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THAT'S WHAT MAKES THE DIFFERENCE TODAY: AN INTERNATIONAL ANALYSIS OF THE DETERMINANTS OF DISCRIMINATION

Siew Ching Goy and Geraint Johnes

The Department of Economics
Lancaster University Management School
Lancaster LA1 4YX
UK

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Siew Ching Goy
Geraint Johnes

Lancaster University Management School
Lancaster LA1 4YX
United Kingdom

T: +44 1524 592852
F: +44 1524 594244
E: s.goy@lancaster.ac.uk

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ABSTRACT

Data from the ISSP are used to evaluate Oaxaca decompositions of the gender wage gap for a group of 38 countries. The component attributable to different 'prices' in the gender-specific wage equations is then modelled as a function of macroeconomic variables. It is established that increased development and openness lead to reductions in discrimination.

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1 Introduction

Since the seminal work of Blinder (1973) and Oaxaca (1973), a range of methodologies has been developed to analyse and decompose the male-female earnings differential, particularly with the aim of identifying the portion of the wage gap which reflects discrimination. The general conclusion is that females' wages lag behind their male counterparts in almost all countries. The gap has, however, been narrowing albeit typically at a declining rate over time[1]. Based on weekly earnings, female-male wage ratios in the US improved from 61.3% in 1978 to 76.8% in 1993. The figure increased further to 79.4% in 2003 (Blau and Khan, 2007). In other industrialized countries in the 1980s, the gender wage ratios ranged from 77% in Sweden to 61% in UK (Blau and Khan, 1996). If we look at the comparable figures for East Asian Economies in 1995, the ratios hovered around 60%, except for the relatively highly developed country of Singapore, where the ratio reached 73% (Zveglich and Rodgers, 2004). The gender wage gap therefore remains an issue of concern.

Beginning with the work of Juhn *et al.* (1991), a recent generation of studies has begun to pay serious attention to the overall wage structure in explaining the relative wages of different subgroups in the labour market. In doing so, experience in one country is often compared with reference to the distributions of male and female earnings elsewhere. Blau and Khan (1996), for example, find that the gender wage gap in the US is due in large measure to the relatively wide distribution of earnings in that country. If this distribution were as compressed as that in Australia or Sweden, then the gender wage gap in the US would be much smaller than it is now.

A considerable amount of attention has been directed in both developed and developing countries at investigating gender earnings differentials (Altonji and Blank, 1999).Most studies on this issue have concentrated on single countries however. Other recent work has also started to provide a more truly international perspective. Extending the work of Stanley and Jarrell (1998), Weichselbaumer and Winter-Ebmer (2005) compare estimates of the gender wage residual gap across more than 60 countries. They use meta-analytical methods to evaluate the sources of differences in the estimates of the wage gap. In so doing, they establish that issues such as the specification of the wage function and estimation methodology have a bearing on the magnitude of the estimated wage differential. They also find that there are significant differences between countries, but beyond observing that countries differ in their culture they do not explore the sources of these findings.

Two other studies may be seen as obvious precursors to the present paper. The first is by Blau and Kahn (1996), and attempts to explain international differences in the gender wage gap by reference to the distribution of income and a measure of decentralisation of labour relations. Blau and Kahn had access to comparable data for relatively few countries, and as a result the authors are able to model international differences in the wage gap using only bivariate regressions with a very limited number of degrees of freedom. Unsurprisingly in view of this, few of their results

[1] It had persisted for as long as four decades after World War II. In the 1980s the gap had shown the inclination to narrow. Yet, it showed only a little progress in the 1990s (Blau, Ferber, and Winkler 2002; Goldin 1990; O'Neil 2000).

are statistically significant. The second paper is by Weichselbaumer and Winter-Ebmer (2007). This builds on the authors' earlier meta-analysis by including country level variables that reflect the level of development, the participation rate of women in the labour force, legislation on discrimination, and product market competition. They find that the last two of these, in particular, have a strong effect in the expected direction.

In the present study, we use microdata from 38 countries collected as part of the International Social Surveys Programme (ISSP) 2004 to evaluate Oaxaca decompositions of the wage differential between men and women, using a consistent methodology across countries. We then use macrodata from the World Bank's World Development Indicators to provide a vector of explanatory variables which we hypothesise exert an influence on of the residual gender wage gap (the gap that remains after one controls for differences in productivity related factors between men and women). The macrodata that we use allow us to add to the vector of explanatory variables that has been used in earlier work, by considering the impact of industry structure on wage gaps. To the best of our knowledge, ours is the first attempt empirically to build, from a consistent micro dataset, a multivariate model that explains why the extent of (the unexplained component of) the gender wage gap varies.

The paper is structured as follows. In section 2 we develop a theoretical model that helps us understand how macroeconomic conditions can affect the wage gap between men and women. In so doing we draw upon the seminal theoretical contribution of Becker (1957). In section 3, we describe the data and the estimation strategy used in this paper. Empirical findings across nations are discussed in Section 4. The final section presents a summary of the main findings of the study.

2 Conceptual Framework

To provide a framework for understanding the sources of gender wage discrimination, we develop a model of discrimination. Suppose the representative firm faces an inverse demand function of the form:

$$p = \alpha Y - \beta Q \tag{1}$$

where Y is the level of demand in the economy and Q is the firm's sales. It is assumed that the firm sells all it produces and has the production function

$$Q = (M+F)^{\gamma} \tag{2}$$

where M and F respectively denote employment of male and female labour. Labour supply is given by

$$M = \delta w_m - \eta Y \tag{3}$$

$$F = \varepsilon w_f - \theta Y \quad (4)$$

for males and females respectively, where w_m and w_f respectively denote the gender-specific wages. The firm is assumed, following Becker (1957), to engage in taste based discrimination against women, so that it behaves as if the female wage is $(1+d)w_f$. Hence the firm's hedonic profit function can be written as

$$\pi = \{\alpha Y-\beta\, [\delta w_m+\varepsilon w_f-(\eta+\theta)Y]^{\gamma}\, [\delta w_m+\varepsilon w_f-(\eta+\theta)Y]^{\gamma} -\delta w_m^2+w_m\eta Y-(1+d)(\varepsilon w_f^2-\theta w_f Y) \quad (5)$$

Differentiating with respect to w_m and w_f and setting the results to zero yields the first order conditions. It serves us well to assume at this stage that $\delta=\varepsilon$. In this case

$$w_m - w_f = dw_f - [\theta\,(1+d)-\eta]Y/2\delta \quad (6)$$

As expressed in (6), the gap between male and female wages rises with d so long as $\theta Y<2\delta w_f$, and it is readily demonstrated that the wage gap falls as Y increases if and only if $\theta(1+d)> \eta$.. Clearly if $\eta=\theta$ then this condition will hold for any positive value of d. In a cross-national analysis of wage gaps, we should therefore expect to find a negative relationship between GDP *per capita* and gender wage differentials.

There are, of course, other factors that might also be expected to have a bearing on the extent to which the gender wage gap varies across countries. The first of these that we shall consider concerns competition (Weichselbaumer and Winter-Ebmer, 2007). Firms essentially have to pay a cost, in terms of lower profits, in order to apply their gender preference in hiring male workers over female workers of similar or higher qualification. As non-discriminatory firms are willing to hire relatively cheaper (but equally productive) female workers, all other things being equal, non-discriminatory firms should out-perform discriminatory firms. This being so, firms with considerable market power will be better able to practice discrimination than those operating in relatively competitive markets. In common with Weichselbaumer and Winter-Ebmer (2007) we use the Index of Economic Freedom developed by the Fraser Institute to measure the extent of competition.

Factors that influence the overall wage structure - such as the demand for and supply of skills, reflected by the share of various industries in GDP - are also likely to be important in explaining variations in the gender wage gap over time and across countries. When a country experiences a tight labour market as a result of structural transformation and economic growth, firms will opt for technological change in production to combat the effect of relatively high labour cost. This technological change may not be gender neutral. For instance, the rapid adoption of automation in many workplaces has served to reduce the premium on the physical strength of workers, and may therefore have contributed to the increased participation of women. More particularly, to the extent that women are more likely than men to use computers at work, women as a whole may have benefited from the spread of computer technology (Weinberg, 2000). It is also observed that men dominate employment in many blue-collar jobs, particularly those requiring strength. We therefore examine the potential impact that industry mix has on gender wage gaps by including in our model measures of the proportion of output accounted for by agriculture and by manufacturing.

The openness of an economy will also produce changes in the employment and earnings of groups initially subject to discrimination. Openness leads to competitive pressures. Moreover, trade expansion is expected to increase the demand for labour that is relatively abundant in the domestic economy. This means that the shift towards globalisation will have different impacts on gender wage gaps in different countries; countries that are abundant in a particular type of labour are likely to witness an increase in the international demand for goods that embody this type of labour. Thus, trade can help close the gap between sexes – in some countries at least.

Recent work by Seguino (2007) has pointed to the impact that female labour market participation can have on people's attitudes to women in the labour market. Using World Values Survey data, she shows that a higher participation rate leads to more positive attitudes. We might expect these attitudinal changes, over time, to lead to a lowering of discrimination

The above discussion suggests that a number of variables might be expected to influence the extent of pay gaps across the sexes. Using countries as data points, we are able in the work that follows to investigate the contribution of each of these potential sources of variation in discriminatory practice. This allows us to speculate about how gender pay differentials are likely to evolve over time.

3 Data and Methodology

The primary data source for the empirical work that follows is the International Social Surveys Programme (ISSP) 2004 microdata. These data are freely available from http://zacat.gesis.org/. Much of the data in this dataset is of direct relevance in the context of labour market research. For instance, we have data on workers' age, employment status, schooling and earnings. The dataset lacks a measure of actual labor market experience, and so this is proxied (as in many other studies) by potential experience in the work reported below. The major merit of the ISSP dataset is that, for a large number of countries, it provides consistent measures of individuals' characteristics, earnings, and other variables.

A total sample of 52550 respondents is collected among the 38 countries that make up our study. To have a representative sample of wage earners, we restrict our data set to paid employees aged 16 to 64 and working in a full-time job. The final sample has 19378 observations, and women constitute 41.3% of the respondents.

To construct our analysis of the wage differential between sexes, separate male and female (m and f) wage equations for each country are estimated as follows with the individual, i, as the unit of observation[2].

$$\ln w_{ij} = \mathbf{X}_{ij}\,\beta_j + \mu_{ij} \qquad j=m,f \qquad (7)$$

[2] Before the work of Oaxaca (1973) and Blinder (1973) it was conventional to use a gender dummy in the wage regression model as the explanatory variable in explaining gender wage discrimination.

where **X** is a vector of human capital attributes, **β** is a vector of parameters representing the impact of these attributes on wage, and μ is a random error term with zero mean and constant standard deviation. We do not make any correction for sample selection bias; though we recognise that the decision of women, in particular, to participate in the labour market may be non-random, much earlier work suggests that this is not, in practice an issue that greatly distorts the values of coefficients in the earnings equations (see, for example, Johnes, 2002).

As is customary in the empirical analysis of earning functions, **X** captures the productivity of a worker. It includes education and experience. For the educational attainment, two dummies are used for the level of schooling. A unit value is given for the respondents with higher secondary education and above and '0' otherwise. Of those who have completed university degree, it was assigned a value of '1', and '0' otherwise. Due to data limitations, experience is proxied using potential experience in the analysis – (age – years of education -6). This measure of potential experience is likely to be a better proxy for men than women as the latter, in particular married women, experience intermittent work due to family responsibility. As such, the rate of return to experience for women tends to be underestimated using potential work experience (Mincer and Polacheck, 1974), and hence, estimates of gender discrimination may be upwardly biased[3]. Other variables, namely marital status, union status, location (urban *versus* rural domicile) and sector of employment (public *versus* private) are controlled for in the models which we estimate for each country. These regressions exclude occupation variables since labour market discrimination may play a role in occupational attainment.

Average gender earnings differentials may be calculated as:

$$\ln \overline{w}_m - \ln \overline{w}_f = \overline{\boldsymbol{X}}_{\mathbf{m}} \boldsymbol{\beta}_{\mathbf{m}} - \overline{\boldsymbol{X}}_{\mathbf{f}} \boldsymbol{\beta}_{\mathbf{f}} \tag{8}$$

Simple rearrangement yields the familiar Oaxaca decomposition

$$\ln \overline{w}_m - \ln \overline{w}_f = (\overline{\boldsymbol{X}}_{\mathbf{m}} - \overline{\boldsymbol{X}}_{\mathbf{f}}) \boldsymbol{\beta}_{\mathbf{m}} + (\boldsymbol{\beta}_{\mathbf{m}} - \boldsymbol{\beta}_{\mathbf{f}}) \overline{\boldsymbol{X}}_{\mathbf{f}} \tag{9}$$

The gender wage gap in (9) arises from two sources. The first term on the right hand side represents differences in productivity-related wage-determining factors. The second term reflects differences in returns to productivity related factors that males and females receive for the same characteristics. This latter term is therefore conveniently referred to as a measure of unjustified discrimination. We acknowledge it is an imperfect measure since it is not possible to include all potentially relevant characteristics when examining gender wage differentials (at least in the absence of panel data which can be used to allow for the presence of unobserved heterogeneity). Omitted variables can be a source of bias in any analysis, and we must assume that, in our cross-country comparisons, any such biases come out in the wash.

[3] O'Neil and Polacheck (1993) argue that the closing of the actual and potential experience gap among women helps to explain the narrowing of the gender gap in the USA.

It must be noted that in Equation (9) we assume that the prices by which characteristic would be rewarded in a non-discriminatory setting are given by the vector of prices currently attached to male workers, that is β_m. Alternative decompositions are investigated by Oaxaca and Ransom (1994). Using different definitions of the 'true' pay structure will vary the extent of wage residual – though most studies find that this variation is quite slight.

Our empirical strategy is to use the above modeling procedure to ascertain, country by country, the component of the wage gap that is due to characteristics differentials - the first term on the right hand side of equation (9) - and the component that is due to unjustified discrimination – the second term on the right hand side of equation (9). We then seek to explain this latter measure by using each country as a separate data point in a regression of unjustified discrimination against a series of macroeconomic data obtained from the World Bank's World Development Indicators.[4] This allows us to evaluate the effect of macroeconomic environment on discrimination. The explanatory variables considered are GDP *per capita* and the Human Development Index (HDI) as an indicators that reflect a country's well being and economic development; the female labour force participation rate (WLFP); the percentage contributions respectively of agriculture and manufacturing to GDP (AGR, MAN – we also use the sum of these two variables, AGRMAN in some specifications); the ratio of the sum of total exports and imports to GDP (TRADE); the Economic Freedom Index (EFI) as a proxy for the effect of competition; and income inequality as measured by the Gini index (GINI).

Our simple regression model therefore takes the following form:

$$D_i = \text{constant} + aHDI_i + bMAN_i + cAGR_i + dTRADE_i + eGDP_i + fWLFP_i + gEFI_i + hGINI_i + \mu_i \qquad i=1,2\ldots38 \qquad (10)$$

where D represents the measure of unjustified wage discrimination.

Note that the magnitude of the unjustified wage discrimination term expresses in Equation (9) is influenced by the variables incorporated in the earnings model. There are, however, also likely to be unobserved variables that influence the extent of discrimination – that is, variables that do not appear in our dataset, but which reflect heterogeneity across countries. To reduce this unobserved heterogeneity, we supplement our levels analysis (10) with an analysis of the determinants of the change over time in discrimination. By thus performing a regression in first differences, and assuming that unobserved variables do not change over time, we can allow for unobserved heterogeneity between the countries in our sample. To operationalise this, we collected data for two years, 1995 and 2004. It is possible to do this for only 21 countries,[5] and so this part of the analysis needs to be treated with caution.

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[4] We focus on unjustified discrimination as a dependent variable, rather than the whole wage gap, because the source of the difference between these two measures is already known to be the vector of explanatory variables in the wage equations.

[5] 24 countries were surveyed in ISSP 1995. Two countries, namely, Italy and Lithuania are not covered in ISSP 2004 while earnings information is not available for the Philippines. This leaves only 21 countries that match the ISSP 2004 dataset.

Using (9), the change in the wage gap difference (D) between two distinct time periods can be decomposed as follows:

$$D_{04} – D_{95} = \beta_{m04} (\Delta X_{04} - \Delta X_{95}) + \Delta X_{95}((\beta_{m04} - \beta_{m95}) + X_{f04}(\Delta\beta_{04} - \Delta\beta_{95}) + \Delta\beta_{95}(X_{f04} - X_{f95}) \quad (11)$$

where Δ denotes gender difference in the mean value of the explanatory variables and subscripts 04 and 95 represent years 2004 and 1995 respectively.

According to this decomposition, changes in the gender earnings differentials arise from four sources. The first term on the right hand side reflects observable gender differences in characteristics. The second term captures differences in prices for these characteristics. The third term indicates the differences in observable prices for equal characteristics between men and women. The last term measures the differences in individual characteristics between women. The unjustified discrimination therefore is attributed to the last two components in (11).

<TABLE 1 ABOUT HERE>

Descriptive statistics for the main variables used in our analysis appear in Table 1. Those for the microeconomic variables refer to the full sample of 38 countries, and so are based on almost 20000 observations. Those for the macroeconomic variables refer to the 38 country level observations. In view of the fact that the data are drawn primarily from developed countries, they reveal no surprises. We do not report descriptives separately by gender in the table, but it is worth observing that the mean values of both the education variables are slightly higher for women than for men; some 46 per cent of women complete upper secondary education, compared with just 41 per cent of men, and the corresponding figures for completion of university education are 22 and 19 per cent respectively. Women are also more likely than men to be working in the public sector (36 per cent versus 22 per cent).

4 Analysis

Table 2 shows, for each country in our analysis, the adjusted log difference in weekly hour wages between men and women, evaluated using the 2004 ISSP data.[6] In all but two countries, men earned higher wages than women. The gap is largest in Japan (cf Johnes and Tanaka, 2007). Once we adjust for gender differences in characteristics – that is, when we look only at the last term in equation (9) – the extent of the gender wage gap actually widens in many countries. Indeed in the majority of countries, the characteristics effect is negative. This indicates that, by 2004, women have characteristics that, on average, place them better than men in terms of labour

[6] In most countries, the ISSP reports monthly earnings. The weekly hour wage of each individual is then calculated using information from the survey about the individual's typical weekly work hours. For some countries, earnings data are grouped. In this case, the midpoint of each group is used (and, for the top group, earnings are assumed to be 10% above the cut off).

market opportunities. That female wages are, on average, and other things being equal, lower than male wages would appear to be purely due to the price effect. In many countries, low education levels amongst women can no longer be used as justification for the wage gap.[7]

<TABLE 2 ABOUT HERE>

In Table 3, we report the results obtained for the group of 21 countries for which analysis is possible for both 1995 and 2004. The total wage gap has narrowed markedly in Japan, albeit from a particularly wide starting position. It has also narrowed in several east European countries, providing some casual evidence in favour of the view that increased competition in the wake of economic transition has helped reduce gender differentials. In many other countries, however, the wage gap widened somewhat over this period according to our data. This is due to a mix of characteristics and price effects. Increases in the latter (what we have called 'unjustified' discrimination) have been particularly pronounced in Netherlands, Canada, the United States and Australia. It is likely that this is due to a well documented tendency for the gender wage gap to be procyclical (Park and Shin, 2005), the period under consideration being one of sustained growth. Over the same period, there have been large changes in the characteristics effect in Ireland, Poland and Russia. For the latter two countries, this is likely associated with the process of transition. Comparing wage decomposition between 1995 and 2004, the characteristics effect is moving in a direction that is favourable to women in most countries. The price ('unjustified' discrimination) effect is also moving in a favourable direction in some countries – but by no means all.

<TABLE 3 ABOUT HERE>

As we have seen in Tables 2 and 3, discrimination varies across countries. What might explain the variation and persistence in the wage gap across nations despite an improvement in female labour market attributes? Could it be explained by the complexity of changes in the overall macroeconomic environment? To answer this question we now use the above Oaxaca wage residual coefficients to examine the link between macroeconomic environment and the price effect ('unjustified' discrimination) component of the wage gap, taking advantage of the variation in experience that is observed across the countries in our sample. (We focus here on explaining the 'unjustified' discrimination component rather than on explaining the whole of the

[7] This finding should be qualified, however. The ISSP data force upon us the use of a parsimonious specification of the wage equation, and this likely biases downward the proportion of the wage gap that is accounted for by gender differences in characteristics. Moreover, the lack of an actual experience variable in the data means that our measure of work experience is biased upwards for women, thereby making their characteristics appear more favourable than they might truly be. These factors may explain, in some measure, the finding of a perverse sign on the characteristics effect for many countries. Nevertheless, the characteristics of women and men have converged over time in many economies, to the extent that an appropriately weighted average of women's education and years of experience (though not full-time equivalent experience) compares favourably with a similar measure for men.

wage gap because the part that is not due to ‘unjustified’ discrimination is known to be explained by characteristics effects. The results are reported in Table 4.

<TABLE 4 ABOUT HERE>

The first column of Table 4 presents a basic model to explain the variation in ’unjustified’ discrimination. The model is based on a variant of equation (10). The coefficient signs reported in column 1 follow the expected patterns. Instead of using GDP to reflect the income level of a country, we refer to GDP *per capita* since it takes into account the size of population. But *per capita* GDP gives no indication of the distribution of that income within the country. We therefore test the impact on ’unjustified’ discrimination of a measure of equality of income distribution, namely the Gini coefficient. We find that *per capita* GDP is significantly negatively related to the wage residual. An increase in the Gini coefficient, on the other hand, serves to widen the ‘unjustified’ component of the wage gap.

The limitations of GDP as a measure of development are well rehearsed in standard textbooks. To check for the robustness of our finding, we therefore experiment with an alternative measure. To be specific, in column 2 we explore the possibility that the Human Development Index (HDI) has content in explaining variation in the gender wage residual. This index measures the average achievements of countries in three basic dimensions of human development: life expectancy, literacy (education), and standard of living. As such, this measure focuses attention on wider aspects of development than the *per capita* income measurement. Because HDI includes GDP *per capita* in its measurement, a strong correlation between the two explanatory variables is observed (r=0.879) and so, owing to issues of multicollinearity, we have not estimated models in which both variables appear. Once the GDP measure is dropped, the coefficient of HDI is remarkably robust as an explanatory variable in our equation. Results in column 2 indicate that a unit increase in HDI, holding other explanatory variables unchanged, would reduce the (‘unjustified’ component of the) wage gap by 0.636.

To explore further the factors leading to international differences in ‘unjustified’ discrimination, we conduct an indirect test of the model of discrimination proposed by Becker (1957). According to Becker, firms who have a taste preference for hiring male workers must act *as if* they are willing to forgo some income in order to avoid employing female workers of equal productivity. But non-discriminating employers can lower their costs of production by employing female workers of equal productivity as men. Such labour cost saving will allow them to compete successfully against those firms who discriminate against women. In such a setting, growing competition in the product market should eventually weed out employers with discriminatory tastes. To test whether the effect of global competition on the commodity market indeed reduces price differences for the same labour, we extend our simple regression by including a variable for competition (proxied by the Economic Freedom Index, EFI). This index is based on five subcategories[8]. This index is designed to capture the degree of economic freedom in a society. As things turn out, the coefficient on the economic freedom variable is not of the expected sign and statistically insignificantly different from zero at conventional levels (column 3). It is, of course, possible that a purer measure of competition might provide a different result. For instance, low inflation rate and low money supply growth rate will have only a second-order effect on the degree of competition in a society, if they have any effect at all. The size of the public sector may have a neutral impact on competition – at least so long as it does not adversely affect company taxes (Weichselbaumer and Winter-Ebmer, 2007).

To overcome these problems with the economic freedom index, we decided to experiment also with an alternative measure of competition, namely the value of trade (imports plus exports) as a proportion of GDP. This measurement is used to examine the effect of globalization on the occupational gender wage gap by Oostendorp (2004). The coefficient of trade variable is associated with a reduction in gender wage residual, but is only marginally significant.

International trade affects not only the degree of competition; it also induces change in the demand for skilled labour as suggested by trade theory. Changes in the skill composition of the demand for labour are unlikely to be gender-neutral. We therefore add to our list of explanatory variables the shares of agriculture and of manufacturing in GDP as proxies for the demand for skilled labour. Although the results show that shares of agriculture and manufacturing to GDP are directly related to a larger magnitude of the gender wage residual, the coefficients are statistically insignificant.

In column 6, we include the HDI, Gini index, openness to trade, industry mix, and the female labour force participation rate in our specification. All the parameter coefficients follow our *a priori* expectations, except that attached to the Gini index. However, only the trade variable turns out to be statistically significant. HDI and the share of agriculture to GDP fall short of significance.

When we added the share of agriculture and manufacturing together, the parameter coefficients for trade and HDI are statistically significant. The results imply that increases in the HDI and openness tend to reduce the level of discrimination.

<TABLE 5 ABOUT HERE>

Re-estimating variants of equation (10) for the smaller sample of 21 countries leads to the results reported in Table 5. The results are broadly similar to those obtained in the earlier analysis, though there are some exceptions. The coefficient on the agriculture and manufacturing are negative but still insignificant in its effect on ‘unjustified’ wage discrimination. The difference between results displayed in columns 1 and 2 of Table 5 is that the latter uses an instrumental variable for the Gini coefficient. We have included this to try to correct for potential endogeneity between Gini and the dependent variable. As such, an instrumental variable – in this case the

[8] It consists size of government; legal structure and security or property rights; access to sound money; freedom to trade internationally; and regulation of credit, labour and business.

predicted values from a regression of GINI on the ratio of expenditure on education to GDP and trade to GDP ratio- is introduced into the model.[9] As can be observed in the table, instrumenting for GINI has a substantial impact on the size of the coefficient and the impact of this variable becomes highly significant.

Differences in gender wage discrimination encountered by female full-time workers in the 21 countries over the sample period are informative. Nevertheless, the empirical results reported in Tables 4 and 5 should be treated with caution. As noted above, the results may in some measure reflect differences in unobserved characteristics. To net out this effect, we explore the determinants of the change in 'unjustified' discrimination over time. We likewise difference the explanatory variables used in our earlier analysis; note that we do not have a time series for the Gini coefficient, and so this variable is dropped from this part of our analysis. The results are summarised in Table 6.

<TABLE 6 ABOUT HERE>

These results are similar in some respects, but differ in others, from those that emerged from our levels analysis reported in Tables 4 and 5. The key result is that the overall level of development, as captured by the HDI, remains a significant negative influence on discrimination. The trade variable that was significant in our levels analysis now falls short of significance.

Although the coefficient attached to the female labour force participation rate is insignificant, the sign here is interesting and somewhat counterintuitive. One might expect an increase in relative supply to dampen relative wages. But the reverse happens. This may be due to the increased voice offered to women by a large female presence in the labour market. Equally it may be the case that employers statistically discriminate against women, but that the extent of this statistical discrimination lessens as, with increasing participation, they learn more about women's behaviour in the labour market. (Aigner and Cain, 1977).

5 Conclusions

The analysis reported above represents a first attempt to investigate the pattern of unexplained gender wage gaps at international level, using multivatiate techniques on a consistent set of microdata. We conduct the analysis both in level terms and, in order to allow for unobserved

[9] The data on education expenditure to GDP ratio are obtained from World Development Indicators 2006. In an earlier version of the paper we used political stance as an instrument, but a referee pointed out that this would likely be correlated with the dependent variable. For this reason we have chosen educational investment as an instrument that more plausibly influences income distribution but not gender discrimination. We do not, however, believe that our attempt to instrument for income inequality is the last word on this issue. Neither do we believe that a blind eye should be turned to the issue of potential endogeneity of the Gini coefficient simply because a satisfactory instrument is hard to find.

heterogeneity across countries, in first differences. Our results support the argument that higher GDP *per capita* and more intense competition will serve to reduce gender wage residuals. To the extent that there is increasing competition as a consequence of global integration, and to the extent that output grows owing to productivity changes, the gender wage residual due to discrimination will tend to diminish naturally over time.

We find also that openness to trade and the perusal of initiatives to promote economic freedom are associated with a reduction in discrimination in the gender wage gap. These last findings, in particular, suggest that policies to promote development, openness, and economic liberty should, over time, help alleviate the worst effects of discrimination based on gender.

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Table 1: Descriptive Statistics for Main Variables Used in the Analysis

Variable	Mean	Standard Deviation
	Microeconomic Variables	
Proportion completing upper secondary education	0..43	0.50
Proportion completing university education	0.21	0.41
Potential experience (years)	22.10	11.83
Proportion ever married	0.73	0.44
Proportion union members	0.31	0.46
Proportion urban domicile	0.33	0.47
Proportion public sector	0.28	0.45
	Macroeconomic variables	
GDP per capita (2004 US$)	22251.66	15702.67
Economic Freedom Index	7.17	0.78
Gini Coefficient	0.35	0.09
Share of agriculture in GDP	0.04	0.03
Share of manufacturing in GDP	0.19	0.05
Ratio of trade to GDP	0.84	0.36
Human Development Index	0.89	0.07
Female participation rate	0.62	0.09

Table 2: Oaxaca Mean Log Wage Decomposition, 2004

	Characteristics Effect	Price Effect	Adjusted F-M Wage Ratio
Philippines	-0.1733	0.5317	0.6416
Chile	-0.0775	0.4237	0.6538
Uruguay	-0.1387	0.3705	0.7682
Japan	0.1778	0.368	0.4542
South Africa	-0.1983	0.3658	0.8325
Russia	-0.0938	0.3587	0.7351
Poland	-0.1534	0.3301	0.8233
Venezuela	-0.1059	0.3153	0.7906
US	-0.0442	0.3132	0.7310
Latvia	-0.0456	0.3105	0.7351
Bulgaria	-0.1130	0.2995	0.8135
South Korea	0.0657	0.2876	0.6467
Canada	-0.0118	0.2784	0.7334
Slovak Rep	0.0021	0.2768	0.7211
Mexico	0.0303	0.2598	0.7099
Taiwan	0.0172	0.2567	0.7261
Australia	-0.0420	0.2472	0.7948
Czech Rep	-0.0484	0.2445	0.8039
Cyprus	0.0250	0.2424	0.7326
Germany	0.0093	0.2371	0.7536
Portugal	-0.0086	0.2265	0.7821
Switzerland	0.0794	0.2229	0.6977
Finland	-0.0697	0.2184	0.8513
New Zealand	-0.0225	0.2142	0.8083
Brazil	-0.1280	0.2016	0.9264
UK	-0.0012	0.1906	0.8106
Spain	-0.0170	0.1803	0.8367
Norway	0.0027	0.1696	0.8277
France	0.0060	0.1561	0.8379
Austria	0.0106	0.1485	0.8409
Flanders	-0.0304	0.1385	0.8919
Israel	-0.0737	0.1366	0.9371
Hungary	-0.0940	0.1185	0.9755
Sweden	-0.0252	0.114	0.9112
Ireland	-0.139	0.1109	1.0281
Netherlands	0.0527	0.0999	0.8474
Denmark	0.0439	0.0683	0.8878
Slovenia	-0.0607	-0.0998	1.1605

Table 3: Changes in Total Wage Differential Decomposition across 21 Countries, 1995 and 2004

	Changes in Total Wage Gap	Changes in Characteristics Effect	Changes in Price Effect
Australia	0.0610	-0.0443	0.1053
Germany	0.0178	-0.0085	0.0263
UK	0.0685	-0.0172	0.0857
US	0.1216	-0.0330	0.1546
Austria	-0.0571	-0.0426	-0.0145
Hungary	-0.0706	-0.0148	-0.0558
Ireland	-0.2974	-0.1732	-0.1242
Netherlands	0.2065	0.0349	0.1716
Norway	-0.0109	-0.0036	-0.0073
Sweden	-0.0089	0.0090	-0.0179
Czech Rep	-0.1052	-0.0206	-0.0846
Slovenia	-0.1826	-0.0026	-0.1800
Poland	-0.0152	-0.0835	0.0683
Bulgaria	-0.0097	-0.0472	0.0375
Russia	0.0174	-0.1195	-0.1021
New Zealand	0.0624	-0.0500	0.0123
Canada	0.1402	0.0086	0.1487
Japan	-0.1291	0.0256	-0.1036
Spain	0.1075	-0.0282	0.0794
Latvia	0.0108	0.0562	0.0670
Slovak Rep	0.0285	0.0152	0.0437

Table 4: The Impact of Macroeconomic Environment on Gender Wage Residual, 2004

	1	2	3	4	5	6	7
Constant	0.150 (1.649)	0.703 (2.117)	0.795 (2.385)	1.025 (2.805)	0.780 (1.983)	0.962 (2.338)	0.998 (2.434)
GDP per capita	-2.4E-006 (-2.004)						
EFI			0.042 (1.438)				
Trade				-0.090 (-1.848)	-0.109 (-2.142)	-0.132 (-2.483)	-0.133 (-2.506)
HDI		-0.636 (-2.096)	-1.042 (-2.534)	-0.820 (-2.647)	-0.623 (-1.868)	-0.535 (-1.589)	-0.641 (-2.009)
AGR					0.780 (1.298)	0.908 (1.511)	
MAN					0.304 (0.951)	0.224 (0.695)	
GINI	0.390 (1.898)	0.283 (1.214)	0.197 (0.833)	0.052 (0.201)	0.047 (0.180)	-0.104 (-0.373)	-0.045 (-0.164)
WLFP						-0.288 (-1.340)	-0.239 (-1.145)
AGRMAN							0.380 (1.353)
Adjusted R^2	0.277	0.284	0.305	0.330	0.341	0.357	0.357
F	8.086	8.335	6.415	7.078	4.833	4.427	5.117

Note: Figures in parentheses are t values.

Table 5: Regression Analysis Confined to 21 Countries, 2004

	1	2
Constant	1.752	0.357
	(2.442)	(0.563)
HDI	-1.376	-1.181
	(-2.496)	(-2.556)
Trade	-0.157	
	(-2.157)	
AGR	-0.258	-0.178
	(-0.232)	(-0.181)
MAN	-0.322	-0.252
	(-0.596)	(-0.555)
GINI	-0.141	
	(-0.277)	
IV GINI		2.889
		(3.024)
WLFP	-0.048	0.122
	(-0.144)	(0.413)
Adjusted $\bar{R}^2$	0.267	0.421
F	2.215	3.908

Note: Figures in parentheses are t values.

Table 6: Change in Gender Wage Discrimination and Macroeconomic Environment

	1	2	3	4	5	6	7
Constant	0.006	0.112	0.114	0.193	0.195	0.194	0.168
	(0.167)	(2.926)	(2.858)	(2.836)	(2.673)	(2.750)	(2.520)
ΔGDP	1.64E-006						
	(0.538)						
ΔHDI		-3.084	-2.991	-2.987	-3.140	-2.956	-3.120
		(-2.753)	(-2.527)	(-2.592)	(-1.977)	(-2.401)	(-1.842)
ΔWLFP				-0.361	-0.351	-0.362	-0.279
				(-1.410)	(-1.258)	(-1.372)	(-1.033)
ΔAGR					-0.225		-0.026
					(-0.161)		(-0.019)
ΔMAN					0.070		0.005
					(0.169)		(0.011)
ΔAGRMAN						0.034	
						(0.096)	
ΔTrade			-0.039	-0.108	-0.117	-0.110	
			(-0.321)	(-0.850)	(-0.827)	(-0.830)	
ΔEFI							-0.005
							(-0.153)
Adjusted R^2	-0.037	0.248	0.210	0.251	0.154	0.205	0.117
F	0.290	7.578	3.662	3.238	1.729	2.289	1.529

Note: Figures in parentheses are t values.