Log Lik.	-66,252	-65,522	-64,435	-63,567	-62,911	-62,034

Table 5.2 Continued

	1942-1944	1945-1947	1948-1950	1951-1953	1954-1956
Female	-0.597*** (0.076)	-0.614*** (0.076)	-0.579*** (0.075)	-0.622*** (0.075)	-0.548*** (0.074)
Education (Ref. Secondary)					
None	-0.738*** (0.222)	-0.805*** (0.219)	-0.743*** (0.219)	-0.817*** (0.216)	-0.910*** (0.214)
Pre-Primary	-0.864*** (0.113)	-0.914*** (0.112)	-0.896*** (0.112)	-0.912*** (0.110)	-0.914*** (0.109)
Primary	-0.560*** (0.117)	-0.515*** (0.117)	-0.505*** (0.116)	-0.488*** (0.115)	-0.518*** (0.114)
Post-Secondary	1.198*** (0.110)	1.147*** (0.110)	1.186*** (0.110)	1.137*** (0.110)	1.122*** (0.109)
Public Sector	0.209 (0.146)	0.187 (0.145)	0.161 (0.145)	0.011 (0.146)	0.216 (0.142)
Occupation of Breadwinner (Ref. Agriculture)					
Senior Prof.	1.218*** (0.196)	1.248*** (0.198)	1.294*** (0.196)	1.208*** (0.196)	1.238*** (0.194)
Prof.	1.106*** (0.211)	1.093*** (0.212)	1.108*** (0.209)	1.017*** (0.211)	0.860*** (0.208)
Technician	1.088*** (0.198)	1.071*** (0.197)	1.001*** (0.194)	1.003*** (0.195)	1.058*** (0.194)
Clerk	0.941*** (0.177)	0.925*** (0.177)	1.022*** (0.176)	1.061*** (0.175)	0.910*** (0.173)
Service	0.531*** (0.157)	0.449** (0.156)	0.571*** (0.156)	0.607*** (0.155)	0.529*** (0.154)
Craftsman	0.279* (0.114)	0.254* (0.114)	0.366** (0.113)	0.246* (0.113)	0.204 (0.111)
Industry	0.386* (0.188)	0.480** (0.186)	0.427* (0.187)	0.306 (0.185)	0.175 (0.184)
Unskilled	0.146 (0.120)	0.117 (0.119)	0.146 (0.119)	0.188 (0.118)	0.075 (0.117)
Armed Services	0.751* (0.306)	0.683* (0.309)	0.665* (0.310)	0.452 (0.305)	0.442 (0.302)
None	1.047*** (0.310)	0.830** (0.307)	0.902** (0.302)	0.969*** (0.294)	0.778** (0.296)
Constant	15.087*** (0.439)	15.104*** (0.432)	15.016*** (0.418)	15.052*** (0.403)	15.054*** (0.408)
var(Cohort)	0.372*** (0.202)	0.354*** (0.193)	0.343*** (0.186)	0.288*** (0.156)	0.245*** (0.138)
var(Country)	1.969*** (0.803)	1.905*** (0.777)	1.758*** (0.717)	1.682*** (0.683)	1.792*** (0.729)
var(Interacted)	0.520*** (0.096)	0.508*** (0.094)	0.461*** (0.087)	0.342*** (0.071)	0.430*** (0.083)
var(Residual)	27.649*** (0.279)	27.131*** (0.276)	26.701*** (0.272)	26.545*** (0.270)	26.608*** (0.267)

Table 5.2 Continued

$\rho_{\text{Cohort}}$	1.22	1.18	1.17	0.99	0.84
$\rho_{\text{Country}}$	6.45	6.37	6.00	5.82	6.16
$R^2_{\text{Cohort}}$	42.27	43.08	43.00	43.49	46.37
$R^2_{\text{Country}}$	22.62	22.64	24.10	23.66	23.20
$R^2_{\text{Total}}$	5.39	5.36	5.46	5.20	5.20
$N$	19,797	19,518	19,422	19,518	19,979
R Log Lik.	-61,075	-60,031	-59,577	-59,803	-61,246

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

Table 5.3 Unconditional Cross-Classified Random Effects Regression on Sequence Complexity with Single Country Omissions

	Austria		W Germany		Sweden	
Constant	15.089*** (0.555)	15.097*** (0.523)	15.010*** (0.553)	15.013*** (0.518)	14.850*** (0.481)	14.852*** (0.450)
var(Cohort)	0.685*** (0.314)	0.623*** (0.303)	0.671*** (0.308)	0.596*** (0.292)	0.543*** (0.250)	0.476*** (0.235)
var(Country)	3.173*** (1.302)	2.756*** (1.151)	3.154*** (1.295)	2.723*** (1.139)	2.338*** (0.962)	2.015*** (0.846)
var(Interaction)		0.479*** (0.089)		0.492*** (0.091)		0.407*** (0.078)
var(Residual)	28.574*** (0.276)	28.182*** (0.273)	28.507*** (0.278)	28.105*** (0.275)	27.664*** (0.273)	27.325*** (0.270)
$\rho_{\text{Cohort}}$	2.11	1.94	2.07	1.86	1.77	1.57
$\rho_{\text{Country}}$	9.78	8.60	9.75	8.53	7.65	6.66
<i>N</i>	21,483	21,483	21,019	21,019	20,625	20,625
R Log Lik.	-66,546	-66,469	-65,085	-65,007	-63,553	-63,490

Table 5.3 Continued

	Netherlands		Spain		Italy	
Constant	15.060*** (0.552)	15.065*** (0.519)	15.161*** (0.549)	15.172*** (0.518)	15.215*** (0.534)	15.227*** (0.503)
var(Cohort)	0.639*** (0.294)	0.560*** (0.276)	0.772*** (0.354)	0.689*** (0.332)	0.771*** (0.353)	0.701*** (0.336)
var(Country)	3.186*** (1.308)	2.767*** (1.157)	2.985*** (1.226)	2.610*** (1.091)	2.779*** (1.142)	2.395*** (1.002)
var(Interaction)		0.494*** (0.092)		0.435*** (0.085)		0.413*** (0.082)
var(Residual)	29.170*** (0.289)	28.760*** (0.286)	29.631*** (0.294)	29.273*** (0.291)	29.351*** (0.288)	29.013*** (0.286)
$\rho_{\text{Cohort}}$	1.93	1.71	2.31	2.15	2.34	2.08
$\rho_{\text{Country}}$	9.65	8.49	8.93	7.36	8.44	7.90
<i>N</i>	20,409	20,409	20,355	20,355	20,776	20,776
R Log Lik.	-63,431	-63,356	-63,423	-63,363	-64,635	-64,577

Table 5.3 Continued

	France		Denmark		Greece	
Constant	15.012*** (0.542)	15.015*** (0.510)	14.865*** (0.481)	14.873*** (0.459)	15.155*** (0.551)	15.160*** (0.519)
var(Cohort)	0.571*** (0.263)	0.511*** (0.253)	0.488*** (0.226)	0.443*** (0.219)	0.767*** (0.352)	0.669*** (0.324)
var(Country)	3.120*** (1.281)	2.718*** (1.136)	2.410*** (0.991)	2.165*** (0.906)	3.014*** (1.238)	2.641*** (1.104)
var(Interaction)		0.474*** (0.088)		0.372*** (0.075)		0.462*** (0.089)
var(Residual)	28.141*** (0.280)	27.747*** (0.276)	27.175*** (0.269)	26.871*** (0.267)	29.587*** (0.294)	29.210*** (0.291)
$\rho_{\text{Cohort}}$	1.79	1.62	1.62	1.48	2.29	2.02
$\rho_{\text{Country}}$	9.80	8.64	8.01	7.25	9.03	8.00
<i>N</i>	20,288	20,288	20,410	20,410	20,272	20,272
R Log Lik.	-62,691	-62,617	-62,709	-62,656	-63,150	-63,085

Table 5.3 Continued

	Switzerland		Belgium		Czechia	
Constant	14.923*** (0.525)	14.930*** (0.492)	15.084*** (0.548)	15.089*** (0.516)	15.161*** (0.546)	15.166*** (0.514)
var(Cohort)	0.602*** (0.277)	0.512*** (0.253)	0.595*** (0.275)	0.531*** (0.263)	0.707*** (0.325)	0.633*** (0.309)
var(Country)	2.856*** (1.173)	2.479*** (1.036)	3.183*** (1.307)	2.765*** (1.156)	3.019*** (1.240)	2.620*** (1.096)
var(Interaction)		0.432*** (0.082)		0.485*** (0.091)		0.481*** (0.090)
var(Residual)	28.427*** (0.276)	28.069*** (0.274)	28.977*** (0.290)	28.577*** (0.287)	29.211*** (0.287)	28.814*** (0.284)
$\rho_{\text{Cohort}}$	1.88	1.62	1.81	1.64	2.14	1.94
$\rho_{\text{Country}}$	8.95	7.87	9.71	8.54	9.16	8.04
<i>N</i>	21,175	21,175	19,966	19,966	20,699	20,699
R Log Lik.	-65,536	-65,468	-61,988	-61,918	-64,347	-64,274

Table 5.3 Continued

	Poland		E Germany	
Constant	15.215*** (0.532)	15.213*** (0.503)	15.084*** (0.554)	15.090*** (0.520)
var(Cohort)	0.734*** (0.337)	0.656*** (0.318)	0.660*** (0.303)	0.584*** (0.286)
var(Country)	2.786*** (1.145)	2.442*** (1.023)	3.181*** (1.306)	2.763*** (1.155)
var(Interaction)		0.465*** (0.088)		0.483*** (0.089)
var(Residual)	29.502*** (0.289)	29.120*** (0.287)	28.767*** (0.279)	28.373*** (0.276)
$\rho_{\text{Cohort}}$	2.22	2.00	2.02	1.81
$\rho_{\text{Country}}$	8.43	7.47	9.75	8.58
<i>N</i>	20,794	20,794	21,265	21,265
R Log Lik.	-64,744	-64,676	-65,942	-65,867

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

Table 5.4 Conditional Cross-Classified Random Effects Regression on Sequence Complexity with Single Country Omissions

	Austria	W Germany	Sweden	Netherlands	Spain	Italy
Female	-0.601*** (0.072)	-0.590*** (0.073)	-0.579*** (0.073)	-0.612*** (0.075)	-0.583*** (0.075)	-0.508*** (0.076)
Education (Ref. Secondary)						
None	-0.803*** (0.212)	-0.836*** (0.213)	-0.788*** (0.209)	-0.750*** (0.215)	-0.662** (0.253)	-0.904*** (0.221)
Pre-Primary	-0.911*** (0.108)	-0.936*** (0.107)	-0.830*** (0.109)	-0.835*** (0.110)	-0.928*** (0.110)	-0.947*** (0.114)
Primary	-0.511*** (0.111)	-0.545*** (0.112)	-0.521*** (0.112)	-0.406*** (0.118)	-0.522*** (0.114)	-0.573*** (0.117)
Post-Secondary	1.168*** (0.105)	1.081*** (0.108)	1.159*** (0.106)	1.141*** (0.109)	1.190*** (0.106)	1.164*** (0.107)
Public Sector	0.179 (0.138)	0.133 (0.140)	0.130 (0.141)	0.132 (0.146)	0.133 (0.139)	0.136 (0.139)
Occupation of Breadwinner (Ref. Agriculture)						
Senior Prof.	1.402*** (0.189)	1.305*** (0.191)	1.338*** (0.192)	1.302*** (0.200)	1.293*** (0.191)	1.341*** (0.193)
Prof.	1.134*** (0.199)	1.072*** (0.200)	1.163*** (0.211)	1.013*** (0.214)	1.111*** (0.204)	1.152*** (0.206)
Technician	1.006*** (0.186)	1.014*** (0.189)	0.990*** (0.188)	1.135*** (0.196)	1.063*** (0.192)	1.129*** (0.192)
Clerk	0.970*** (0.168)	0.845*** (0.173)	0.899*** (0.167)	1.037*** (0.173)	1.010*** (0.172)	0.988*** (0.178)
Service	0.600*** (0.151)	0.571*** (0.152)	0.568*** (0.152)	0.658*** (0.156)	0.578*** (0.155)	0.637*** (0.156)
Craftsman	0.284** (0.109)	0.308** (0.110)	0.300** (0.110)	0.337** (0.113)	0.296** (0.112)	0.320** (0.113)
Industry	0.327 (0.177)	0.370* (0.179)	0.418* (0.185)	0.435* (0.191)	0.366* (0.185)	0.376* (0.183)
Unskilled	0.152 (0.114)	0.127 (0.114)	0.169 (0.114)	0.152 (0.117)	0.139 (0.121)	0.177 (0.124)
Armed Service	0.642* (0.294)	0.534 (0.298)	0.556 (0.296)	0.916** (0.307)	0.728* (0.303)	0.418 (0.311)
None	1.045*** (0.304)	0.734* (0.311)	0.923** (0.292)	1.044*** (0.311)	0.971** (0.299)	1.042*** (0.303)
Constant	15.139*** (0.455)	15.129*** (0.455)	14.866*** (0.384)	15.060*** (0.457)	15.212*** (0.447)	15.129*** (0.455)
var(Cohort)	0.349*** (0.181)	0.324*** (0.171)	0.266*** (0.142)	0.315*** (0.167)	0.424*** (0.212)	0.392*** (0.200)
var(Country)	2.099*** (0.884)	2.128*** (0.896)	1.432*** (0.610)	2.155*** (0.907)	1.925*** (0.810)	2.039*** (0.859)
var(Interacted)	0.484*** (0.089)	0.493*** (0.090)	0.422*** (0.080)	0.490*** (0.091)	0.405*** (0.080)	0.447*** (0.086)
var(Residual)	27.275*** (0.264)	27.267*** (0.267)	26.497*** (0.262)	27.930*** (0.278)	28.094*** (0.277)	28.355*** (0.282)



Table 5.4 Continued

$\rho_{\text{Cohort}}$	1.15	1.07	0.93	1.02	1.32	1.25
$\rho_{\text{Country}}$	6.94	7.04	5.00	6.97	6.23	6.52
$R^2_{\text{Cohort}}$	43.92	45.58	44.03	43.34	39.55	43.02
$R^2_{\text{Country}}$	23.82	21.87	28.91	22.09	19.63	21.86
$R^2_{\text{Total}}$	5.71	5.34	5.30	5.18	5.14	5.37
$N$	21,483	21,019	20,625	20,409	20,776	20,355
R Log Lik.	-66,124	-64,694	-63,179	-63,062	-64,248	-63,045

Table 5.4 Continued

	France	Denmark	Greece	Switzerland	Belgium	Czechia
Female	-0.548*** (0.074)	-0.591*** (0.073)	-0.518*** (0.076)	-0.543*** (0.073)	-0.582*** (0.076)	-0.593*** (0.074)
Education (Ref. Secondary)						
None	-0.746** (0.254)	-0.788*** (0.208)	-0.803*** (0.240)	-0.826*** (0.211)	-0.889*** (0.218)	-0.778*** (0.215)
Pre-Primary	-0.881*** (0.111)	-0.801*** (0.107)	-0.952*** (0.114)	-0.930*** (0.108)	-0.980*** (0.112)	-0.897*** (0.110)
Primary	-0.527*** (0.112)	-0.488*** (0.110)	-0.540*** (0.114)	-0.494*** (0.113)	-0.575*** (0.118)	-0.570*** (0.118)
Post-Secondary	1.075*** (0.108)	1.152*** (0.109)	1.170*** (0.109)	1.170*** (0.105)	1.245*** (0.110)	1.182*** (0.107)
Public Sector	0.154 (0.145)	0.152 (0.137)	0.142 (0.150)	0.151 (0.139)	0.207 (0.149)	0.295* (0.147)
Occupation of Breadwinner (Ref. Agriculture)						
Senior Prof.	1.233*** (0.192)	1.100*** (0.197)	1.414*** (0.192)	1.325*** (0.191)	1.205*** (0.194)	1.267*** (0.189)
Prof.	1.143*** (0.210)	0.872*** (0.202)	1.327*** (0.210)	1.123*** (0.201)	1.122*** (0.213)	1.135*** (0.206)
Technician	1.022*** (0.193)	0.972*** (0.187)	1.238*** (0.191)	1.037*** (0.189)	1.053*** (0.195)	1.043*** (0.196)
Clerk	1.007*** (0.174)	0.847*** (0.167)	1.198*** (0.177)	0.933*** (0.171)	0.911*** (0.178)	0.945*** (0.174)
Service	0.572*** (0.151)	0.523*** (0.152)	0.738*** (0.160)	0.590*** (0.152)	0.440** (0.152)	0.524*** (0.154)
Craftsman	0.254* (0.112)	0.215* (0.109)	0.390*** (0.114)	0.272* (0.110)	0.254* (0.112)	0.259* (0.113)
Industry	0.271 (0.180)	0.306 (0.176)	0.471** (0.183)	0.323 (0.177)	0.342 (0.187)	0.318 (0.189)
Unskilled	0.149 (0.118)	0.106 (0.116)	0.246* (0.121)	0.152 (0.114)	0.078 (0.121)	0.087 (0.116)
Armed Services	0.244 (0.313)	0.464 (0.285)	0.757* (0.310)	0.545 (0.291)	0.710* (0.313)	0.553 (0.302)
None	0.881** (0.294)	0.876** (0.286)	1.106*** (0.304)	1.069*** (0.293)	0.758* (0.311)	0.860** (0.306)
Constant	15.058*** (0.450)	14.964*** (0.409)	15.051*** (0.455)	14.952*** (0.424)	15.181*** (0.447)	15.209*** (0.449)
var(Cohort)	0.287*** (0.154)	0.246*** (0.132)	0.393*** (0.201)	0.262*** (0.141)	0.271*** (0.147)	0.362*** (0.188)
var(Country)	2.103*** (0.885)	1.714*** (0.723)	2.036*** (0.857)	1.856*** (0.782)	2.092*** (0.881)	2.011*** (0.848)
var(Interacted)	0.478*** (0.089)	0.384*** (0.076)	0.446*** (0.086)	0.422*** (0.080)	0.485*** (0.090)	0.480*** (0.089)
var(Residual)	26.961*** (0.269)	26.102*** (0.259)	28.267*** (0.282)	27.185*** (0.265)	27.635*** (0.278)	27.878*** (0.275)

Table 5.4 Continued

$\rho_{\text{Cohort}}$	0.96	0.86	1.26	0.88	0.88	1.11
$\rho_{\text{Country}}$	7.04	6.02	6.53	6.24	6.68	6.54
$R^2_{\text{Cohort}}$	43.74	44.46	41.18	48.75	49.05	42.75
$R^2_{\text{Country}}$	22.65	20.84	22.88	25.12	24.32	23.25
$R^2_{\text{Total}}$	5.15	4.70	5.57	5.60	5.79	5.58
$N$	20,288	20,410	20,272	21,175	19,966	20,699
R Log Lik.	-62,331	-62,366	-62,757	-65,134	-61,588	-63,937

Table 5.4 Continued

	Poland	E Germany
Female	-0.546*** (0.075)	-0.580*** (0.073)
Education (Ref. Secondary)		
None	-0.835*** (0.218)	-0.804*** (0.214)
Pre-Primary	-0.906*** (0.114)	-0.889*** (0.108)
Primary	-0.524*** (0.112)	-0.531*** (0.111)
Post-Secondary	1.163*** (0.107)	1.174*** (0.108)
Public Sector	0.147 (0.139)	0.116 (0.139)
Occupation of Breadwinner (Ref. Agriculture)		
Senior Prof.	1.384*** (0.191)	1.285*** (0.191)
Prof.	1.173*** (0.205)	1.075*** (0.206)
Technician	1.113*** (0.191)	1.026*** (0.188)
Clerk	1.001*** (0.172)	1.000*** (0.171)
Service	0.637*** (0.153)	0.618*** (0.153)
Craftsman	0.365** (0.115)	0.306** (0.110)
Industry	0.368* (0.182)	0.347 (0.181)
Unskilled	0.201 (0.118)	0.140 (0.115)
Armed Services	0.549 (0.301)	0.665* (0.296)
None	0.962** (0.298)	0.948** (0.295)
Constant	15.152*** (0.445)	15.147*** (0.452)
var(Cohort)	0.386*** (0.198)	0.326*** (0.171)
var(Country)	1.931*** (0.815)	2.088*** (0.879)
var(Interacted)	0.457*** (0.086)	0.483*** (0.089)
var(Residual)	28.221*** (0.278)	27.506*** (0.268)

Table 5.4 Continued

$\rho_{\text{Cohort}}$	1.24	1.07
$\rho_{\text{Country}}$	6.23	6.86
$R^2_{\text{Cohort}}$	41.12	44.20
$R^2_{\text{Country}}$	20.92	24.43
$R^2_{\text{Total}}$	5.16	5.59
$N$	20,794	21,265
R Log Lik.	-64,355	-65,542

Note: Sig.: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Standard errors in parentheses

## 6. Model Assumptions

Two general assumptions must be fulfilled for consistent and efficient estimations of parameters and standard errors in unconditional cross-classified random effects regressions. First, it is assumed that the total residual has an expectation of zero.<sup>1</sup> It follows from the zero mean expectation of residuals that the expectation of the response variable, i.e. the complexity index, is its mean. Second, it is assumed that the level-1 residuals are uncorrelated as well as the level-1 residuals and the random intercepts<sup>2</sup>. As for distributional assumptions, the restricted maximum likelihood estimator and empirical Bayes predictions of the random intercepts are based on the assumption that both the random intercepts as well as the level-1 residuals conditioned on the random intercepts are normally distributed.

The model assumptions for consistent and efficient model parameters must be extended to account for the addition of covariates at the individual level. There are four general assumptions. First, it is assumed that the means of level-1 residuals conditioned on the random intercepts and random intercepts themselves are zero when conditioned on the covariates. Further, the level-1 residuals conditioned on the random intercepts and random intercepts are uncorrelated with the covariates.<sup>3</sup> Second, level-1 residuals conditioned on the random intercepts and random intercepts are assumed have a constant variance conditioned the covariates, i.e. homoscedasticity. Third, level-1 residuals conditioned on the random intercepts as well as the random intercepts are uncorrelated when conditioned on the covariates.<sup>4</sup> Finally, associations between the response variable, i.e. sequence complexity, and the covariates are assumed to be conditionally linear. The same distributional assumptions stated above apply.

The distribution of the complexity index and the residuals of individuals as well as clusters for all models are displayed below. The complexity index is approximately normally distributed with a slightly positive excess kurtosis. This will have little to no effect on the cross-classified random effects regressions if the model residuals are normally distributed.

The level-1 residuals in all models are also approximately normally distributed with a slight positive excess kurtosis, which could potentially inflate the standard errors of the covariates. However this renders my inference conservative, because I would be more likely to conclude that a coefficient is not unequal to zero. All level-2 residuals are normally distributed with the exception of the residuals of the interacted random effect in model 2. The 1945-1947 East German and the 1951-1953 Swiss birth cohort residuals in the interacted random effect in model are very large, however their exclusion generates an approximately normal distribution. Further the distribution of the interacted random effect residuals are normally distributed when conditioned on individual characteristics in model 3.

Not included in this online appendix are correlation matrixes of the level-1 residuals and the residuals of the random effects as well as the covariates. I have further omitted scatter plots

---

<sup>1</sup>  $E(\xi_{ijk}) = E(\zeta_j + \zeta_k + \zeta_{jk} + \varepsilon_{ijk}) = 0$

<sup>2</sup>  $Cov(\varepsilon_{ijk}, \zeta_j) = Cov(\varepsilon_{ijk}, \zeta_k) = Cov(\varepsilon_{ijk}, \zeta_{jk}) = Cov(\varepsilon_{ijk}, \varepsilon_{i'jk}) = 0$

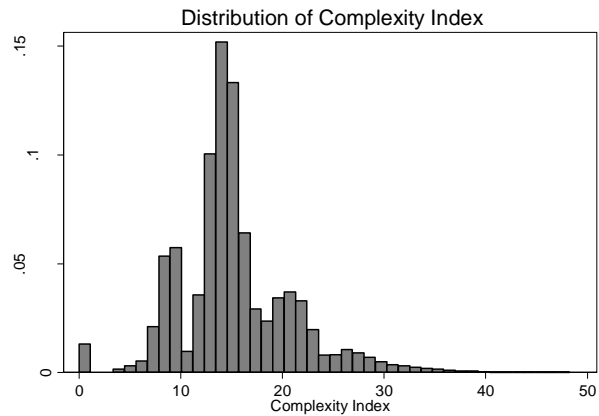
<sup>3</sup>  $E(\varepsilon_{ijk}|\mathbf{X}, \boldsymbol{\zeta}) = E(\zeta_j|\mathbf{X}) = E(\zeta_k|\mathbf{X}) = E(\zeta_{jk}|\mathbf{X}) = 0$  and

$Cov(\varepsilon_{ijk}, \mathbf{X}, \boldsymbol{\zeta}) = Cov(\zeta_j, \mathbf{X}) = Cov(\zeta_k, \mathbf{X}) = Cov(\zeta_{jk}, \mathbf{X}) = 0$

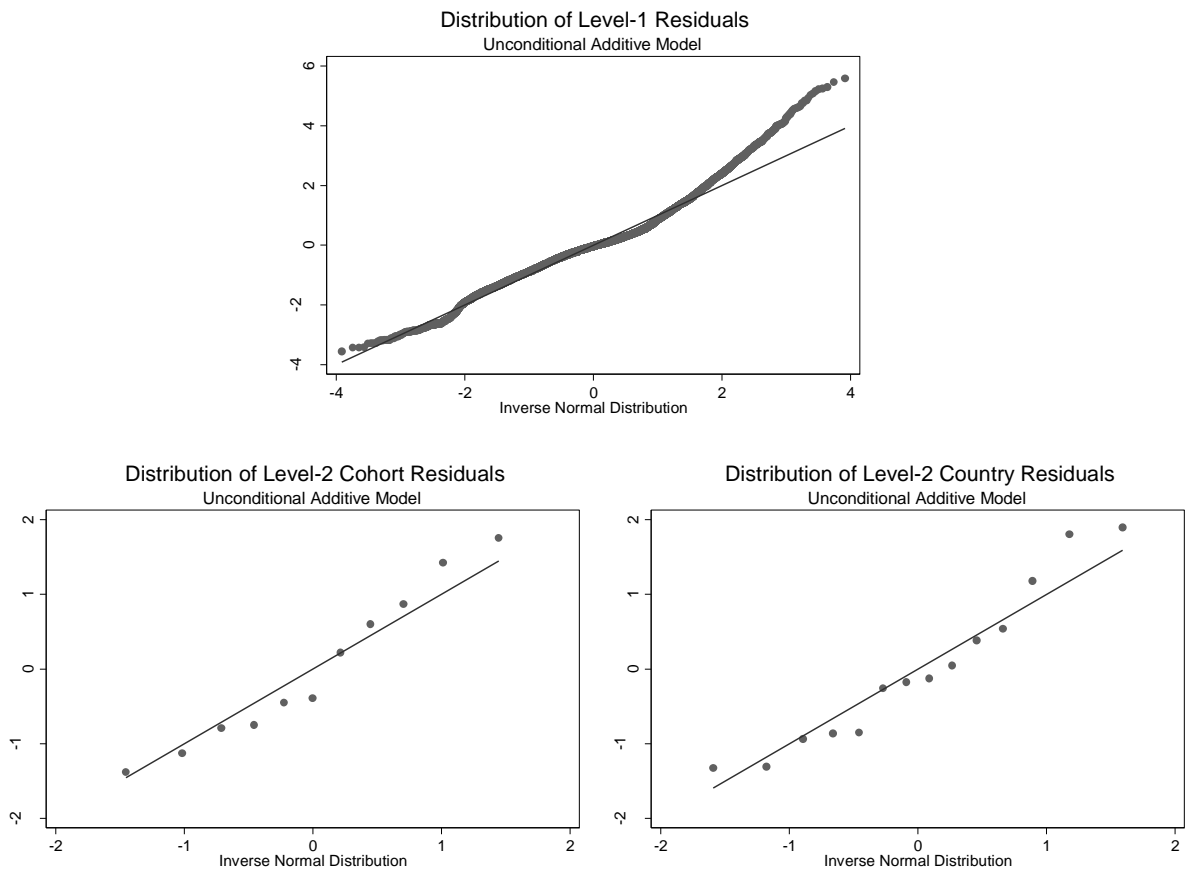
<sup>4</sup>  $Cov(\varepsilon_{ijk}, \varepsilon_{i'jk}|\mathbf{X}, \boldsymbol{\zeta}) = Cov(\zeta_j, \zeta_{j'}|\mathbf{X}) = Cov(\zeta_k, \zeta_{k'}|\mathbf{X}) = Cov(\zeta_{jk}, \zeta_{j'k'}|\mathbf{X}) = 0$

displaying the relationship between the level-1 and random intercept residuals, and the covariates to examine the models for homoscedasticity. These are available by the author. I consider the model assumptions to be fulfilled to the extent that these are testable. I conclude that all parameters and their standard errors in the cross-classified models will be consistently and efficiently estimated.

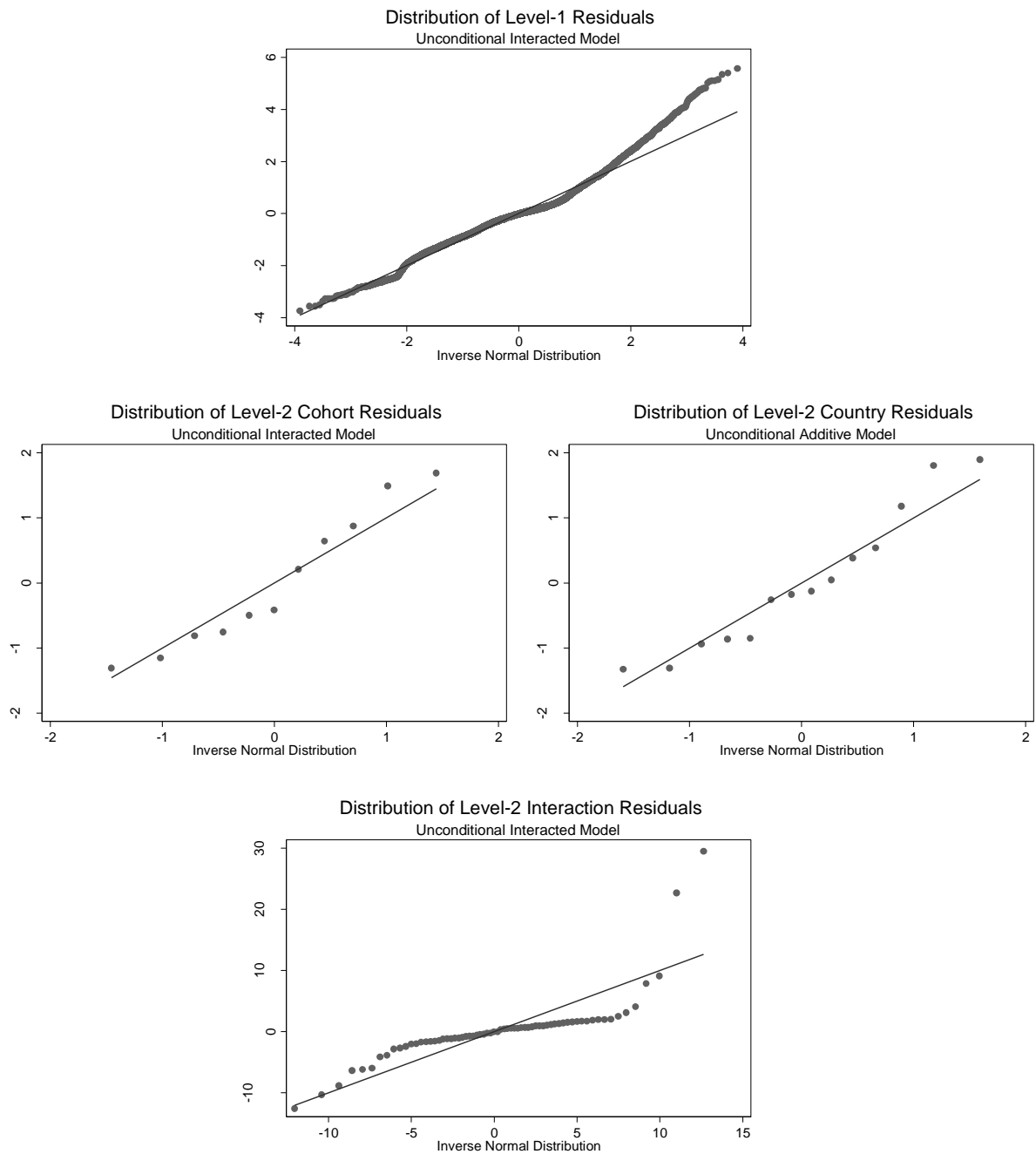
## 6.1 Distribution of Complexity Index



## 6.2 Distribution of Residuals of Model 1

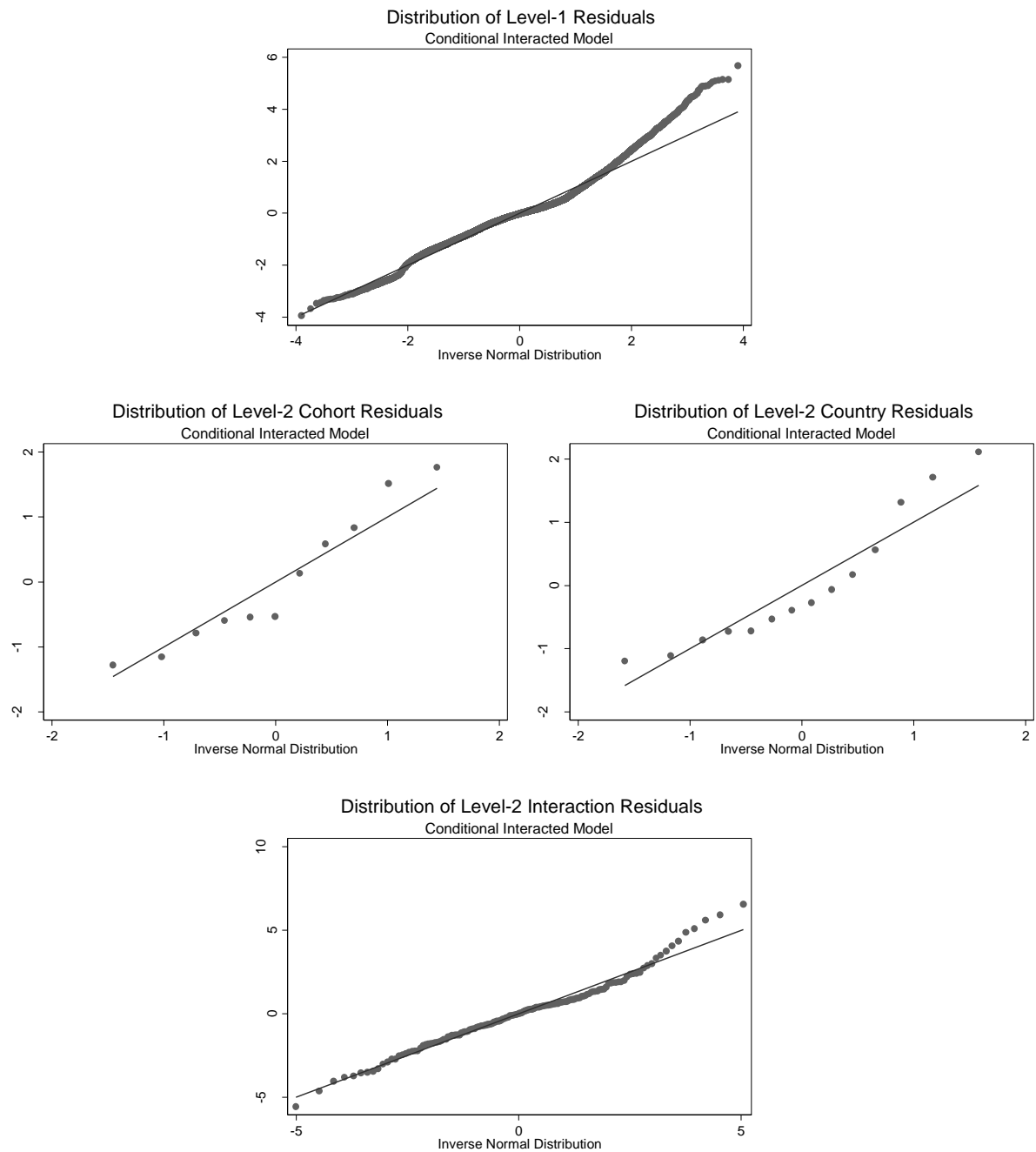


## 6.3 Distribution of Residuals of Model 2





## 6.4 Distribution of Residuals of Model 3



## ***7. Combined Two-Level Country-Cohort Random Effects Model***

The results of a two-level random effects regression with 154 country-cohorts as higher level units are displayed in Table A7. The effects of the covariates are substantively equivalent and the amount of total complexity variation accounted for by individual characteristics is also comparable to the results reported in the manuscript. Further, the proportion of variance accounted for by country-cohort differences is comparable to the sum of the intraclass correlation coefficients in random effects models cross-classified by birth cohort and country. However my main research question, whether family trajectory complexity varies more across countries or more across birth cohorts, cannot be answered using two-level models.

Table 7. Random Effects Regression on Sequence Complexity with Country-Cohort Higher Level Units

	Unconditional	Conditional
Female		-0.549*** (0.071)
Education (Ref. Secondary)		
None		-0.996*** (0.212)
Pre-Primary		-0.971*** (0.106)
Primary		-0.546*** (0.109)
Post-Secondary		1.152*** (0.103)
Public Sector		0.155 (0.137)
Occupation of Breadwinner (Ref. Agriculture)		
Senior Prof.		1.329*** (0.185)
Prof.		1.127*** (0.199)
Technician		1.070*** (0.184)
Clerk		0.982*** (0.166)
Service		0.601*** (0.148)
Craftsman		0.314** (0.107)
Industry		0.369* (0.176)
Unskilled		0.151 (0.113)
Armed Services		0.587* (0.291)
None		0.955*** (0.290)
Constant	15.081*** (0.151)	15.113*** (0.162)
var(Country-Cohort)	3.261*** (0.396)	2.479*** (0.307)
var(Residual)	28.390*** (0.270)	27.516*** (0.262)

Table 7. Continued

$\rho_{\text{Country-Cohort}}$	10.30	8.26
$R^2_{\text{Country-Cohort}}$		23.98
$R^2_{\text{Total}}$		5.23
$N$	22,272	22,272
R Log Lik.	-69,077	-68,720

## 8. Cluster Solution Quality Measures

The average silhouette width and  $\chi^2$  values for diverse cluster solutions are displayed below.

*Average Silhouette Width and Chi-Squared Values for Diverse Ward Cluster Analysis  
Solutions on OM Distances*

