Male-Female Wages Differentials In Guatemala: 1989-1998

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I. Introduction

Guatemala, with a population of more than 11 million and a per capita income of around $1,700, is one of the poorest and most unequal countries in Latin America. Some 57 per cent of the population is estimated to be living in poverty. Around 50 per cent of total population are indigenous Mayan people, who are among the poorest in the society. Two per cent of the population are of "European" extraction, in whom both political and economic power are highly concentrated (Ghosh 2003).

The 1990s were a volatile decade in Guatemala. The 1996 peace accords ended 36 years of civil war, after that, economic reforms, including trade liberalization, downsizing of public sector, and general economic deregulation, took place all around the nation. In the 1990s, the male-female wage gap in Guatemala quadrupled, a much greater increase than in other similar Central American countries (Table1). However, to the best of my knowledge, no studies have focused on the changes that occurred in male-female earnings and wage differentials in Guatemala. In this study, I try to examine the possible reasons behind the dramatic increase in the gender wage gap in Guatemala during the period from the end 1980s to the end of 1990s.

Table1. Male-female Hourly Wage Gaps ($lnwage^m - lnwage^f$)

	The early-1990s[1]	The mid-1990s	The end-1990s
Costa Rica	0.28	0.29	0.35
Guatemala	0.17	N/A	0.68
Honduras	0.38	0.35	0.34
Nicaragua	-0.06	N/A	0.17
Panama	0.20	0.24	0.23
El Salvador	N/A	N/A	0.29

Source: Author's calculations from the household survey data.

[1] Or the end of 1980s.

II. Data

The data of this paper are large-scale household survey data (calculated by Guatemala's Central Government), and they include two years: 1989 and 1998. Approximately 0.1% of the population of Guatemala was surveyed. The data provide information on earnings, hours worked, workplace characteristics, and personal characteristics of individuals in Guatemala. It is worth to pointing out that the dataset that I use includes information only on those employed workers who are 10 years and older and report non-zero (and non-missing) earnings and hours worked.

III. Macroeconomic Backgrounds

Gindling (Gindling, 1993) finds that in Costa Rica during the recession (July 1980-July 1982) a dramatic increase in the gender wage gap was due primarily to the influx of less educated women into the labor force in response to falling real earnings for the primary family worker. Is it also the case in Guatemala? Let us check the macroeconomic background in Guatemala from 1989 to 1999.

TABLE 2: Selected Macroeconomic Indicators

Year	GDP growth rate (%)	Unemployment Rate (%)	Inflation Rate (%)
1989	1.3	6.7	15.0
1990	3.5		60.0
1991	3.0	6.5	40.0
1992	4.2	6.1	14.0
1993	4.0		11.6
1994	4.0	4.9	12.0
1995			
1996	3.0		10.9
1997	4.1	5.2	9.0
1998	5.0		6.4
1999	3.5	7.5	6.8

Source: The World Fact Book, published by CIA.

From the table 2 we can see that the economy of Guatemala have grown mildly and consecutively from the end of 1980s to the end of 1990s, and economic reforms introduced since 1996 have helped to stem inflationary pressures. This paper examines the way in which male-female earnings and wage differentials evolve during the process of economic development.

IV. The Sector Segregation and Male-Female Wage Differentials

The female labor participation rate in Guatemala increased dramatically from 1989 to 1998 (from 25.68% to 35.73%[2]). Who were these new female workers? Did these increased female workers enter into high-paid sectors or low-paid sectors? Table 3 shows that more educated (but M/F ratio for education increased from 1989 to 1998), more older and more indigenous female workers who work fewer hours entered into the labor market. I suspect that these women with these characteristics would not easily work within the high-paid formal sectors, so the first point of my study is to test whether the dramatic increase in gender wage gaps in Guatemala results from women's lack of access to high-paid sector employment.

Table2. The Mean Values for the Main Variables.

	1989			1998		
	Male	Female	M/F Ratios	Male	Female	M/F Ratios
log-wage	4.98 (1.00)	4.81 (1.05)	1.04	6.75 (1.05)	6.07(1.27)	1.11
education	3.58 (4.12)	4.55 (4.82)	0.79	4.42 (4.47)	4.58 (4.80)	0.97
experience	27.52 (16.29)	23.82 (15.82)	1.16	27.32(17.52)	26.39 (16.63)	1.04
work hours	48.65 (11.26)	42.49 (17.96)	1.14	48.27(15.62)	35.64(19.97)	1.35
race	0.65 (0.48)	0.76 (0.43)	0.86	0.55 (0.50)	0.57 (0.49)	0.96
urban	0.37 (0.48)	0.63 (0.48)	0.59	0.42 (0.49)	0.56 (0.50)	0.75

Source: Author's calculations from the household survey data.

[2] Source: Author's calculations from the household survey data.

Panizza's study (2000) exploits a rich collection of household surveys to investigate the gender wage differential between the public and private sectors in 17 Latin American countries during the 1980s and 1990s. His paper finds that, on average, Latin American women earn 30 percent less than men with similar skills and that approximately one third of this gender gap results from lack of access to formal sector employment. Panizza also finds that the public sector pays a significant premium to female workers in the Latin American countries. As a consequence, the gender gap drops dramatically when only formal sector workers are considered. This is also the case in Guatemala. In Guatemala, the gender wage gap in the public sector is very small, even negative[3]. However, we did observe a dramatic reduction of the share of workers employed in the public sector because of economic reform (from 8.8% in 1989 to 5.6% in 1998), while within the public sector the proportion of women rose from 1989's 25.68% to 1998's 35.73%. It seems that men were affected more by the downsizing of the public sector than women. From this point, Guatemala is different from many other Latin American countries: its great increased male-female wage differential is unlikely to be caused by the more severe sector segregation for women. On the other side, however, more female work force went into the self-employed sector. Did this phenomenon cause increase in the male-female wage gap? In order to test the overall effect, it is necessary to use other ways to measure the sector segregation.

[3] Source: Author's calculations from the household survey data.

Table4. Proportions of workers in each sector (%)

Sector	1989			1998		
	Total	Male	Female	Total	Male	Female
Public	8.81	8.27	10.39	5.58	5.15	6.36
Big Firms	29.61	31.76	23.37	28.48	32.62	21.03
Small Firms	19.23	17.38	24.60	24.07	26.18	20.28
Self-employed	42.35	42.59	41.64	41.87	36.05	52.33
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00

Source: Author's calculations from the household survey data.

Next, I use the Duncan index to measure the degree of sector segregation. The Duncan index (D) is calculated as:

$$D = 0.5\sum_{i=1}^{N} | f_i - m_i | \quad (1)$$

Where N is the total number of sectors (here N=3), and f_i and m_i are the employment ratios of women and men respectively in each sector. The index is equal to one-half of the sum of the absolute differences between the women's and men's ratios in each sector. The Duncan index varies between 0 and 1. D=0, means that women and men have identical employment distributions across sectors; in other words, there is no sector segregation for female. If D=0, then there is complete segregation.

The results of Duncan index are consistent with the anticipation. In 1989, D=0.9134; in 1998, D=0.5817. It means that from 1989 to 1998, the degree of gender sector segregation in Guatemala was reduced rather than increased.

In order to study the effects of sector segregation on the greatly increased gender wage differential further, I decompose the difference between mean wages of men and women into[4]

$$\ln \overline{W}^{m} - \ln \overline{W}^{f} = \sum_{j} \Pr_{j}^{f} (\ln \overline{W}_{j}^{m} - \ln \overline{W}_{j}^{f}) + \sum_{j} \ln \overline{W}_{j}^{m} (\Pr_{j}^{m} - \Pr_{j}^{f}) \qquad (2)$$

$$= \qquad \mathrm{W} \qquad + \qquad \mathrm{J}$$

where j is the public, big firms, small firms and self-employed sector; Pr_j is the probability that man or woman is found working in a given sector. **J** is the mean log-wage differential that is due to differences between the access that men and women have to the sector where one gets higher payment, and this could roughly measure the degree of sector segregation by sex; **W** is the differential explained by the different log-wages that men and women earned within the same sector.

Table 4: Decomposition of the Difference in Mean Male and Female Hourly Wages

Year	log-wage gap	W	J
1989	0.17	0.164 (96.58%)	0.005 (3.42%)
1998	0.68	0.685 (100.7%)	-0.004 (-0.7%)
Changes	0.51	0.52	-0.01

The value of J in 1998 is negative, which means that women are more likely to enter into the high-paid sector than men. As we analyzed before, the average wage in public sector is significantly more than those of other sectors, but because of public sector downsizing, more male workers were displaced relatively to female workers. In brief, the results of the decomposition shows that sector segregation for female cannot explain the great increase in gender wage differentials. The gender wage gaps are mainly caused by the increased male-female wage differentials within the same sector.

[4] We can also decompose the wage gap into

$$\ln \overline{W}^{m} - \ln \overline{W}^{f} = \sum_{j} \Pr_{j}^{m} (\ln \overline{W}_{j}^{m} - \ln \overline{W}_{j}^{f}) + \sum_{j} \ln \overline{W}_{j}^{f} (\Pr_{j}^{m} - \Pr_{j}^{f})$$

In which sector did the male and female wage differentials increase most? Table 5 tells us the answer.

Table 5: Change of ***W*** from 1989 to 1998

	***Δ*W**	**Per cent (%)**
Public	0.021995	4.22
Big Firms	0.033787	6.49
Small Firms	0.043929	8.43
Self-employed	0.421203	80.86
Total	0.520914	100.00

NOTE: $W = \sum_j \Pr_j^m (\ln \overline{W}_j^m - \ln \overline{W}_j^f)$ $\quad$ $\Delta W = \sum_j \Pr_{j98}^m (\ln \overline{W}_{j98}^m - \ln \overline{W}_{j98}^f) - \sum_j \Pr_{j89}^m (\ln \overline{W}_{j89}^m - \ln \overline{W}_{j89}^f)$

$\Pr_j$ can be got from table 4.

In table 5, ***ΔW*** is the change of gender wage gap from 1989 to 1998. The male-female earning differential in self-employed sector contributes more than eighty per cent of the total change of gender wage gap. The following part of this paper is to explore what reasons caused such a great increase in gender wage gap in the self-employed sectors.

V. Male-Female Earnings Differentials in the Self-employed Sector

The econometric literature tends to group the determinations of the wage gap between males and females into two broad categories. One is labor market discrimination, which is usually defined as "different payment rules for men and women with the same productivity" (Ehrenberg and Smith, 1991). The second determinate is differences in the "endowment" of men and women, which usually includes education, training, and experience, sometimes the job characteristics, such as size or location of firm, are also included.

A common method of measuring these two sources of gender wage gap is to estimate separate semi-log wages function for male and female and to decompose the difference of mean of log-wages using Oaxaca (1973) or Blinder (1973)'s method.

$$\ln \overline{W}^m = \alpha^m + \beta^m \overline{X}^m \quad (3)$$

$$\ln \overline{W}^f = \alpha^f + \beta^f \overline{X}^f \quad (4)$$

$\ln \overline{W}$ is the mean log-wage of men and women; β is a vector of estimated parameters; and $\overline{X}$ is a vector of the mean personal productivity-related characteristics for men or women. Subtracting equation (2) from equation (1), then adding and subtracting $\beta^m \overline{X}^f$ [5],

$$\ln \overline{W}^m - \ln \overline{W}^f = \overline{X}^f (\beta^m - \beta^f) + \beta^m (\overline{X}^m - \overline{X}^f) \quad (5)$$
$$= \quad U \quad + \quad E$$

The variable **E** is the part of log-wage differential between men and women that can be explained by different personal characteristics; **U** is the difference not explained by differences in wage-determining personal characteristics, and thus could be considered the rough measure of wage discrimination for female workers. Actually, to interpret **U** correctly and thoroughly is very difficult.

Table7 Decomposition for the total change on gender wage gap in the self-employed sector.

	ΔE	**ΔU**	**E%**	**U%**
ed	0.0877	-0.0183	11.59	-2.42
exp	0.0340	-0.3333	4.49	-44.05
exp2	-0.0692	0.0398	-9.15	5.27
urban	0.0825	-0.1425	10.90	-18.84
race	0.0457	-0.0837	6.04	-11.07
loghour	0.1219	0.0814	16.11	10.75
constant	0.0000	0.9109	0.00	120.40
Total	0.3025	0.4542	40.00	60.00

[5] There is another way to the decomposition: adding and subtracting $\beta^f \overline{X}^m$, then we can get $\ln \overline{W}^m - \ln \overline{W}^f = \overline{X}^m (\beta^m - \beta^f) + \beta^f (\overline{X}^m - \overline{X}^f)$.

Note: For self-employed sector, in 1989, $\ln \overline{W}^m - \ln \overline{W}^f$ = 0.24;
in 1998, $\ln \overline{W}^m - \ln \overline{W}^f$ =0.99. The total change of gender wage gap is 0.75. I calculate the function (5) for year 1989 and year1998 separately, then get $\Delta E = E_{98} - E_{89}$, $\Delta U = U_{98} - U_{89}$.

From the table 7, we can see that within the self-employed sector around forty per cent of the increases in male-female wage gap from 1989 to 1998 can be explained by the gender differences in qualifications, and sixty per cent of the change is not explainable, which is roughly considered as the wage discrimination against women.

Interpret the Part ***E***

About twelve per cent of the change was due to the male-female education differences, and urban variable and race variable contribute about 11% and 6% respectively to the total increases in gender wage gap. In addition, the fewer hours female workers worked for have a significant effect on the male-female wage gap, which could explain about sixteen per cent of the total change. The variable of experience failed to interpret the male-female wage differentials. It seems that even though female are more experienced than male, they still earn less than male. However, there is a mismeasurement for the variable experience. Since *Exp= Age –Education –6*, the higher value on the experience variable does not necessarily mean that the worker is more experienced, maybe he or she is just older than others. These above results are consistent with the descriptions in table 8.

Table8. The Mean Values for the Main Variables of the Self-employed Sector.

	1989			1998		
	Male	Female	M/F Ratios	Male	Female	M/F Ratios
log-wage	4.63 (1.19)	4.40 (1.12)	1.05	6.73 (1.25)	5.74 (1.32)	1.17
education	2.39 (3.41)	2.60 (3.59)	0.92	3.52 (4.23)	2.98 (3.68)	1.18
experience	33.60 (15.87)	31.85 (15.49)	1.05	34.91(17.37)	33.17(16.15)	1.05
work hours	48.81 (11.28)	38.78 (20.17)	1.26	46.49(11.57)	31.48(21.46)	1.48
race	0.49 (0.50)	0.62 (0.49)	0.79	0.50 (0.50)	0.53 (0.50)	0.94
urban	0.26 (0.44)	0.52 (0.50)	0.50	0.36(0.48)	0.48 (0.50)	0.75

Source: Author's calculations from the household survey data.

The average education level for both male and female increased from 1989 to 1998, but since male's education level increased more than female's, women could be less competitive for wages when holding other factors equal. Unlike male, female's hour worked reduced noticeably from 1989 to 1998 (from 38.78 to 31.48). Besides, relative to male, more female labor force are indigenous, and work in rural, which all caused the increased gender wage gap.

Interpret the Part ***U***

Sixty per cent of the change of gender wage gap from 1989 to 1998 in self-employed sector is unexplainable, but it is unsafe to regard this unexplainable part as wage discrimination against female, because selection bias is an important issue in the estimation of male-female wage differentials. The decision, especially for women, to participate in the labor market and the self-employed sector are likely to be non-random. Since women usually take more responsibility on housework, they will join in the market labor force only if their incomes are higher than their reservation wage. From this point, the increase in value of ***U*** (in 1989 U=0.27; in 1998 U=0.72) does not necessarily mean that the wage discrimination also increased. Maybe it was caused by the decreased women's reservation wage. However, in practice, it is very difficult to find a set of variables that affect the probability to participate in the labor market but not affect wage. The cure might be worse than the disease because, as pointed out by Manski (1989), small mis-specifications in the selection equation could generate large biases in the estimates of the coefficients of interest. In this paper, the information on women's

reservation wages in Guatemala are not available, so I can not find an effective way to correct the sample selection bias issue.

VI. Conclusions

Since the male-female wage differentials in Guatemala quadrupled from 1989 to 1998, the purpose of this paper was to examine to the possible reasons behind the dramatic increase in gender wage gap. For this purpose, I used a large set of household surveys in Guatemala that cover year 1989 and year 1998. I find that sector segregation could not explain the big change on gender wage gap, the proportion of women in high-paid formal sectors rose from 1989 to 1998. The increased male-female wage differentials mainly took place within the same sector, especially the self-employed sector.

I focuse on studying the gender wage gap within the self-employed sector and find that the differentials on characteristics between male and female could explain forty per cent of the increases in gender wage gap, but the other sixty per cent are unexplainable, which include the effects of discrimination. The education level of women increases as not fast as that of men, more female workers work in rural and work less time than before, and many indigenous female labor force entered into the market, all of these to some extent, caused the great increase in gender wage gap. When I interpret the explainable part of the change on male-female wage gap, selection bias issue is briefly discussed.

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APPENDIX : Regression Results

YEAR 1989

	All-Male	All-Female	Public-M	Public-F	Big Firm-M	Big Firm-F	Sm-Firm M	Sm-Firm F	Self-Em-M	Self-Em-F
ed	0.109	0.120	0.080	0.096	0.096	0.121	0.063	0.067	0.133	0.850
	(38.64)	(34.13)	(15.67)	(11.06)	(24.77)	(20.44)	(8.80)	(8.07)	(19.64)	(8.39)
exp	0.037	0.026	0.029	0.033	0.040	0.036	0.036	0.018	0.042	0.015
	(18.01)	(8.48)	(6.79)	(4.09)	(15.07)	(6.32)	(9.13)	(2.81)	(8.73)	(2.20)
exp2	-0.0005	-0.0004	-0.0003	-0.0004	-0.0005	-0.0005	-0.0005	-0.0003	-0.0005	-0.0002
	(-15.21)	(-6.84)	(-4.50)	(-2.20)	(-11.08)	(-4.31)	(-8.27)	(-2.57)	(-7.97)	(-2.14)
urban	0.293	0.302	-0.003	0.038	0.176	0.196	0.196	0.277	0.384	0.376
	(14.08)	(9.66)	(-0.06)	(0.53)	(7.68)	(3.84)	(6.47)	(5.77)	(8.34)	(6.92)
race	0.414	0.302	0.320	0.127	0.130	0.122	0.164	0.089	0.417	0.439
	(19.67)	(8.06)	(5.01)	(0.77)	(5.79)	(1.63)	(4.99)	(1.59)	(11.23)	(7.43)
loghour	0.386	0.570	0.176	0.127	0.470	0.654	0.521	0.652	0.374	0.563
	(10.10)	(19.03)	(2.85)	(1.67)	(9.09)	(8.36)	(8.99)	(13.18)	(5.25)	(12.94)
constant	2.196	1.429	3.905	3.998	2.328	1.308	2.032	1.527	1.820	1.509
	(14.57)	(11.64)	(14.65)	(14.29)	(11.49)	(4.26)	(8.96)	(6.86)	(6.34)	(8.48)
# of obs.	9382	3365	826	360	3013	792	1651	841	3892	1372
R-squared	0.3434	0.5010	0.4174	0.4374	0.4150	0.5638	0.2226	0.3395	0.2761	0.3625

Note: T-statistics in parentheses.

YEAR 1998

	All-Male	All-Female	Public-M	Public-F	Big Firm-M	Big Firm-F	Sm-Firm M	Sm-Firm F	Self-Em-M	Self-Em-F
ed	0.111	0.110	0.127	0.109	0.120	0.123	0.085	0.100	0.112	0.076
	(28.50)	(18.75)	(12.26)	(7.57)	(20.60)	(12.39)	(11.00)	(8.66)	(13.13)	(5.79)
exp	0.062	0.043	0.030	0.050	0.065	0.045	0.050	0.054	0.062	0.046
	(16.98)	(8.71)	(3.27)	(5.42)	(12.28)	(4.59)	(9.04)	(5.72)	(6.91)	(4.87)
exp2	-0.0008	-0.0005	-0.0004	-0.0008	-0.008	-0.0006	-0.0007	-0.0007	-0.0008	-0.0006
	(-14.14)	(-6.89)	(-2.34)	(-3.87)	(-9.09)	(-2.88)	(-7.48)	(-4.84)	(-7.08)	(-4.63)
urban	0.209	0.356	0.158	0.084	0.273	0.420	0.361	0.327	0.111	0.397
	(6.24)	(6.48)	(1.06)	(0.57)	(5.58)	(3.97)	(6.99)	(3.51)	(1.61)	(4.60)
race	0.212	0.365	0.285	-0.062	0.162	0.376	0.234	0.308	0.220	0.403
	(6.31)	(7.07)	(2.52)	(-0.45)	(3.42)	(3.82)	(4.55)	(4.00)	(3.09)	(4.90)
loghour	0.482	0.637	0.454	0.308	0.437	0.671	0.563	0.622	0.442	0.624
	(9.93)	(17.84)	(3.47)	(3.31)	(6.31)	(6.35)	(5.77)	(12.70)	(5.59)	(12.57)
constant	3.384	2.409	3.739	4.405	3.539	2.260	3.094	2.392	3.608	2.387
	(17.56)	(16.20)	(6.91)	(12.65)	(12.37)	(5.33)	(8.04)	(9.57)	(11.50)	(11.14)
# of obs.	7038	4823	778	685	1882	801	1784	971	2594	2366
R-squared	0.3574	0.4689	0.5697	0.5063	0.4861	0.5796	0.3784	0.4551	0.2648	0.3525

Note: T-statistics in parentheses.