

Globalisation and Occupational Wage Gap in Developing Countries: 1983-2003

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How does globalisation affect occupational wage gap within developing countries? This paper empirically examines this issue by focusing on two dimensions of globalisation, openness to trade and openness to capital flows, using a relatively new dataset on occupational wages. Estimates from a dynamic model for 37 developing countries spanning the period 1983-2003 suggest that increased openness to international trade has insignificant effect on wage gap. Increased openness to capital flows appears to be associated with an increase in wage gap in middle-income developing countries during the period of analysis.

I. INTRODUCTION

Globalisation, particularly openness to trade, is expected to reduce occupational wage gap¹ by raising the wages of relatively abundant unskilled workers in developing countries. Large amount of empirical evidence, however, suggests the opposite to this conventional wisdom (see Goldberg and Pavcnik 2007, Anderson 2005, Milanovic and Squire 2005). These findings have created an intense debate among academics and policymakers, as many developing countries have undergone significant liberalisation of international trade and capital since the 1980s. It is, therefore, of great interest to understand the impact of globalization on income distribution in general and on wage gap in particular.

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¹ Occupational wage gap (or wage gap) is the difference between skilled and unskilled workers.

Cross-country analysis on the impact of globalisation on occupational wage gap is limited mostly due to the lack of comparable occupational wage data across countries. Recently, internationally comparable wage data “occupational wages around the world” (OWW) became available that have both cross-section and time series observations.² The OWW contains wages for 164 occupations in more than 150 countries for the period 1983-2003. So far only a limited number of studies have used this database to analyse the impact of globalisation on wage gap and obtain evidence contrary to the conventional wisdom (Milanovic and Squire 2005, Te Velde and Morrissey 2004, Majid 2004).

This paper further explores this issue by covering relatively recent period when increased capital flows along with trade play an increasingly important role in the globalisation process. We cover the entire OWW period (e.g. 1983-2003) to examine how increasing trade and capital flows affect wage gap across 37 middle- and low-income developing countries. Wage gap is measured as the ratio of wages of skilled to unskilled workers for the same occupations in all countries where occupations are classified as skilled or unskilled based on educational attainment following the International Standard Classification of Occupations 1988 (ISCO-1988). In contrast to previous empirical findings, we find that increased openness to trade has insignificant impact on wage gap. However, increased openness to capital appears to be associated with an increase in wage gap in the middle-income developing countries during the period of our analysis.

The remainder of the paper proceeds as follows. Section II presents a review of standard theory and relevant empirical literature on globalisation and wage gap, and Section III presents a description of the econometric model and data used in the paper. Section IV presents the econometric analysis and the results, and Section V concludes the paper.

II. GLOBALISATION AND WAGE GAP

The standard model used to investigate the effects of openness to trade on wage gap is the Heckscher-Ohlin-Samuelson model (Samuelson 1953). According to this model, unskilled labour-intensive developing countries will tend to specialise and export unskilled labour-intensive products, while skilled labour-intensive and capital-endowed developed countries will specialise and export skilled labour-intensive products. Thus, increased trade, via the Stolper-Samuelson effect (Stolper and Samuelson 1941), should raise the wages of unskilled workers in developing

² The OWW is International Labour Organisation’s “October Inquiry” (ILO OI) data, standardised by Freeman and Oostendorp (2000). The dataset can be accessed at <http://www.nber.com>.

countries and of skilled workers in developed countries. Hence, under certain assumptions, the model predicts a reduction in wage gap in developing countries and vice versa in developed countries.

Trade liberalisation is often accompanied by policies targeted to liberalise capital markets. The increased capital flows that began in the 1990s are along with trade playing an increasingly important role in the globalisation process. While increased trade may reduce wage gap, increased capital flows, particularly foreign direct investment (FDI), may cause it to increase in a particular country. In a worst case scenario, they may actually both increase the wage gap. The empirical evidence so far provides mixed results of the impact of increased capital on wage gap in developing countries (see Anderson 2005, Goldberg and Pavcnik 2007). Depending on the nature of foreign investment and the level of development of the recipient country, wage gap may either increase or decrease.

To our knowledge, only a few studies use the OWW dataset to analyse the impact of globalisation on wage gap. However, the studies use different methodologies and cover different time periods. Milanovic and Squire (2005) obtain evidence of increased levels of wage gap in poor countries in the 1984-1999 period. Majid (2004) finds similar results. Te Velde and Morrissey (2004) find decreasing levels in some, but not all, East Asian countries in the 1985-1998 period.

III. ECONOMETRIC MODEL AND DATA

This section outlines the empirical model, describes the data, and finally explains the choices of the explanatory variables used in the analysis. The general specification of the empirical model is as follows:

$$W_{it} = \alpha_2 TRA_{it} + \alpha_3 CAP_{it} + \alpha_4 GDP_{it} + \alpha_5 TRA_{it}GDP_{it} + \alpha_6 CAP_{it}GDP_{it} + \theta_t + \eta_i + \mu_{it} \quad [1]$$

where W_{it} denotes the log of the ratio of skilled to unskilled wages in country i at time t . This ratio is the measure of occupational wage gap. The variables TRA_{it} and CAP_{it} denote measures of openness to trade and openness to capital respectively. The coefficient of TRA_{it} is expected to have a negative sign, while the coefficient of CAP_{it} may have a positive or negative sign. The variable GDP_{it} denotes log of GDP per capita, used here as a proxy for the level of development. The two interaction terms, $TRA_{it}GDP_{it}$ and $CAP_{it}GDP_{it}$, denote the logarithms

of the interaction between GDP per capita and openness to trade and the interaction between GDP per capita and openness to capital respectively. Finally, θ_t is a time effect, η_i is a country fixed effect which takes care of unobservable time-invariant heterogeneity across countries, and μ_{it} is the overall error term where i indexes individual countries in a cross section and t indexes time.

III.1 The Occupational Wage Gap

This paper classifies the occupations as either skilled (19 occupations) or unskilled (15 occupations) according to the skill levels used in ISCO-88. The ISCO-88 uses education categories with reference to the International Standard Classification of Education 1976 (ISCED 76) to approximate skill levels.³ Following this, an unskilled worker is at the first ISCO skill level (major group 9: elementary occupations). This corresponds to ISCED category 1 which comprises primary education. Skilled workers are at the fourth ISCO skill level (major group 2: professional) which corresponds to ISCED categories 6 and 7, which comprises a university or post graduate university degree or equivalent. Occupational wage gap is measured by the ratio of wages of skilled to unskilled workers for the same occupations in all countries.⁴ In the OWW, occupational wage data is available for the 64 developing nations.⁵ However, only 37 of the 64 are used in the analysis due to lack of relevant data.

III.2 Explanatory Variables

Globalisation has many different dimensions; outsourcing, immigration, and mobility of goods, services, and capital are some aspects that have been subject to empirical analysis. In this paper we focus on two dimensions of globalisation: openness to trade and openness to capital. Fully satisfactory measures of openness to trade and openness to capital are not available. Reduced tariffs and non-tariff

³ However, in ISCO-88, skills necessary to perform a job can also be acquired by informal training and experience. For instance, the 2nd skill level (e.g., skilled agricultural or fishery workers/plant and machine operator) corresponds to the ISCED categories 2 and 3, which comprise the first and second stages of secondary education. Following ISCO-88, on-the-job training may supplement this education. A list of skilled and unskilled occupations with the corresponding ISCO-88 codes used in this paper is reported in Tables 1 and 2 in the Appendix.

⁴ Te Velde and Morrissey (2004) use a similar measure.

⁵ Countries are classified according to the *World Development Indicator 2006*. The countries included in this study are reported in Table III in the Appendix.

barriers generally indicate reduced trade protection, but these policy variables (particularly the non-tariff barriers) are difficult to obtain and apply. The most commonly used proxies for measuring the consequences of trade policies are the outcome-based measures exports and imports, or the sum of them as a percentage of GDP. An increase in the ratio over time is taken to indicate increased openness to trade. The limitation of these measures is obvious; an increase in the ratio can be influenced by other factors used in the empirical analysis, thus creating an endogeneity problem. Still, we use “import as a percentage of GDP” as a proxy to measure openness to trade. For openness to capital, we use FDI stock as a percentage of GDP as a proxy.⁶

Globalisation may impact skilled and unskilled wages differently depending on a country’s level of development. There are huge differences in GDP per capita (an indicator of level of development) between the countries in the sample. To investigate whether the impact of openness on wage gap varies by GDP per capita, the empirical analysis includes two interaction variables—openness to trade interacted with GDP per capita and FDI interacted with GDP per capita.⁷ Table I presents the descriptive statistics of the variables used in the analysis.

TABLE I
DESCRIPTIVE STATISTICS

Variables (in logarithms)	Mean	Standard Deviation	No. of Observations
Relative wage (the ratio of skilled to unskilled wage)	1.04	0.550	320
Real GDP per capita	8.06	0.932	381
Imports as a percentage of GDP (Openness to trade)	3.40	0.533	381
Foreign Direct Investment stock as a percentage of GDP (Openness to capital)	2.30	1.094	371

⁶ Te Velde and Morrissey (2004) have used this proxy for openness to capital. The data is available at <http://www.unctad.org/fdistatistics>. The data for openness to trade are obtained from the *World Development Indicator 2006*.

⁷ GDP per capita is in constant 2000 international dollars, which is obtained from the Penn World Table 6.2.

III.3 Short-run Impact of Globalisation on Wage Gap

The past level of wage gap is an important determinant of current wage gap since current wages most likely depend on past wages. Therefore we include the lagged dependent variable as an explanatory variable in equation [1] yielding:

$$W_{it} = \alpha_1 W_{i,t-1} + \alpha_2 TRA_{it} + \alpha_3 CAP_{it} + \alpha_4 GDP_{it} + \alpha_5 TRA_{it} GDP_{it} + \alpha_6 CAP_{it} GDP_{it} + \theta_t + \eta_i + \mu_{it} \quad [2]$$

The variable $W_{i,t-1}$ denotes a one period lag of the dependent variable. Allowing dynamics create endogeneity problem. This implies that random effects and OLS estimators will provide inconsistent estimates. However, Fixed Effects (FE) or First Differenced (FD) estimators can provide consistent estimation by transforming the equation to eliminate this source of inconsistency (η_i). The FE estimator is consistent in the case of large T panels (see Bond 2002, Judson and Owen 1999). We have a fairly large T panel (T=21) but the missing values make the average T smaller than 21.⁸ Therefore, we use the first-differenced Two Stage Least Squares estimator (2SLS) proposed by Anderson and Hsiao (1981, 1982). The first-differencing transformation eliminates the country fixed effects from the model:

$$\Delta W_{it} = \alpha_1 \Delta W_{i,t-1} + \alpha_2 \Delta TRA_{it} + \alpha_3 \Delta CAP_{it} + \alpha_4 \Delta GDP_{it} + \alpha_5 \Delta TRA_{it} GDP_{it} + \alpha_6 \Delta CAP_{it} GDP_{it} + \Delta \theta_t + \Delta \mu_{it} \quad [3]$$

The 2SLS is used to estimate equation [3] where two periods lag of the dependent variable is used as instrument for $\Delta W_{i,t-1}$.

IV. RESULTS

The results for equation (3) are presented in Table II.

We do not find any statistically significant impact of openness to trade and its interaction with the GDP per capita on wage gap, implying that the impact of increased trade on wage gap is low at all levels of development within developing

⁸ Judson and Owen (1999) show that the bias of a FE estimator for dynamic models can be up to 20% even when T=30.

countries. This is contradictory to the Stolper-Samuelson prediction of reduction in wage gap in developing countries. There may be several reasons for this finding. As already mentioned, there are huge differences in per capita incomes across countries varying from \$825 or less for low-income countries to \$10,065 for upper middle-income countries (according to WDI 2006). Trade liberalisation may have different effects on wage gap depending on the level of development of a country. The initial levels of wage gap is important; Latin American countries have had relatively higher level of wage gap in the 1980s and 1990s and trade liberalisation is one of the factors contributing to this increase (Goldberg and Pavcnik 2004, Attanasio, Goldberg and Pavcnik 2004). In some of the Asian and African countries trade liberalisation contributed to a reduction in wage gap (Mishra and Kumar 2005, Bigsten and Durevall 2006). This positive and negative effect in different regions can cancel out each other resulting insignificant impact of openness to trade on wage gap in our case. There is also difference in factor abundance in Latin American and Asian countries for which the simple Stolper-Samuelson prediction may be contradictory to empirical findings. Measurement error in developing country data can be another source for the insignificance of the globalisation variable. However, the possibility of omitted variable bias may not be ruled out; there might be some other variables affecting developing country wage gap in cross-section analysis.

TABLE II
GLOBALISATION AND OCCUPATIONAL WAGE GAP

Dependent Variable: Relative Wage	Coefficients
Lagged relative wage	0.536 (1.43)
Openness to trade	0.385 (0.38)
Openness to capital (FDI)	-1.205* (1.97)
GDP per capita	-0.640 (1.27)
Openness to trade × GDP per capita	-0.039 (0.32)
FDI × GDP per capita	0.181** (2.14)
No. of Observations	190

Notes: All variables are in logarithms. Absolute value of t statistic is in parentheses. Linear time trend and constant are included in the regression. Superscripts **, and * denote statistical significance at the 5% and 10% level respectively.

The coefficient for the openness to capital is negative and significant while the coefficient for the interaction term between openness to capital and GDP per capita is found to be positive and significant. This implies that the effect of increased openness to capital on wage gap depends on the GDP per capita. When evaluated at the sample mean of log GDP per capita the short-run effect of openness is 0.257 (standard error =0.008). This suggests a positive partial effects of openness; a 1% increase in openness is associated with an increase in wage gap by 0.26%. Of course, the partial effect will be smaller for poorer countries (i.e. the increase in wage gap less than 26%). For very poor countries the effect may even turn negative, consistent with the Stolper-Samuelson prediction. The robustness of the results discussed above is checked by using another measure of openness: trade as a percentage of GDP. Overall, the main results are qualitatively the same; the coefficients for openness to trade and its interaction with GDP per capita are insignificant and the coefficient for openness to capital variable and its interaction with GDP per capita are significant with the same sign.

IV. CONCLUSIONS

Following standard trade theory increased international trade is expected to reduce wage gap in developing countries. However, trade liberalisation is often accompanied by policies targeted to liberalise capital market. Increased openness to capital, particularly FDI, sometimes decreases wage gap, and sometimes increases it.

This paper analyses whether globalisation in the form of increased openness to trade and capital contributes to a change in wage gap in a panel of thirty seven low- and middle-income developing countries. The empirical evidence here suggests that increased openness to capital (FDI) is associated with an increase in occupational wage gap in middle-income developing countries and this effect weakens for poorer developing countries. A reasonable explanation for this result is that increased FDI may have increased the relative demand for skilled workers relative to the demand for unskilled workers in middle-income developing countries and this increased demand has not been matched by increased supply. A large number of studies have pointed to skilled-biased technological change, related either directly or indirectly to FDI, as one of the most important factors causing wage gap to rise in middle-income developing countries (Behrman, Birdsall and Szekely 2000, Esquivel and Rodriguez-Lopez 2003, Pavcnik 2003). The findings in this paper have important

implications for a country's policy towards trade liberalisation as well as attraction of FDI.

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Appendix 1: Occupations and Country Lists

TABLE 1
SKILLED OCCUPATIONS

# from ILO OI	Occupation	ISCO-88 code
11	Coalmining engineer	2147
14	Petroleum and natural gas engineer	2147
44	Journalist	2451
52	Chemical engineer	2146
61	Occupational health nurse	2230
76	Power distribution and transmission engineer	2143
129	Accountant	2411
133	Computer programmer in insurance	2132
138	Computer programmer in public administration	2132
145	Mathematics teacher (third level)	2310
146	Teacher in languages and literature (third level)	2310
147	Teacher in languages and literature (second level)	2320
148	Mathematics teacher (second level)	2320
149	Technical education teacher (second level)	2320
150	First-level education teacher	2331
151	Kindergarten teacher	2331
152	General physician	2221
153	Dentist (general)	2222
154	Professional nurse	2230

TABLE 2
UNSKILLED OCCUPATIONS

# from ILO OI	Occupation	ISCO-88 code
13	Underground helper, loader in coal mining	9311
21	Hand packer	9322
28	Labourer in textiles	9322
51	Labourer in printing, publishing, and allied industries	9322
56	Labourer in manufacturing of industrial chemicals	9322
58	Hand packer in manufacture of other chemical products	9322
59	Labourer in manufacture of other chemical products	9322
70	Labourer in manufacturing in machinery	9322
80	Labourer in electric light and power	9322
90	Labourer in construction	9312/9313
100	Room attendant or chambermaid	9132
104	Railway vehicle loader	9333
117	Dockworker	9333
123	Aircraft loader	9333
144	Refuse collector	9161

TABLE 3
LIST OF DEVELOPING COUNTRIES (37)

Algeria	Mali
Argentina	Mauritius
Bangladesh	Mexico
Barbados	Mozambique
Belize	Nicaragua
Bolivia	Niger
Burkina Faso	Peru
Burundi	Philippines
Cambodia	Rwanda
Cameroon	Sri Lanka
Central African Republic	St. Lucia
Chad	St. Vincent and the Grenadines
Chile	Thailand
China	Trinidad and Tobago
Colombia	Tunisia
Honduras	Uruguay
India	Venezuela, RB
Madagascar	Zambia
Malawi	