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Sex and the Labour Market: Wage Discrimination in Latin American Manufacturing

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Translog production fucntions are used to determine male and female marginal products. Sex-specific wages are not available but aggregate wages are explained as dependent on capital, the male and female labour productivities, and the male/female shares in employment. These variables relate to each other and to the wage according to alternative discrimination models, emphasizing either the relationship between skill level, productivity and the labour supply slope, or generalized preferences for discrimination in economic agents. The method is tested and the presence of either intercept or angular discrimination confirmed with Brazilian and Colombian data.

I. Introduction

This paper examines the nature of male-female wage discrimination in employment in manufacturing. In contrast with previous studies, its approach does not require the estimation of earnings functions based on individual human capital stocks. There is no need to take sides in the ongoing discussion between supporters of the direct versus the reverse regression discrimination models; the present approach makes that discussion unnecessary. Translog production functions are used to estimate male and female marginal products, which are then compared with the respective wages. The focus on two Latin American countries makes it possible to assess the effect of some particularly interesting characteristics of labour markets. Supplies of unskilled labour are extremely elastic, but supply responsiveness diminishes as higher skills are demanded. Moreover, in this region there seems to be a strong preference for discrimination even in the victims themselves, working women.

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The next section looks at the conventional perspectives on human capital, earnings functions and discrimination. In Section 3 the translog production function is presented. Alternative theoretical models of wages, expressed as functions of the male and female productivities and the female share of employment under different forms of discrimination are developed in Section 4. The empirical estimation is discussed in Section 5. Cross section production functions for Brazil in 1959-60 and 1970-72, and Colombia in 1976 are presented. The respective female shares in manufacturing employment are 22, 23, and 25 percents. The principal conclusions are summarized in the last section, among them that wage discrimination is present in all three cases, although its extension and characteristics change.

II. Male-Female Wage Discrimination

The conventional explanation of individual earnings makes them dependent on personal stocks of human capital, represented by variables such as years of schooling (S), vocational training (T), or on-the-job experience (X). A (male) wage-earner would be paid according to the following earnings function, where W_m represents the wage rate:

$$W_m = m_0 + m_1 S + m_2 T + m_3 X$$

The parameters affecting the female wage (W_f) may be different:

$$W_f = f_0 + f_1 S + f_2 T + f_3 X$$

Wage discrimination (D) is defined as the (positive) male-female wage gap when the right-hand explanatory variables are equal.[1]

[1] All wage discrimination theories are exposed to a serious objection: in a competitive environment and because of their lower labour costs, discrimination-averse firms should eventually push discrimination-prone firms out of business (Sloane (1985)). If discrimination persists, it is because of non-competitive product market structures, or because firms are prepared to meet higher labour costs, and consumes to pay higher prices. In Latin America, indirect but strong evidence suggests that women accept to be paid less than men in equally productive jobs: the threats of emotional stress and other marriage problems caused by the wife bringing home more money than the husband seem to be immense (Boyle (1986)). In Brazilian and Colombian manufacturing, female employment grew faster than male employment during industrialization, from the 1950s to the 1970s (Rosenberg (1982); Humphrey (1984)), possibly as a result of both general expansion of employment opportunities (Hojman (1985)), and some firms taking advantage of female labour's lower cost. Unfortunately, the data available are not sufficiently disaggregated to check whether these firms captured a relatively larger share of product markets.

Table 1

PRODUCTION FUNCTIONS FOR BRAZILIAN MANUFACTURING, 1959-60
(number of observations: 17)

Regressor	Eq. 1:1	Eq. 1:2	Eq. 1:3	Eq. 1:4	Eq. 1:5
Constant term	0.814	20.88	1.078	13.97	18.26
	(1.032)	(3.960)	(1.478)	(2.347)	(4.072)
logK	0.715	-1.166	0.750	-1.385	-0.901
	(6.545)	(2.344)	(6.968)	(2.005)	(2.073)
logL	0.220	-1.642			
	(1.793)	(3.323)			
logK·logL		0.173			
		(3.828)			
logM			0.052	-0.880	-1.535
			(0.443)	(1.058)	(3.658)
logF			0.134	0.788	0.086
			(2.381)	(1.149)	(2.080)
logK·logM				0.174	0.155
				(3.594)	(3.856)
logK·logF				0.033	
				(0.514)	
logM·logF				-0.095	
				(1.124)	
$\bar{R}^2$	0.9245	0.9618	0.9326	0.9657	0.9674
DW:	1.739	1.941	1.728	1.260	1.590

$$D = W_m - W_f = (m_0 - f_0) + (m_1 - f_1)S + (m_2 - f_2)T + (m_3 - f_3)X$$

$$m_i < f_i \text{ for any } i$$

Intercept discrimination is the positive gap between m_0 and f_0. We refer to a positive gap between m_1 and f_1, m_2 and f_2 or m_3 and f_3 as angular discrimination. Attempts at measuring discrimination have been largely unsuccessful for two reasons. Firstly, there are doubts as to whether right-hand variables such as male and female on-the-job training are comparable, as opposed to sex-specific. Married women are expected to take time periodically away from work to give birth. So, firms may train women for doing only those jobs where the disruption caused by several weeks of absence will be minimal.[2] Secondly, conceptual problems have arisen as to what is the adequate measure for discrimination. A reverse regression measure has been proposed, D', which looks at the differences in S, T or X for the same wage level W'.

$$D' = X_f(W') - X_m(W') > 0$$

Several empirical studies have suggested that D' is smaller than D; sometimes the evidence of discrimination disappears when the reverse measure is used (Kamalich and Polachek (1982); Kapsalis (1982)). This outcome should not be surprising; elsewhere we have shown that D' is just a special case of D where no discrimination in the constant term is supposed to exist. D' assumes that m_0 and f_0 are equal (Hojman, 1984). Thus, the direct approach will be more relevant than the reverse one if intercept discrimination is present.[3]

These problems may be overcome by measuring male and female labour productivities directly. According to human capital theory, personal stocks of human capital are related empirically to earnings, only because human capital donations explain individual levels of labour productivity, and earnings are determined by productivity levels. If the male and female marginal products can be measured directly, by estimating production functions, and these marginal products are shown to be different, then the difference can be compared with the wage gap. This procedure should provide a measure of wage discrimination without the need to estimate human capital stocks or to relate these stocks to wage levels through earnings functions.

III. The Translog Production Function

As compared with the more frequently used Cobb-Douglas or CES production functions, the translog one is more general and more flexible on several accounts (Christensen et al. (1971, 1973); Berndt and Christensen (1973a, 1973b, 1974)). It makes it possible to explore relationships and look into production function shapes when these are not well

2 A consequence of this is that the distinction between "male" and "female" jobs is accentuated artificially, and with it the difficulties to substitute one of these types of labour for the other.

3 For further discussion see Solon (1982), Goldberger (1984) and Green (1984) and Ferber (1984).

Table 2

PRODUCTION FUNCTIONS FOR BRAZILIAN MANUFACTURING, 1970-72
(number of observations: 20)

Regressor	Eq. 2:1	Eq. 2:2	Eq. 2:3	Eq. 2:4	Eq. 2:5
Constant term	7.748 (9.036)	8.857 (4.539)	7.882 (7.184)	12.86 (3.439)	12.51 (42.23)
logK	0.398 (4.887)	0.315 (2.022)	0.415 (4.170)	-0.026 (0.078)	
logL	0.476 (5.429)	0.218 (0.526)			
logK·logL		0.019 (0.636)			
LogM			0.352 (3.789)	-1.073 (1.664)	-0.779 (2.702)
logF			0.104 (2.031)	1.111 (1.364)	0.608 (3.252)
logK·logM				0.120 (2.087)	0.100 (5.263)
logK·logF				-0.039 (0.503)	
logM·logF				-0.098 (0.829)	-0.118 (2.704)
$\bar{R}^2$	0.9662	0.9650	0.9540	0.9601	0.9640
DW:	1.498	1.466	1.549	1.522	1.587

known, or to assess to what extent particular pairs of productive factors are complements or substitutes, or the elasticity of substitution can be assumed to be variable. Both Cobb-Douglas and CES are special cases of the translog production function, and empirical estimation of the latter can be carried out using ordinary least squares.[4]

The two-factor case is also known as the nonhomogeneous, variable

4 Theoretical properties and empirical applications of the translog function are presented in Berndt and Wood (1975), Burgess (1975), Humphrey and Moroney (1975), Denny and May (1977), and Fuss (1977).

elasticity of substitution production function. Let X, K and L stand for output, and capital and labour inputs, respectively. Then:

$$X = A_0' \, (K^{**}A_1') \, L^{**}(A_2' + A_3'\log K)$$

$$(1) \quad \log X = \log A_0' + A_1'\log K + A_2'\log L + A_3'\log K \cdot \log L$$

For the properties of this function, see Vinod (1972), Chakravarty and Hojman (1982) or Hojman (1985).[5] If the labour input is divided into its male (M) and female (F) components:

$$(2) \quad \log X = \log A_0 + A_1\log K + A_2\log M + A_3\log F + A_4\mathrm{Log}K \cdot \log M + A_5\log K \cdot \log F = A_6\log M \cdot \log F$$

The marginal products of K, M and F are equal to the partial derivatives dX/dK, dX/dM and dX/dF, respectively. These expressions are quite complex and there is no need to present more than one, since they are all analogous.

$$(3) \quad dX/dM = (A_0K^{**}(A_1 + A_4\log M)) \;\; ((M^{**}(A_2 + A_6\log F) \; (A_2 + A_6\log F))/M) \; + \; A_0((\log K(A_4(1/M)))K^{**} \; (A_1 + A_4\log M)) \; M^{**}(A_2 + A_6\log F)F^{**}(A_3 + A_5\log K)$$

Several specification for the production function and the respective marginal products were estimated with cross-section data for Brazilian manufacturing in 1959-60 and 1970-72, and Colombian manufacturing in 1976. Data on male and female wages disaggregated per industrial branches were not available, although average wages were. It was therefore possible to estimate wage equations, where the branch average wage depends on the marginal productivity of capital, the marginal productivities of male and female labour, and the male and female shares in the branch's total employment.

IV. The Wage Equation

There seems to be general agreement that in the Latin American case average wages in individual industrial branches depend in the first in-

[5] In the present study only the nonhomogenous variable elasticity of substitution or the translog production functions could be used since, as opposed to the Cobb-Douglas or CES, only they could provide marginal products, elasticities of substitution, or returns to scale specific to individual industrial branches.

Table 3

PRODUCTION FUNCTIONS FOR COLOMBIAN MANUFACTURING, 1976
(number of observations: 28)

Regressor	Eq. 3:1	Eq. 3:2	Eq. 3:3	Eq. 3:4	Eq. 3:5
Constant	4.086	4.760	4.206	3.195	4.619
term	(9.993)	(7.485)	(9.504)	(1.805)	(8.698)
logK	0.576	0.428	0.555	0.760	0.471
	(5.724)	(2.917)	(5.093)	(2.061)	(3.252)
logL	0.243	-0.116			
	(1.902)	(0.399)			
logK·logL		0.071			
		(1.368)			
LogM			0.279	0.796	
			(1.504)	(0.814)	
logF			-0.001	-0.597	
			(0.010)	(0.823)	
logK·logM				-0.107	0.046
				(0.571)	(1.448)
logK·logF				0.114	
				(0.711)	
logM·logF				0.005	0.022
				(0.038)	(0.542)
$\bar{R}^2$	0.7811	0.7884	0.7742	0.7668	0.7886
DW:	1.180	1.465	1.199	1.373	1.477

stance on aspect which are related-directly or indirectly-to the respective marginal productivity of capital: the technological level, capital/output ratio, firm size, market share, or profit rate (Souza (1978); Baily (1979); Morley, Barbosa and de Souza (1979); Salazar-Carrillo (1982)). Our dependent variable (W) is therefore the branch wage rate (BW) after controlling for differences in the marginal product of capital (MPK).

$$W = BW / MPK = (1-SH)W_m + SHW_f$$

The male wage equation makes it dependent on male productivity:

$$W_m = a_1 + b_1 \text{ MPM}; \ b_1 > 0$$

SH is the share of female labour in total branch employment, and MPM and MPF are the marginal products of male and female labour, respectively.

In the region there are strong cultural elements supporting preferences for discrmination. In the most general formulation of the model, the female wage depends on female productivity, just like the male wage depends on male productivity, but the respective parameters are different from (possibly lower than, equal to only a fraction of) the male parameters. Furthermore, it is assumed that, in the eventuality that female productivity is so high that the female wage may increase so much that it risks to become higher than the male wage, then women are simply paid the male rate. Several safeguards are therefore built into the system to avoid embarrasement to male workers. For levels of the female wage lower than the male one, W_f depends on MPF; but the application of this rule is suspended if the female wage gets dangerously high: the maximum female wage permitted equals W_m. The female wage equation is:

$$\text{If } W_f < W_m, \text{ then: } W_f = a_2 + b_2\text{MPF}$$

$$\text{But if } a_2 + b_2\text{MPF} > W_m, \text{ then: } W_f = W_m$$

The female parameters a_2 and b_2 are equal to a fraction of the respective male parameters:

$$a_2 = c_1 \ a_1; \ 0 < c_1 < 1$$

$$b_2 = c_2 \ b_1; \ 0 < c_2 < 1$$

The parameters c_1 and c_2 are inversely related to the coefficients of intercept and angular discrimination, respectively (Hojman, 1984). There is no information as to how large the share of women who get paid according to their productivity (SH-SH') is, or the share of women who get paid the male wage (SH'). However, we would expect that in any individual industrial branch, the latter share will be larger the higher MPF is in relation to MPM; SH' would be positively related to the ratio MPF/MPM.

$$SH' = h \ (\text{MPF}/\text{MPM}); \ h > 0$$

The wage equation becomes:

$$W = (1-SH)\ W_m + SH'\ W_m + (SH-SH')\ W_f$$

Substituting and rearranging:

$$(4) \quad W = a_1 + a_1\ (c_1-1)\ SH + b_1\ (1-SH)\ MPM + b_1\ h\ MPF + c_1\ a_1\ SH \cdot MPF + a_1\ h\ (1-c_1)\ (MPF/MPM) - c_2 b_1\ h\ (MPF^{**}2/MPM)$$

Thus, in the most general formulation the average wage depends on SH, MPM, MPF, and the parameters a_1, b_1, c_1, c_2 and h.[6] Successful empirical tests of this model with Colombian data are presented later. All other possibilities, including the complete absence of discrimination, can be derived as special cases of the above. Of particular interest are the case when only angular discrimination is made explicit in the formal analytical model (it provides a good fit, but not the best one for Brazil in 1959), and the rather different case when discrimination is expressed as W_f being a fraction of W_m (which provides one of the best fits for Brazil in 1970). If only angular discrimination is made explicit:

$$W_f = a_2 + b_2\ MPF;\ b_2 = c_2\ b_1;\ c_2 < 1$$

Substituting and rearranging:

$$(5) \quad W = a_1 + (a_2-a_1)\ SH - b_1\ SH \cdot MPM + c_2 b_1\ SH \cdot MPF$$

By contrast, if W_f is expressed as a fraction of W_m:

$$W_f = h'\ W_m;\ h' < 1$$

Substituting and rearranging:

$$(6) \quad W = a_1 + b_1\ MPM + a_1\ (h'-1)\ SH + b_1\ (h'-1)\ SH \cdot MPM$$

The previous general model emphasized what seems to be a strong preference for discrimination in the Latin American case in all the actors involved, including working women themselves. Alternatively, it is possible to emphasize an equally important characteristic of labour markets in many developing countries, namely the elastic nature of labour supplies at low skill levels, which become increasingly rigid as higher skills are

6 Whereas MPK, MPM, MPF, SH and all wages are branch-specific, the same values of the parameters, a_1, b_1, c_1, c_2 and h apply to manufacturing as a whole.

demanded. Under these circumstances, male workers should be in a better position to press for discrimination in their favour, and female workers in a better position to press for the demise of discrimination against them, the higher the own skills and productivity, and the lower the other sex's skills and productivity are. Parameter c_2 (inversely related to the angular coefficient of discrimination) becomes a negative function of MPM and a positive function of MPF.

$$c_2 = c' + c'' \text{ MPM} + c''' \text{ MPF}; \; c'' < 0; \; c''' > 0$$

Substituting and rearranging:

$$(7) \quad W = a_1 + (a_2 - a_1) \text{ SH} - b_1 \text{ SH} \cdot \text{MPM} + b_1 c' \text{ SH} \cdot \text{MPF} + b_1 c'' \text{ SH} \cdot \text{MPM} \cdot \text{MPF} + b_1 c''' \text{ SH}(\text{MPF}^{**2})$$

In addition to the above, we also tested an ad-hoc model of discrimination which cannot be used to estimate structural parameters, but from which elasticities can be obtained.

$$(8) \quad W = f(\text{MPM}, \text{MPF}, \text{SH}); \; dW/d\text{MPM}, \; dW/d\text{MPF} > 0; \; dW/d\text{SH} < 0$$

V. Empirical Estimation

The estimating equations are 1, 2, and 4 to 8. Brazilian data come from Taylor et al. (1980), Humphrey (1984) et al. and Rocca (1985), and Colombian data from UN (1985) and ILO (1984). Cross section production function estimates for Brazil in 1959-60 and 1970-72, and for Colombia in 1976 are presented in table 1 to 3, respectively. These tables are all organized in the same way: successive columns repressent the Cobb-Douglas function with two factors, capital and total labour; the respective translog; the Cobb-Douglas with three factors, capital, male labour and female labour; the respective translog where all the products between logarithms are included; and finally the best fit after deleting insignificant regressors from the previous one.

For both Brazil in 1959-60 and Colombia in 1976 the translog regressions improve on the Cobb-Douglas ones, and at least for Brazil the best fit with three factors is better than the one with two. For Brazil in 1970-72 there is no improvement in relation to the two-factor Cobb-Douglas, but no significant information loss either.[7] These results confirm that the decisions as to use translog functions and to separate aggregate labour into its male and female components are both adequate. MPK, MPM and MPF were estimated using equations such as Equation 3 and its equivalents for capital and female labour, and the respective parameters from the best fits. As a proportion of female productivity, the average MPM is equal to 0.21, 0.70, and 1.40 the average MPF, in Brazil in 1959-60 and 1970-72, and Colombia in 1976, respectively. The exact analytical expressions for the marginal products and the branch-specific actual estimates of them are available from the author on request.

Brazilian wage equations are presented in Table 4. Equation 4:1 corresponds to the theoretical model for Equation 5 after eliminating the regressor SH MPM, insignificant in a previous exercise. The adjusted coefficient of determination is not high, but all estimated coefficients are statistically significant (the SH one at the ten percent level) and signs are as expected. As regards structural parameters, a_1 (the intercept in the male wage equation) is equal to 59, and a_2 (the female intercept) is equal to only 58. This represents significant evidence of intercept discrimination, albeit small (less than two percent). The product of multiplying the parameters c_2 and b_1 (which is equal to the angular coefficient in the female wage equation) is equal to 939. Since c_2 is positive (it is assumed to range between 0 and 1), this is evidence that both b_1 and b_2, the male and female angular coefficients, are significantly positive although the exact value of b_1 is not known. The presence of intercept discrimination is confirmed by this regression, but the presence of angular discrimination is not.

The best empirical fit for Brazil in 1959-60 is, however, Equation 4:2. It corresponds to the theoretical model represented by Equation 7, after the elimination of insignificant regressors. Parameter a_1 is significant and equal to 50; the product of multiplying parameters b_1 and c' is significant at the 20 percent level; and more importantly the product of multiplying parameters b_1 and c''' is significant and positive as expected, and equal to 515. This means that both b_1 and c''' are different from zero, and that if angular discrimination (which is inversely related to parameter c_2) is present, then it diminishes as female productivity increases. Again, the size of parameter b_1 cannot be determined. In the 1959-60 Brazilian case, discrimination seems to be best explained by the theoretical model that emphasizes the relationship between the labour supply slope and the possibility to exert pressure on behalf of or against discrmination.

7 Sahota and Rocca (1985) present two series for labour employed in Brazilian manufacturing in 1970-72: an ordinary one, and one of labour weighted by skills. Regressions were run with both sets of data, but the differences between the original sets, and between results, are minimal. Correlation between the two series is equal to 0.99. The regressions presented in Table 2 were obtained using ordinary labour.

Table 4

THE WAGE EQUATION FOR BRAZILIAN MANUFACTURING, 1959-60 AND 1970-72
(17 and 20 observations, respectively)

Regressor	Eq. 4:1 (1959)	Eq. 4:2 (1959)	Eq. 4:3 (1970)	Eq. 4:4 (1970)
Constant term	59.18	50.06	-354.9	1005.
	(2.851)	(2.853)	(0.269)	(1.219)
SH	-0.913		29.65	-7.520
	(1.924)		(0.906)	(0.472)
SH·MPE	938.9	455.0		
	(3.505)	(1.442)		
SH (MPF**2)		514.8		
		(2.480)		
MPM			0.142	0.106
			(4.738)	(5.727)
SH·MPM			-0.0009	
			(1.301)	
MPF				0.0013
				(0.225)
$\bar{R}^2$	0.4620	0.5274	0.7102	0.6805
DW:	2.232	2.152	1.207	1.253
Elasticities				
MPM				0.83
MPF				0.01
SH				-0.03

For Brazil in 1970-72, the best wage regressions are 4:3 and 4:4, representing the theoretical models of Equations 6 and 8 respectively. Data are expressed in different units, so comparison with 1959-60 is not straightforward. The adjust coefficients of determination are much higher than for 1959-60, but by contrast not all regressors are significant. In Equation 5:3 only the MPM coefficient is significant, and the SH•MPM one at the twenty percent level. Parameter b_1, the angular coefficient of the male wage equation, equals 0.14, and parameter h′, the factor by which W_m is multiplied to obtain W_f, is equal to 0.99. Just like in

1959-60, there is signifícnt evidence that male productivity and the male wage are positively associated. This is conformed by Equation 4:4 (the ad-hoc model), where the male productivity elasticity of the total wage is equal to 0.83, but the female productivity and female share estimated coefficients are insignificant, and their respective elasticities negligible, even if the signs are as expected. Unlike 1959-60, now there is evidence of intercept discrimination, although angular discrimination is clearly present.

As shown in Table 5, in the Colombian case the quality of the fits is better, and possibly related to this, evidence of angular discrimination is much stronger. According to Equation 5:1, the angular coefficients in the male and female wage equations are equal to 0.34 and 0.03, respectively, and both are statistically significant. As regards intercepts, the information on the male and female intercepts conveyed to Equation 5:1 is conflicting. Empirical estimation of the ad-hoc model (Equation 5:2) confirms that the aggregate branch wage is significantly affected by MPM (positively) and by SH (negatively), but the impact of MPF is insignificant. The MPM and SH elasticities are 1.13 and −0.33, respectively. In spite of the problems in determining intercepts, in the Colombian case evidence in support of the presence of angular discrimination seems to be overwhelming.

As opposed to Brazil in 1959-60, in both the 1970-72 Brazilian and the 1976 Colombian cases discrimination seems to be best explained by the theoreteical model that makes discrimination a result of preferences of all the agents involved, including its victims. The difference between the years 1959-60 and 1970-72 in Brazil should not be very surprising: during the "miracle" period labour demand grew faster than supply (Macedo (1977); Morley (1982); Hojman (1985)), which made it difficult to discriminate against women by taking advantage of "unlimited" supplies of female labour.[8] However, discrimination persisted because of cultural reasons, and essentially due to the persistence of the traditional pattern of allocation of male and female roles in the household and on the factory floor.

VI. Conclusions

A method has been suggested to investigate the presence or otherwise, and the quantitative importance of male-female wage discrimination. It is

8 The situation in Colombia during the period is discussed by Berry (1975, 1978), Baily (1979), *IEC* (1981), Rosenberg (1982), and Urrutia (1985).

Table 5

THE WAGE EQUATION FOR COLOMBIAN MANUFACTURING, 1976
(28 observations)

Regressor	Eq. 5:1	Eq. 5:2
Constant term	16.07	1.803
	(3.529)	(1.539)
SH	-46.78	-12.66
	(2.758)	(3.498)
MPM (1-SH)	0.337	
	(2.705)	
SH·MPF	-0.649	
	(2.302)	
MPF/MPM	-4.989	
	(5.471)	
(MPF** 2)/MPM	-0.010	
	(3.137)	
MPM		0.107
		(12.69)
MPF	0.130	0.002
	(6.926)	(0.341)
$\overline{R}^2$	0.9001	0.9467
DW:	2.404	1.526
Elasticities		
MPM		1.13
MPF		0.02
SH		-0.33

based on the direct determination of male and female marginal products using translog production functions where male and female labour are introduced as separate inputs. Average wages are explained as dependent on (apart from the productivity of capital) these productivities, and the male female shares in employment under alternative discrimination models. The method does not require estimating individual human capital stocks, or earnings functions based on these stocks, and therefore it circumvents the recent arguments about the relative merits of the direct against the reverse regression approaches to discrmination. Moreover, not even disaggregated data of male and female wages are necessary.

This approach was tested with cross section Brazilian and Colombian manufacturing data. Despite the typical problems of data availability and reliability affecting developing countries, the empirical estimates of the production functions are good. No information is lost by using translog instead of Cobb-Douglas production functions, or by presenting male and female labour separately rather than jointly, and in some cases the empirical results do improve. The presence of at least some form of discrimination-intercept or angular- is confirmed in all cases. It is also shown that male productivities and average wages are significantly related in all cases. In Brazil before the "miracle" years discrimination seems to have been based on the fact that the supply of female labour was extrenely elastic, whereas during the boom period and in Colombia in the mid 1970s discrimination appears to result to a larger extent from strong preferences for discrimination in all the agents involved. This effect has roots which are social, cultural and educational rather than economic, and other things being equal it is not likely to diminish even if fast economic growth makes female labour relatively more scare.

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