

# Economic Development and the Gender Wage Gap

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## I. INTRODUCTION

General wage inequality within countries is a topic that has received a great deal of attention in the economic literature. Differences in wages between men and women, particularly cross-national variation in the size of the gender gap, have not been studied as thoroughly. Ester Boserup (1970) completed the first full study of the role of women in economic growth and the affect of development on them. The difference in income between men and women is of great importance because it affects a very large number of people. The gender wage gap is not uniform cross-nationally, and if determinants of the gap size can be found, policy could be implemented to reduce the income disparities.

Economic inequality between men and women is an important problem deserving of in-depth study because of the large number of people it affects. Not only do current gender wage gaps affect women, they also likely affect their children and future generations. A number of studies have found evidence that women tend to spend income differently than men, with greater shares being put back into the household and more equally allocated between children of both sexes (Blau, Ferber, and Winkler, 2001). This in turn improves equality between genders if both girls and boys receive similar benefits and education.

This study will examine the relationship between the gender wage gap and the degree of economic development of a country as measured by the gross domestic product per capita. It also analyzes the relationship of educational attainment and general wage inequality to the size of the gender wage gap.

## II. Theory and Literature Review

This research is based upon the basic theory of supply and demand and on human capital theory with reference to the inverted-U curve postulated by Simon Kuznets.

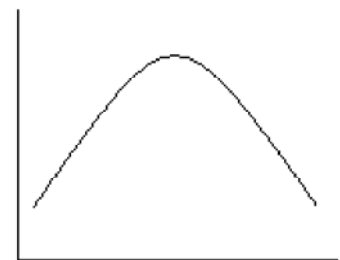
Kuznets' Inverted-U Hypothesis states that there is a relationship between the per capita income of a country and the amount of income inequality within it. When plotted it creates an inverted-U curve (Figure 1) such that as per capita income increases from subsistence a country will experience first increasing inequality and then decreasing inequality at later stages of development.

Kuznets suggested that the pattern was the result of the inflow of people into urban areas

with unequal income distributions as a country begins to develop, which would cause inequality to increase at first, but that inequality then decreases as the new members integrate into the labor force (Lantican et al, 1996).

This study suggests that an inverted-U pattern is also to be expected when measuring income inequality between genders within countries. As a country begins to develop the growing industrial sector increases the demand for male labor, while not providing greater opportunities for female workers, resulting in a larger wage gap between men and women. Boserup (1970) concluded that women are often active participants in "home industries" which produce

**Figure 1: Kuznets' Inverted-U**



hand made items for sale. As these industries gradually decline in importance in an economy and lose business to large scale manufacturing – which hire a larger share of men – women’s jobs are lost. In later stages of development, as the economy continues to grow and provide more service sector jobs, the labor force opportunities for women increase, thus decreasing the gender earnings gap.

Pampel and Tanaka found support for Boserup’s conclusion about women’s participation in the work force in their study of the effects of economic development on female labor force participation rates. Their cross-national study of 70 countries showed a curvilinear relationship, with female labor force participation rates first decreasing with regards to the measure of economic development and increasing at greater levels of development. This would also suggest that female earnings first decrease relative to those of men and increase at later stages of development.

Human capital theory suggests that people are compensated in the work place based on their abilities and skills (Borjas, 2000). Common measures used to get at the difficult to quantify concept of human capital include years of schooling, on-the-job training, and years in the labor force. Human capital theory would suggest that the greater the difference in educational attainment between men and women, the greater the wage difference will be.

Blau and Kahn found in their study of ten industrialized nations that the wage structure of a country is an important factor in determining the size of the gender wage gap. In the countries they examined, overall income inequality of a country accounted for a large portion of the gender wage gap. There is no reason to suppose that this factor would only be important in the industrialized countries, and so should also be included in the study.

Kidd and Shannon expanded on Blau and Kahn’s work, using the same methodology to compare the gender wage gaps of Australia and Canada. They also found that wage structure was

significant, and point out that this is important because it “highlights the fact that the gender wage differential may differ between countries for reasons not specifically tied to gender” (1996). Evidence of the importance of the wage structure has also been found outside of the industrialized West. Brainerd’s study of seven countries of the former Soviet Union showed that the widening of the wage gap negatively affected women in all of them, although in five of the seven the losses were “more than offset by gains in rewards to observed skills and by an apparent decline in discrimination against women” (2000).

In sum, the literature suggests that an inverted-U pattern can be expected when plotting the gender wage gap against a measure of economic development. It is also expected that differences in human capital attainment between men and women will help explain the wage gap. Recent studies also propose that greater general wage inequality within a country will be correlated with higher gender wage inequality.

### **III. Data**

Cross-sectional data for the dependent variable, a ratio of male-to-female earnings, is available from the United Nations Human Development Report 2005: Human Development Indicators. The estimated earned income for men and women in US purchasing power parity dollars is provided for 154 of 177 countries based on the most recent year for which data is available between 1991 and 2003. While it is less than ideal to use data from different years, it is the best available, and it is also unlikely that the values for each country would have changed extremely in the time period. The data on the independent variable, GDP per capita, is also available in the Human Development Report 2005.

The percent of women in the labor force with different levels of education would be an ideal measure for operationalizing the education variable. The World Bank’s World Development Report reports this variable; however, it is missing data for a large percent of the countries under

study. Adult literacy rates by gender are available from the Human Development Report and are used as an independent variable in the study as the male to female literacy ratio.

General wage inequality of a country can be measured in a number of ways. The Gini coefficient is one such measure commonly used for comparing income inequality across countries. The Gini coefficient is calculated by dividing the area between a country's Lorenz curve and the perfect equality line by the total area under the equality line. A country's Lorenz curve is a plot of the percentage of income receivers (citizens) against the percentage of total national income. The equality line depicts perfectly equal income distribution. For example, if ten percent of the country controlled ten percent of the wealth, twenty percent controlled twenty percent of the wealth, and so on. This results in a coefficient ranging from 0, representing perfect equality, to 100, which indicated perfect inequality (Todaro and Smith, 2006). The Gini coefficients for a large number of the countries included in the study are available from the Human Development Report.

**IV. Empirical Method**

My hypotheses to be tested are as follows:

1. Gender wage inequality will follow an inverted-U pattern with respect to the level of economic development of countries, specifically the gross domestic product per capita.
2. The disparity in educational attainment by gender will be positively related to the size of the gender wage gap.
3. The degree of general wage inequality in a country will be positively related to the size of the gender wage gap.

First, a scatter plot of the male-to-female wage ratio against the GDP per capita will be created to look for any obvious indication of a trend across countries. The greater the wage ratio,

the larger the wage gap between genders in the country. Hence, a ratio of one represents gender wage equality, while a ratio of two means that men have an estimated earned income twice as great as women of the same country. As predicted by the theory, an inverted-U relationship is expected between the two variables.

Regression analysis will then be used to test the importance of each independent variable on the gender wage gap. In order to test the inverted-U hypothesis, both the GDP per capita and the square of the GDP per capita will be included as independent variables. It is expected that the GDP per capita will be positively related, while the square of the variable will be negatively related to the wage ratio. Table 1 lists the variables with their descriptions and expected sign of their coefficients.

The equation to be tested is as follows:

$$MEarning/FEarnings = \alpha_1 + \alpha_2(GDP \text{ per capita}) + \alpha_3(GDP \text{ per capita})^2 + \alpha_4(MLit/FLit) + \alpha_5(Gini) + e$$

Where MLit/FLit is the ratio of the male-to-female adult literacy rates, and, as a measure of educational attainment, is predicted to be positively related to the male-to-female wage ratio. Gini, as a measure of general wage inequality, is also predicted to be positively related to the dependent variable. After removing 33 countries from the study due to lack of data on one or more variables, a total of 121

Table 1: Variable Descriptions and Expected Signs

Variable	Description	Expected Sign
<b>Dependent</b>		
Mearn/Feearn	Estimated yearly earnings of males divided by those of females	
<b>Independent</b>		
GDP per capita	Gross domestic product per capita in PPP US\$ for the most recent year 1991-2003	+
(GDP per capita) <sup>2</sup>	Above variable squared	-
MLit/FLit	Adult male literacy rate divided by the adult female literacy rate	+
Gini	Gini coefficient as reported by the World Bank	+

Table 2: Descriptive Statistics for Data by Income Group

Variable and Group	N	Minimum	Maximum	Mean
<b>Male to Female Earnings</b>				
High	26	1.11	2.85	1.8
Upper Middle	17	1.47	2.68	2
Lower Middle	38	1.44	3.84	2.25
Low	40	1.08	3.27	1.83
<b>GDP per Capita</b>				
High	26	17971	37738	27192
Upper Middle	17	4919	14584	10367
Lower Middle	38	2587	10346	5548
Low	40	548	3262	1522
<b>Gini Coefficient</b>				
High	26	24.7	43.4	32.6
Upper Middle	17	25.8	63	43
Lower Middle	38	26.2	70.7	42.3
Low	40	26.8	63.2	42.3
<b>Male to Female Literacy</b>				
High	26	1	1.09	1.01
Upper Middle	17	0.93	1.08	1.01
Lower Middle	38	0.92	1.65	1.09
Low	40	0.82	2.44	1.46

countries are included in the data set (See Table 4 at the end of this article for complete data set).

Descriptive statistics of the data set are given in Table 2. Data are grouped according to the income categories specified by the World Bank: high income, gross national income per capita of \$9,386 or more; upper middle income, \$3,036-9,385; lower middle income, \$766-3,035; and low income, \$765 or less. One observation important to note is that the means of the dependent variable show a Kuznets-type relationship. The average value for low and high income countries is lower than that of the middle income groups.

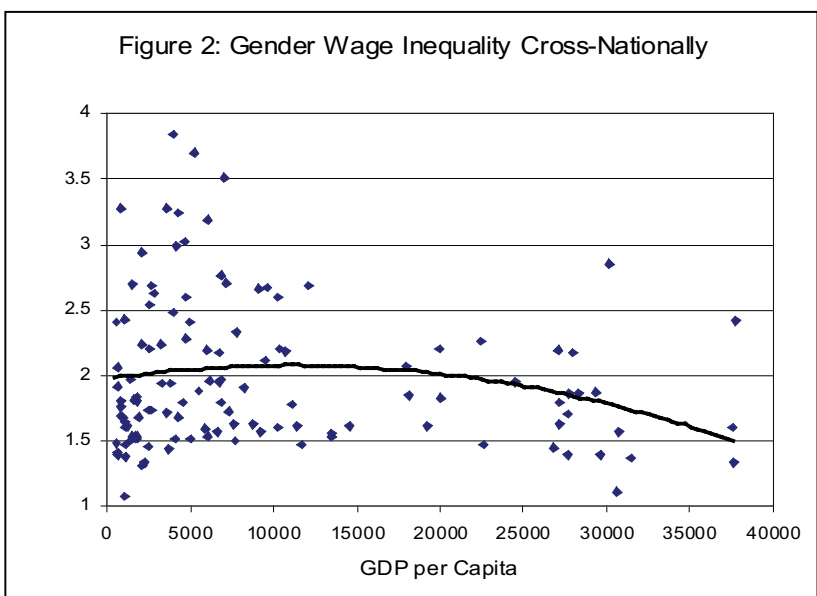
### V. Results

The scatter plot of the male-to-female wage ratio against GDP per capita with a best fit quadratic line is depicted in Figure 2. While it is by no means a perfect inverted-U curve, there is a noticeable cluster of countries with

low GDP per capita levels and lower wage ratios followed by higher wage ratios at slightly higher GDP levels. Countries with high incomes per capita—above approximately \$25,000—tend to have lower male-to-female wage ratios, with just a couple high outliers.

There was large variation across countries in regard to each of the variables. The dependent ranged in value from near equality at 1.08 to significantly imbalanced at 3.84. The GDP per capita of the countries included in the study went from a low of \$548 to a high of \$37,738. The adult literacy rate ratio included a couple countries in which women had the advantage (low of .82), but in most nations men recorded higher rates, with a ratio high at 2.44. The Gini coefficient, where 0 represents perfect equality and 100 signifies perfect inequality, ranged from low inequality at 24.7 to high inequality at 70.7.

The results of the OLS regression analysis (Table 3), while not robust, do provide tentative support for the hypotheses. All coefficients had the sign predicted by the literature. Only the Gini variable was significant at the .01 level with a significance value of .005. However, GDP per capita and GDP per capita squared were close to being significant at the .05 level with significance values of .067 and .055, respectively. The ratio of male-to-



female literacy rates was not significant and also had a small coefficient. Overall, the variables predict only a small amount of the variance in the dependent variable, with an R square value of .118.

**Table 3: Summary Results of OLS Regression Analysis**

Variable	Coefficient	Significance
Constant	0.901	0.015
GDP per capita	3.96E-05	0.067
(GDP per capita) <sup>2</sup>	-1.18E-09	0.055
MLit/FLit	0.281	0.135
Gini	0.015	0.005

R Square = 0.118

N = 121

## **VI. Conclusion**

The results of this study provide cautious support for the presence of a Kuznets variety inverted-U curve between GDP per capita and gender wage inequality across nations. GDP per capita was positively related to the size of the gender wage gap while the square of it was negatively related. This shows that the relationship holds at least somewhat: as economic development increases, the size of the gender wage gap increases, but only at high levels of per capita income does the difference in pay decrease.

The study does not support the role of human capital in determining the gender wage gaps as the ratio of literacy rates did not prove significant in the study. While differences in literacy rates may serve as a reasonable proxy for human capital differences in some countries, it is possible that in a large number of countries literacy is so high for both genders that it does not show much of the difference. Research using a different measure of human capital differences may find them to be significant.

The importance of overall wage inequality (as measured by the Gini coefficient) on gender wage inequality was seen to be significant in this study. One policy implication that can be seen stems from the significance of the Gini coefficient variable in the analysis. As suggested by Blau and Kahn and supported by Kidd and Shannon as

well as Brainerd, general wage inequality within a country is positively related to gender wage inequality. One way in which a government could take action to reduce the disparity in incomes between genders would be to work to lower the overall income gap, or at a minimum keep it from growing.

Further research which would expand upon this study could use a different measure of human capital which shows more variation across countries. It would also be worthwhile to conduct the study using a more encompassing measure of economic development. While GDP is the variable of choice for previous literature on the Kuznets hypothesis, it has also been shown that GDP does not account for all aspects of development. The UN Human Development Index is one alternative measure of development which takes into account not only income of a country, but health and education of the people as well.

## **REFERENCES**

- Blau, Francine D., Marianne A. Ferber, and Anne E. Winkler. *The Economics of Women, Men, and Work*. New Jersey: Pearson Education Inc., 2001.
- Blau, Francine D., and Lawrence M. Kahn. "Wage Structure and Gender Earnings Differentials: An International Comparison." *Economica*, 1996 63(250), S29-S62.
- Borjas, George J. *Labor Economics*. Boston: Irwin McGraw-Hill, 2000.
- Boserup, Ester. *Women's Role in Economic Development*. New York: St. Martin's Press, 1970.
- Brainerd, Elizabeth. "Women in Transition: Changes in Gender Wage Differentials in Eastern Europe and the Former Soviet Union." *Industrial and Labor Relations Review*, 2000, 54(1), pp. 138-162.

- Kidd, Michael P., and Michael Shannon. "The Gender Wage Gap: A Comparison of Australia and Canada." *The Canadian Journal of Economics*, 1996, Special Issue: Part 1, S121-S125.
- Lantican, Clarita P., Christina H. Gladwin, and Seale Jr., James L. "Income and Gender Inequalities in Asia: Testing Alternative Theories of Development." *Economic Development and Cultural Change*, 1996, 44(2), pp. 235-63.
- Pampel Fred C., and Kazuko Tanaka. "Economic Development and Female Labor Force Participation: A Reconsideration." *Social Forces*, 1986 64(3), pp. 599-619.
- Todaro, Michael P, and Stephen C. Smith. *Economic Development*. Boston: Pearson Addison Wesley, 2006.
- United Nations Development Programme. *Human Development Report 2005*. <<http://hdr.undp.org/reports/global/2005/>>.

Table 4: Dataset in Descending Order by GDP per Capita

	Male to Female Earnings	GDP per Capita (US\$)	(PPP Gini Coefficient)	Male to Female Literacy		Male to Female Earnings	GDP per Capita (PPP US\$)	Gini Coefficien t	Male to Female Literacy
<b>High Income</b>									
Ireland	2.42	37738	35.9	1	Turkmenistan	1.59	5938	40.8	1.01
Norway	1.34	37670	25.8	1	Ukraine	1.88	5491	29	1.01
United States	1.6	37562	40.8	1	Peru	3.7	5260	49.8	1.14
Denmark	1.37	31465	24.7	1	China	1.51	5003	44.7	1.1
Canada	1.57	30677	33.1	1	Venezuela	2.4	4919	49.1	1.01
Switzerland	1.11	30552	33.1	1	El Salvador	2.28	4781	53.2	1.07
Austria	2.85	30094	30	1	Swaziland	2.6	4726	60.9	1.03
Australia	1.39	29632	35.2	1	Paraguay	3.02	4684	57.8	1.03
Netherlands	1.87	29371	30.9	1	Albania	1.79	4584	28.2	1.01
Belgium	1.86	28335	25	1	Philippines	1.68	4321	46.1	1
Japan	2.17	27967	24.9	1	Jordan	3.24	4320	36.4	1.12
Germany	1.86	27756	28.3	1	Guatemala	2.99	4148	59.9	1.19
France	1.7	27677	32.7	1	Jamaica	1.51	4104	37.9	0.92
Finland	1.39	27619	26.9	1	Morocco	2.48	4004	39.5	1.65
Hong Kong, China (SAR)	1.79	27179	43.4	1.08	Egypt	3.84	3950	34.4	1.54
United Kingdom	1.62	27147	36	1	Sri Lanka	1.94	3778	33.2	1.04
Italy	2.19	27119	36	1	Armenia	1.44	3671	37.9	1.01
Sweden	1.45	26750	25	1	Ecuador	3.28	3641	43.7	1.03
Singapore	1.95	24481	42.5	1.09	Azerbaijan	1.71	3617	36.5	1.01
New Zealand	1.47	22582	36.2	1	Indonesia	1.94	3361	34.3	1.11
Spain	2.26	22391	32.5	1	Nicaragua	2.24	3262	43.1	1
Israel	1.83	20033	35.5	1.03	India	2.63	2892	32.5	1.54
Greece	2.2	19954	35.4	1.06					
Slovenia	1.61	19150	28.4	1	<b>Low Income</b>				
Portugal					Honduras	2.68	2665	55	1
Korea, Rep. of	1.85	18126	38.5	1	Papua New Guinea				
	2.07	17971	31.6	1	a	1.74	2619	50.9	1.25
					Bolivia	2.21	2587	44.7	1.16
<b>Upper Middle Income</b>					Lesotho	2.54	2561	63.2	0.82
Hungary	1.61	14584	26.9	1	Viet Nam	1.46	2490	37	1.08
Estonia	1.56	13539	37.2	1	Zimbabwe	1.74	2443	56.8	1.09
Slovakia	1.54	13494	25.8	1	Ghana	1.34	2238	40.8	1.38
Argentina	2.68	12106	52.2	1	Cameroon	2.24	2118	44.6	1.29
Lithuania	1.47	11702	31.9	1	Pakistan	2.94	2097	33	1.75
Poland	1.61	11379	34.1	1	Cambodia	1.31	2078	40.4	1.32
Croatia	1.78	11080	29	1.02	Gambia	1.68	1859	47.5	1.46
Trinidad and Tobago	2.18	10766	40.3	1.01	Mongolia	1.51	1850	30.3	1.01
South Africa	2.2	10346	57.8	1.04	Bangladesh	1.84	1770	31.8	1.6
Chile					Mauritania	1.8	1766	39	1.37
	2.59	10274	57.1	1	Lao People's Dem.				
Latvia	1.6	10270	33.6	1	Rep.	1.53	1759	37	1.26
Costa Rica	2.67	9606	46.5	1	Kyrgyzstan	1.53	1751	34.8	1.01
Malaysia	2.12	9512	49.2	1.08	Uzbekistan	1.52	1744	26.8	1.01
Russian Federation	1.57	9230	31	1.01	Senegal	1.81	1648	41.3	1.75
Mexico	2.66	9168	54.6	1.04	Moldova, Rep. of	1.54	1510	36.9	1.03
Botswana	1.63	8714	63	0.93	Côte d'Ivoire	2.7	1476	44.6	1.57
Uruguay	1.9	8280	44.6	0.99	Uganda	1.5	1457	43	1.33
					Nepal	1.97	1420	36.7	1.8
<b>Lower Middle Income</b>					Rwanda	1.61	1268	28.9	1.2
Brazil	2.33	7790	59.3	1	Burkina Faso	1.38	1174	48.2	2.28
Bulgaria	1.5	7731	31.9	1.01	Mozambique	1.47	1117	39.6	1.98
Thailand					Tajikistan	1.6	1106	32.6	1
	1.63	7595	43.2	1.05	Central African Re				
Romania	1.72	7277	30.3	1.02	public	1.65	1089	61.3	1.93
Tunisia	2.71	7161	39.8	1.28	Nigeria	2.43	1050	50.6	1.25
Iran, Islamic Rep. of	3.51	6995	43	1.19	Kenya	1.08	1037	42.5	1.11
Panama	1.97	6854	56.4	1.01	Mali	1.68	994	50.5	2.24
Dominican Republic	2.76	6823	47.4	1.01	Yemen	3.27	889	33.4	2.44
Macedonia, TFYR	1.79	6794	28.2	1.04	Zambia	1.8	877	52.6	1.27
Turkey	2.17	6772	40	1.18	Niger	1.76	835	50.5	2.09
Colombia	1.95	6702	57.6	0.99	Madagascar	1.69	809	47.5	1.17
Kazakhstan	1.57	6671	32.3	1.01	Ethiopia	1.91	711	30	1.46
Namibia	1.96	6180	70.7	1.04	Guinea-Bissau	2.06	711	47	2.23
Algeria					Burundi	1.39	648	33.3	1.29
	3.19	6107	35.3	1.32	Tanzania, U. Rep.				
Belarus	1.53	6052	30.4	1	of	1.41	621	38.2	1.25
Bosnia and Herzegovina	2.19	5967	26.2	1.08	Malawi	1.48	605	50.3	1.39
					Sierra Leone	2.41	548	62.9	1.94

Notes: Data are grouped according to the income categories specified by the World Bank:

High income: Gross National Income per capita of \$9,386 or more

Upper middle income: \$3,036-9,385

Lower middle income: \$766-3,035

Low income: \$765 or less