

9-14-2016

Working Paper Number 16006

# Urban-Rural Wage Gaps, Inefficient Labor Allocations, and GDP per Capita

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## Recommended Citation

Artz, Georgeanne M.; Hoque, Maniul; Orazem, Peter F.; and Shah, Urja, "Urban-Rural Wage Gaps, Inefficient Labor Allocations, and GDP per Capita" (2016). *Economics Working Papers*: 16006.

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# Urban-Rural Wage Gaps, Inefficient Labor Allocations, and GDP per Capita

## **Abstract**

Using a newly compiled data set from household surveys from 101 developed and developing countries, we decompose observed urban-rural log wage gaps for each country into the portion explained by skill differences and the unexplained portion. Larger unexplained wage gaps are evidence of labor market distortions that lead to inefficient allocation of labor across sectors and lower country production relative to its potential. We find that on average, eliminating unexplained urban-rural wage gaps raises per capita GDP by 13.9%. Unexplained urban-rural wage gaps are larger in countries with less democratic political systems, higher marginal tax rates, and higher average urban education levels, but are lower in countries with larger government shares of GDP.

## **Keywords**

Urban-rural wage gaps, Efficiency, Labor market policy, Growth, Allocation

## **Disciplines**

Labor Economics | Regional Economics

Urban-Rural Wage Gaps, Inefficient Labor Allocations, and GDP per Capita

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September 2016

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JEL: J01; J31; R1

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## Urban-Rural Wage Gaps, Inefficient Labor Allocations, and GDP per Capita

In many countries, urban wages exceed rural wages even after adjusting wages for differences in labor productivity and the cost of living. Large real wage gaps between equally skilled urban and rural workers are a sign that an inefficient allocation of labor exists by region within a country. The larger the wage advantage earned by urban workers over equally skilled rural workers, the greater the inefficiency. To illustrate the equilibrium, suppose that workers are equally skilled in the urban and rural markets as in Figure 1. If labor was freely mobile across the two sectors, labor would allocate across the two sectors so as to eliminate any wage discrepancy between urban and rural wages, i.e.  $W_U = W_R = P * MP_L$ , where the marginal product would also equalize across sectors. Any reallocation of workers from that equilibrium would result in differential marginal products across sectors and less output in total.

Using the Harris and Todaro (1970) model as an example, suppose a minimum wage is set at  $W_{U'} > W_U$  in the urban market. Employment is constrained in the urban market even as labor supply entry is induced by the higher wage. Then, the equilibrium would equate expected real wages across the two sectors so that

$$W_R = (1 - u) * W_{U'} = \left(1 - \frac{(L_{Us} - L_{Ud})}{L_{Us}}\right) * W_{U'} = e * W_{U'}$$

where,  $e = \frac{L_{Ud}}{L_{Us}}$  is the fraction of urban labor supply that is employed. The urban-rural wage gap is  $\frac{W_{U'}}{W_R} = \frac{1}{e}$ , and so the urban rural wage gap increases as the urban employment rate decreases.

In addition, larger urban-rural wage gaps imply a greater misallocation of labor across the two areas and a larger dead-weight loss compared to the free labor market equilibrium.

While Harris and Todaro emphasized restrictions on wage adjustments as the source of labor immobility, there are numerous ways that a country may limit the ability of workers to

switch from rural to urban markets. The most discussed example is the Chinese hukou system that limits access to social services to residents born in the city. Hukou has been cited as a limitation on rural to urban migration in China that results in large wage gaps between urban and rural markets. However, restrictions on migration are quite common in both developed and developing countries. The United Nations (2013) reports that 80% of the countries have policies in place to lower rural to urban migration. These policies are most common in the least developed countries with 88% limiting internal migration. The simple labor market model would imply that such policies lower efficient allocation of labor and per capita GDP in these countries, but that proposition has been rarely tested empirically.

This study derives estimates of urban-rural wage gaps in 101 countries controlling for differences in observed skills. We find average urban wage advantages of 38%, about half of which cannot be explained by differences in average skills across the markets. We then demonstrate that larger unexplained urban-rural wage gaps lower per capita GDP. Eliminating the wage gap would raise per capita GDP by 13.9% on average, similar to recent findings by Hsieh and Moretti (2015) for eliminating wage gaps across metropolitan areas in the United States. We also show that the unexplained urban-rural wage gaps are tied more closely to economic and political institutions in the country rather than measures of resource endowments or levels of development. The implication is that both developed and developing countries can add to per capita incomes significantly by relaxing constraints on rural to urban migration.

### ***I. Literature Review***

This paper will explore whether wage inequality between equally skilled workers in urban and rural markets leads to lower per capita GDP. This differs from the more commonly explored macroeconomic relationships between inequality and economic growth that have not

distinguished between wage gaps attributable to skill and wage gaps that reflect inefficient labor market allocations.

As reviewed by Galor (2011) and Neves and Silva (2014), empirical evidence suggests that inequality in wealth or income is negatively correlated with economic growth, particularly in developing countries. One explanation that is supported by the data is that households in developing countries face credit constraints that lead to suboptimal investments in human capital, which in turn lowers growth. More unequal societies have a greater incidence of suboptimal investments (Galor and Zeira, 1993). A second explanation, that inequality leads to inefficient redistributive fiscal policies in democracies, has not been supported by the data. In fact, inequality may lead a country toward more democratic institutions to avoid social unrest (Acemoglu and Robinson, 2000).

Another strand of the growth literature has emphasized the role of urbanization and agglomeration in fostering growth. As reviewed by Baldwin and Martin (2004), Annez and Buckley (2009), and Henderson (2010), there are strong theoretical and empirical linkages between the process of urbanization and economic growth. Increased density of workers, customers, educated labor, entrepreneurs, inventors, similar firms, or different firms have all been argued to raise worker productivity. As a result, the migration of labor from rural to urban areas can spur economic development. That migration is induced by the higher wages in urban areas that result from the higher worker productivity.

Some have argued that the process of urbanization does not foster productivity growth. Instead, the industrial revolution forces workers to live in poor environments with high costs of living and high unemployment. In a series of papers examining historical data on the industrial revolution, Jeffrey Williamson and his colleagues have demonstrated that higher urban wages are

not merely compensating for poor living conditions (Williamson, 1981, 1982) but that workers were also compensated for higher urban unemployment with higher wages (Hatton and Williamson, 1991a); and that urban and rural wages responded to sectoral demand shocks in ways that suggested the labor markets were highly albeit not perfectly integrated one with another (Hatton and Williamson, 1991b).

As will be shown, the urban wage advantage commonly observed in the 1800s is found in almost every country of the world today. Young (2013) found that the urban-rural wage gap is responsible for 40% of inequality within countries. If the urban-rural wage gap is simply a reflection of labor productivity differences, compensating differentials or differences in cost-of-living between urban and rural markets, then there are no adverse consequences of the wage gap for economic growth. In Lucas (2004) for example, higher urban wages reflect the greater productivity of time investments in human capital in urban compared to rural markets, and so the higher urban wage induces rural workers to efficiently migrate to urban markets. Similarly, Young (2013) treated the urban-rural wage gap as the outcome of sorting across labor markets according to the latent productivities of migrants.

However, if the urban-rural wage gap is not fully explained by differences in productivity, living costs or compensating differentials, then labor is not being allocated efficiently across markets and the economy will not reach its production possibilities frontier. That possibility was explored by Hsieh and Moretti (2015) who examined wage gaps between metropolitan areas in the United States. Wage gaps that were not explainable by differences in observed labor productivity across cities lowered aggregate GDP by 13.5% relative to what would have been produced had labor been reallocated from low productivity to high productivity cities. If relatively flexible labor markets such as that in the U.S. fail to allocate labor efficiently,

how much greater might be the adverse consequences of inefficient labor allocations in less flexible labor markets? According to a survey of 185 governments' policies (United Nations, 2013), 80 per cent had policies to lower rural to urban migration. This suggests that the great majority of countries engage in policies that, if effective, would result in inefficient labor market allocations. In the next section, we advance a simple model that motivates an empirical strategy for measuring those inefficiencies.

## ***II. Model***

This model is an extension of the formulation advanced by Shukla and Stark (1990), modified to formulate productive externalities due to agglomerations of human capital in urban areas (Romer, 1986; Lucas, 1988). A country is composed of two sectors, urban ( $U$ ) and rural ( $R$ ). The labor force must be in one or the other sector so that  $N = N_U + N_R$ . Consistent with evidence that urban markets have greater returns to human capital than rural markets,<sup>1</sup> we assume that the urban sector benefits from human capital externalities but the rural sector does not.

Production in both sectors depends on the level of employment,  $N_i$  and human capital per worker,  $h_i$  in each sector  $i$ . Profitability in the urban market is given by

$$\pi_U = P_U G(h_U, N_U) = P_U h_U^\gamma F(h_U N_U) - w h_U N_U$$

where  $h^\gamma$  is the externality associated with higher average levels of human capital in the urban market,  $P_U$  is the price of urban output and  $w$  is the wage per unit of human capital. If firms can internalize the value of the externality, the first best allocations of  $h_U$  and  $N_U$  are given by the first-order conditions

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<sup>1</sup> Evidence from developing countries including Yang (1997) in China; Jolliffe (1998) in Ghana; Fafchamps and Quisumbing (1999) in Pakistan; and Godoy et al (2005) in Bolivia all found evidence that returns to education were larger off-farm than on-farm. In fact, returns to schooling on the farm were at or close to zero. Human capital does improve agricultural productivity in modern agriculture settings (Huffman and Orazem, 2007).

$$(1) \quad \frac{\partial \pi_U}{\partial N_U} = P_U h_U^\gamma F'(h_U N_U) - w = 0$$

$$(2) \quad \frac{\partial \pi_U}{\partial h_U} = \frac{\gamma P_U h_U^{\gamma-1} F(h_U N_U)}{N_U} + P_U h_U^\gamma F'(h_U N_U) - w = 0$$

The first term in (2) is the added marginal revenue per worker from the urban agglomeration of human capital. However, firms will typically not be able to coordinate their hiring to anticipate the impacts of their own workers' skills on the productivity of other urban firms. In that case, they would treat  $h^\gamma$  as exogenously determined and they will choose their own  $h$  according to

$$(2A) \quad \frac{\partial \pi_U^f}{\partial h_U} = P_U h_U^\gamma F'(h_U N_U) - w = 0$$

which is the same condition as the one setting the number of urban workers in equation (1). If urban firms do not internalize the external benefits of their decision on human capital per worker, the ratio of marginal products of the number of urban workers and human capital per urban

worker,  $\frac{\partial G/\partial N_U}{\partial G/\partial h_U} = \frac{h_U^\gamma F'(h_U N_U)}{\frac{\gamma h_U^{\gamma-1} F(h_U N_U)}{N_U} + h_U^\gamma F'(h_U N_U)} < 1$ , and so urban firms will hire fewer workers and

have less human capital per worker as a share of output compared to the efficient allocation of labor.

Rural production follows the same production technology as in urban production. Rural profits are characterized by

$$\pi_R = P_R F(h_R N_R) - w h_R N_R$$

There is no externality associated with the hiring decisions of rural firms. The first order conditions are

$$(3) \quad \frac{\partial \pi_R}{\partial N_R} = P_R F'(h_R N_R) - w = 0$$

$$(4) \quad \frac{\partial \pi_R}{\partial h_R} = P_R F'(h_R N_R) - w = 0$$

which also suggests that rural firms will treat human capital per worker and numbers of workers as interchangeable in production.

If wages per unit of human capital equalize across the urban and rural markets, and if urban firms set human capital according to (2A), labor will be allocated across urban and rural firms according to

$$(5) \quad P_U h_U^\gamma F'(h_U N_U) = P_R F'(h_R (N - N_U))$$

Assuming diminishing marginal productivity, as employment in one sector increases, employment in the other must fall. Marginal revenue product will decrease in the sector with rising employment and it will rise in the sector losing employment. If  $P_U h_U^\gamma > P_R$ , then  $h_U N_U > h_R N_R$  so that the urban market will have more workers, more human capital per worker, or both. On the other hand, if firms internalize the human capital agglomeration effect, equation (2) holds, and the equilibrium labor allocation across the two markets would equate

$$(6) \quad \frac{\gamma P_U h_U^{\gamma-1} F(h_U N_U)}{N_U} + P_U h_U^\gamma F'(h_U N_U) = P_R F'(h_R N_R) = w$$

which would result in the most efficient allocation of labor.

Let the allocations of labor and human capital across the sectors determined by equation (5) be designated by  $N_i^f$  and  $h_i^f$ ;  $i=U,R$ ; and let the allocations determined by equation (6) be designated by  $N_i^*$  and  $h_i^*$ . The ratio of the marginal revenue products in the two sectors will be

$$(7) \quad \frac{W_U}{W_R} = \frac{\frac{\gamma P_U (h_U^f)^\gamma F(h_U^f N_U^f)}{N_U^f} + P_U (h_U^f)^{\gamma+1} F'(h_U^f N_U^f)}{P_R h_R^f F'(h_R^f (N - N_U^f))} \geq \frac{\frac{\gamma P_U (h_U^*)^\gamma F(h_U^* N_U^*)}{N_U^*} + P_U (h_U^*)^{\gamma+1} F'(h_U^* N_U^*)}{P_R h_R^* F'(h_R^* (N - N_U^*))} = \frac{w h_U^*}{w h_R^*}$$

The inequality exists because too few workers and too little human capital per worker will be allocated to the urban market under (5), raising the marginal revenue product in the urban market and depressing it in the rural market compared to the labor allocation defined by equation (6).

Note from the right-hand-side of the inequality (7), that with the first-best solution defined by equation (6), the wage gap between the urban and rural market will be defined entirely by the difference in human capital per worker. Wages per unit of human capital will equalize across the two markets.<sup>2</sup>

Without the ability to coordinate employment decisions, economies will not be able to meet the first-best efficient labor allocation in (6). But the economy may not even satisfy the condition in (5) if there are constraints on wage or labor force adjustments. The labor market allocations will be even less efficient than implied by the difference between equations (6) and (5) if there are economic or political institutions that restrict the ability for rural populations to migrate to urban areas, or more generally, that limit wages or employment to adjust to local economic prices or productivity.

Countries have been increasing restrictions on rural to urban migration over time. In 1976, 48% of countries had policies lowering rural to urban migration while 7% had policies encouraging rural to urban migration. By 2013, 80% restricted rural to urban migration while only 2% encouraged it. Of the most developed countries, 67% discouraged migration to the cities, while 88% of the least developed countries had restrictions on rural-to-urban migration. This suggests that the great majority of countries engage in policies that would result in inefficient labor market allocations. In those cases, part of the urban rural wage gap will reflect the inefficient allocation of labor across the two sectors and part will reflect the differences in human capital per worker between the urban and rural markets. The magnitude of the inefficiency will be indicated by the size of the urban rural wage gap that cannot be explained by

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<sup>2</sup> Because rural residents can migrate to urban markets, the greater opportunities for skilled labor in urban markets can be an inducement for greater investments in human capital for rural residents. Jensen (2010) found that families with better information on urban wages invested more in their children's schooling. Boucher *et al* (2009) found that Mexican rural households in areas with established high-skill internal migration networks were more likely to have their children attend school beyond the compulsory level.

differences in human capital between the urban and rural markets. We present the strategy for decomposing the observed gaps into explained and unexplained components in the next section.

### ***III. Explained and Unexplained Urban-Rural Wage Gaps and Labor Allocations***

Based on equation (7), we know the efficient allocation of labor occurs when returns are equal per unit of human capital across the urban and rural markets. Urban and rural wages will differ when labor is allocated efficiently because of differences in productive skills across the two markets. Nominal wages may differ also due to differences in living costs, but real wages per unit of human capital should equalize.<sup>3</sup> Consequently, we require measures of the urban-rural wage gap that are orthogonal to differences in skills or living costs if we are to identify wage-gaps that signal inefficient allocations of labor across markets.

Let the natural log of urban and rural wages be explained by a vector of measured skills,  $X_{ij}$ ,  $i = U, R$ ; an indicator of living costs,  $P_{ij}$ ; a dummy variable indicating urban residence,  $D_{ij}^U$ , and a random error. For each country  $j$ ,

$$(8) \quad \ln(W_{ij}) = X'_{ij}\beta_j + \gamma_P P_{ij} + \gamma_{Uj}^U D_{ij}^U + \varepsilon_{ij}; i = U, R$$

The coefficient  $\gamma_{Uj}^U$  is a measure of the unexplained urban-rural log wage gap in country  $j$ : the difference in log wages between the urban and rural markets after controlling for observable differences in human capital and living costs. Larger magnitudes of  $\gamma_{Uj}^U$  will measure the inefficiency in labor allocation across the sectors.

The expected difference between the observed and unexplained urban-rural log wage gap,

$$(9) \quad E[\ln(W_{Uj}) - \ln(W_{Rj}) - \gamma_{Uj}^U D_{ij}^U] \\ = E[(X'_{Uj} - X'_{Rj})\beta_j - \gamma_P(P_{Uj} - P_{Rj}) + (\varepsilon_{Uj} - \varepsilon_{Rj})] = \gamma_{Uj}^E,$$

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<sup>3</sup> Moretti (2004).

is a measure of the explained wage gap. Because the expected value of the error terms is zero by construction, the average explained real urban-rural log wage gap in country  $j$  is the coefficient weighted difference in average observed attributes,  $\gamma_{Uj}^E = [(X'_{Uj} - X'_{Rj})\beta_j]$ . Therefore,  $\gamma_{Uj}^E$  is the natural log of the right-hand-side relative wage in equation (7).

#### ***IV. Computing the Urban-Rural Wage Gap***

The World Bank has compiled household data sets for a wide variety of developed and developing countries over the years. Many of these data sets are proprietary and can only be accessed with the permission of the country. However, the World Bank made available to us a series of country data sets composed of cell averages based on individuals where the cells are defined by years of schooling completed, age, gender and urban/rural residence. Cells only included individuals in the workforce with wages who are not in school. Ages ranged from 15 to 65. Years of schooling completed ranged from 0 to 20. That implies a maximum of  $(51 \times 21 \times 2 \times 2) = 4,284$  possible cells in any given year although in practice, many cells at the upper and lower ranges of age and schooling were empty. On average, the country data sets had 1,618 cells. When we restricted the analysis to samples of males who were more likely to work for wages, we averaged 1,195 cells out of a maximum of 2,142 male cells. Sufficient data were available for at least one cross-section for 106 countries from all regions and income groups.

For each country and year, we estimated equation (8) using weighted least squares where weights reflected the number of sampled workers in the cell relative to the number in the population. Elements of the vector of productive attributes include linear and quadratic terms in age and education. We included the employment rate for the age, education and gender of the cell as a control for nonrandom sorting into wage labor. We also included a dummy variable if

the cell was composed of male workers. Summary information on these regressions for each country is reported in the Appendix.

As shown in Table 1, urban workers are more educated and slightly older than rural workers. The employment rate is slightly lower in urban markets. The average urban-rural wage gap is 0.38 log points, and roughly half the gap is explained by differences in measured skills and half are unexplained.

Figure 2 shows the distribution of the observed and unexplained urban-rural log wage gaps. The unexplained log wage gap is skewed more towards the left than the observed log wage gap with a mean of 0.18 compared to 0.38. When we restrict the sample to male workers, a very similar pattern of explained and unexplained log wage gaps is obtained.<sup>4</sup> As shown in Figure 3, only 9.5% of the estimated unexplained urban-rural wage gaps are negative and less than 1% are sufficiently negative to lie outside the  $\pm 1\sigma$  band. On the other hand, 91.5% are positive and 30.7% significantly so. While any deviation from a zero gap would imply an inefficient allocation of labor across rural and urban markets, suggesting that we should use the absolute value of the gap, we use the direct estimates as our negative estimated gaps are not significantly different from zero.

If the unexplained urban-rural wage gap leads to inefficient allocation of labor within the country, they will systematically lower overall productivity and per capita income within the country relative to its potential level. However, explained wage gaps that reflect productivity differences will reflect an efficient labor allocation and will not lower per capita income. We test these hypotheses adapting the development accounting specification:<sup>5</sup>

$$(10A) \quad \ln\left(\frac{Y_{jt}}{N_{jt}}\right) = \ln(A_{jt}) + \alpha_k \ln\left(\frac{K_{jt}}{N_{jt}}\right) + \alpha_h \ln\left(\frac{H_{jt}}{N_{jt}}\right) + \alpha_L \ln\left(\frac{L_{jt}}{N_{jt}}\right)$$

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<sup>4</sup> We will report results using both the overall and male urban-rural wage gaps.

<sup>5</sup> See Hsieh and Klenow (2010), equation (2).

$$(10B) \ln(A_{jt}) = \alpha_0 + \alpha_E \gamma_{Uj}^E + \alpha_U \gamma_{Uj}^U + e_{jt}$$

Equation (10A) relates the natural logarithm of Gross Domestic Product per capita in country  $j$  to the natural logarithms of capital per worker, human capital per worker and the intensity of labor force utilization. We measure the first of these by the Penn World Tables measure of capital per worker, the second by average education levels in the urban and rural markets, and the third by the employment rates in the urban and rural markets. The first term,  $\ln(A_{jt})$ , reflects total factor productivity (TFP) in the country. In equation (10B), we hypothesize that the total factor productivity depends among other factors on the efficiency of labor force allocation within the market which we proxy by the magnitude of the unexplained urban-rural wage gap so that  $\alpha_U < 0$ . The explained urban-rural wage gap should not affect the productivity of labor allocations and so we would expect that we should fail to reject the null hypothesis that  $\alpha_E = 0$ . We test these propositions indirectly by inserting (10B) into (10A). We test it directly by estimating (10B), using the Penn World Tables estimates of country TFP as the dependent variable. The result of these estimations are reported in Table 2.

In the left panel, we report the results from estimating equation (10A). We use two measures of the urban-rural log wage gaps, one based on all workers and one based only on male wages to correct for possible labor market selection bias in measuring the urban-rural wage gaps. The qualitative results are similar across the two specifications. GDP per capita is closely related to levels of capital per worker. Employment rates have positive effects on GDP per capita but the estimates are not statistically precise. Average levels of schooling do not affect GDP per capita. However, unexplained wage gaps between the urban and rural markets have large negative effects on GDP per capita. In contrast, the explained urban-rural wage gap has no effect on GDP per capita.

The second panel in Table 2 reports the results of estimating equation 10B) explaining cross country variation in log TFP. We use the same regressors as in our estimate of 10A). As noted by Hsieh and Klenow (2010), TFP need not be orthogonal to physical or human capital. Taken literally, TFP is positively affected by higher urban employment rates while higher rural schooling lowers TFP by a small albeit statistically significant amount. To our primary concern, explained urban-rural wage gaps have no effect on TFP, but larger unexplained urban-rural wage gaps lower TFP in a manner consistent with our presumption of inefficient allocation of available labor resources across the two markets.

The implied impact of the unexplained urban-rural log wage gap is not small. On average, setting the unexplained male urban-rural wage gap to zero would raise country GDP per capita by 13.9%. This is almost identical to the 13.5% implied growth in U.S. GDP from eliminating cross metro wage gaps as found by Hsieh and Morretti (2015).

Figure 4 traces out the observed relationship between actual and potential log GDP per capita across the 101 countries. There are a handful of countries that had negative urban-rural wage gaps and so they lie below the 45 degree line. We could have treated negative and positive gaps symmetrically as implying lower GDP but as there were so few, we left them in their unaltered state. The fitted line through the scatter plot is flatter than the 45 degree line, implying that the percentage gap between actual and potential GDP gets smaller as the countries become more developed.

That last point is made even clearer in Figure 5 which shows the scatter plot of the size of the gap between actual and potential lnGDP per capita against actual lnGDP per capita. For every 10 percent increase in GDP per capita, the urban rural wage gap falls by 0.3%. That suggests that as a country develops, it also eliminates some of the barriers to worker migration

across markets which further benefits the efficiency of resource allocation in the country. We explore the underlying political and economic factors affecting the size of the urban-rural wage gap in the next section.

### ***V. Factors Affecting the Urban-Rural Wage Gap***

From the patterns in Figures 4 and 5, we know that the urban-rural wage gaps shrink with economic development, but there is considerable variation in the size of the urban-rural wage gaps across countries at the same level of per capita GDP. In this section, we explore whether the size of the urban-rural wage gaps changes with government policies regulating the economic and political freedoms. The presumption is that the policies allowing greater individual economic or political choices will tend to equalize utility and wages across urban and rural markets.

Let  $Z_j$  be a vector of economic and political institutions that potentially affect mobility. Elements of  $Z_j$  that restrict migration of resources toward their most productive ends will tend to increase the unexplained urban-rural wage gap as summarized in the regression

$$(11A) \quad \gamma_{Uj}^U = Z_j' \theta^U + \epsilon_j^U$$

Economic and political factors with  $\theta^U > 0$  raise the unexplained urban-rural wage gap while factors with  $\theta^U < 0$  reduce it. For completeness, we also examine how these same factors affect the observed urban-rural log wage gap using

$$(11B) \quad \ln(W_{Uj}) - \ln(W_{Rj}) = Z_j' \theta^O + \epsilon_j^O$$

To the extent that government policies restrict mobility and alter the unexplained urban-rural wage gap, they will also be affecting the observed urban-rural wage gap. We can test whether all the effects of these policies on relative wages lies in their impact on the unexplained gap by taking the difference between 11B) and 11A)

11C)  $[\ln(W_{Uj}) - \ln(W_{Rj})] - \gamma_{Uj}^U = \gamma_{Uj}^E = Z_j'(\theta^O - \theta^U) + \epsilon_j^E$  The coefficient on the vector of political or economic institutions will be the difference between their effects on the observed and unexplained urban-rural wage gaps. If all their effect is through the unexplained gap, the measure of inefficient allocation of labor, then  $(\theta^O - \theta^U) = 0$ . Consequently, the estimated coefficients from 11C) will test whether these economic and political institutions create unexplained gaps in pay between the urban and rural markets without altering the explained wage gap due to skill differences.

We begin our specification of  $Z_j$  with the level and pace of economic development in the country. As noted, more advanced countries have lower urban-rural wage gaps, presumably because more advanced countries, as indexed by the per capita GDP,  $\ln(\frac{GDP}{L})$ , will have better infrastructure for labor market information and migration which should shrink the wage gap. Faster growing countries, as indexed by the GDP growth rate,  $\Delta \ln(GDP)$ , will have more labor shocks which would widen gaps if there are lags in those labor force adjustments to new opportunities. Our other measure used to characterize naturally occurring sources of unexplained wage gaps include the average urban schooling level in the country. Skill-biased technical change has been shown to raise inequality in the most developed economies. If these technologies are typically located in urban markets, they could also increase wage inequality between urban and rural markets.

Two theories relate overall inequality to the magnitude of the wage gap. As argued by Blau and Kahn (1996, 1999), groups at the lower tail of the age distribution are disadvantaged by rising overall inequality and so the urban-rural wage gap would increase as the wage distribution becomes less equal. The Borjas (2014) theory of international migration by skill proposes that it is relative inequality in the rural and urban markets that affects incentives to migrate from the

rural to the urban market. In particular, if there were more wage inequality in the urban than in the rural market, the most able would migrate away from the rural areas, widening the urban-rural wage gap. We measure the overall level of inequality by the proportional wage gap between the 80<sup>th</sup> and 20<sup>th</sup> percentile wages in the economy ( $\ln\left(\frac{W_{80}}{W_{20}}\right)$ ).

Harris and Todaro (1970) believed that institutional rigidities in wages would cause workers to queue in urban markets for access to the high wage jobs. That suggests that the largest wage gaps would be in countries with the lowest urban employment rates, designated as  $\ln\left(\frac{L_{Ud}}{L_{Us}}\right)$  in Figure 1.

Holding fixed these more traditional measures of sources of wage inequality, we add measures of economic and political institutions that can affect the freedom to migrate toward economic opportunity within a country. Acemoglu *et al* (2008, 2014) emphasize the role of democratic institutions on economic growth, arguing that the causality goes in the direction of democracy enhancing growth. One plausible mechanism is that democratic institutions encourage labor mobility that would equalize returns for similar skills and lessen the importance of inefficient allocations of skills across markets. The data used by Acemoglu *et al* (2008) shows the association between the Freedom House measure of democracy and log income per capita in the 1990s. We use the Freedom House Polity index which varies from 0 (absolute dictatorship) to 10 (pure democracy) as our measure of the country's strength of democratic institutions.

There are several measures of economic institutions used by Blau and Kahn (1996, 1999) and Koeniger *et al* (2007) to explain variation in labor market outcomes such as employment or wage inequality in OECD economies. These economic institutions include the extent of the tax wedge between the cost of labor to firms and the return from labor for workers, the extent of government regulation or intervention in the economy, and exposure to international trade. The

exact measures available for industrialized economies are not universally available for poorer countries, so we use corresponding measures of Economic Freedom produced by the Heritage Foundation in their place (Heritage Foundation). Another measure is the proportion of the labor force covered by union bargaining. Again, these measures are not commonly available in less developed countries, but Cingranelli and Richards (2010) provide a measure of worker rights to bargain collectively by country. In our context, institutions that limit labor market flexibility would be expected to increase the urban-rural wage gap.

## ***VI. Results***

In Table 3, we report the results of the models explaining the urban-rural log wage gap. We report results for both the observed and unexplained wage gaps and then the test of the null hypothesis that the two coefficients are equal. Failure to reject the null hypothesis suggests that the overall effect is being driven by the unexplained wage gap, while significant differences between the two must be driven by the explained portion of the wage gap. As we will see, most of the variation in urban-rural wage gaps is due to the unexplained portion of the gap.

The first set of three columns reports the results focusing only on the level and pace of economic development in the country and factors commonly believed to affect wage inequality. As illustrated in Figures 4-5, the urban-rural wage gap declines as per capita GDP increases. Faster increases in GDP raise the urban-rural wage gap, but the effect is not statistically significant. The urban-rural wage gap rises with the level of urban schooling and with the overall level of inequality in the country. For all of these variables, it is the unexplained gap that has the bulk of the response. We cannot reject the null hypothesis of equal coefficients between the observed and unexplained coefficients except for the per capita GDP measure where the coefficient is larger in magnitude for the unexplained gap than the overall gap. However, there is

no evidence supporting the view that unemployed workers are queuing in urban areas for access to higher wage jobs as predicted by Harris and Todaro (1970). In fact, the unexplained wage gap increases with the employment rate in urban areas although the coefficient is not precisely estimated.

When we add the institutional measures in the last three columns, only the average level of urban schooling retains its significant positive effect on the urban-rural wage gap compared to the first columns of results. On the other hand, the institutional measures are jointly significant and explain an additional 12 percent of the variation in urban-rural wage gaps. Of these, three of the institutions have individually significant effects: the level of democracy in the country, the tax wedge, and the degree of government involvement in the economy.

The urban-rural wage gap is smallest in more democratic countries. Combining this result with that in Table 2, more democratic countries would have higher per capita incomes, but for reasons different than emphasized in Acemoglu *et al* (2008, 2014). In our context, a side benefit of democracy is to increase the mobility of labor in ways that reduce wage gaps and improve the efficiency of labor allocations. Acemoglu *et al* (2014) estimated that democracy raises GDP per capita by about 20%. In our setting, going from absolute dictatorship to pure democracy would lower the unexplained urban-rural log wage gap by .36 log points. Using Table 2, lowering the gap by .36 log points raises per capita GDP by  $(-0.36)*(-0.668) = 0.24$  log points or roughly 24%. Going from absolute dictatorship to the average democracy score implies an increased per capita GDP of  $(-.036*7.3)*(-0.668) = 0.176$  log points. Consequently, our estimates are in line with the Acemoglu *et al* (2014) results.

Lower marginal and average tax rates also lower the wage gap and raise per capita incomes. In this case, smaller price distortions associated with lower marginal tax rates improve the allocation of resources across labor markets and raise productivity.

On the other hand, economies that are more heavily influenced by government expenditures and state-owned enterprises have lower wage gaps. It is plausible that these economies administer wages across markets or allocate labor demand more equally across markets in ways that equalize urban and rural wages. However, greater opportunity for collective bargaining would also be expected to normalize wages across markets, but in our setting, the urban-rural wage gap is not significantly affected by collective bargaining rights. Exposure to international trade has been found to affect income inequality (Autor *et al*, 2013) as well (Autor *et al*, 2013), but it does not seem to affect wage inequality across urban and rural markets.

Again, most of the effects of institutions on the urban-rural wage gap are captured by the unexplained portion of the wage gap. In only 1 of 11 cases can we reject the null hypothesis that the coefficient on the unexplained gap is equal to the coefficient on the observed gap. The presumption is that institutions distort the unexplained pricing of relative skills in ways that lead to misallocations of labor across the urban and rural markets, and ultimately, lower the per capita incomes relative to potential. In Table 4, we repeat the regression including only the results for male wages. Because of the greater incidence of nonrandom sorting of women than men into the labor market, we might expect that the results based on samples of men will be less biased by selection. However, while the results in Table 4 are marginally more significant, none of the conclusions are altered.

## ***VII. Conclusion***

Using a newly compiled data set based on household data from 104 developed and developing countries, we explore the factors that influence the size of country urban-rural log wage gaps. Larger wage gaps are evidence of labor market distortions that lead to inefficient allocation of labor across sectors and lower country production relative to its potential. We find that these wage gaps are not driven by the economic circumstance of the country but are determined by the political and economic institutions in the country. Countries with democratic political systems, low marginal tax rates, and a lower incidence of collective bargaining for wages have lower urban-rural wage gaps. However, countries with larger government shares of enterprise ownership and overall production have lower wage gaps. The urban-rural wage gap rises with the education level of the country, consistent with the presumed role of skill-biased technical change.

Thus, the results imply that countries have policies determined by the political and economic institutions that raise inequality and presumably lower labor mobility. These policies include more dictatorial or less democratic political structures, higher marginal tax rates and a higher prevalence of collective bargaining for wages. In consideration that freely mobile labor equalizes wages between urban and rural areas and this minimizes lost potential output due to misallocation of labor across regions in the country, it is advisable to follow policies that reduce wage inequality between urban and rural areas.

Considering these results and its implications, further research could use better measures for local cost of living to better control for the share of the urban-rural wage gap that is due to differential costs of consumer products. However, commodity immobility could also create differences in cost of living, and so it is not obvious that correcting for differences in cost of living is appropriate if the differences in cost of living are themselves evidence of distortions due

to immobility in the economy. It would be fascinating to see if greater wage inequality is tied to future economic growth in the country as well. We would expect that greater inequality lowers growth due to distortions in labor allocation across sectors. It would be interesting to measure labor mobility to see if greater mobility lowers wage inequality consistent with our maintained hypothesis. Past research has not explored the effects of these factors on developing countries in general or on the urban-rural wage gap in particular so the results would provide useful information to take into account for future developmental policies.

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Table 1: Selected Sample means from the *International Income Distribution Database*

	Urban	Rural
Urban-Rural Wage Gap		0.38
Explained Gap		0.20
Unexplained Gap		0.18
Schooling	9.4	8.2
Age	38.6	37.8
Employment Rate	0.71	0.74
Number of cells	133,431	98,700

Table 2: Regressions Explaining log Gross National Product per Capita and log Total Factor Productivity

Variables	A	B	A	B
	$\ln\left(\frac{Y_{jt}}{N_{jt}}\right)$	$\ln\left(\frac{Y_{jt}}{N_{jt}}\right)$	$\ln(TFP_{jt})$	$\ln(TFP_{jt})$
$\ln\left(\frac{K_{jt}}{N_{jt}}\right)$	1.074** (15.2)	1.059** (15.3)	0.013 (1.12)	0.013 (1.02)
Average Education in Urban Areas	-0.011 (0.14)	-0.014 (0.23)	0.013 (1.38)	0.010 (1.08)
Average Education in Rural Areas	0.048 (0.65)	0.051 (0.85)	-0.022** (2.52)	-0.018** (2.26)
Employment Rate in Urban Areas	0.929 (0.81)	1.074 (0.92)	0.642* (1.72)	0.669* (1.76)
Employment Rate in Rural Areas	0.581 (0.50)	0.366 (0.32)	-0.193 (0.99)	-0.205 (1.09)
Explained log urban-rural wage gap: $\gamma_{Uj}^E$	0.094 (0.17)	0.078 (0.14)	0.010 (0.14)	0.061 (0.81)
Unexplained log urban-rural wage gap: $\gamma_{Uj}^U$	-0.668** (2.17)	-0.857** (2.50)	-0.084* (1.90)	-0.087* (1.87)
Constant	-4.696** (4.27)	-4.45** (4.07)	-0.430* (1.72)	-0.443* (1.65)
R <sup>2</sup>	0.85	0.85	0.21	0.22
N(clusters)	179 (101)	179 (101)	143 (74)	143 (74)

\*p<0.10, \*\*p<0.05

Standard errors corrected for clustering across 101 countries for the first panel and across 74 countries for the second panel. Columns labeled A (B) use urban-rural log wage gaps measured across all workers (male workers only).

Table 3: Regressions Explaining the Observed, Unexplained, and Explained Log Urban-Rural Wage Gap

Variables	Observed $\ln\left(\frac{W_{Uj}}{W_{Rj}}\right)$	Unexplained $\gamma_{Uj}^U$	Difference $\gamma_{Uj}^E$	Observed $\ln\left(\frac{W_{Uj}}{W_{Rj}}\right)$	Unexplained $\gamma_{Uj}^U$	Difference $\gamma_{Uj}^E$
$\ln\left(\frac{GDP}{L}\right)$	-.049* (3.57)	-.069** (4.34)	-.024** (2.14)	-0.023 (0.97)	-.019 (0.69)	-0.005 (0.24)
$\Delta\ln(GDP)$	.386 (0.78)	.387 (0.84)	0.017 (0.06)	0.134 (0.31)	0.297 (0.83)	-0.163 (0.59)
Schooling	.024** (2.61)	0.020** (2.17)	0.004 (0.62)	0.031** (3.27)	.023** (2.52)	0.008 (1.31)
$\ln\left(\frac{W_{80}}{W_{20}}\right)$	.072 (1.39)	.061** (2.08)	.011 (0.33)	0.042 (0.96)	0.040 (1.45)	0.003 (0.08)
$\ln\left(\frac{L_{Ud}}{L_{Us}}\right)$	-.081 (0.47)	0.244 (0.91)	-0.325 (1.24)	-0.171 (1.04)	0.160 (0.61)	-0.331 (1.25)
Democracy				-0.024* (1.91)	-0.036** (3.62)	0.012 (1.42)
Fiscal Freedom (Smaller Tax Wedge)				-0.003 (1.59)	-0.003** (2.52)	0.001 (0.60)
Freedom from Government (Lower Government Share of GDP)				0.004** (4.54)	0.002** (2.03)	0.002** (3.77)
Free Trade				-0.0005 (0.26)	0.001 (0.35)	-0.001 (0.81)
Collective Bargaining Rights				0.023 (0.37)	0.077 (1.36)	-0.054 (1.25)
Constant	.605** (3.46)	.322** (2.60)	.174 (1.59)	0.183 (0.78)	0.357* (1.94)	-0.140 (0.94)
R <sup>2</sup>	0.22	0.13	0.09	0.3	0.25	0.19
N (clusters)	179 (101)	179 (101)	179 (101)	178 (100)	178 (100)	178 (100)
Exclusion test on institutions F(5, clusters – 5)				5.6**	7.1**	6.5**

\*p<0.10; \*\*p<0.05

Standard errors corrected for clustering at the country level.

Table 4: Regressions Explaining the Observed, Unexplained, and Explained Log Urban-Rural Wage Gap

$\ln\left(\frac{GDP}{L}\right)$	-0.070** (4.58)	-0.047** (2.73)	-0.023* (2.10)	-0.037 (1.63)	-0.029 (1.13)	-0.007 (0.40)
$\Delta\ln(GDP)$	0.560 (1.26)	0.566 (1.36)	-0.006 (0.03)	0.274 (0.65)	0.433 (1.32)	-0.159 (0.60)
Schooling	0.021** (2.44)	0.016* (1.75)	0.005 (0.75)	0.027** (3.04)	0.019** (1.99)	0.008 (1.24)
$\ln\left(\frac{W_{80}}{W_{20}}\right)$	0.072 (1.48)	0.049* (1.71)	0.022 (0.66)	0.046 (1.11)	0.032 (1.12)	0.014 (0.44)
$\ln\left(\frac{L_{Ud}}{L_{Us}}\right)$	-0.130 (0.72)	0.187 (0.72)	-0.317 (1.28)	-0.214 (1.29)	0.113 (0.44)	-0.327 (1.30)
Democracy				-0.026** (2.35)	-0.030** (3.41)	0.004 (0.58)
Fiscal Freedom (Smaller Tax Wedge)				-0.002 (1.35)	-0.003* (2.04)	0.001 (0.58)
Freedom from Government (Lower Government Share of GDP)				.004*** (4.08)	0.002* (1.87)	0.002** (3.41)
Free Trade				0.0005 (0.29)	0.001 (0.73)	-0.0005 (0.42)
Collective Bargaining Rights				0.074 (1.30)	0.081 (1.47)	-0.007 (0.22)
Constant	0.474** (2.64)	0.338** (2.74)	0.136 (1.34)	0.137 (0.61)	0.319* (1.91)	-0.182 (1.33)
R <sup>2</sup>	0.27	0.15	0.12	0.37	0.24	0.19
N	179 (101)	179 (101)	179 (101)	178 (100)	178 (100)	178 (100)
Exclusion test on institutions F(5, clusters – 5)				5.5**	6.6**	4.2**

\*p<0.10; \*\*p<0.05

Standard errors corrected for clustering at the country level.

Figure 1: An Illustration of the Harris-Todaro (1970) Model of the Urban-Rural Wage Gap

Assume all workers have identical skills

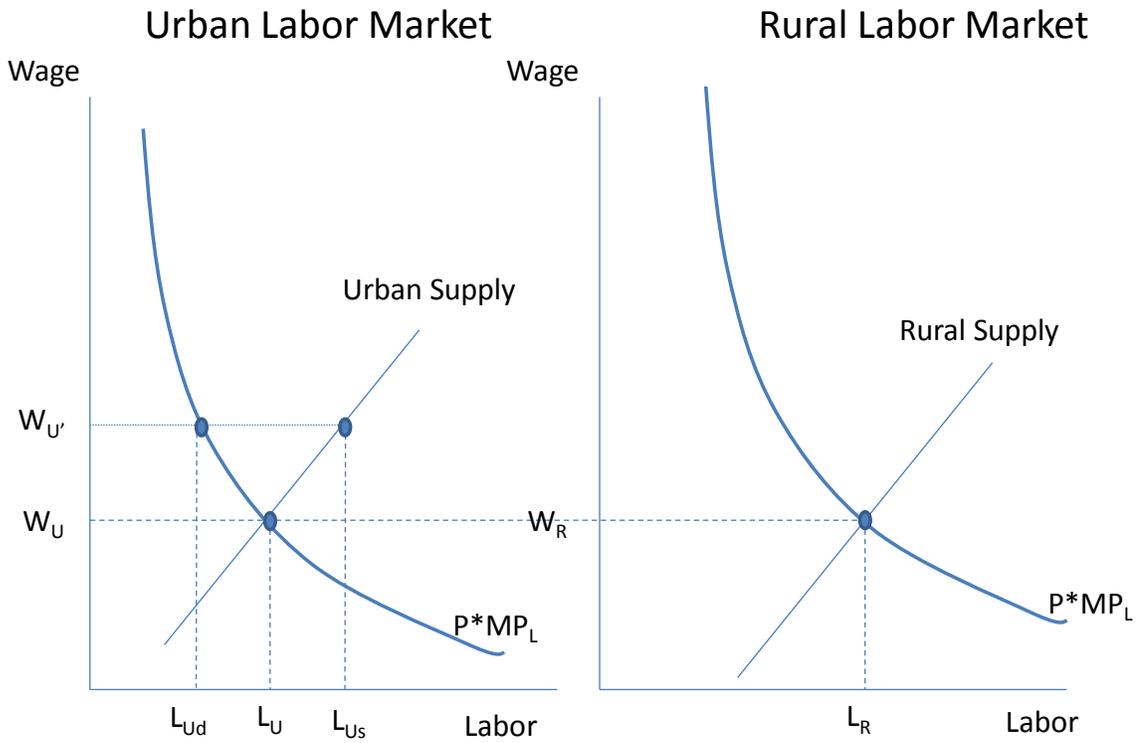


Figure 2: Distribution of Observed and Unexplained Rural Log Wage Gap

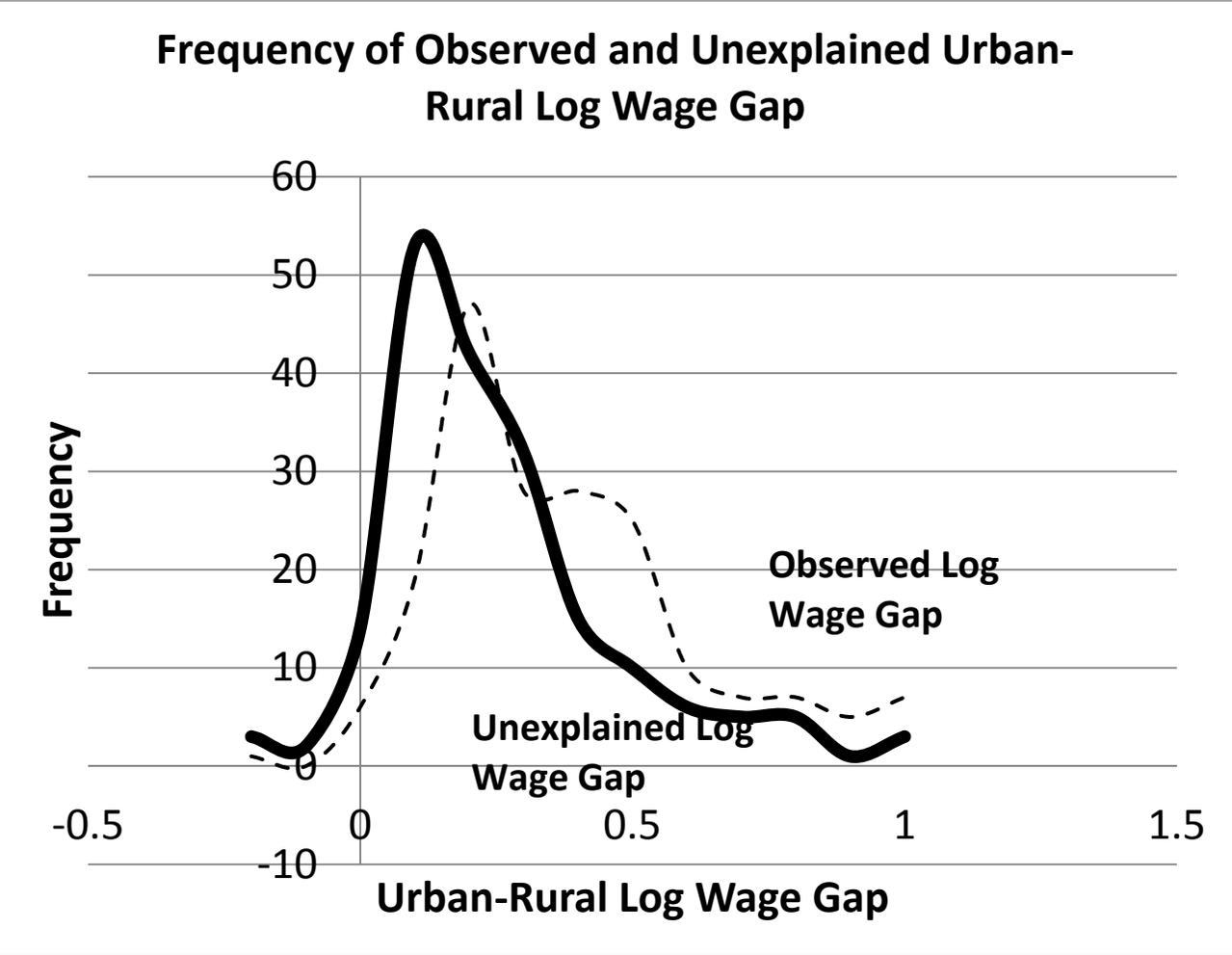


Figure 3: Distribution of Unexplained Urban-Rural Log Wage Gaps with bounds

### Distribution of Unexplained Urban-Rural Wage Gaps, Various Countries

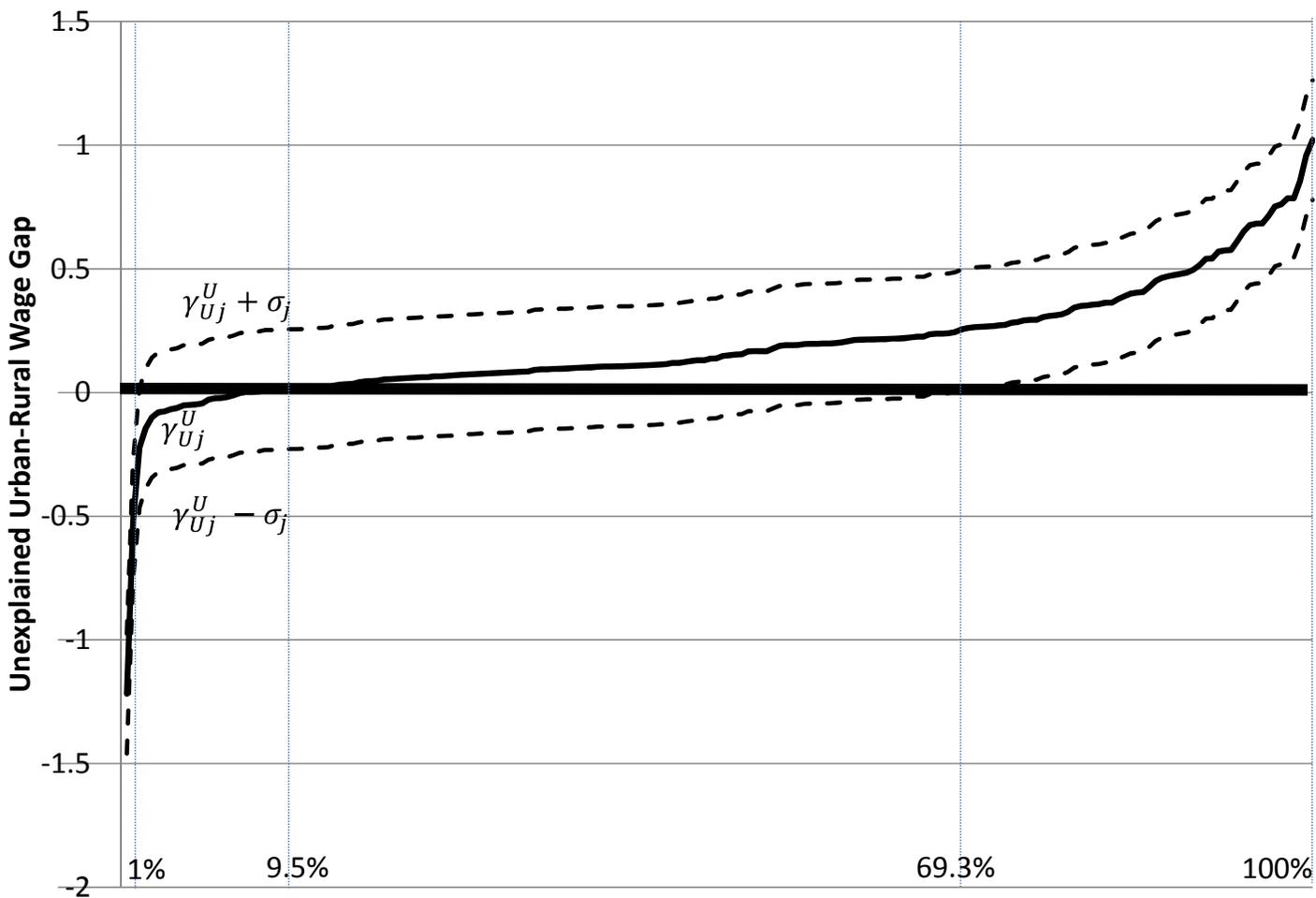


Figure 4: The gap between actual and potential GDP per capita in 101 countries

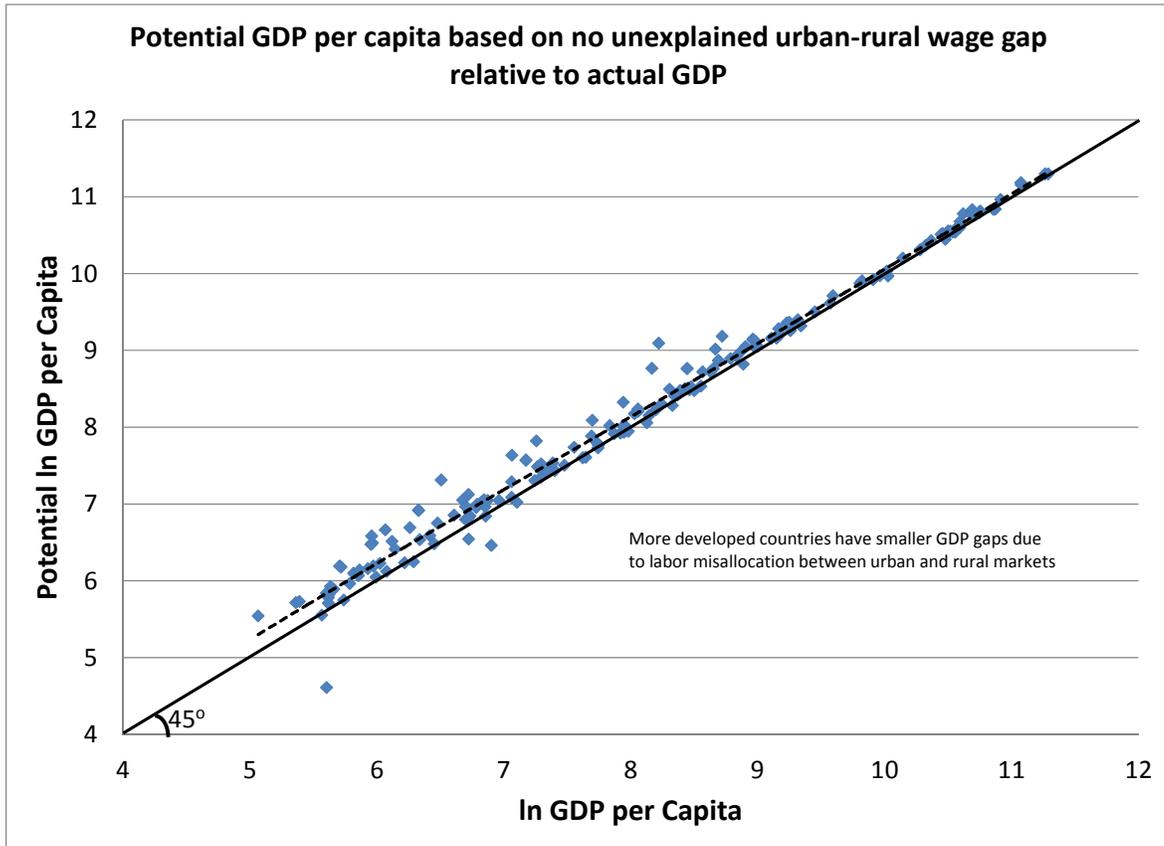
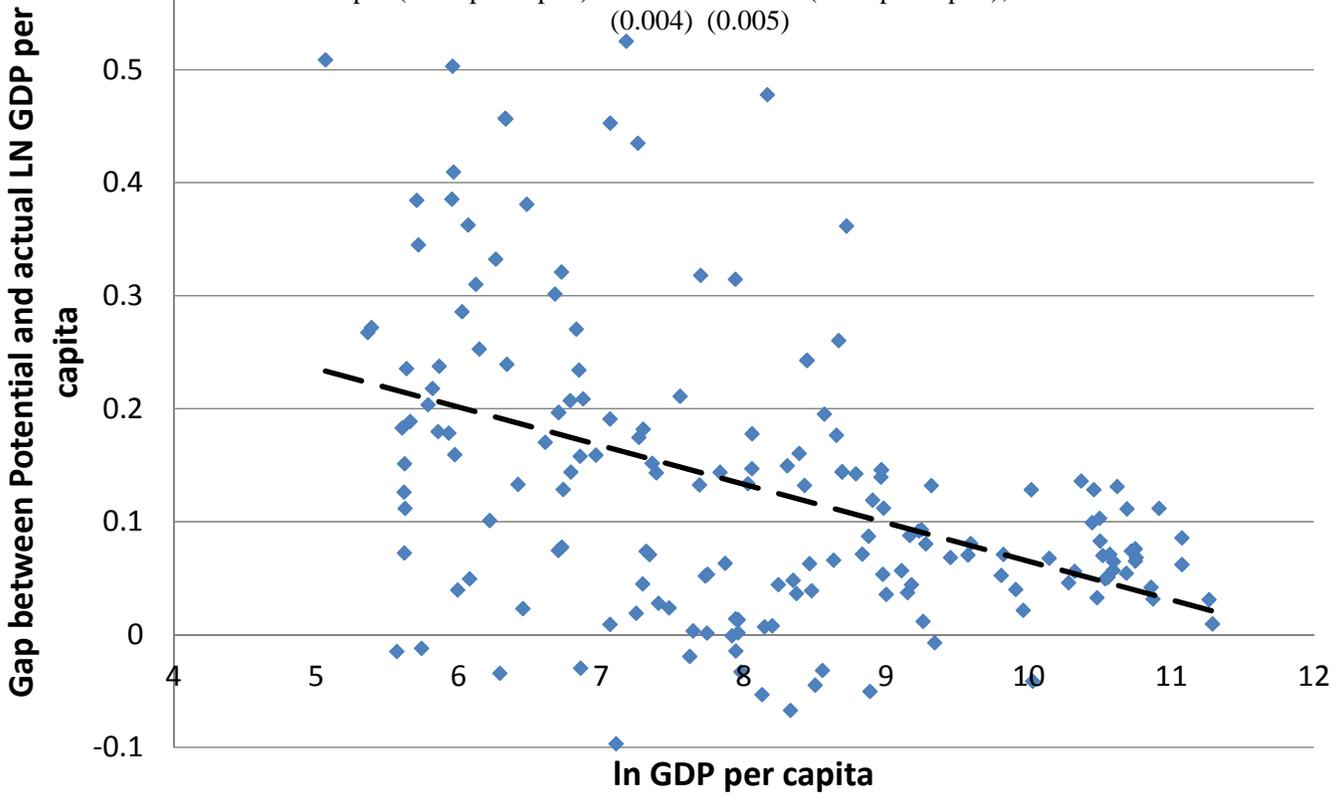


Figure 5: Increase in log GDP per capita if the urban rural unexplained wage gap were eliminated in 101 countries

### Potential gain in ln GDP per capita from eliminating the unexplained urban-rural wage gap, various countries

$$\text{Gap ln(GDP per capita)} = 0.40 - 0.034 * \text{ln(GDP per capita)}; R^2 = 0.20$$

(0.004) (0.005)



**Table A1: Data****Appendix**

<b>Variable</b> (source, mean, std. dev. )	<b>Description</b>
Workers Rights (Cingranelli and Richards, 2010) 0.95 (0.62)	Is the average measure of workers' freedom of association at their workplaces and the right to bargain collectively with their employers. This variable indicates the extent to which workers enjoy these and other internationally recognized rights at work, including a prohibition on the use of any form of forced or compulsory labor; a minimum age for the employment of children; and acceptable conditions of work with respect to minimum wages, hours of work, and occupational safety and health. A score of 0 indicates that workers' rights were severely restricted; a score of 1 indicates that workers' rights were somewhat restricted; and a score of 2 indicates that workers' rights were fully protected during the year in question
Democracy (Freedom House/Imputed Polity) 7.29 (2.71)	Scale ranges from 0-10 where 0 is least democratic and 10 most democratic.
Fiscal Freedom (Heritage Foundation) 71.8 (13.0)	Fiscal Freedom (Tax Wedge) is composed of three quantitative components in equal measure: The top tax rate on individual income, the top tax rate on corporate income, total tax revenue as a percentage of GDP. In the fiscal freedom factor, each of these numerical variables is weighted equally as one-third of the factor. This equal weighting allows a country to achieve a score as high as 67 percent based on two of the components even if it receives a score of 0 percent on the third. The country's fiscal freedom ranges between 0 and 100, where 100 represent the maximum degree of fiscal freedom.
Freedom from Government (Heritage Foundation) 65.4 (25.3)	Freedom from Government scoring of the freedom from government factor is based on two components: Government expenditure as a percentage of GDP, Revenues generated by state-owned enterprises (SOEs) and property as a percentage of total government revenue. Government expenditure as a percentage of GDP is weighted as two-thirds of the freedom from government factor score, and revenue from SOEs is weighted as one-third. In cases where SOE data does not exist, the data is excluded from the factor score. The country's freedom from government ranges between 0 and 100, where 100 represent the maximum degree of freedom from government.
Trade Freedom (Heritage Foundation) 69.8 (14.8)	Trade Freedom score is based on two inputs: The trade-weighted average tariff rate, Non-tariff Barriers (NTBs). Weighted average tariffs is a purely quantitative measure and accounts for the basic calculation of the score. The presence of NTBs in a country affects its trade freedom score by incurring a penalty of up to 20 percentage points, or one fifth of the maximum score. The country's trade freedom ranges between 0 and 100, where 100 represent the maximum degree of trade freedom.
GDP growth (World Development Indicators) 0.04 (0.04)	Annual log GDP growth rate represents the annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
GDP per capita in	GDP per capita (constant 2005 US dollar) is gross domestic product divided by

constant 2005 US dollars (World Development Indicators) 10396 (16486)	midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2005 U.S. dollars.
$\ln\left(\frac{L_{Ud}}{L_{Us}}\right)$ -0.28 (0.11)	Log of employment rate in (employed/population) urban areas. Computed by the authors.
lnW80/W20 1.30 (0.69)	Measures the overall level of inequality by the proportional wage gap between the 80 <sup>th</sup> and 20 <sup>th</sup> percentile wages in the economy. Computed by the authors.
Schooling 10.5 (2.6)	Average years of schooling in the urban labor market. Computed by the authors.