Deliverable 1.6.2: Figure pack summarizing key results

Research Question
Which macro-level factors most strongly and consistently correlate with national fertility rates?

Deliverable 1.1.1: Comprehensive country-year panel dataset integrating fertility, economic, governance, and social variables.

iso_code	year	CPI10	CPI100	WGI	annual_rate	current_usd	deflation	female_participation	fertility_rate	log_gdppc	married_percentage	unemployment
ABW	1960	NaN	NaN	NaN	NaN	NaN	NaN	NaN	4.567000	NaN	NaN	NaN
AFE	1960	NaN	NaN	NaN	NaN	186.121835	NaN	NaN	6.650310	5.226401	NaN	NaN
AFG	1960	NaN	NaN	NaN	NaN	NaN	NaN	NaN	7.282000	NaN	NaN	NaN
AFW	1960	NaN	NaN	NaN	NaN	121.939925	NaN	NaN	6.468887	4.803529	NaN	NaN
AGO	1960	NaN	NaN	NaN	NaN	NaN	NaN	NaN	6.708000	NaN	NaN	NaN

Non-null fraction (overall):

fertility_rate	94.4	female_participation	45.8
current_usd	81.1	unemployment	44.5
annual_rate	78.7	CPI100	2.7
deflation	78.2	CPI10	2.2
married_percentage	68.1	WGI	1.5

Deliverable 1.2.1: Pooled correlation matrices across countries showing macro-level associations.

	group	var	n	pearson	pearson_p	spearman	spearman_p	abs_pearson	sig
0	Fertility	fertility_rate	16928	1.000000	0.000000e+00	1.000000	0.000000e+00	1.000000	****
1	GDP	log_gdppc	14313	-0.779028	0.000000e+00	-0.806182	0.000000e+00	0.779028	****
2	Politics/Safety	CPI100	441	-0.592150	4.431201e-43	-0.646295	1.654795e-53	0.592150	****
3	Politics/Safety	CPI10	382	-0.483343	9.294564e-24	-0.555990	2.238960e-32	0.483343	****
4	GDP	current_usd	14313	-0.441411	0.000000e+00	-0.806182	0.000000e+00	0.441411	****
5	Marriage	married_percentage	11266	0.426064	0.000000e+00	0.384271	0.000000e+00	0.426064	****
6	Politics/Safety	WGI	270	-0.190101	1.701899e-03	-0.173353	4.277711e-03	0.190101	**
7	Employment	unemployment	7751	-0.121932	4.601028e-27	-0.165152	1.601575e-48	0.121932	****
8	Employment	female_participation	7986	0.098179	1.448453e-18	0.088141	3.003470e-15	0.098179	****
9	GDP	annual_rate	13880	-0.069156	3.448448e-16	-0.127040	4.914051e-51	0.069156	****
10	GDP	deflation	13784	0.009322	2.737804e-01	0.173432	1.560824e-93	0.009322	

Deliverable 1.2.2: Bar graph illustrating structural relationships between fertility and key correlates.

Correlation strength (|Pearson r|) — Pooled

	|r| vs fertility
log_gdppc	-0.78 (p=0.0e+00)
CPI100	-0.59 (p=4.4e-43)
CPI10	-0.48 (p=9.3e-24)
current_usd	-0.44 (p=0.0e+00)
married_percentage	+0.43 (p=0.0e+00)
WGI	-0.19 (p=1.7e-03)
unemployment	-0.12 (p=4.6e-27)
female_participation	+0.10 (p=1.4e-18)
annual_rate	-0.07 (p=3.4e-16)
deflation	+0.01 (p=2.7e-01)
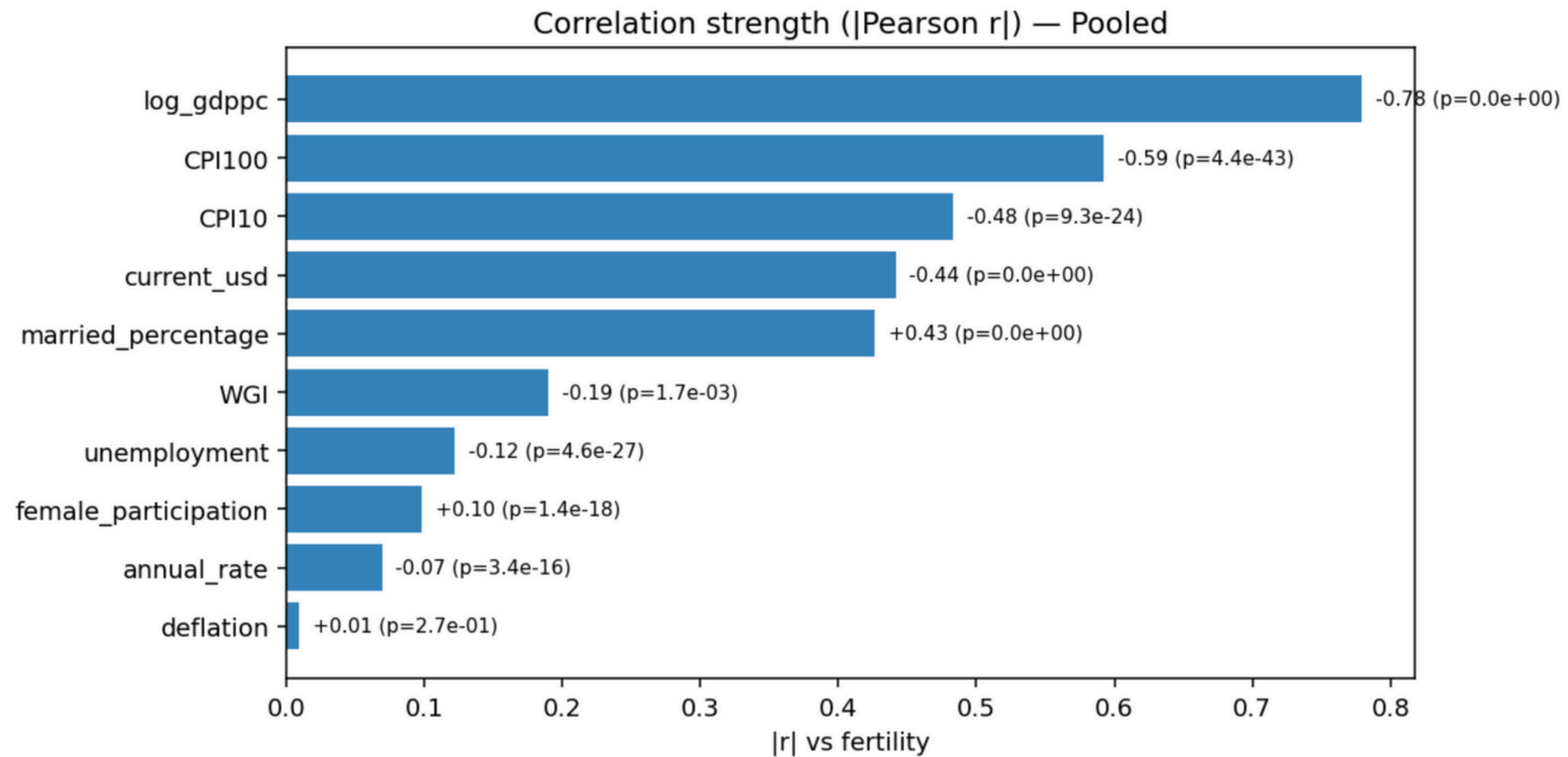
Deliverable 1.3.1: Demeaned and first-difference models capturing within-country variation over time.

	group	var	n	pearson	pearson_p	spearman	spearman_p	abs_pearson	sig
0	GDP	log_gdppc	14313	-0.721322	0.000000e+00	-0.723611	0.000000e+00	0.721322	****
1	Marriage	married_percentage	11266	0.449693	0.000000e+00	0.469145	0.000000e+00	0.449693	****
2	GDP	current_usd	14313	-0.235877	3.587683e-180	-0.537510	0.000000e+00	0.235877	****
3	Politics/Safety	WGI	270	-0.043246	4.791669e-01	-0.049986	4.133261e-01	0.043246	
4	Employment	unemployment	7751	-0.039488	5.065128e-04	-0.016488	1.466580e-01	0.039488	**
5	Employment	female_participation	7986	-0.029895	7.546607e-03	-0.011716	2.951814e-01	0.029895	**
6	GDP	annual_rate	13880	0.019382	2.240176e-02	-0.019746	1.999677e-02	0.019382	*
7	Politics/Safety	CPI100	441	-0.014120	7.674659e-01	-0.045964	3.355375e-01	0.014120	
8	GDP	deflation	13784	0.010946	1.987658e-01	0.150144	2.608400e-70	0.010946	
9	Politics/Safety	CPI10	382	-0.004710	9.268939e-01	-0.006035	9.064105e-01	0.004710	

Deliverable 1.3.2: Tables and figures highlighting temporal changes in fertility relative to economic and governance shifts.


Pooled vs Within-country correlation strength
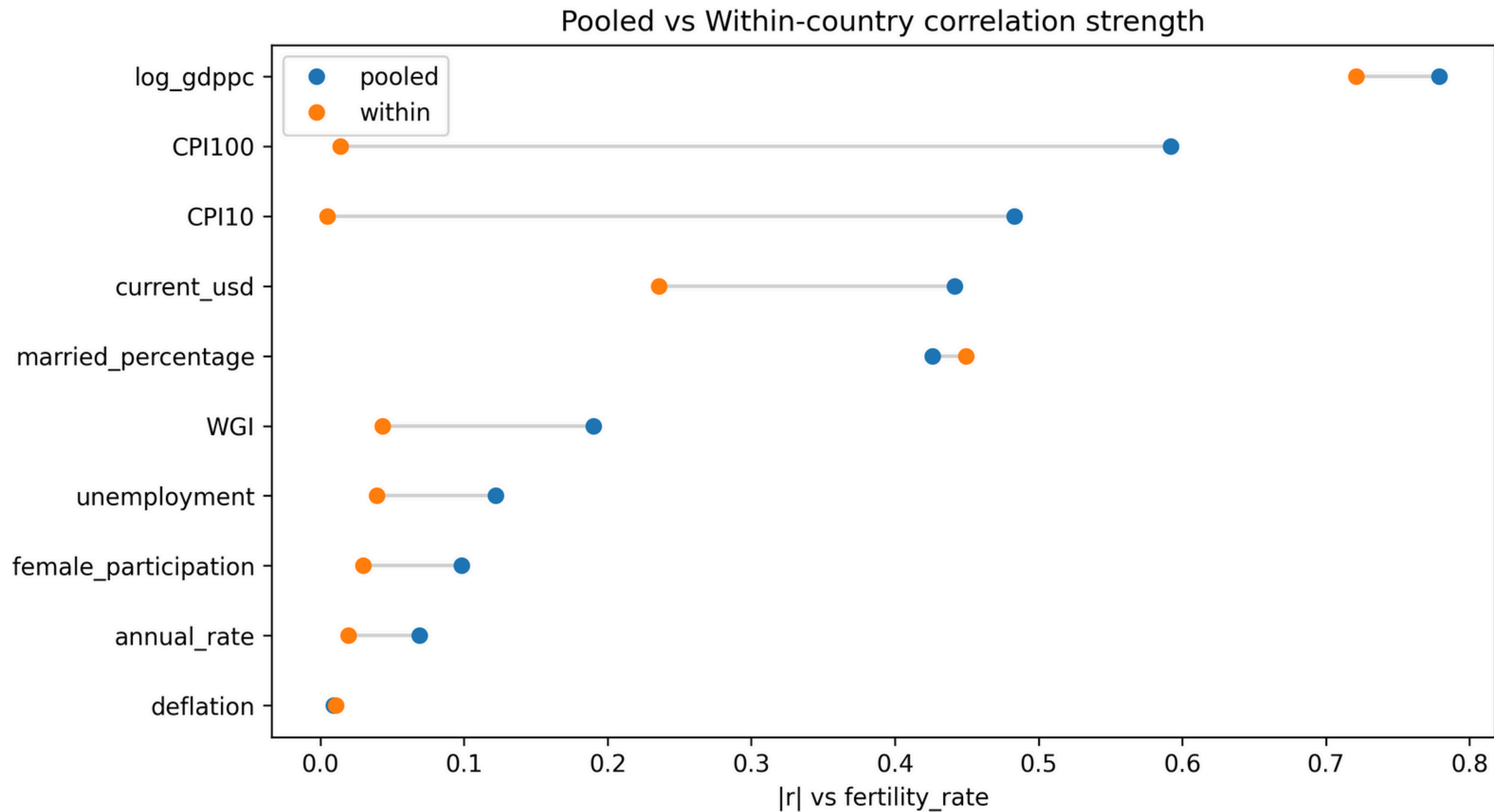
Deliverable 1.4.1: Partial correlations controlling for GDP per capita to disentangle development effects.

	x	y	z	n	partial_r	partial_p	sig
8	log_gdppc	fertility_rate	married_percentage	9941	-0.679962	0.000000e+00	****
7	unemployment	fertility_rate	log_gdppc	7602	-0.132480	4.116892e-31	****
3	annual_rate	fertility_rate	log_gdppc	13784	-0.110820	6.367438e-39	****
1	CPI100	fertility_rate	log_gdppc	441	-0.072884	1.264486e-01	
0	CPI10	fertility_rate	log_gdppc	382	-0.038198	4.566369e-01	
4	deflation	fertility_rate	log_gdppc	13719	-0.035518	3.167375e-05	***
2	WGI	fertility_rate	log_gdppc	260	-0.019006	7.603596e-01	
5	female_participation	fertility_rate	log_gdppc	7823	0.094616	5.028473e-17	****
6	married_percentage	fertility_rate	log_gdppc	9941	0.187086	5.442435e-79	****

# Deliverable 1.4.2: Comparative results across models showing stability or sensitivity of correlates under controls

var	pooled	within
married_percentage	+0.426	+0.450
log_gdppc	−0.779	−0.721
current_usd	−0.441	−0.236
annual_rate	−0.069	+0.019
deflation	+0.009	+0.011
CPI10	−0.483	−0.005
CPI100	−0.592	−0.014
WGI	−0.190	−0.043
female_participation	+0.098	−0.030
unemployment	−0.122	−0.039

Comparative correlation strength across models
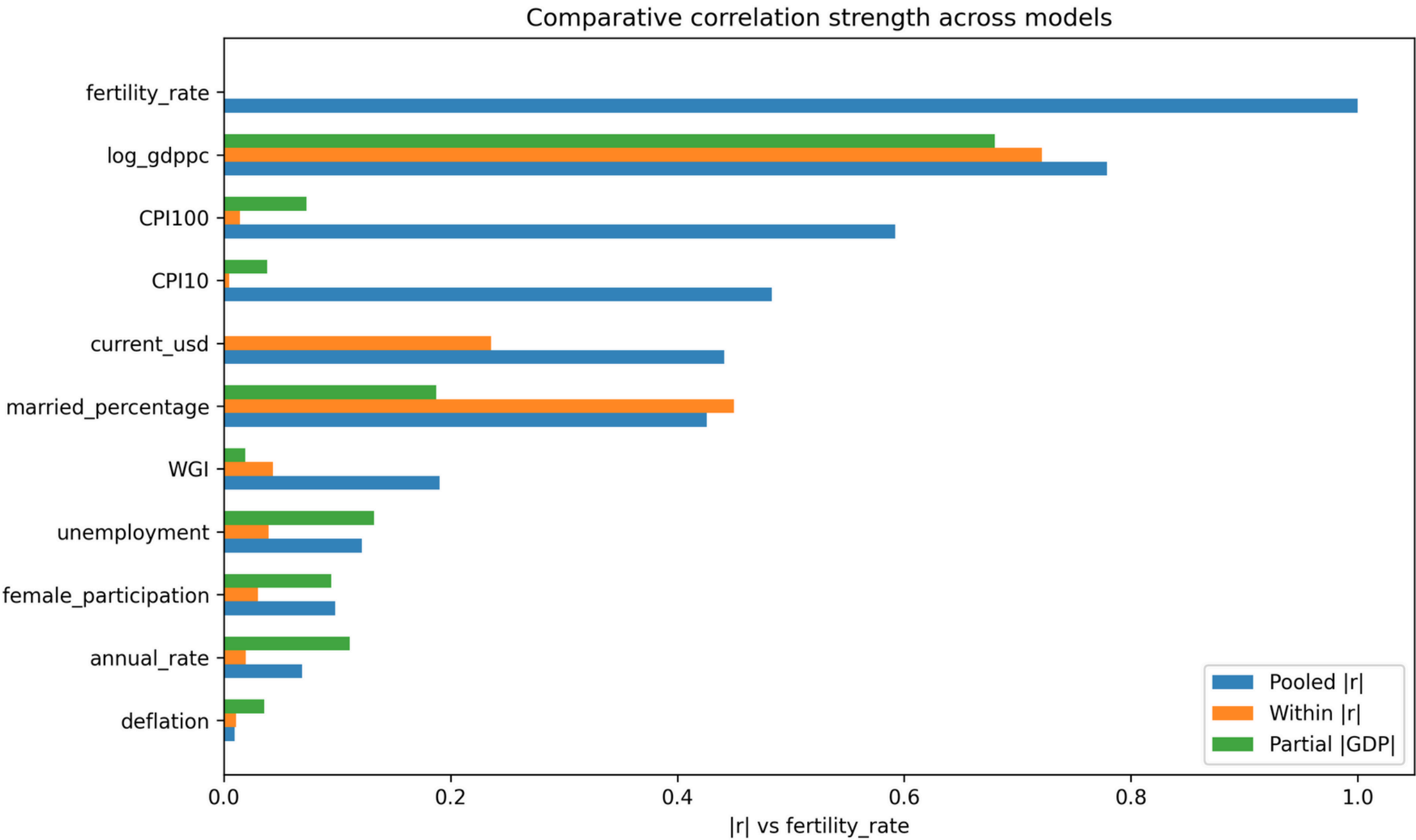
Lagged Correlations vs Fertility 1-3 Years
(Not a deliverable from Task 2)

Lagged correlations vs fertility (Pearson r)
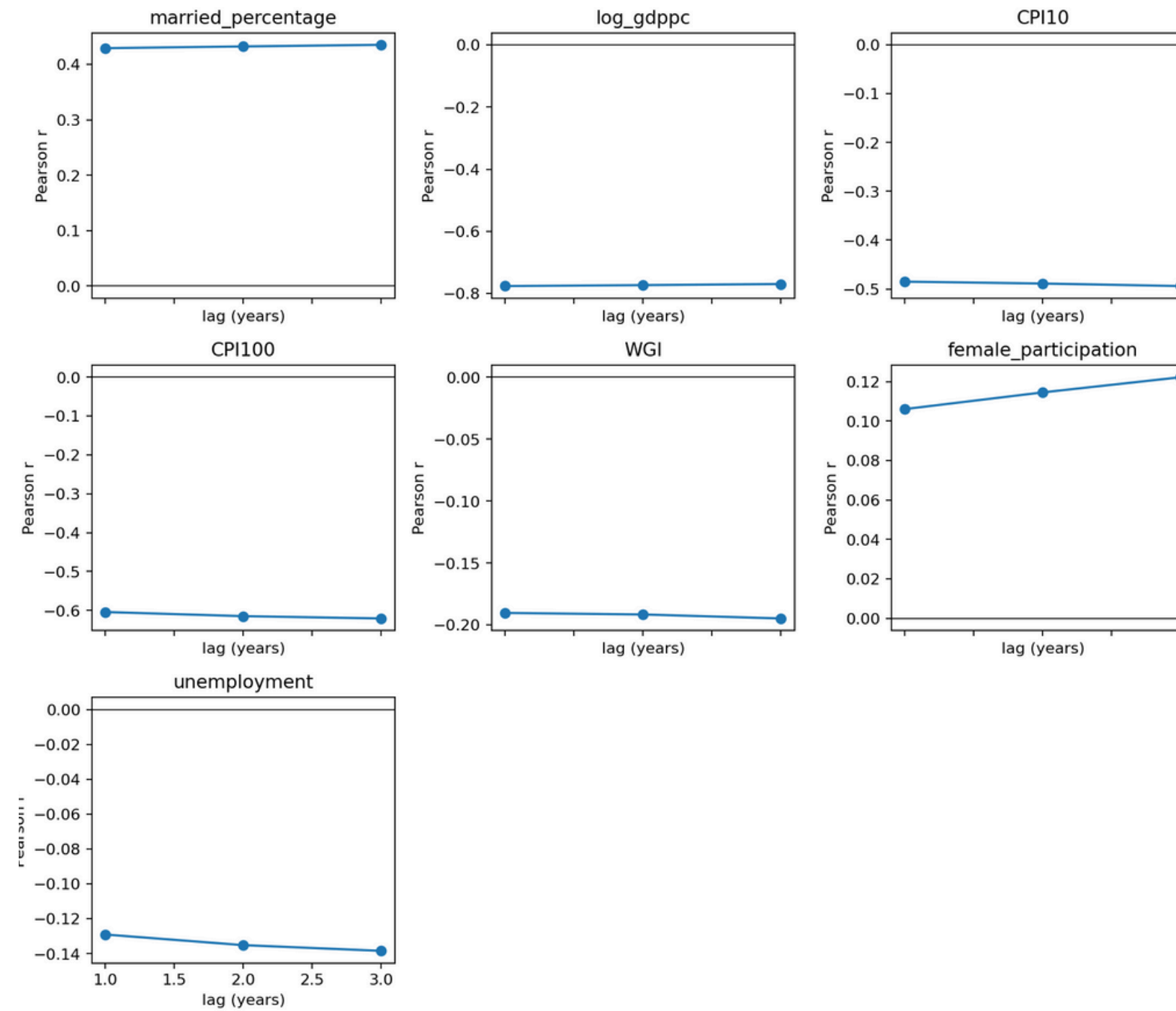
Deliverable 1.5.1: Results from applying minimum-year thresholds (and 1% winsorization next slide)

Within–country correlations with per–variable ≥K–year filter (sorted by |Pearson r| within K):

	min_years	var	countries_used	rows_used	pearson_r_within	spearman_r_within
0	10	log_gdppc	260	14301	-0.744044	-0.761179
2	10	married_percentage	209	11266	0.454988	0.488411
1	10	current_usd	260	14301	-0.242999	-0.559247
5	10	WGI	12	197	-0.095004	-0.192569
3	10	CPI10	22	256	-0.089168	-0.052025
4	10	CPI100	34	408	-0.084322	-0.060133
7	10	unemployment	235	7751	-0.061187	-0.023176
6	10	female_participation	235	7986	-0.042000	-0.030371
8	10	annual_rate	260	13866	0.019710	-0.010198
9	10	deflation	260	13777	0.011547	0.121873
10	15	log_gdppc	260	14301	-0.744044	-0.761179
12	15	married_percentage	209	11266	0.454988	0.488411
11	15	current_usd	260	14301	-0.242999	-0.559247
17	15	unemployment	235	7751	-0.061187	-0.023176
15	15	WGI	6	126	-0.043322	-0.114304
16	15	female_participation	235	7986	-0.042000	-0.030371
18	15	annual_rate	257	13828	0.019726	-0.010156
19	15	deflation	257	13739	0.011547	0.121513
13	15	CPI10	0	0	NaN	NaN
14	15	CPI100	0	0	NaN	NaN

Deliverable 1.5.1: Results from applying minimum-year thresholds and 1% winsorization.

Partial correlations with 1% winsorization (controls: log_gdppc):

	var	n	partial_r_winsor_1pct
1	current_usd	14313	0.251679
0	married_percentage	9941	0.179485
7	annual_rate	13784	-0.163023
6	unemployment	7602	-0.129352
8	deflation	13719	-0.095522
5	female_participation	7823	0.094951
3	CPI100	441	-0.057649
2	CPI10	382	-0.033384
4	WGI	260	-0.018890

Why Does This Matter?

Fertility decline will impact labor demographics and consumer markets.
Understanding key correlating factors can provide clues
to root issues in society.

Conclusion

Marriage is positively correlated with fertility; GDP per capita is
negatively correlated with fertility.
Policymakers should explore causal analysis of relationship factors (e.g.,
divorce, domestic abuse, dating apps).
Support should target family and household stability, not one-off
incentives.