

The Large-Firm Wage Premium in Developing Economies

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Abstract

Large firms pay higher wages. In developing economies, the large-firm wage premium is comparable to the average gap between male and female wages, or two-thirds of the gap between urban and rural wages. There is substantial variation across countries in the share of the premium that is explained by sorting of human capital into large firms.

The average large-firm wage premium declines in national income and has declined over time. Across industries, it is highest in public utilities and commerce. These stylized facts suggest several hypotheses about differences between labor markets in developing and advanced economies.

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Introduction

Larger firms pay higher wages. Moore (1911) first observed this regularity among Italian textile mills, and a subsequent literature has established the large-firm wage premium (LFWP)---or the positive difference between wages paid by large firms and those paid by small ones---as a stylized fact of the labor market. Here, we offer the first systematic comparison of the LFWP across developing economies, using a common regression specification and harmonized controls from 69 surveys of individual income across 25 developing economies compiled by the World Bank.

A worker's wage summarizes their productivity as well as any rents associated with employment in a particular firm. Prior LFWP literature (e.g., Brown and Medoff, 1989; Abowd, et. al., 1999, Troske, 1999) has been primarily concerned with identifying whether the observed LFWP is due to the sorting of higher ability workers into larger firms (worker effects), or due to large firms paying higher wages to otherwise similar workers (firm effects). Overall, sorting is understood to explain at least half of the effect, though its contribution may vary depending on national context, as we confirm here.² Identifying this sorting effect requires a panel of workers with firm identifiers, which is not commonly available, especially in smaller low-income economies or in a format that is comparable across many countries at once. We address this issue in the cross-section by employing a heuristic benchmarking technique that reports the magnitude of potential sorting on unobserved worker quality.

The analysis reveals five stylized facts about the LFWP in developing economies. First, conditional on occupation, education and experience, the LFWP is comparable to the average gap between male and female wages, or two-thirds of the gap between urban and rural wages. Second, the LFWP has been declining over time, consistent with what is observed in advanced economies (Bloom, et. al., 2018). Third, the LFWP is also declining in national income.³ Fourth, there is large variation across countries in the share of the premium explained by sorting on human capital (i.e., education and experience), conditional on occupation. Fifth, the LFWP in developing economies is low in manufacturing relative to commerce, a pattern that is reversed in advanced economies (Berlingieri, et. al., 2018). In concluding

² For instance, in Brazil, Menezes-Filho, Muendler, and Ramey (2008) find the premium to be entirely explained by selection, whereas in Ghana and Kenya, Söderbom, Teal, and Wambugu (2005) find that a substantial portion remains unexplained.

³ The LFWP has been estimated in several developing economies, but its variation with income has not been tested systematically. See, for instance, Dobbelaere (2004) on Bulgaria; Funkhouser (1998) on Guatemala; Söderbom, Teal, and Wambugu (2005) on Kenya and Ghana; Schaffner (1998) on Peru; and Velenchik (1997) on Zimbabwe.

remarks, we discuss several hypotheses that emerge from these facts regarding systematic differences between the labor markets of developing and advanced economies.

Data

The International Income Distribution Database (I2D2) is a harmonized database of households and individuals drawn from nationally-representative surveys, built to compare income equality across countries. Depending on the country, the I2D2 draws observations from different types of surveys, usually conducted by national statistical agencies, including Household Budget Surveys, Household Income and Consumption Surveys, Labor Force Surveys, and multi-topic surveys (such as Living Standards Measurement Study Surveys). It includes major economies such as Bangladesh, China, Vietnam, Mexico and Chile. Crucially, along with hourly wages, the data include the size of the worker's firm, along with indicators of worker demographics, occupation, industry and wage.

We restrict attention to the 69 surveys (25 countries) in which data on the size of the employer firm are provided, which cover 1988-2015. Where data are available, I2D2 includes a categorical variable for the size of the workers' firm (for instance, <100 employees, between 100-500 employees, or more than 500). The breakpoint used varies across countries however, and in the lowest income countries very few or zero individuals report working at firms with more than 500 employees, or even 100. For this reason, to maximize the number of countries in the sample, we define the LFPW as the (log) difference in wages between those workers in firms with 100 or more employees, and those workers in firms with fewer employees. The share of workers in our sample in large firms ranges from 31 percent in China and 26 percent in Chile, to 0.5 percent in Mali and 0.3 percent in the Comoros.

Results

The LFPW is estimated using the following regression specification, for worker i , in a survey in country k and year t :

$$\ln(\text{wage}_i^{k,t}) = \alpha^{k,t} + \theta \text{Large}_i + \mathbf{X}_i \boldsymbol{\beta} + \mathbf{W}_i \boldsymbol{\gamma} + \varepsilon_i^{k,t}$$

where $\text{wage}_i^{k,t}$ is the hourly wage (in real dollars, at current exchange rates); Large_i indicates whether worker i 's employer has more than 100 employees; $\alpha^{k,t}$ is a country year fixed effect accounting for productivity differences across countries and years; \mathbf{X}_i is a vector of Mincerian worker characteristics (i.e. age, age squared, and dummies for completion of primary, secondary and tertiary education);

$W_i^{j,k}$ is a vector of job characteristics (i.e., industry and occupation fixed effects); and $\varepsilon_i^{j,k}$ is a normally distributed i.i.d. error term. The parameter of interest is θ . In some specifications, we run this regression at the country-year or industry level, allowing for more flexibility in parameter values.

Table 1 presents estimates of this equation, pooling all country years. Column 1 shows the raw unconditional LFWP, at 0.340 (standard error = 0.0116), implying that, across all countries, wages are on average 34 percent higher in firms with more than 100 employees. Column 2 adds 9 industry fixed effects, which change the coefficient little. Column 3 adds occupation fixed effects, which reduce the premium to 0.276 (s.e. = 0.0118). Column 4 adds the Mincerian human capital controls for schooling and experience, reducing the premium further to 0.180 (s.e. = 0.0125), or an 18 percent difference. The substantial decline in the premium once controlling for occupation indicates that job requirements have specific effects on wages, as does the human capital embodied in the education and experience of the worker. Both factors play a role in explaining the observed (unconditional) premium.

A concern with hedonic wage regressions is that the parameter θ could reflect sorting of workers into firms: selection on unobserved aspects of human capital, not captured by average quality of worker in the occupation (col. 3), or Mincerian human capital controls (col. 4). Such selection would imply the parameter does not have a causal interpretation, though it still accurately measures an empirical compensation differential between firms of different sizes in the labor market. Nunn and Wantchekon (2011), building on the insight of Altonji, Elton and Taber (2005), propose a ratio to gauge how large selection on unobservables would have to be to explain an observed premium. Comparing column 3, which conditions on job observables, and column 4 which adds the Mincerian controls, the ratio is $0.180/(0.276-0.180) = 1.875$, indicating that selection on unobservables must be at least 1.875 times selection on observables to explain the entire premium measured in column 4.

Bloom et al. (2018) show that in the United States, the LFWP has been declining within industries since 1980.⁴ To test for this trend, column 5 adds a linear time trend to the regression, which shows a decline in the LFWP over time of -8.72 percentage points per decade.

⁴ They find that this decline is explained largely by a decline in the extent to which large firms pay the same workers more, rather than a decline in the quality of workers at large firms.

It is helpful to summarize the LFWP by benchmarking its magnitude to other persistent wage differentials observed in the literature: the gender wage gap (Goldin, 1992, Altonji and Blank, 1999, Blau and Kahn, 2017), and the urban-to-rural wage gap (Harris and Todaro, 1970, Glaeser and Mare, 2001, Combes et. al., 2008, Young, 2013, Jones, D'Aoust, and Bernard, 2017).⁵ Column 6 adds dummies for whether the worker is female and whether the worker lives in an urban, rather than rural, area. In this specification, the LFWP is almost identical in absolute value to the average discount of female wages to male wages, once controlling for occupation, industry, education and experience. The urban wage premium however remains larger by approximately 50 percent. Column 7 interacts the urban and female dummies with the large firm dummy, to test for heterogeneity in the LFWP by location and worker. The interaction with urban is positive and significant, indicating that the large firm wage premium is even higher in urban areas. The interaction with female is positive but not significant, and also smaller than the urban premium in magnitude.

The LFWP across developing economies and sectors

An unanswered question in the LFWP literature has been whether the premium varies across countries and levels of development. To investigate the question systematically, we estimate the wage premium separately for each survey, allowing more flexibility in parameters, for instance the returns to human capital as well as occupation and industry wage differentials. Table 2 shows the results of specifications identical to columns 3 and 4 of Table 1 estimated at the country level with year fixed effects, as well as the Nunn and Wantchekon (2011) ratio introduced above. This analysis reveals that across developing economies, there is substantial variation in the importance of human capital sorting in determining the LFWP.

This variation emerges among countries with similar GDP per capita: In Chad for instance (real GDP per capita: \$863), the ratio of selection on unobservables required to explain the LFWP (conditional on occupation and industry) must be as large as 2.1 times the observed selection on education and experience. In the Kyrgyz Republic (real GDP per capita: \$921), this ratio must be 25.1 times. Further, in Moldova and Nicaragua, the LFWP actually rises when conditioning education and experience,

⁵ Oi and Idson (1999) take this approach in U.S. data and find an LFWP of 35%: comparable to a gender gap of 36% of men over women, and greater than the wage gap of 14% for white over black employees. They also find that the premium is larger for men and larger in the United States than in France, Germany, Italy, and Japan.

suggesting that there can be negative sorting, with workers with *less* human capital selecting into large firms. Clearly, the ability of observable and unobservable human capital to explain the LFWP varies substantially across national contexts.

To investigate whether the LFWP varies systematically with level of national income, Figure 1 displays the LFWP as in column 4 of Table 1, which includes Mincerian controls, and a best fit line between the points. Though there is substantial variance in the premium, with even negative point estimates in Bangladesh, Nicaragua, Honduras and Guatemala, this overall slope is statistically significant and negative, at -0.09 (s.e. = 0.037). Further, there is less variance in the estimates as income increases.

Past literature has also been concerned with whether the LFWP varies across industries. Figure 2 displays the LFWP estimated separately for each industry, with fixed effects for country year, and the same controls as in column 4. Some of the differences are not surprising. The premia for public utilities and public administration workers may reflect rents associated with government employment. The high coefficient on commerce however, which encompasses wholesale and retail trade, is surprising given findings from advanced economies. Berlingieri, Calligaris and Criscuolo (2018) identify larger premiums in manufacturing relative to services in OECD countries and argue that this may be explained by a stronger correlation between firm-size and productivity in manufacturing relative to services.

Concluding Remarks

Taken together, these new comparable cross-country results suggest several interesting hypotheses regarding labor markets in developing economies, which warrant further inspection from researchers.

First, that the LFWP is smaller than the urban rural wage gap suggests that average productivity differences across space may be larger than across firms within a location. If true, this would suggest that aggregate productivity may be more responsive to moving factors out of rural and into urban areas, relative to reallocating factors to more productive (larger) firms within cities.

Second, if the LFWP is declining in national income, as observed in Figure 1, it must be that either structural frictions (e.g., access to finance, monopoly rents, higher monitoring costs within firms, or worker search costs) are more pronounced in poor countries, or alternatively that unobserved worker human capital (for instance trustworthiness, which is relevant in the absence of effective legal

institutions) is disproportionately important in determining wages in poor countries. For the LFWP to be declining over time, as observed in Table 1, one of these factors must also be declining in its importance in determining wages.

Third, the cross-industry results specifically suggest that in developing economies, the firm-size productivity correlation might, if anything, be stronger in services, specifically in wholesale and retail trade, relative to manufacturing, contrary to what is observed in advanced economies. One potential underlying reason is the predominance of small informal (and less productive) businesses in the wholesale and retail sector specifically in developing countries (LaPorta and Shliefer, 2014). Another potential explanation may be that a lack of contract enforcement affects the services sector more disproportionately, for instance due to higher monitoring costs, driving a higher LFWP that compensates for unobservable human capital, such as trustworthiness.

Tables and Figures

Table 1: Real Wages and Firm Size

VARIABLES	(1) ln(wage)	(2) ln(wage)	(3) ln(wage)	(4) ln(wage)	(5) ln(wage)	(6) ln(wage)	(7) ln(wage)
Large	0.340 (0.0116)	0.335 (0.0114)	0.276 (0.0118)	0.180 (0.0125)	0.252 (0.0149)	0.162 (0.0124)	0.118 (0.0160)
Female						-0.167 (0.0103)	-0.176 (0.0121)
Large X Female							0.0314 (0.0214)
Urban						0.243 (0.0130)	0.235 (0.0136)
Large X Urban							0.0427 (0.0206)
Large X Decade ^a					-0.0872 (0.0189)		
Observations	1,281,234	1,278,100	1,234,681	912,116	912,116	907,619	907,619
R-squared	0.815	0.824	0.832	0.851	0.851	0.855	0.855
Country-Years	69	69	66	60	60	58	58
Unique Countries	25	25	23	22	22	20	20
Country-Year FE	YES	YES	YES	YES	YES	YES	YES
Industry FE	NO	YES	YES	YES	YES	YES	YES
Occupation FE	NO	NO	YES	YES	YES	YES	YES
Mincer Controls	NO	NO	NO	YES	YES	YES	YES

a) normalized so 2000 = 0.

Notes: Wage is hourly, in real US dollars. Large indicates that the employer has more than 100 employees. Mincer controls include age, age squared, and dummies for completion of primary, secondary and tertiary education. Female indicates that the worker is female. Urban indicates the worker lives in an urban area. Heteroskedasticity robust standard errors in parentheses.

Table 2: LFWP by country, with and without Mincer controls

Country	ISO Code	LWFP conditional on occupation and industry, compare to col (3) of Table 1	LWFP conditional on occupation, education and experience, compare to col (4) of Table 1	Magnitude of selection on unobservables relative to education and experience required to explain LFWP conditional on occupation and industry	First Year	Last Year	Number of observations	GDP per Capita (2005 US Dollars)
Niger	NER	1.15 (0.18)	0.785 (0.18)	2.1	2007	2011	5,794	339
Comoros	COM	0.936 (0.73)	0.621 (0.81)	2.0	2013	2013	809	1,373
Cameroon	CMR	0.681 (0.05)	0.552 (0.05)	4.3	2007	2014	21,296	1,311
Moldova	MDA	0.315 (0.06)	0.397 (0.06)	-4.9	2006	2012	2,412	1,953
Chad	TCD	0.47 (0.20)	0.32 (0.18)	2.1	2011	2011	2,545	863
Bahamas, The	BHS	0.324 (0.07)	0.267 (0.07)	4.6	2001	2001	1,752	31,911
Kyrgyz Republic	KGZ	0.272 (0.09)	0.261 (0.09)	25.1	2011	2011	3,280	921
Madagascar	MDG	0.305 (0.06)	0.256 (0.06)	5.2	2012	2012	16,088	408
Albania	ALB	0.265 (0.07)	0.246 (0.07)	13.1	2005	2005	1,847	3,063
Lebanon	LBN	0.289 (0.10)	0.227 (0.11)	3.6	2011	2011	354	7,453
China	CHN	0.292 (0.01)	0.2 (0.01)	2.2	2002	2013	29,841	4,026
Thailand	THA	0.242 (0.01)	0.18 (0.01)	2.9	1988	1995	61,061	2,893
Tajikistan	TJK	0.279 (0.09)	0.179 (0.31)	1.8	2009	2009	1,301	719
Papua New Guinea	PNG	0.175 (0.08)	0.137 (0.09)	3.6	2009	2009	1,134	1,811
Paraguay	PRY	0.157 (0.05)	0.118 (0.05)	3.1	2007	2012	13,680	4,146
Mexico	MEX	0.186 (0.02)	0.117 (0.02)	1.7	2008	2012	74,013	9,476
Vietnam	VNM	0.101 (0.02)	0.09 (0.02)	8.6	1997	2010	103,805	1,297

Honduras	HND	0.168 (0.01)	0.087 (0.01)	1.1	2001	2011	100,016	1,789
Chile	CHL	0.116 (0.01)	0.076 (0.01)	1.9	1990	2013	458,846	10,664
Guatemala	GTM	0.14 (0.03)	0.071 (0.03)	1.0	2000	2003	16,448	2,573
Nicaragua	NIC	-0.059 (0.05)	-0.074 (0.05)	-5.2	2005	2005	9,910	1,409
Bangladesh	BGD	-0.465 (0.03)	-0.431 (0.03)	12.7	2010	2015	22,904	783

Year Fixed Effects	YES	YES
Occupation Fixed Effects	YES	YES
Industry Fixed Effects	YES	YES
Mincer controls	NO	YES

Notes: Wage is hourly, in real US dollars. Large indicates that the employer has more than 100 employees. Mincer controls include age, age squared, and dummies for completion of primary, secondary and tertiary education. Heteroskedasticity robust standard errors in parenthesis

Figure 1: The Large-Firm Wage Premium is Declining in National Income

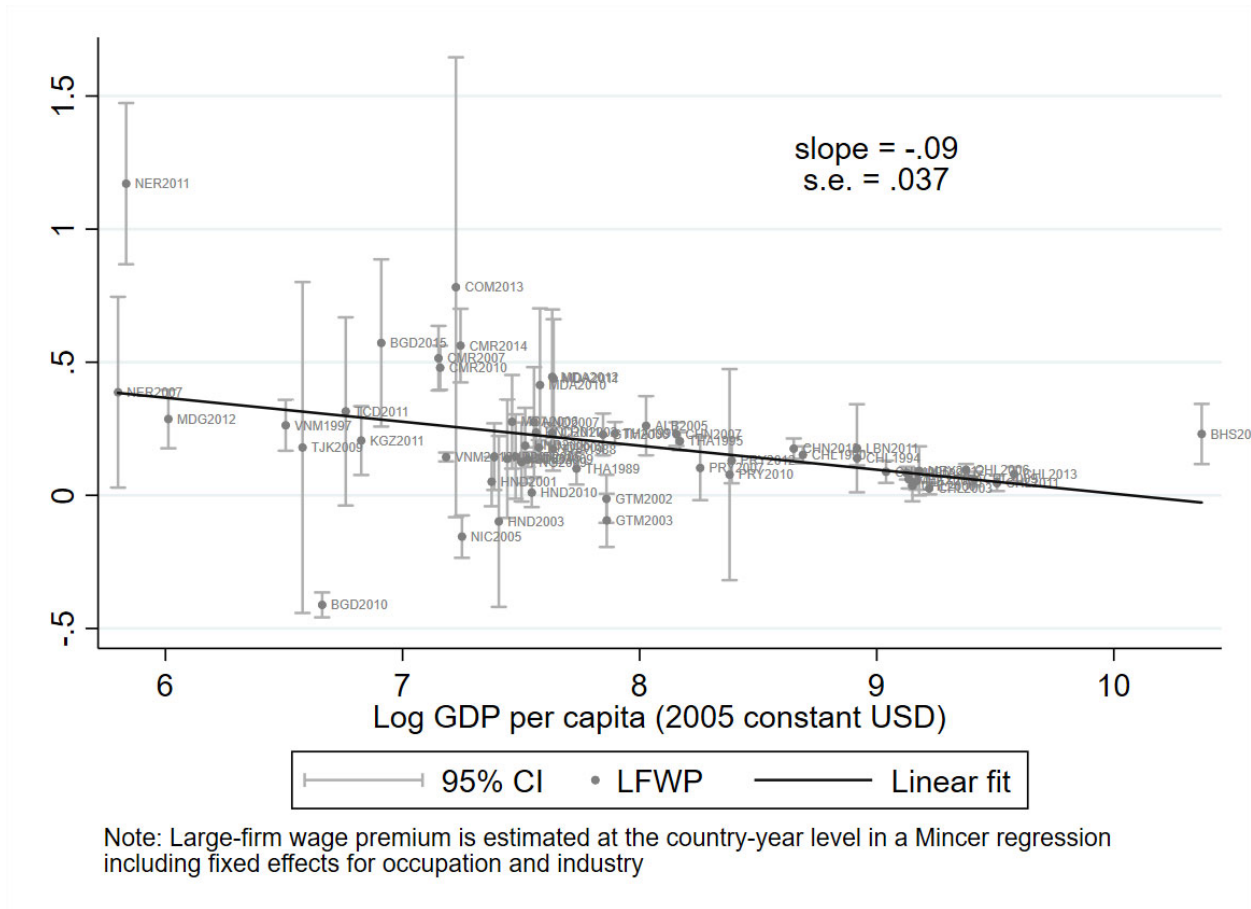
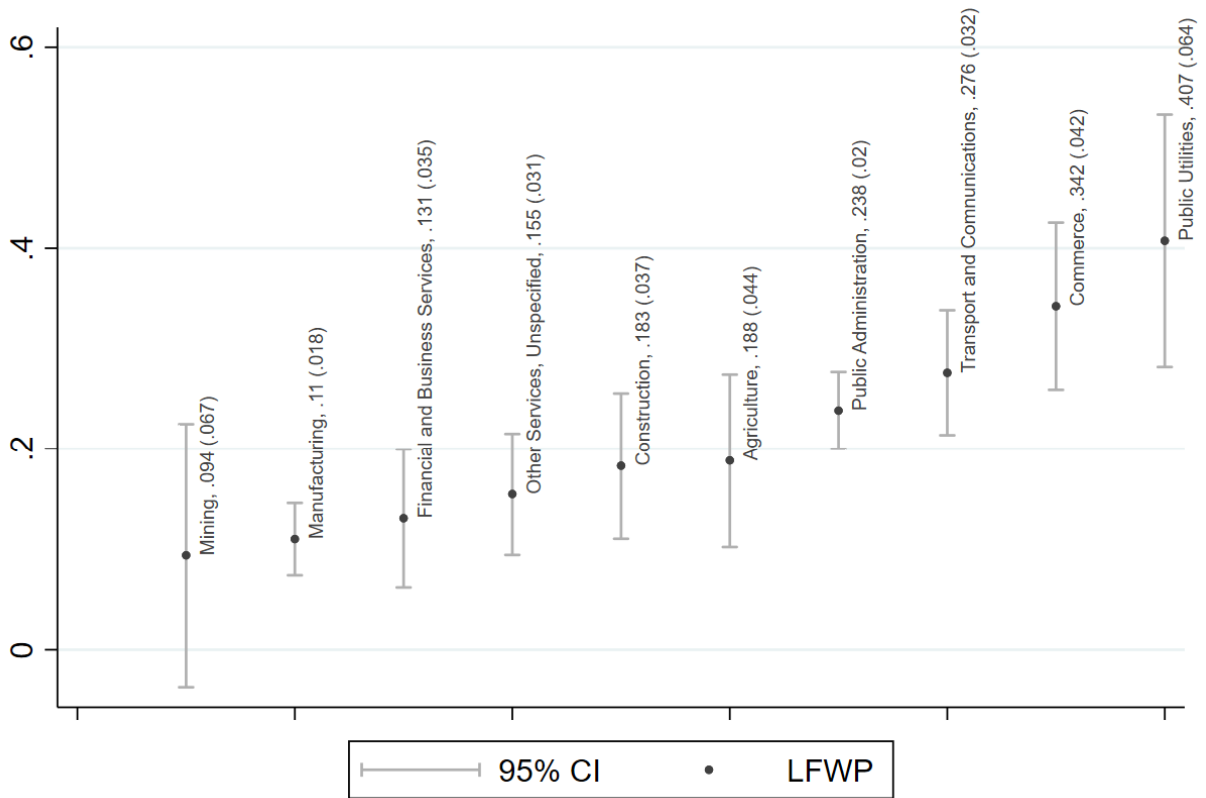


Figure 2: Large-firm wage premium, by industry



Note: Large-firm wage premium estimated separately for each industry in a Mincer regression including fixed-effects for occupation and country*year. Heteroskedasticity robust standard errors in parenthesis

References

- Altonji, J.G. and Blank, R.M., 1999. Race and gender in the labor market. *Handbook of labor economics*, 3, pp.3143-3259.
- Altonji, J.G., Elder, T.E. and Taber, C.R., 2005. Selection on observed and unobserved variables: Assessing the effectiveness of Catholic schools. *Journal of political economy*, 113(1), pp.151-184.
- Abowd, J.M., Kramarz, F. and Margolis, D.N., 1999. High wage workers and high wage firms. *Econometrica*, 67(2), pp.251-333.
- Berlingieri, G., Calligaris, S. and Criscuolo, C., 2018. The productivity-wage premium: Does size still matter in a service economy? *American Economic Review: Papers and Proceedings*, forthcoming
- Bloom, N., Guvenen, F., Smith, B.S., Song, J., and von Wachter, T. (2018) *American Economic Review: Papers and Proceedings*, forthcoming
- Blau, F.D. and Kahn, L.M., 2017. The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature*, 55(3), pp.789-865.
- Brown, C. and Medoff, J., 1989. The employer size-wage effect. *Journal of political Economy*, 97(5), pp.1027-1059.
- Combes, P.P., Duranton, G. and Gobillon, L., 2008. Spatial wage disparities: Sorting matters!. *Journal of urban economics*, 63(2), pp.723-742.
- Dobbelaere, S., 2004. Ownership, firm size and rent sharing in Bulgaria. *Labour Economics*, 11(2), pp.165-189.
- Funkhouser, E., 1998. The importance of firm wage differentials in explaining hourly earnings variation in the large-scale sector of Guatemala. *Journal of Development Economics*, 55(1), pp.115-131.
- Glaeser, E.L. and Mare, D.C., 2001. Cities and skills. *Journal of labor economics*, 19(2), pp.316-342.
- Goldin, C., 1992. *Understanding the Gender Gap: An Economic History of American Women*. Oxford University Press.
- Harris, J.R. and Todaro, M.P., 1970. Migration, unemployment and development: a two-sector analysis. *The American economic review*, 60(1), pp.126-142.
- Jones, P., D'Aoust, O. and Bernard, L., 2017. The urban wage premium in Africa. In *Wage Inequality in Africa* (pp. 33-53). Palgrave Macmillan, Cham.
- La Porta, R. and Shleifer, A., 2014. Informality and development. *Journal of Economic Perspectives*, 28(3), pp.109-26.
- Menezes-Filho, N.A., Muendler, M.A. and Ramey, G., 2008. The structure of worker compensation in Brazil, with a comparison to France and the United States. *The Review of Economics and Statistics*, 90(2), pp.324-346.
- Moore, H.L., 1911. *Laws of wages: An essay in statistical economics*. Macmillan.
- Nunn, N. and Wantchekon, L., 2011. The slave trade and the origins of mistrust in Africa. *American Economic Review*, 101(7), pp.3221-52.

- Oi, W.Y. and Idson, T.L., 1999. Firm size and wages. *Handbook of labor economics*, 3, pp.2165-2214.
- Söderbom, M., Teal, F. and Wambugu, A., 2005. Unobserved heterogeneity and the relation between earnings and firm size: evidence from two developing countries. *Economics letters*, 87(2), pp.153-159.
- Schaffner, J.A., 1998. Premiums to employment in larger establishments: evidence from Peru. *Journal of Development Economics*, 55(1), pp.81-113.
- Tan, H. and Batra, G., 1997. Technology and firm size-wage differentials in Colombia, Mexico, and Taiwan (China). *The World Bank Economic Review*, 11(1), pp.59-83.
- Troske, K.R., 1999. Evidence on the employer size-wage premium from worker-establishment matched data. *Review of Economics and Statistics*, 81(1), pp.15-26.
- Velenchik, A.D., 1997. Government intervention, efficiency wages, and the employer size wage effect in Zimbabwe. *Journal of Development Economics*, 53(2), pp.305-338.
- Young, A., 2013. Inequality, the urban-rural gap, and migration. *The Quarterly Journal of Economics*, 128(4), pp.1727-1785.