

The reversal of the gender gap in education and its impact on union formation:

An end to hypergamy?

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Short abstract.-

The educational expansion that most countries of the world have witnessed in recent decades has been accompanied by a reduction of the gender gap in educational attainment. In some countries, younger cohorts of women are attaining higher levels of education than men of the same cohorts. In this paper we focus on the effect of the closing gender gap in education on a specific dimension of union formation in which education plays a relevant role: assortative mating. We take a cross-national perspective to examine worldwide whether the increase in women's educational attainment has led to greater gender symmetry in union formation. First, we explore among young cohorts the relationship between the gender gap in educational attainment and two measures of female hypergamy. We distinguish between crude and net hypergamy. Second, we explain differences between countries by taking into consideration other factors that may have a role in the relationship between gender gap and hypergamy: i) Marriage prevalence by education; ii) Universality of marriage; ii) Maturity of the educational system; iii) Educational homogamy; iv) Informal unions. Together with the gender gap, these variables will be framed into a multilevel ordinary least square regression model.

We use integrated census microdata samples from the IPUMS international database. Our analysis is based on 83 census samples from 38 countries covering all major regions of the world. The study is limited to persons aged 25-34 old. We consider both formal and informal unions. Preliminary results show that advances in women's education clearly reduces the number of hypergamous couples and even reverses the pattern of hypergamy. The strength of this relationship weakens when we measure hypergamy using net indicators that control for the availability of candidates in the marriage market.

Background.-

The educational expansion that most countries of the world have witnessed in recent decades has been accompanied by a reduction of the gender gap in educational attainment. This has led to an unprecedented scenario in human history: in some countries, younger cohorts of women are attaining higher levels of education than men of the same cohorts. The consequences of the gender gap reversal in education have yet to be fully explored in most dimensions of the social life. In this paper we focus on the effect of the closing gender gap in education on a specific dimension of union formation in which education plays a relevant role: assortative mating. We take a cross-national perspective to examine worldwide whether the increase in women's educational attainment has led to greater gender symmetry in union formation.

Traditionally, female hypergamy (those unions in which the wife has a lower level of educational attainment than her husband) has been the rule among heterogamous unions. Scattered evidence from small number of countries, however, shows that the ubiquity of female hypergamy has diminished to an important degree in recent decades. The authors conclude that the reduction and even the inversion of the traditional educational difference between men and women in marriage is due to the reduction of gendered differences in educational attainment and also in the emerging gender symmetry in conjugal preferences. Using international census data from the IPUMS database, we aim at examining whether the documented increase in women's educational attainment has had a similar effect on female hypergamy in countries with different marriage regimes.

Objectives and analytical strategy.-

The paper has two objectives. First, we examine among young cohorts the relationship between the gender gap in educational attainment and two measures of female hypergamy. We distinguish between crude and net hypergamy. The former is based on the proportion of hypergamous couples among heterogamous couples. The later controls for the distribution by education of men and women and provides a measure of hypergamy assuming that there are no restrictions in the marriage market. We use log-linear models to estimate this parameter for each sample. We also examine the degree of association between both measures.

Second, we aim at explaining differences between countries. The relationship between gender gap in educational attainment and hypergamy is not straightforward. There are several factors that may interfere between the two. Countries with similar educational structures may differ in the level of hypergamy for several reasons. We consider the following factors: i) Marriage prevalence by education; ii) Universality of marriage; ii) Maturity of the educational system; iii) Educational homogeneity; iv) Informal unions.

Data and methods.-

We use integrated census microdata samples from the IPUMS international database. Our analysis is based on 83 census samples from 38 countries covering all major regions of the world (see Appendix 1). We had to leave some samples out of the study because they did not meet the requirements for the analysis (i.e. educational attainment was not comparable or lack of household information). From the available and eligible samples, we selected at random 200.000 households per sample. The study is limited to persons aged 25-34 old. Regarding unions, we consider both formal and informal unions in which at least one of the partners is 25-34 years old.

Education is measured at the time of the census. For the sake of comparability, we make use of the IPUMS 'Educational attainment' variable. This variable is an attempt to merge into a single variable the educational classifications available in each sample. IPUMS' Educational attainment records the person's educational attainment into four categories: Less than primary, primary completed, secondary completed, and university completed. For further specifications regarding the construction and overall comparability of this variable, readers should look up in the integrated metadata available at the IPUMS site (<https://international.ipums.org/international/>).

The gender gap in educational attainment is measured as a ratio between two proportions: In the numerator, the share of women among highest educated, and, in the denominator, the share of women among the least educated. In most of the samples, we take 'University completed' and 'Less than primary' as the highest and lowest educated individuals respectively. However, if the proportion of any of these two educational categories represents less than 5% of the total

population, we have merged this category to the next one in the educational hierarchy. For instance, if the proportion of university graduates is less than 5%, then we take secondary completed and university completed as the highest educated. If the share of women among the highest and the lowest educated is the same, the ratio between the two equals 1. 1 means lack of gender gap. Values below 1 indicates that the share of women among the highest educated is lower than among the lowest educated, thus, there is a gender gap in educational attainment in favor of men. Values over 1 indicate the opposite situation in which women attain higher levels of education compared to 1. For graphical purposes and to have a symmetrical distribution at both sides of the value of reference, we use a log-transformation of the ratio.

Two indicators of hypergamy are considered. The first one corresponds to the log-transformation of the ratio between educationally hypergamous (women < men) and hypogamous (women > men) unions. This indicator is based exclusively on heterogamous couples. Again, when the ratio is equal to 1 (the log ratio = 0) the number of hypergamous and hypogamous unions is the same. Values over 1 (log ratio > 0) indicate higher prevalence of hypergamous couples. As it can be seen, this indicator of crude hypergamy does not control for the unequal distribution of men and women by educational attainment. If women are on average less educated than men, it is natural to find more hypergamous than hypogamous unions. To account for this fact, we also computed net measure of hypergamy using a log-linear symmetry model with a parameter of asymmetry, which basically measures the odds of a union of being hypergamous net of the constraints of the marriage market. The asymmetry parameter is expressed in log-odds. 0 indicates perfect gender symmetry among heterogamous couples given the constraints of the marriage market. Values higher than 0 indicate a preference for hypergamous couples.

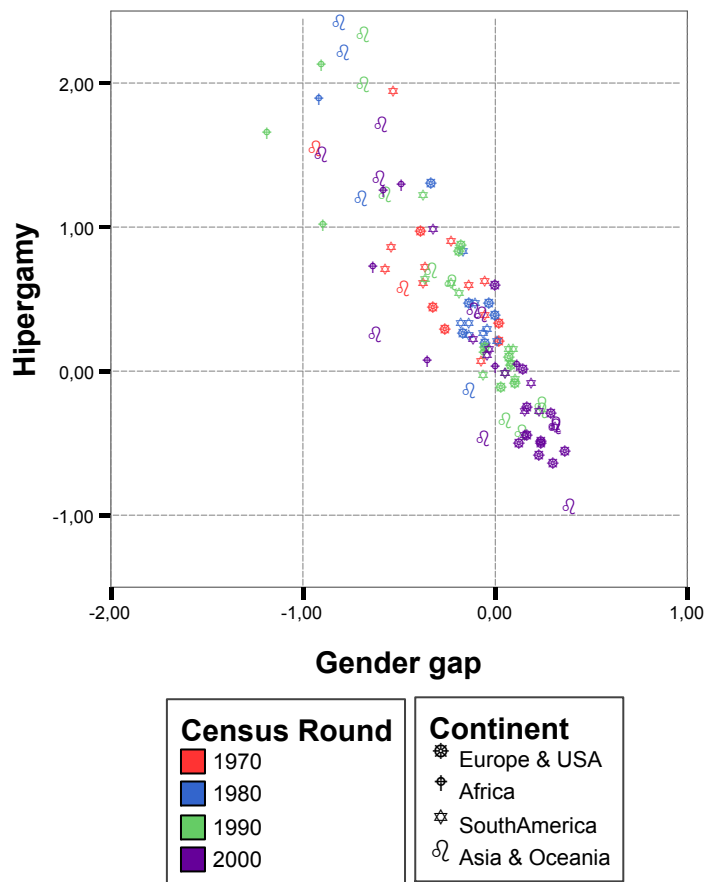
The exact variables to be included in the explanatory models are still being constructed. We expect to develop robust measures of: i) marriage prevalence by education; ii) universality and timing of marriage; iii) maturity of the educational system; iv) educational homogamy; v) informal unions. Together with the gender gap, these variables will be framed into a multilevel ordinary least square regression model in which samples will be nested into countries.

Preliminary results.-

Figures 1 and 2 show the relationship between the gender gap in education and the crude and net measures of hypergamy respectively. As we see in both cases, there is a negative relationship between the gender gap and hypergamy, which means that as women's education increases, hypergamy decreases. Crude hypergamy is strongly tied to the gender gap in educational attainment. However, as the gender gap closes or even is being reversed, the variance in hypergamy reduces. This basically shows that there is some heteroscedasticity that needs to be explained. We expect that the variables included in the explanatory model will account for most of this variance differences. Indeed, preliminary tests not shown in this abstract confirm our expectations.

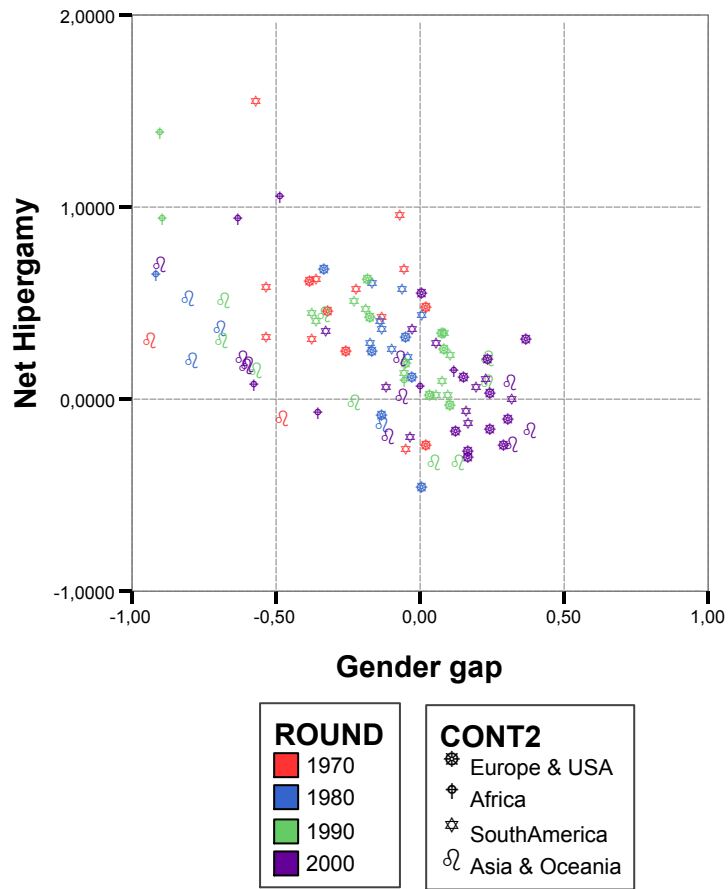
In Figure 2, we explore the relationship between the gender gap in education and the net measure of hypergamy. Compared to Figure 1, the association between the two is still negative but weaker. The variance is much higher. Countries with similar gender gaps do show distinct values of net hypergamy. This clearly suggests that other factors may be interfering in this relationship. Using a multilevel ordinary least square regression model, we'll examine the correlation between the net measure of hypergamy (dependent variable) and the gender gap. The model will also take into consideration the factors mentioned above.

Figure 1. Hypergamy and the gender gap in education



Source: IPUMS international

Figure 2. Net Hypergamy and the gender gap in education



Appendix 1. Gender gap in educational attainment and measures hypergamy by sample and country

	Gendergap	Hypergamy	Net Hypergamy	Sample size. Pop 25-34	
				Male	Female
EUROPE & NORTHAMERICA					
Armenia					
2001	1,3428	0,7224	-0,2666	20.230	22.238
France					
1968	0,7308	1,4933	0,4318	37.875	35.886
1975	1,0220	1,3431	0,4525	40.734	38.083
1982	0,9531	1,1745	0,2905	43.616	42.603
1990	1,0418	0,8651	-0,0069	37.718	37.615
1999	1,1389	0,5848	-0,1926	34.952	34.798
Greece					
1971	0,6832	2,5555	0,5888	41.577	45.159
1981	0,8479	1,2605	0,2205	41.293	42.415
1991	0,9569	1,1307	0,1539	40.036	41.924
2001	1,2756	0,5820	-0,0016	43.492	42.533
Hungary					
1970	1,0262	1,1877	-0,2634	34.745	35.654
1980	0,7200	3,5705	0,6505	39.323	38.438
1990	0,8369	2,2072	0,5962	32.133	31.550
2001	1,1679	0,9806	0,0847	33.354	32.309
Italy					
2001	1,2701	0,5405	0,1818	39.609	39.391
Portugal					
1981	0,9728	1,5354	0,0839	32.327	33.347
1991	1,1147	0,8816	-0,0562	32.181	33.478
2001	1,3651	0,5058	-0,1340	30.496	30.236
Romania					
1977	1,0098	1,4177	-0,4833	42.537	42.653
1992	0,8406	2,3115	0,4021	37.750	37.447
2002	1,0070	1,7362	0,5209	48.987	48.505
Slovenia					
2002	1,4526	0,5501	0,2865	13.399	12.332
Spain					
1991	1,0885	1,0039	0,2331	50.878	49.990
2001	1,2752	0,5950	-0,1797	48.810	47.098
United States					
1970	0,7743	1,2876	0,2220	32.531	34.351
1980	0,8767	1,5459	-0,1124	39.007	39.703
1990	1,0833	1,0558	0,3131	39.360	39.570
2000	1,1849	0,7503	-0,3307	32.321	31.753
2005	1,1879	0,6178	-0,2996	31.123	31.182
AFRICA					
Ghana					
2000	0,6176	3,4968	1,0206	63.396	71.984
Guinea					
1983	0,4011	6,3636	0,6173	27.927	38.211
1996	0,4070	8,0588	1,3585	43.621	56.605
Kenya					
1989	0,4105	2,6481	0,9101	60.616	63.542
1999	0,5334	1,9820	0,9127	61.063	64.848

	Gendergap	Hypergamy	Net Hypergamy	Sample size. Pop 25-34	
				Male	Female
Rwanda					
2002	0,7018	1,0285	-0,0984	48.002	55.806
South Africa					
1996	0,9463	1,0827	0,0679	56.079	60.968
2001	1,0016	0,9825	0,0362	58.538	63.363
2007	1,1308	1,0021	0,1157	44.474	49.288
Uganda					
1991	0,3066	5,0503	0,6129	58.632	63.181
2002	0,5622	3,3624	0,0444	64.228	62.619
SOUTH AMERICA					
Argentina					
1970	0,6875	1,7666	0,2866	32.509	33.028
1980	0,8454	1,3355	0,2606	57.583	58.584
1991	0,9468	0,9398	0,1021	48.588	49.744
2001	1,1791	0,6189	-0,0921	47.578	49.422
Bolivia					
1976	0,5880	6,7378	0,5596	30.182	31.696
1992	0,6902	3,2635	0,4205	43.369	45.831
2001	0,7253	2,5673	0,3288	46.287	48.158
Brazil					
1970	0,9508	1,7881	0,6499	62.898	63.723
1980	1,0134	1,1771	0,4050	61.419	63.301
1991	1,1116	0,9155	0,2054	66.515	70.274
2000	1,2612	0,7257	0,0718	59.097	61.829
Chile					
1970	0,8767	1,7573	0,3980	55.250	59.215
1982	0,9594	1,2924	0,1869	58.735	61.960
1992	1,0872	1,0119	0,3108	61.933	64.349
2002	0,9671	1,0685	-0,2309	48.985	49.640
Colombia					
1973	0,6979	1,9943	0,5992	65.023	72.283
1985	0,8755	1,3349	0,3790	68.696	74.842
1993	1,0568	0,9536	-0,0085	67.797	74.471
2005	1,1812	0,7310	-0,1573	56.331	60.052
Costa Rica					
1973	0,9386	1,0287	0,9313	11.000	11.350
1984	0,8821	1,2354	0,3343	18.591	19.259
2000	1,0570	0,9453	0,2651	29.415	30.128
Ecuador					
1974	0,8019	2,3861	0,5442	39.685	40.051
1982	0,8496	2,2133	0,5750	54.248	55.285
1990	0,8305	1,6653	0,4400	57.997	61.191
2001	0,9789	1,1264	0,3368	49.795	52.298
Mexico					
1970	0,5676	1,9570	1,5202	28.724	30.087
1990	0,7004	1,8104	0,3749	67.932	75.110
1995	0,7994	1,7608	0,4809	24.717	26.930
2000	0,8938	1,1974	0,0318	65.417	73.692

	Gendergap	Hypergamy	Net Hypergamy	Sample size. Pop 25-34	
				Male	Female
Panama					
1970	0,9545	1,4282	-0,2909	9.810	9.655
1980	0,9416	1,2562	0,5450	13.820	14.217
1990	1,0834	1,1248	0,0623	18.405	18.333
2000	1,2188	0,8840	0,0349	23.341	23.125
Venezuela					
1971	0,5876	2,2748	0,2921	48.037	49.707
1981	0,9075	1,5421	0,2272	68.194	68.800
1990	1,1085	1,1145	-0,0061	61.451	62.813
2001	1,3801	0,6498	-0,0257	55.022	57.390
ASIA & OCEANIA					
Cambodia					
1998	0,4068	4,3929	0,6794	71.535	77.985
China					
1982	0,4539	8,8177	0,1822	70.752	66.137
1990	0,5678	3,3200	0,1282	64.595	60.204
India					
1983	0,4470	10,9454	0,5058	44.203	43.797
1987	0,5063	9,9946	0,4971	49.095	48.664
1993	0,5059	7,1307	0,2841	42.869	43.828
1999	0,5535	5,3589	0,1541	44.390	46.860
Iraq					
1997	0,5491	3,7264	0,1474	108.408	106.998
Israel					
1972	0,6221	1,7186	-0,1179	19.482	19.632
1983	0,8801	0,8517	-0,1531	30.266	31.307
1995	1,1481	0,6317	-0,3513	37.286	38.213
Jordan					
2004	0,9424	0,6095	-0,0108	44.647	41.052
Kyrgyz Republic					
1999	1,3768	0,6697	-0,2603	36.338	36.293
Malaysia					
1970	0,3940	4,5583	0,2873	10.691	10.896
1980	0,5026	3,2222	0,3474	13.081	13.846
1991	0,7197	1,9431	0,4175	28.837	29.393
2000	0,9338	1,4397	0,1944	34.303	34.386
Mongolia					
1989	1,0563	0,6866	-0,3522	14.674	14.688
2000	1,4732	0,3780	-0,1858	21.015	21.165
Palestine					
1997	0,5407	1,2582	0,1928	18.404	17.023
Philippines					
1990	1,2707	0,7700	0,1912	78.526	78.683
1995	1,2741	0,7369	0,0643	78.190	77.225
2000	1,3687	0,6586	0,0608	74.804	74.170
Vietnam					
1989	0,7970	1,7859	-0,0415	72.715	83.278
1999	0,8984	1,4806	-0,2179	72.218	72.938

Source: IPUMS international