Gender, pay and development: a cross-country analysis

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Abbreviations

GDP	gross domestic product
GNP	gross national product
US	United States
UN	United Nations
UNDP	UN Development Programme
WISTAT	UN's Women's Indicators and Statistics Database

This paper analyses the determinants of the female–male non-agricultural wage ratio in developing countries. By combining data on industrial composition, economic performance and women's labour market and educational outcomes for a group of developing countries, a cross-country study is carried out of the determinants of the gender pay gap in developing countries in the 1990s. The results show that higher female literacy and greater female labour market activity is associated with a lower wage gap. In addition, the greater the degree of industrialisation and market emergence, the greater the gender wage gap. And, as in the industrialised nations, women's overrepresentation in low-paying occupations is a key factor in explaining women's lower relative pay.

In recent decades, there has been a significant and growing feminisation of poverty. Of the estimated 1.3 billion people in the world today that live in poverty, over 70 per cent are female. This phenomenon presents itself in both industrialised economies such as the United States (US) where more than half the women-headed households are poor, and in developing countries (United Nations Development Programme [UNDP] 1995).

Previous studies have explored the factors determining female poverty (see pioneering studies by Boserup 1970, 1990; Youssef 1974; Bruce and Dwyer 1988; Buvinic *et al.* 1988), for example the link between female-headship and poverty. An important factor behind the large disparity between male and female-headed households is that women have fewer income-earning opportunities than men due to their unequal status in the labour market. Either women are paid less than men for doing the same work, or they are denied employment in the higher-paying occupations.

In most countries of the world, women earn lower wages than men, (the global average is around three-fourths, and is based on the non-agricultural wage in countries where data are available). In the case of the industrialised countries, while there has been a rapid closing of this gap in a few countries in recent decades (for example, in Norway, Finland and the United States), there has also been stagnation of the gap in certain cases (see, Datta Gupta *et al.* 2000 for Denmark). In general, progress has been slow, despite the dramatic improvements in women's educational attainments worldwide. Nevertheless, it has not been possible until now to conduct cross-country analyses of the determinants of the female–male wage ratio in developing countries, because of a lack of availability of data. A few such studies exist for the industrialised countries (Blau and Kahn 1992).

With the development of the United Nation's Women's Indicators and Statistics Database (WISTAT data), for the first time a wide cross-section of data on women's educational and labour market achievements and opportunities is now available to researchers. Based on both WISTAT and the UNDP's published statistics on Gender and Development (1995), I combine information on women's relative wages and their educational and labour market status together with data on industrial composition and economic

performance, which enables me to analyse which factors are important in explaining the lower pay of women in developing countries.

I choose to focus only on developing countries rather than pool together industrialised and developing countries in the analysis, mainly because the functioning of labour markets and the wage determination process can be quite different in developing countries. Labor markets in developing countries, are typically characterised by wage floors, rigid bureaucratic wage scales, incomplete or missing markets and informational asymmetries. Further, the underlying data show more variation in females' relative pay within the sample of developing countries than across the two groups (the correlation coefficient between the female–male non-agricultural wage ratio and real gross domestic product (GDP) is only 0.05 for the full sample of 55 countries for which data is available).

Visual inspection of the data shows the same. Figure 1 shows a scatter diagram

Figure 1 Female–male wage ratio by real GDP, 1994
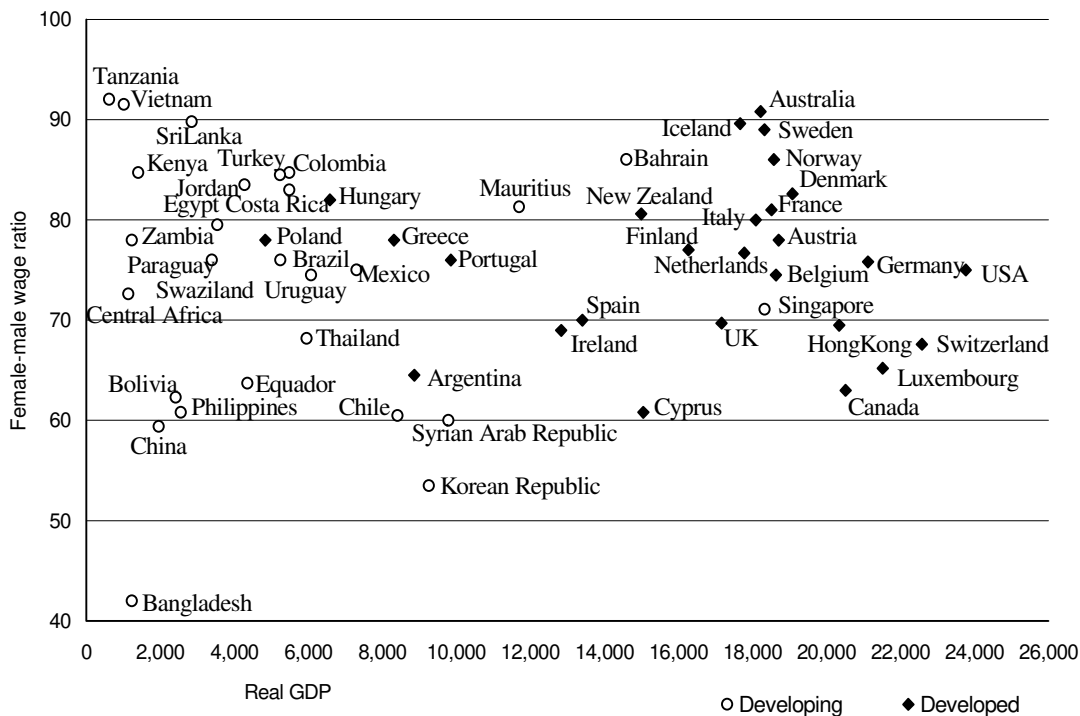
between the female–male ratio of non-agricultural wages and real GDP in 1994, for a sample of 55 countries (22 industrialised, 33 developing)[1]. There appears to be no discernable relationship between the level of a nation's income and the female–male pay ratio. In a small sample, the data are sensitive to the presence of outliers, but nonetheless, there appears to be more variation within the group of developing countries than there is across the two income groups. Thus, the question of interest is what are the factors that can explain this large variation in women's pay relative to men's within the group of developing countries.

Why do women in Tanzania (a small, relatively less-developed African economy) have a non-agricultural wage equal to 92 per cent of men's, compared to only 42 per cent in Bangladesh? Could it be that Tanzania lacks an export-oriented manufacturing industry and has therefore not needed to keep wages of female labour employed in the trade sector artificially low in order to compete in the world economy? Or is it because Tanzania, a nation with a history of socialism, probably has in place policies regarding equal pay, and a large public sector that supports the employment of women? Certainly both economic factors such as a nation's export orientation, and female relative human capital attainment as well as political and institutional factors such as having a government committed to gender equality and the existence of a large public sector, could be important in explaining the variation in the gender pay gap across developing countries. The relative importance of such factors will be explored in this paper.

Hypotheses

Several hypotheses must be considered with regard to the factors that can explain the variation in women's pay relative to men's in developing countries and present findings from previous studies regarding these hypotheses.

First, does women's relative human capital attainment such as educational advancement enhance their income earning capability? The large literacy gap that exists, particularly in parts of Africa and Asia, remains a pervasive barrier to women's participation in the economy, and improvements in female literacy and enrollment rates as well as increased access to training and development projects can only serve to increase women's economic contribution (Hill and King 1991). Further, what is the role of women's increasing work experience relative to men's in narrowing the gender pay gap? While measures of actual work experience are difficult to obtain, the female activity rate measures the degree of female employment in the economy and can be used to capture the effect that high levels of unemployment or underemployment among women relative to men prevent them from gaining valuable work experience and force their wages down. Much evidence seems to suggest that there exists a wide variation (and severe under-reporting) of female employment in developing countries, so that women in agricultural economies tend to be more economically active than women in developing countries in beginning stages of urbanisation. As modernisation increases however, women's labour force

participation increases (Beneria 1982). In addition, does the gender representation in the occupation affect the female–male pay ratio? Does the predominance of women in certain professions such as teaching and clerical work affect women's earnings relative to men's? Of course a more fundamental type of gender segregation in the least developed countries is the concentration of female employment in the informal or traditional sector, including self-employment, out-working, family enterprise and household service (Momsen 1991). The available data, however, are typically the standard International Labour Organization broad occupational categories that do not permit analysis of such dichotomies. Earlier findings show that, as is the case with labour force participation rates, there is much variance in the degree of gender occupational segregation in developing countries, with Sub-Saharan Africa and East Asia (including China) showing much lower indexes of segregation (17–20s) than Latin America, North Africa, Middle East and South-Central Asia (40s). Some of these differences may reflect differences in industrial composition and the role of agriculture (a large employer of developing country women), while others may be a result of differences in cultural norms and traditions with respect to discrimination and sexual stereotyping (Blau, Ferber and Winkler 1998). Nonetheless, what can be generalised is that whatever the underlying mechanism, women in general tend to be concentrated in the lower-paying occupations which affect their pay relative to men. All of these differences may reflect either men's and women's differential human capital

investments and/or differential access to educational and labour market opportunities.

A second set of factors have to do with the potential impact political and institutional factors such as political commitment to issues of women's empowerment or the size of a nation's public sector, may have on a nation's gender wage gap. In many countries, the public sector has actively recruited female employment and centralised wage bargaining agreements covering public enterprises have in many cases contributed to a narrowing of the gender wage gap. With regard to political participation, while women are virtually absent from decision-making positions on a worldwide scale (only 3 per cent of all ministerial positions, and 10 per cent of parliamentary positions are held by women), there is large variation in the representation of women in elected public positions in developing countries, but in many cases while women are adequately represented in some countries, they arguably have little real power (UN 1991). Increasing women's access to decision-making and leadership positions in the government can be expected to increase their involvement in policies and programs affecting women, such as labour market issues of equal pay and promotion.

Third, what is the role of industrial composition on the gender wage gap? Could a country's industrial composition and trade orientation affect the gender wage gap, particularly if industrial composition distinguishes between countries that specialise in capital-intensive primary goods production and those that are emerging,

industrial economies? The latter in particular may be more dependent on hiring cheap female labour in order to compete in an expanding global economy and thereby may contribute to maintaining the gender wage gap. Previous research has shown that export orientation can have both positive and negative effects on the gender wage gap. Black (1999) shows that increased competition through trade contributed to the narrowing of the gender wage gap in the US manufacturing sector possibly due to employers having to pay competitive wages to their skilled female employees in an open economy. Seguino (1999, 2000) finds on the other hand, that the export-led growth successes of the newly-industrialised countries such as South Korea, have depended on keeping women's wages low. Of course, while it is true that such considerations about emerging industrialisation do not affect the majority of women workers in the least developed countries who are employed as unskilled workers in the rural sector, in most developing countries today, women constitute the fastest growing group of employees within the industrial sector. This is because manufactured exports from developing countries are increasingly dominated by the types of products produced by routine-skilled female labour (light export-oriented industries) (Momsen 1991).

A fourth set of factors that can affect male–female wages involve changes in the wage structure, by which is meant the prices determined in the market of different skills and qualifications. For example, if women make up the bottom of the wage distribution

in a country, and if macro factors in a country lead to an increased dispersion in the wage distribution in general, then the gender gap in pay will widen, even though men and women's relative qualifications have not changed. Changes in these variables can result in changes in the distribution of wages in an economy. The higher the level of national income, the higher the incomes accruing to those producing it, thereby men and women. But, distributional issues are relevant. If women make up the bottom of the wage distribution and the growth in earnings occurs mainly at the top, then this will lead to a wider wage gap. Macroeconomic instability can also affect the gender wage gap. That is, countries that have a large external debt are often required to adopt stabilisation policies that disproportionately affect lower and middle-income groups (Streeten 1994). Rising unemployment and falling real wages have been found to affect workers with the least labour market experience and the weakest attachment, typically women, who tend to be recent entrants and more likely to be in informal sector jobs (Stewart 1991; Cornia *et al.* 1987). Thus, the higher the debt, the higher will be the gender wage gap. Finally, what is the relationship between the official development assistance and the gender gap? If official development assistance stimulates growth of high-paying modern sector jobs, and at the same time women are hired in these jobs, then the effect will be to lower the wage gap. Since 1997, the World Bank has embarked on conscious 'project lending', lending based on specific non-government organisation efforts or issues like women's rights, the environment and so on. On the

other hand, structural assistance programs may mean cuts in the education and health sectors where women are concentrated, thereby raising the gender wage gap. The net effect is difficult to determine *a priori* and can only be empirically determined. The reverse causality is also possible that countries which receive the most aid have more equal wages, that is aid is given to countries that demonstrate a willingness to promote free markets, liberalisation of the economy and democratic principles, by for example promoting gender pay equality. As aid is primarily given for political reasons, however, we expect this effect to be unimportant.

Empirical model

The approach taken in this paper is a simple regression analysis of the above determinants of female's relative pay in developing countries, and the estimated coefficients on the regressors should therefore only be indicative of correlations and not of causality[2].

With this background in mind, the form of the wage regression to be estimated is given below

$$\log\left(W^m/W^f\right)_j = \alpha + \beta^{HK} X_j^{HK} + \beta^{INST} X_j^{INST}$$
$$+ \beta^{IND-COMP} X_j^{IND-COMP}$$
$$+ \beta^{MACRO} X_j^{MACRO} + \varepsilon_j \quad (1)$$

where for each country j in the sample, the gender wage gap, which is the (log) male–female wage ratio, is regressed on variables measuring women's relative human capital attainment (X^{HK}) such as educational achievement degree of

employment experience and variables measuring the proportion female in broad occupational groupings; political and institutional factors (X^{INST}) such as the share of women in parliamentary positions and the size of the public sector; variables measuring industrial composition and export-orientation ($X^{IND-COMP}$), and several macroeconomic and policy measures (X^{MACRO}) such as (log) GDP, the total debt owed and the amount of aid received. The error term captures the effect of omitted variables and/or random disturbance effects on a country's female–male pay ratio.

I expect a positive association between women's educational attainment relative to men and the female–male wage ratio. In terms of work experience, the greater the degree of female employment in the economy, the lower I expect the gender wage gap to be. Regarding women's occupational representation, I expect that as in the case of the industrialised countries, the higher the proportion female in the low-paying occupations, the higher the gender wage gap (Sorensen 1990; Johnson and Solon 1986). A similar pattern is expected for the developing countries.

In terms of the institutional variables, the greater is women's representation in the government, the lower would be the gender wage gap, as increased female political participation can be expected to bring issues such as gender equality in wages and job segregation to the forefront. The greater the size of the public sector, the lower the gender wage gap as the public sector both supports female employment and raises female wages through collective bargaining, the

maintenance of wage floors and well-defined wage scales.

In terms of industrial composition, I expect that emerging industrialised nations may be associated with a higher gender wage gap, particularly if female wages are kept low in such economies in order to maintain a cost-advantage (Seguino 1999, 2000). As shown by Black (2000), however, export-orientation may have positive effects on the gender wage gap, at least in the case of the United States, so the net effect will be decided by the data.

Macro variables are included to control for economy-wide conditions that may affect the wage distribution and thereby the gender wage gap. Increases in the level of GDP and official development assistance can have ambiguous effects on the gender wage gap, while an aggravated debt situation most likely worsens the gender wage gap.

Data

The data set for this study is created by combining information on women's labour market and educational opportunities and achievements from the UNDP's published statistics on Gender and Development (1995) and WISTAT data. The data collected for the most part are from the early 1990s, or the latest available year. The dependent variable in this study is the (log) ratio of male to female non-agricultural wages in 1994 or latest available year.[3] Note that this measure is likely to underestimate the average disparity between female and male pay in developing countries because it excludes the agricultural sector (an important employer

of women in developing countries) in which female relative wages may be even lower. As sufficient data are not available for agricultural sector relative wages, I use the best measure that is available, the ratio of non-agricultural wages, as an indicator of the overall wage ratio. A further caveat is that there may be inconsistencies in measurement of the wage ratio and other data across countries so that the results should be interpreted with caution. The findings should be taken only as illustrative of underlying trends, until better and more comparable data become available.

In terms of regressors, X^{HK} consists of the education variable *LITRAT*, which is adult female literacy relative to males (female as per cent of males) in the relevant country in 1992, four variables which measure the proportion female among administrative and managerial workers (*FADMIN*), professional, technical and related workers (*FPROF*), clerical and sales workers (*FCLER*) and service workers (*FSVC*), in 1990, and a proxy for work experience, the female economic activity rate in the age 15 plus population, (*FECON*) which is the share of females who are supplying their labour in the production of goods and services in a specified time-reference period in 1992. While the latter is not a direct measure of work experience, it may capture the effect of high levels of unemployment among groups forcing down wages for members of that group.

In terms of institutional variables, X^{INST}, I include the share of parliamentary seats held by women, *FPLSHARE* and the share of central government expenditures in GDP, *CGEXP*, as proxies for women's political

power and the nation's commitment to promoting equality in employment.

In order to directly test the hypothesis that emerging industrialised markets depress female wages, I define a variable (*IND*EXPIMP*)/100, which is the interaction between industrialisation (share of industry in GDP) and export-orientation (the export to import ratio) as an indicator of emerging markets. A degrees-of-freedom constraint does not allow defining separate country dummies for different types of markets represented in the sample, that is emerging industrialised NIC's, primary goods producers and so on. Instead, the created variable is an index for market emergence and industrialisation and ranges in values from 0–100. If Seguino's (1999, 2000) hypothesis is supported, then the greater the degree of market emergence, the greater the gender wage gap.

In terms of the macro variables X^{MACRO}, I use (log) real GDP per capita in 1992 ($PPPs) (*LRGDP*) as a measure of overall

Table 1   Relevant indicators

Country	Real GDP per capita (PPP$) 1992	Estimated population (millions) 1992	Male–female wage ratio 1994	Female–male literacy rate 1992	Female (age 15+) economic activity rate 1994	Index of industrial-isation and market emergence (0–100)
Argentina	8,860	33.4	64.5	100	28	20.25
Bangladesh	1,230	112.7	42.0	51	62	12.75
Brazil	5,240	153.8	76.0	99	31	57.72
Bolivia	2,410	6.9	62.3	82	31	15.21
Central Afr. Rep.	1,130	3.1	72.6	72	65	8.84
Chile	8,410	13.6	60.5	99	39	31.01
Colombia	5,480	33.4	75.0	100	22	36.05
Costa Rica	5,480	3.2	83.0	100	24	20.25
Ecuador	4,350	10.7	63.7	96	20	47.19
Egypt	3,540	59.0	79.5	58	9	11.10
Jordan	4,270	4.7	83.5	82	10	8.12
The Korean Republic	9,250	43.7	53.5	97	31	42.30
Mauritius	11,700	1.1	81.3	89	29	24.75
Mexico	7,300	88.2	75.0	95	30	15.96
Paraguay	3,390	4.6	76.0	96	23	10.58
Philippines	2,550	63.4	60.8	99	36	20.79
Thailand	5,950	57.0	68.2	95	65	64.00
Turkey	5,230	58.4	84.5	77	45	19.20
Sri Lanka	2,850	17.7	89.8	92	29	18.00
Uruguay	6,070	3.1	74.5	101	32	23.49
Zambia	1,230	8.7	78.0	81	35	39.95

Sources: United Nations Development Programme, 1995. *Human Development Report*, Oxford University Press, New York. United Nations, *Women's Indicators and Statistics Database*, Version 3, CD-ROM, Statistical Division, New York.

macroeconomic performance. Total net official development assistance received as a percentage of GDP in 1993 (*AID*) and the total external debt in 1992 as a percentage of gross national product (GNP) (*DEBT*) are also included as macroeconomic variables.

A final variable, which is not shown in the wage equation above but used in an alternative specification, is the country's sex ratio, in terms of the number of females per 100 males. This variable, which I call *SEXRAT*, is included as a measure of the extent of gender bias in a country.[4] In countries where women are treated equally as men, there are around 106 females for every 100 males, given that child mortality rates (up to age 5) are higher for boys than girls, and that women live longer than men in most societies. In some developing countries today, the preference for male children over female children translates over to practices such as female infanticide, selective abortion of female fetuses as well as general nutritional deprivation and lower healthcare provision to females. Thus, in some countries in South Asia and China the sex ratio is as low as 94 females to 100 males.[5] I expect that if discrimination is present, then the lower the sex ratio, the higher the gender wage gap, or a negative relationship.

Table 2　Descriptive statistics

Variable	Label	Mean (standard deviation)	
WGAP	(Log)male–female non-agricultural wage ratio	0.342	(0.183)
LITRATIO	Female–male literacy ratio	88.619	(14.225)
FECON	Female activity rate in 15+ population	32.947	(16.154)
FADMIN	Proportion female in administrative	13.333	(9.309)
FPROF	Proportion female in professional	40.133	(14.254)
FCLER	Proportion female in clerical and sales	39.200	(16.667)
FSVC	Proportion female in service jobs	44.667	(23.022)
PLSHARE	Share of parliamentary seats held by women	6.158	(3.848)
CGEXP	Central government expenditures % of GDP	2.308	(8.441)
IND	Industry 's share in GDP	32.684	(11.230)
EXPIMP	Export-import ratio	77.000	(28.871)
LRGDP	Log of real GDP per capita	8.341	(0.672)
AID	Total net ODA as % of GNP	4.062	(6.252)
DEBT	Total external debt as % of GNP	65.238	(47.374)
LA	=1 if Latin American country	0.476	(0.512)
AFR	=1 if African country	0.143	(0.358)
ME	=1 Middle Eastern country	0.095	(0.301)
SEXRAT	Females per 100 males	100.223	(3.619)

Notes: N=21, the countries appearing in the sample are Argentina, Bangladesh, Brazil, Bolivia, The Central African Republic, Chile, Colombia, Costa Rica, Ecuador, Egypt, Jordan, the Korean Republic, Mauritius, Mexico, Paraguay, Philippines, Thailand, Turkey, Sri Lanka, Uruguay and Zambia.
Source: United Nations Development Programme, 1995. *Human Development Report*, Oxford University Press, New York.

Results

Table 1 shows some relevant indicators for the 21 countries used in the statistical analysis for whom complete data was available.

There is no apparent relationship between GDP and the female–male wage ratio. Zambia for example, has a fairly low level of real GDP per capita (US$1,230) yet a considerably higher male–female wage ratio than Korea whose income level is nearly 8 times as much. An interesting regularity that emerges from Table 1 is that countries with a high female relative literacy rate on the other hand, tend to have fairly low levels of female participation and the reverse. That is, conscious social policies may have targeted education over employment in these cases. The final column shows the underlying data for the index of market emergence and industrialisation.

Table 2 presents descriptive statistics for the sample for which complete data are available.[6]

On average, the gender wage gap is 40.8 per cent[7]. Women are on average 89 per cent as literate as men. The average female activity rate in the 15 and over age-group is 33 per cent, that is, one-third of the 15 plus female population on average is engaged in the production of goods and services. Compared to their share of the adult labour force, women are clearly over-represented in clerical and sales and service occupations and under-represented in administrative and managerial occupations. On average, women hold 6 per cent of the seats in parliament, while the share of central government expenditures in GDP average

to roughly 2 per cent. Real GDP per capita on average is around US$4,200 (1992 PPPs). The average developing country in the sample has an export to import ratio of 77 per cent, receives around 4 per cent of its GNP in official development assistance and has a total outstanding debt equal to nearly 65 per cent of GNP. Around 48 per cent of the countries in the sample are from Latin America, slightly less than one third from Asia, around 14 per cent from Africa and 9 per cent from the Middle East. The typical country has a sex ratio (number of females per 100 males) equal to around 100, indicating the presence of gender bias.

Table 3 presents the estimated coefficients of the regression of the male-female non-agricultural wage ratio on its determinants (Equation 1). The first column presents a model with only human capital variables. The second column adds political and institutional factors to the human capital only model. A third column adds the industrial composition effect to the specification with human capital. The fourth column adds macro variables to the preceeding specification while the fifth column augments the analysis with the sex ratio variable. A sixth column presents the final model.

To correct for heteroskedasticity resulting from different population sizes, all the models are estimated by weighted least squares, in which the weights used are equal to the (square root) of population size. In addition, all standard errors reported have been obtained using White's variance-covariance matrix.

The first model estimated has overall significance (F value=5.209, p=0.0323) and

Table 3   Regression results

	(1)		**(2)**		**(3)**	
INTERCEPT	1.2498	(2.8904)***	1.0108	(2.3197)**	1.3886	(6.6915)***
LITRATIO	-0.0129	(-2.8763)***	-0.0119	(-2.4061)**	-0.0177	(-8.7069)***
FECON	-0.0047	(-3.5324)***	-0.0057	(-3.4359)***	-0.0059	(-5.9263)***
FADMIN	-0.0120	(-3.1284)***	-0.0062	(-1.2701)	-0.0091	(-4.6792)***
FPROF	-0.0056	(-2.6769)***	-0.0080	(-2.7960)***	0.00001	(0.0034)
FCLER	0.0188	(8.6096)***	0.0215	(5.6564)***	0.0174	(12.0493)***
FSVC	0.0030	(1.1330)*	0.0032	(1.4643)*	0.0014	(0.9351)
PLSHARE	..		-0.0165	(-1.6936)*	..	
CGEXP	..		0.0081	(1.4277)*	..	
IND*EXPIMP/100	..		..		0.0066	(4.2507)***
LRGDP	..		..		..	
DEBT	..		..		..	
AID	..		..		..	
SEXRAT	..		..		..	
Adjusted R^2	0.6779		0.6506		0.8744	
F value	5.209		3.793		12.939	
Prob>F	0.0323		0.1067		0.0062	
SSE	0.2323		0.1680		0.0755	
	(4)		**(5)**		**(6)**	
INTERCEPT	1.1421	(3.3292)***	0.5740	(1.0285)	1.3619	(6.0371)
LITRATIO	-0.0154	(-3.3623)***	-0.0190	(-8.0932)***	-0.0171	(-6.4146)***
FECON	-0.0080	(-7.4019)***	-0.0067	(-5.7710)***	-0.0064	(-5.4991)***
FADMIN	-0.0059	(-1.4672)*	-0.0107	(-6.0618)***	-0.0089	(-3.6201)***
FPROF	0.0086	(2.4225)**	0.0021	(0.8247)	..	
FCLER	0.0136	(5.4601)***	0.0180	(9.8808)***	0.0189	(8.4938)***
FSVC	-0.0022	(-1.4149)*	0.0004	(0.2306)	..	
PLSHARE	..		..		..	
CGEXP	..		..		..	
IND*EXPIMP/100	0.0099	(5.4085)***	0.0075	(5.2873)***	0.0065	(8.1006)***
LRGDP	0.0002	(0.0035)	..		..	
DEBT	-0.0013	(-1.0834)	..		..	
AID	-0.0206	(-0.7233)	..		..	
SEXRAT	..		0.0090	(1.7045)*	..	
Adjusted R^2	0.8585		0.8703		0.8976	
F value	8.284		11.068		22.029	
Prob>F	0.1124		0.0171		0.0004	
SSE	0.0340		0.0624		0.0862	

Notes: N=21, the countries appearing in the sample are Argentina, Bangladesh, Brazil, Bolivia, The Central African Republic, Chile, Colombia, Costa Rica, Ecuador, Egypt, Jordan, the Korean Republic, Mauritius, Mexico, Paraguay, Philippines, Thailand, Turkey, Sri Lanka, Uruguay and Zambia.
T-ratios in parentheses. *Significant at 10 per cent; **Significant at 5 per cent; ***Significant at 1 per cent.

fares well in terms of the signs of the individual regressors, as all regressors have the expected signs. Higher relative female literacy rates, higher female economic activity and higher female representation in professional and administrative jobs lowers the gender wage gap, while a greater proportion female in service and clerical jobs raises the gender wage gap. [8] However, the share of females in the service sector is only weakly significant. The adjusted R^2 is 0.68, which indicates that human capital differences alone explain around two-thirds of the variation in the gender wage gap across this sample of developing countries.

From column 2, it is clear that adding political and institutional factors worsens the significance and fit while the estimated coefficients on the human capital variables do not change appreciably (excepting the coefficient on *FADMIN* which is halved and loses significance). While the share of women in parliament tends to reduce the gender wage gap, its effect not very significant. Contrary to what was hypothesised, higher central government expenditures increase the gender wage gap, but not significantly. An F-test of joint significance of the two political/institutional variables fails to reject the model in (1) over the model in (2) as the F statistic is 2.296 which is less than the critical value for degrees of freedom 2,12.

In column 3 therefore, I return to the human capital only model and add the effect of market emergence and industrialisation, which is the interaction between industry's share in GDP and the export to import ratio. The interaction is needed to capture both aspects of emerging markets, that is export

penetration and the reliance on industrial production. The coefficient is positive and highly significant indicating that the greater the degree of emergence, the higher the gender wage gap, confirming the result found earlier by Seguino (1999, 2000), that perhaps, such countries artificially hold women's wages down in an attempt to compete in a global economy. [9] An F-test of the unrestricted model in (3) over the restricted model in (1) strongly rejects the restricted model (the F ratio=27.03 which is strictly greater than the critical value at any level of significance for degrees of freedom 1 and 13 for the numerator and denominator respectively).

The human capital variables are also more precisely estimated in this model, with both the literacy rate and the female activity rate being strongly positively related to the female–male gender wage ratio. Some of the occupation variables are also highly significant while all have the expected signs. The higher the proportion female in professional and administrative/managerial positions, the lower the wage gap, while the greater the proportion female in clerical and service jobs, the higher the wage gap. These results match those found in earlier studies of occupational segregation and the male–female wage gap in industrialised countries. The goodness-of-fit is high at 87 per cent adjusted R^2.

I next turn to a model in column 4 in which macroeconomic variables are added to the expanded human capital specification in column 2. The macroeconomic variables turn out to be insignficant in explaining the non-agricultural female to male wage ratio and an F-test of the joint significance of the

macro variables against the restricted model in (3) fails to reject the restricted model.[10] Of course, while the macro variables are insignificant in levels, changes in these variables can potentially affect changes in the wage gap over time, but such an analysis requires time-series data on wages and other variables.

In column 5, I re-estimate the model in (3) with the addition of the variable *SEXRAT*, which is a proxy for the extent of gender bias in a country. The estimated coefficients in (5) resemble those in (3) indicating that the sex ratio variable is exogenous to the model, but the estimated coefficient and standard error on the sex ratio variable shows that it has, if any, a positive effect on the gender wage gap (but only significant at 10 per cent). Therefore, I conclude that bias against women as proxied by the sex ratio does not seem to adversely affect women's labour market performance relative to men, holding other things constant, although it certainly may have important consequences for women's lower status in the household and society in general. Again, a F-test fails to reject the model in (2) over the model in (5).[11] As the sex ratio in some countries may be affected by net migration as well as by differential mortality, ideally data on differential mortality of boys and girls in the 0–5 age group (if available) would have been preferred for testing this hypothesis.[12]

As the sample is small, in order to avoid over-fitting the data and for the purpose of improving precision even further, I run a final regression in column (6) in which I only include the significant variables from the best model until now, in (3). An F-test of the unrestricted model in (3) to the restricted

model in (6) yields a F-statistic=0.0695, degrees of freedom, 1,14, which is strictly less than the critical value so that the restricted model is failed to be rejected. In terms of interpretation of the coefficients, from model (6) we see that a one percentage point increase in female literacy relative to male literacy is associated with a fall in the gender wage gap of 1.7 per cent. A one percentage point increase in the female economic activity rate is linked to fall in the gender wage gap of six-tenths of one per cent. A one percentage point rise in the proportion female in administrative and managerial jobs is related to a fall in the gender wage gap by approximately nine-tenths of one per cent, whereas a one percentage point rise in the proportion female in clerical jobs is associated with a rise in the gender wage gap by approximately 1.9 per cent. Finally, a one-unit increase in the index of market emergence (ranges from 0–100) increases the gender wage gap by seven-tenths of one per cent.

Policy recommendations made on the basis of these findings would point to continued investments in female literacy, the creation of employment opportunities for women and the opening of traditionally male-dominated occupations to women as the means towards lowering the gender wage gap in developing countries. Further, newly industrialised and emerging economies should consider ways in which the negative impacts of rapid industrialisation and export-oriented development strategies on female wages can be offset. It bears pointing out that the sample is small, and that the paper does not build a structural model of wage determination and as such, considerations

of potential endogeneity of the regressors are not explored here. Further, potential inconsistencies of data measurement and incomparability of data definitions across countries need to be taken into account. Nonetheless, the empirical model fits the data well and the estimates are found to be reasonably precise.

Conclusion

This paper considers the determinants of the male–female non-agricultural wage ratio in developing countries. Combining data from both the WISTAT data and published statistics on Gender and Development by the UNDP, I am able to put together information on economic performance and women's labour market and educational outcomes for a sample of developing countries, enabling a cross-country analysis of the determinants of the pay gap in the 1990s. The results show that higher female literacy and greater female economic activity is associated with a lower gender wage gap. In addition, market emergence as measured by export promotion interacted with industrialisation is significantly positively related to the wage gap. As in the industrialised nations, women's under-representation in high-paying administrative and professional jobs and their over-representation in low-paying clerical and service occupations are key factors in explaining women's lower relative pay. Macroeconomic variables are not significant once market emergence is controlled for, and gender bias while present and possibly affecting women's lower status in the household and society does not seem

to have a negative impact on their relative pay in the labour market. While these results are precise, they are obtained on a small (although reasonably representative) sample of developing countries for which complete information on the variables of interest was available. Future work can build upon the analysis in this paper by collecting data on relevant covariates for additional developing countries and reassessing the results found herein.

Notes

1 I use the UNDP's system of aggregation of countries in the major groups of developing (includes both least developed and other developing) versus industrialised countries, (see UNDP 1995).

2 As the predetermined variables are measured at an earlier point in time than the dependent variable (see the Data section), a certain degree of exogeneity may be argued for.

3 The primary source for these data is WISTAT, Version 3, CD-ROM, government data from national consultants and Pscharopoulos and Tzannatos, 1992 (see UNDP 1995: 36, Table 2.5). Data on male-female wages in the HDR appear in 1995 only.

4 Information on the sex ratio was merged in some cases from the UN's Demographic Yearbook, 1995, when not otherwise available from WISTAT.

5 See for example Amartya Sen's (1992) calculation of the 100 million 'missing' women in these countries.

6 Data on the female–male non-agricultural wage ratio was available for 31 developing countries in the UNDP statistics. Of these, 21 had complete data on all variables of interest.

7   The log wage difference is 0.342, thus the percentage difference in male and female wages is $(e^{0.342}-1) = 40.8$.

8   It is worth pointing out that alternative measures of female educational attainment were tried in the wage regression, such as the female enrolment rates, both overall and at the primary, secondary and tertiary levels, but these turned out to be insignificant in explaining the gender wage gap.

9   In a previous version of the paper, regional dummies (LA, AFR, ME) were used as proxies for industrial composition, but these turned out to be insignificant and arguably only indirectly related to industrial composition as pointed out by an anonymous referee.

10   The F-statistic=2.217 which is smaller than the critical value for d.o.f.=3,10 for the numerator and denominator.

11   The F-statistic=2.519 while the critical value for d.o.f. 1 and 12 for numerator and denominator respectively is 4.75 at the 5 per cent level.

12   I thank an anonymous referee for pointing out this potential problem with the sex ratio variable.

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Acknowledgments
Abbreviations
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