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Wage inequality and welfare in developing countries: Privatization and reforms in the short and long run

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Abstract: The impacts of privatization on wage inequality and welfare are considered for developing countries. In the short run, privatization can narrow wage inequality but reduce output of public firms. However, the favorable effect of privatization on lowering wage inequality vanishes in the long run due to the excessive entry of public firms. Thus, a policy recommendation for privatization would be: to avoid rising wage inequality, entry regulation of public firms should be imposed in the short run, and to mitigate the output contraction, complementary structural changes or policy reforms are needed in the transitional period of privatization.

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1. Introduction

Income inequality is an important issue both in advanced and developing countries. According to a recent report by anti-poverty charity Oxfam (2015), the rich are getting richer and the world's richest 1% will control over 50% of global wealth next year. The widening wage gap between the rich and the poor creates social conflicts and undermines economic growth and regional stability. U.S. president Obama plans to increase taxes on the wealthy while a rich tax policy has already been implemented in other countries, like France.

Many studies in labor economics and international trade have investigated the reasons for worsening wage inequality between skilled and unskilled labor in advanced countries.¹ The analysis on skill premium mainly focusses on the rising skilled wages by skilled-biased technologies,² while the declining unskilled wages can be attributed to globalization and demand for less unskilled labor domestically through importing unskilled labor-intensive goods and services or shifting unskilled jobs abroad.³

On the other hand, for developing economies, in addition to the above two reasons, rising wage inequality has been primarily due to market distortions, factor movements and trade restrictions. Davis (1998) considers unemployment as a factor that reduces unskilled wages, while this reduction is attributed to immigration in Kar and Beladi (2004) and to foreign investment by Marjit et al. (2003). Recently, political and institutional factors have been included as important sources for rising wage inequality in developing economics. For example, Ghosh and Sen (2012) consider privatization as a reason for lowering wage income

¹ The early literature on the widening of wage inequality between skilled and unskilled workers can be found in Wood (1995) and Leamer (1998).

² Francois and Nelson (1998) analyze the effect of technological progress on the wages on unskilled and skilled workers.

³ See Feenstra and Hanson (1996) who show that international outsourcing can cause a wage disparity between skilled and unskilled labor.

in developing countries. However, they are unable to discuss the problem of rising wage inequality because the workers are homogenous in a full-employment, monopolistically competitive model.

Using an oligopolistic framework for an open, dual developing economy with urban unemployment, this paper investigates the issues arising in Ghosh and Sen (2012): Does privatization worsen wage inequality between skilled and unskilled workers and consequently lower welfare of the developing economy? If yes, are there complementary policy reforms that could mitigate or reverse the detrimental impacts caused by privatization during the transition period to a market-based economy? We consider a dual developing economy model with skilled and unskilled labor, while skilled workers provide managerial services and unskilled workers produce goods. We find that in the short run with entry regulation of urban public enterprises, increased privatization towards profit maximization can lower the wage gap between skilled and unskilled labor but at the expense of a contraction in the production of goods and services. However, the bonus of narrowing wage inequality by privatization vanishes or is even reversed in the long run with free entry/exit of public firms. This implies that the excessive number of public firms is a main source of rising wage inequality in developing economies during the transition to privatization. Therefore, a policy recommendation would be that to avoid rising wage inequality, entry regulation or even closure of public firms should be imposed in the short run, and then accompanied by complementary policies in structural changes or policy reforms, such as downsizing managerial teams, freer inflows of foreign capital or skilled labor, to mitigate the loss from output contraction during privatization.

We consider China as an example to illustrate the above points on privatization. China opened her door to foreign countries in 1979, and then followed by massive privatization in her state-owned enterprises (SOEs), with a guideline to “retain the large, release the small.” During the process of privatization of SOEs, increasing wage gaps between skilled and unskilled labor has been identified as one of the many problems facing China, especially in the recent years (Appleton et al., 2014). One of the main reasons for such

wage inequality was that privatization has led to a shortage of skilled labors and a drastic retrenchment of (unskilled) workers in those enterprises. Even though there has been a massive migration of workers from rural to urban areas seeking better employment opportunities, those migrants were mostly less educated and could only join the unskilled labor pool, which mainly supplied workers for private firms rather than SOEs. Worker retrenchments in SOEs and rural-to-urban migration have, therefore, dampened wage inequality in China. Indeed, wages in the state sectors in China started to surpass that in the private sector in 2003 and the trend has since then been on the rise (Yang et al., 2010).

Between 1995 and 2001, the number of SOEs in China fell from 1.2m to 468k, while the number of urban jobs in SOEs dropped by 36m or from 50% to 32% of total urban employment.⁴ During the transitional period of privatization, some central public enterprises were transformed or closed, while other provincial or city new companies were created. Although the direction of privatization by reducing the number of public firms was in general appropriate, China could perform even better economically if the size of big public firms were trimmed or inflows of foreign investment and skilled labor were increased.

To help better understand the process of development in a globalizing world, we look at the issue of privatization in developing economies. In general, in those countries where there has been a push towards privatization by the central government, there has been, at the same time, a pushback to establish more control at the province or regional level. Therefore, it is useful to identify the players and discuss the motivations and constraints on the central and local government leaders. One of the main motivation of the central government in developing countries to privatize is the escalating government expenditure relative to GDP growth. This fiscal revenue reform can be combined with pension portability and opening up the services sector (especially in urban areas) to soak up the excess labor. Local governments

⁴ See “Privatization in China: Capitalism Confined,” *The Economist*, 3 September, 2011. <http://www.economist.com/node/21528262/print>.

in China will be keen to support privatization of their SOEs if they can guarantee themselves higher fiscal revenues and retention of their private benefits from the privatized firms. So, for the economic policy to be effective, the central government must obtain the cooperation of the SOE managers (usually local government officials) for compensating the workers (either through wages, unemployment insurance or relocation) and other things, such as guaranteeing payments of existing bank loans after the restructuring (Liu et al., 2006).⁵

The phenomenon in which economic reform and privatization of SOEs have resulted in wage inequality and social welfare consequences is not unique to China, but has also been observed in other newly emerging economies, especially those in the Asia Pacific region. Take Vietnam, an economy with an impressive average annual GDP growth of 7.3% during the period 1990-2010, as an example (Vietnam Development Report, 2012). Vietnam started the process of economic reform in 1986 under the famous program called *Doi Moi* in which privatization of SOEs was among the priorities. According to the World Bank, thanks to *Doi Moi*, Vietnam has moved from a low income country and has now joined the lower middle income group.⁶ However, similar to China, Vietnam has suffered from the skilled labor shortage and, consequently, increased wage inequality during the process of SOEs' privatization.⁷ For instance, McKinsey Global Institute (2012) reports that the shortage of

⁵ Historically in China, and other developing economies, SOEs have provided a buffer against adverse shocks by hoarding excess labor instead of laying off workers during downturns. They favored gradual adjustment through relocation buyouts and severance pay. See Lam et al. (2015).

⁶ See <http://data.worldbank.org/country/vietnam>.

⁷ As with other countries, SOEs in Vietnam utilized most of the country's capital and fixed assets (such as land) and created most jobs. Between 2000 and 2009, due to privatization, the number of SOEs reduced by 40%, while the SOEs' share of capital and fixed assets in the country reduced from 68% to 39% and from 55% to 45%, respectively. However, the SOEs' total employment reduced more drastically, from 59% to 19% (Vietnam Development Report,

qualified engineers and middle managers in Vietnam appeared to be more challenging than in other Asian economies. Local media also reveals that Vietnam had some 53 million workers in 2012, of whom over 83 per cent were manual laborers without any vocational certificates.⁸ As such, Viettel, a state telecommunication company, had to pay its CEO and experts more than ten times the average salary of its employees, a phenomenon which could never happen prior to *Doi Moi*.⁹

As will be seen in what follows, the consequences of privatization in relation to wage inequality and welfare in both China and Vietnam and many other transitional economies are well captured in our model. Our recommendations – in particular a set of complementary reforms – can therefore provide some practical solutions to help those countries achieve a more sustainable long-run socio-economic development.

Since SOEs have provided a buffer against adverse shocks, in particular, during the economic downturns, a central government or regional government may want to have more control over SOEs. Indeed, such control of SOEs can be viewed as an insurance against the outcome of economic recession. However, Li and Xu (2002) have shown empirically that lobbying group (mainly the financial sector and urban workers/consumers) in pro-democratic country always asks for reform, in particular, privatizing SOEs, where as in less democratic country, the same interest groups want more state control of SOEs (Li and Xu, 2002). Finally, Li and Xu (2002) have argued that: “Democracy appears to affect the pace of reforms by

2012). Improvements in productivity (partially due to worker retrenchment) and relaxation of the government’s payment policy, which allowed profit-based bonuses, have enabled the SOEs to pay high salaries for their management positions (McCarty, 1999; Migheli, 2012).

⁸ See <http://www.thanhniennews.com/business/shortage-of-skilled-workers-hinders-fdi-in-vietnam-537.html>.

⁹ See <http://english.vietnamnet.vn/fms/business/80701/the-companies-top-for-payroll-in-vietnam.html>.

magnifying the voices of the interest groups in more democratic countries and by moderating politicians' discretion in less democratic countries.”

Our paper complements Li and Xu's (2002) findings by providing a possible theoretical justification. Following from the Proposition 1, since urban unemployment has fallen and the rural unskilled wage has risen (thus reducing the wage inequality), privatization could be a win-win solution for unskilled workers and governments. Thus democracy not only appears to affect the pace of reforms such as privatization but also leads to improving outcomes in terms of a rise in urban employment and a reduction in wage inequality at least in the short. However, one should be cautious as such win-win situation might be compromised in the long run as the whole outcome may be reversed if there is no control of entry of new public firms. This may also provide a justification for why the less democratic countries like to have more control over their SOEs, as evident in Li and Xu's (2002) findings. Our paper may thus contribute to the literature of political economy of privatization by showing the trade-off between short-run and long run consequences of undertaking privatization as a reform policy.

This paper is organized as follows. Section 2 provides a dual structure for a developing economy, in which n public enterprises operate in the urban sector while the firms in the rural sector are competitive and privately owned. Using this set up, the short- and long-run effects of increased privatization in urban public enterprises on social welfare and wage distribution of skilled and unskilled labor are examined in section 3. Some combined complementary structural changes and policy reforms are discussed and recommended in section 4. Section 5 offers concluding remarks.

2. A model of developing economies with public firms

We consider an open, two-sector developing economy in which the manufacturing good X is produced by n public firms in the urban sector, while the agricultural good Y is produced by competitive private firms in the rural area. Choosing good Y as the *numeraire*, the domestic relative price of good X is denoted by p .

Letting D_X and D_Y be the consumers' demands for these two goods and following Ghosh et al. (2015), their preference can be represented by a quasi-linear utility function: $U(D_X, D_Y) = eD_X - mD_X^2/2 + D_Y$, where e and m are positive parameters. Utility maximization subject to the budget constraint, $I = pD_X + D_Y$, yields the inverse demand function for good X : $p = p(D_X)$ with $p_X (= \partial p / \partial D_X) = -m$, where the income I falls completely on the demand for good Y .¹⁰ This gives the indirect utility function: $V = V(p, I)$, where $V_p = -D_X$ and $V_I = 1$ by envelope theorem. In equilibrium, demand for good X is equal to its supply from domestic and foreign firms, denoted respectively by X and Q , i.e., $D_X = X + Q$. Since there are n domestic firms in the urban manufacturing sector, by imposing a symmetry condition, we have $X = nx$, where x is output per firm. Note that the sales by foreign firms is restricted by an import quota Q imposed by the domestic government. An increase in Q could be viewed as trade liberalization.

On the supply side of the economy, the production of agricultural good Y requires unskilled labor and capital under the constant-returns-to-scale technology in the rural area. The corresponding unit cost function is denoted by $g(w_R, r)$, where w_R and r represent the unskilled wage and the rate of returns on capital. By using the envelope theorem, the demands for unskilled labor and capital are respectively: $L_Y = g_w(w_R, r)Y$ and $K_Y = g_r(w_R, r)Y$, where the subscript represents the partial derivative. Under perfect competition, unit cost equals the price of good Y :

$$g(w_R, r) = 1, \quad (1)$$

where the price of good Y is normalized to unity.

For the urban production of the manufacturing good X , each public firm produces good x under increasing returns to scale: the administrative team, comprised of skilled

¹⁰ The analysis is tractable under quasi-linear preference. Quasi-linear preference is also adopted in Singh and Vives (1984), in which the income effect falls completely on the *numeraire* good.

workers and capital, provides in-house managerial services z with per unit cost $f(w_S, r)$, where w_S is the skilled wage rate. This gives a fixed cost $f(w_S, r)z$ for producing good x . In addition, the variable inputs to produce good x are unskilled labor and capital with the unit variable cost, $m(w_U, r)$, where w_U is the urban wage rate to unskilled workers. Total cost for producing good x is therefore: $c(w_U, w_S, r, x, z) = f(w_S, r)z + m(w_U, r)x$. By the envelope property, the employments of skilled administrative and unskilled production workers for individual firm in sector X are: $s = f_w(w_S, r)z$ and $l_x = m_w(w_U, r)x$, while the use of capital is: $k_x = f_r(w_S, r)z + m_r(w_U, r)x$. The profit of each firm is therefore: $\pi = p(X + Q)x - c(w_U, w_S, r, x, z)$. Since firm in sector X is publically-owned, it is concerned with not only its profits but also the employment of unskilled production workers. Following Ghosh and Sen (2012), the public firm thus maximizes a target that considers not only firm's profit (received partly by skilled workers) but also wage payment to production workers, $\pi + (1 - k)w_U l_x$, where $k \in [0, 1]$.¹¹ The inclusion of wage payment in the firm's target is equivalent to a wage subsidy to unskilled worker by $1 - k$. Hence, an increase in k by reducing the wage subsidy expresses more privatization of the public firm in the urban manufacturing sector.¹²

Each public firm in the urban sector chooses the level of output x to maximize the goal of profit and wage payment. The corresponding first-order optimality condition is obtained as:

$$p(X + Q) + p_x(X + Q)x + (1 - k)w_U m_w(w_U, r) = m(w_U, r). \quad (2)$$

The marginal benefit (MB) for producing additional good x therefore is made up of the standard marginal revenue, $MR = p + p_x x$, presented in the first two left-hand terms in (2) and

¹¹ Under a fixed urban unskilled wage rate w_U , the wage payment, $w_U l_x$, is equivalent to the level of employment l_x .

¹² In the literature on mixed oligopoly, public firms consider a mixture of profit and welfare. See White (1996), Beladi and Chao (2006), Wang and Chiou (2015) and Wang and Tomaru (2015).

an extra benefit for unskilled production workers in the third term. When more privatization takes place by an increase in k , the MB is accordingly adjusted towards MR .

Following Harris and Todaro (1970), the urban sector imposes a minimum wage rate w_u for unskilled production workers, which exceeds the wage rate w_R in the rural sector. The higher urban wage leads to rural-urban migration, resulting in urban unemployment, L_u , while the unskilled labor employment in sector X is $L_X = nl_x$. Defining the unemployment ratio of unskilled workers in the urban manufacturing sector by $\mu = L_u/L_X$, the Harris-Todaro migration equilibrium is:

$$w_U/(1 + \mu) = w_R, \quad (3)$$

where $1/(1 + \mu)$ expresses the probability of finding a job for unskilled workers in the urban area. Equation (3) simply states that in equilibrium, the expected urban wage rate is equal to the rural wage for unskilled workers in the economy.

Consider next the factor markets. The equilibrium conditions for skilled workers, unskilled workers and capital are respectively:

$$f_w(w_S, r)nz = S, \quad (4)$$

$$(1 + \mu)m_w(w_U, r)nx + g_w(w_R, r)Y = L, \quad (5)$$

$$f_r(w_S, r)nz + m_r(w_U, r)nx + g_r(w_R, r)Y = K, \quad (6)$$

where S , L and K denote the amounts of skilled workers, unskilled workers and capital available in the economy. Note that in (4), full employment prevails in the market of skilled labor, which determines its wage rate w_S , with $w_S > w_U > w_R$.

Finally, the time horizon is considered in terms of the short versus the long run. In the short run, entry of urban public firms is regulated and the number of public firms (n) is hence fixed, whereas in the long run it is flexible by allowing free entry or exit. That is, in the long run, firms in the urban sector X can freely enter or exit until profit reaches to zero.¹³

¹³ As pointing out by the referee, public firms often receive subsidies from the government. In this paper, the inclusion of unskilled wage payments in the public firm's objective function is equivalent to a wage subsidy to unskilled workers.

$$p(X + Q)x - f(w_S, r)z - m(w_U, r)x = 0. \quad (7)$$

It is possible to introduce a welfare transfer from the government to public firms in the long run in our model. That is, in the long run, each of the public firms can make a negative (pure) profit but still stays in the market due to financial support from the government. However, we have not done so due to a number of reasons. First, as suggested by Ghosh *et al.* (2015), welfare transfer is often practically and politically impossible. Hence, it is natural to assume that the number of public firms is determined according to the zero (pure) profit condition, which is similar to the case of private firms. Second, in reality, with intensifying privatization (in particular in transitional economies such as China and Vietnam), both the managers of public firms and their employees are judged against (and hence can keep their job/receive bonuses based on) the firms' performance rather than government subsidy. Equation (7) is, therefore, suitable to capture long run with free entry and exit of public firms.

The model specified in (1) – (7) describe the dual structure of a developing economy, in which the first six equations determine unknowns, w_R , w_S , r , μ , x and Y , in the short run with a fixed number of urban firms n ,¹⁴ while in the long run it is determined by the entry/exit condition given in (7). The exogenous variables in the model include a policy variable on privatization k , a structural variable in firm size z , and four trade variables on factor movements in L , S and K and foreign entry Q . We will use this set up to examine the short- and long-run effects of privatization on wage inequality and social welfare of the developing economy, and then probe the consequent impacts from a combined structural change in firm size as well as the effects of policy reforms via factor movements and foreign entry.

3. Privatization

¹⁴ In the short run, a barrier to entry comes from the fixed cost of urban firm, $f(w_S, r)z$, where managerial service z exceeds its minimum level \bar{z} . However, the main reason for an entry barrier in developing countries may be the regulatory permission to establish a public firm.

Facing the twin objectives of profit and employment maximization, a rise in privatization of a urban public firm in sector X is expressed by a change from employment to profit consideration (i.e., an increase in k) in (2), thereby reducing the extra benefit to unskilled workers. Letting “ $\hat{\cdot}$ ” over a variable denote its percentage change, by totally differentiating (2) we obtain the change in firm’s output as:

$$-s(1+1/n)\hat{x} = \varepsilon h \hat{k} + s \hat{n} + (1-s)\hat{Q} + \varepsilon b \theta_{kX}^m A \hat{r}, \quad (8)$$

where $s = X/(X + Q)$ is the share of domestic production, $b = m/p$ is marginal cost to price ratio, $h = kw_w m_w/p$ signifies (subsidized) unskilled wage to price ratio, and $\varepsilon = -p/D_x p_x > 0$ is the price elasticity of demand for good X . Note that $A = 1 - (1-k)\theta_{LX}^m \sigma_X^m > 0$ when the elasticity of substitution between unskilled labor and capital in production (σ_X^m) is not large. In addition, θ_{jX}^m represents the variable cost share of the j th production factor in producing good x . Therefore, from (8) for a given capital cost r , firm output of good x decreases in face of increased privatization and higher competition from domestic and foreign sales.

In addition, as expressed in the last term in (8), there is a second-round effect through the change in capital cost, measured by r , on output x in (8). Moreover, the change in capital cost affects total costs of producing good Y in the rural sector and providing managerial services in the urban manufacturing firms. Consequently, the wage rates of unskilled and skilled labor will be affected. From (1) and (4), we have:

$$\hat{w}_R = -(\theta_{KY}/\theta_{LY}) \hat{r}, \quad (9)$$

$$\hat{w}_S = \hat{r} + \hat{n}/s_{SX}^F + \hat{z}/s_{SX}^F - \hat{S}/s_{SX}^F, \quad (10)$$

where θ_{jY} represents the cost share of the j th production factor in sector Y and s_{SX}^F expresses the substitution effect between skilled labor and capital in sector X .¹⁵ Note that from (9),

¹⁵ The unit fixed cost of sector X is $f(w_s, r)$, and the elasticity of factor substitution between skilled labor and capital is defined as: $\sigma_X^F = f_{w_s} f_r / f_w f_r$. Following Jones (1965), the substitution

capital cost and unskilled wage move in the opposite direction because for a given price of good Y , higher capital cost decreases the production of good Y , thereby reducing unskilled wage in (9). In contrast, to provide a give size (z) of managerial services for the firm in sector X , higher capital cost causes a substitution from capital to skilled labor. This raises the skilled wage rate in (10). Note that the skilled wage rate is positively affected by the size of managerial services provided and the amount of competition from firms in the sector X , and is negatively related to inflows of skilled labor.

In addition, changes in the unskilled wage rate in the rural sector lead to rural-urban migration. By totally differentiating (3), the percentage change in the urban unemployment ratio is given by:

$$\hat{\mu} = - [(1 + \mu)/\mu] \hat{w}_R. \quad (11)$$

Higher rural wage will attract more unskilled labor to the rural sector, thereby mitigating unemployment in the urban sector.

Finally, from the factor market conditions for unskilled and capital in (5) and (6), we can obtain the overall changes in outputs of good x and Y , which will lead to further repercussions on unskilled and skilled wages and capital returns. Totally differentiating them, we have:

$$(1 + \mu) \lambda_{LX}^m \hat{x} + \lambda_{LY} \hat{Y} = \hat{L} - (1 + \mu) \lambda_{LX}^m \hat{n} - [(1 + \mu) s_{LX}^m + s_{LY}] \hat{r} + s_{LY} \hat{w}_R - \mu \lambda_{LX}^m \hat{\mu}, \quad (12)$$

$$\lambda_{KX}^m \hat{x} + \lambda_{KY} \hat{Y} = \hat{K} - \lambda_{KX}^F \hat{z} - \lambda_{KX} \hat{n} + (s_{KX}^F + s_{KX}^m + s_{KY}) \hat{r} - s_{KY} \hat{w}_R - s_{KX}^F \hat{w}_S, \quad (13)$$

where λ_{jX}^m and λ_{jY} are respectively the employment shares of variable factor j in sectors X and Y , while s_{ji} represents the effect of a change in the factor prices on the demand for factor j in sector i .¹⁶ Note that $|\lambda^m| = \lambda_{KX}^m \lambda_{LY} - (1 + \mu) \lambda_{LX}^m \lambda_{KY}$ is positive (negative) if the manufacturing

effect in demand for skilled labor is: $s_{SX}^F = \sigma_X^F \theta_{KX}^F$, where $\theta_{KX}^F (= rf_r/f)$ is the cost share of capital in the fixed cost of sector X .

¹⁶ Note that $s_{LY} = \sigma_Y \theta_{KY} \lambda_{LY}$, where $\sigma_Y = g g_{wr} / g_w g_r$.

sector X is capital (labor) intensive relative to the agricultural sector Y in variable inputs. For stability of the model, it requires that $|\lambda^m| > 0$, as shown in Appendix. Thus, according to the Rybczynski effect, we have: $\hat{x}/\hat{L} < 0$, $\hat{Y}/\hat{L} > 0$, $\hat{x}/\hat{K} > 0$ and $\hat{Y}/\hat{K} < 0$. Nonetheless, these output effects will be adjusted through the changes in wages and capital cost as indicated in (12) and (13).

3.1. Short-run effects

By taking into the account the changes in wages and capital cost, from (8) – (13), we can solve for the overall effect of increased privatization on firm output x in the urban sector X :

$$\hat{x}/\hat{k} = -\varepsilon h B/D < 0, \quad (14)$$

where $B > 0$ and $D = s(1 + 1/n)B + \varepsilon h \theta_{LY} \theta_{KX}^m A |\lambda^m| > 0$.¹⁷ Hence, privatization lowers the marginal benefit for producing good x , thereby yielding a negative impact on production and consequently an upward pressure on its price:

$$\hat{p}/\hat{k} = - (s/\varepsilon) (\hat{X}/\hat{k}) > 0, \quad (15)$$

where $\hat{X} = \hat{x}$ for a given n .

Turn next to the income distributional effect of increased privatization. Since the urban manufacturing firms are capital intensive, the lowered production of good x from (8) releases more capital from the urban to the rural sector, which in turn reduces the rate of return on capital:

$$\hat{r}/\hat{k} = -\varepsilon h \theta_{LY} |\lambda^m| / D < 0. \quad (16)$$

¹⁷ The term B is: $B = \theta_{KY} \{ \lambda_{LY} s_{KY} + \lambda_{KY} [s_{LY} s_{LY} + (1 + \mu) \lambda_{LX}^m] \} + \theta_{LY} \{ \lambda_{LY} (s_{KY} + s_{KX}^m) + \lambda_{KY} [s_{LY} + (1 + \mu) s_{LX}^m] \}$.

Accordingly, from (9) and (10), the changes in wages for unskilled and skilled workers can be obtained as:

$$\hat{w}_R/\hat{k} = -(\theta_{KY}/\theta_{LY})(\hat{r}/\hat{k}) > 0, \quad (17)$$

$$\hat{w}_S/\hat{k} = \hat{r}/\hat{k} < 0. \quad (18)$$

Increased privatization can result in a rise in the unskilled wage and a fall in the skilled wage, if the urban public firms are relatively capital intensive vis-à-vis the private firms in the rural sector. In addition, by (11), the rise in the rural unskilled wage rate can lead to a reverse migration, which lowers the urban unemployment ratio for the developing economy:

$$\hat{\mu}/\hat{k} = -[(1+\mu)/\mu](\hat{w}_R/\hat{k}) < 0. \quad (19)$$

Using the results on outputs and unemployment, we can evaluate the short-run welfare impact of increased privatization in the dual developing economy. Social welfare is represented by the indirect utility function, $V = V(p, I)$, where national income, I , comes from factor incomes and profits of the urban public firms: $I = w_UL_X + w_RL_Y + w_S S + rK + n\pi$. Totally differentiating the indirect utility function and then using (1) – (6), we obtain the change in social welfare for the economy:

$$dV/dk = n(p-m)(dx/dk) - w_R L_X (d\mu/dk), \quad (20)$$

where $dx/dk < 0$ and $d\mu/dk < 0$. Thus, for the developing economy, increased privatization worsens the monopoly distortion via a fall in output x but it can raise rural unskilled wage, leading to less unemployment in the urban sector. These two conflicting forces make the welfare impact in (20) ambiguous. By setting $dV/dk = 0$, we obtain the optimal level of privatization in the short run:

$$k^o = 1 + \theta_{LY} \lambda^m / \mu B - s/n \epsilon b \theta_{KX}^m. \quad (21)$$

In summary, we have the following short-run results on welfare and income distribution:

Proposition 1. *For an open dual developing economy with public firms in the urban sector, increased privatization can aggravate the monopoly distortion but lower urban*

unemployment through a fall in the output of public firms and a rise in the rural unskilled wage rate. If the unfavorable output contraction effect outweighs the beneficial employment effect, privatization lowers social welfare in the short run. Nonetheless, increased privatization narrows the wage inequality between skilled and unskilled labor as well as reducing the rate of return on capital.

3.2. Long-run effects

In the previous section, we have considered the short-run case in which the number of public firms in the urban sector is fixed and shown that privatization alone lowers the production of good X to the economy in the short run, but it narrows the wage gap between skilled and unskilled workers. In addition, increased privatization reduces capital cost in production. This attracts new entry of public firms to the urban sector in the long run until the entry-exit condition in (7) prevails. Totally differentiating (7) yields:

$$[s + \varepsilon(1 - b)\theta_{SX}^F / s_{SX}^F] \hat{n} = - [(1 - 1/n)s + (1 - k)\varepsilon b \theta_{LX}^m] \hat{x} - \varepsilon[(1 - b) + b \theta_{KX}^m] \hat{r}. \quad (22)$$

Equation (22) states that new entry to urban public firms will be deterred when the existing firms are large or capital cost is high.

We are now ready to investigate the long-run impacts of privatization to the economy. By differentiating (7) and solving from (8) – (13) and (22), the effect of increased privatization on the number of the urban public firms is:

$$\hat{n}/\hat{k} = - \varepsilon h \{ [(1 - 1/n)s + (1 - k)\varepsilon b \theta_{LX}^m] B + \varepsilon[(1 - b) + b \theta_{KX}^m] \theta_{LY} |\lambda^m| \} / \Delta > 0, \quad (23)$$

where $\Delta < 0$ by the stability condition. In the long run with free entry or exit of the public firms, increased privatization always attracts new firms to the urban sector.¹⁸ This entry effect crowds out the production of good x for the existing firms:¹⁹

¹⁸ In the absence of factor markets, Anderson et al. (1997) show that an increase in the number of the firms by privatization always improves welfare of the economy. Ghosh et al. (2015) verify this point in the case of free entry of foreign firms. Our results are somewhat

$$\hat{x}/\hat{k} = \varepsilon h \theta_{LY} \{ [s + \varepsilon(1-b) \theta_{SX}^F / s_{SX}^F] B + \varepsilon[(1-b) + b \theta_{KX}^m] (|\lambda| + \lambda_{LY}) \} / \Delta < 0, \quad (24)$$

where $|\lambda| = \lambda_{KX} \lambda_{LY} - (1 + \mu) \lambda_{LX}^m \lambda_{KY}$ is the factor intensity measured for total capital usage in sector X. Note that $|\lambda| > 0$ for the case where urban firms are more capital intensive than rural firms. Equation (24) indicate that, based on the output effect and the entry effect, the change in total output of good X is ambiguous, i.e., $\hat{X} / \hat{k} = \hat{x} / \hat{k} + \hat{n} / \hat{k} \geq 0$. This yields an ambiguous effect on the rate of returns on capital. However, if the total output effect is positive, the impact on the capital rate could be higher:

$$\hat{r}/\hat{k} = - \varepsilon h \theta_{LY} \{ [(1-1/n)s + (1-k)\varepsilon b \theta_{LX}^m] (|\lambda| + \lambda_{LY}) - [s + \varepsilon(1-b) \theta_{SX}^F / s_{SX}^F] |\lambda^m| \} / \Delta, \quad (25)$$

since the urban firms are more capital intensive. In this case, increased privatization raises the wage of skilled workers but lowers the unskilled wage rate.

We have the following proposition:

Proposition 2. *In the long run with free entry or exit of public firms in the urban sector, increased privatization attracts entry of public firms to the urban sector. This lowers firm output and widens the wage gap between skilled and unskilled workers. Thus, privatization can lower social welfare of the developing economy in the long run.*

4. Complementary policies

As shown in the previous section, excessive number of public firms in the long run can harm the developing economy through a fall in firm output, accompanied with a rise in wage inequality between skilled and unskilled workers. Thus, the policy recommendations for stronger than these previous results in the sense that not only public firms' profits but their wage subsidies to low income workers also contribute to welfare of the domestic country; hence, the potential welfare gains (of privatization) is larger in our model than in previous papers.

¹⁹ Poor long-run performance of corporations after privatization is found in Dewenter and Malatesta (2001).

improving the economy during the transitional period of privatization would be: (i) to avoid rising wage inequality, entry regulation or closure of public firms should be imposed, and (ii) to mitigate the output contraction of good x , complementary policies on structural changes, like downsizing managerial services, or policy reforms, such as increasing inflows of foreign capital and skilled labor, need to be adopted.²⁰

Our results that regulating entry is welfare enhancing are, indeed, consistent with the literature on excess entry in a general equilibrium setting (Mankiw and Whinston, 1986; Ghosh and Saha, 2007). In particular, Mankiw and Whinston show for the case of symmetric firms that the presence of “business stealing effect” and fixed costs leads to an outcome in which free entry is socially inefficient. Ghosh and Saha identify conditions for entry regulation to be socially efficient for the case of asymmetric firms (with varying marginal cost) where they investigate both scenarios of economies of scale and diseconomies of scale. It should be noted, however, that entry regulation in our model changes welfare through its impact on reducing wage inequality and increasing output, which are different from these previous papers.

Solving (8) – (13), the output effects of the complementary policies for the developing economy can be obtained as:

$$\hat{x}/\hat{z} = -\theta_{LY}\lambda_{LY}(1 + \lambda_{KX}^F)A/D < 0, \quad (26)$$

$$\hat{x}/\hat{n} = -[sB + \epsilon b\theta_{LY}\theta_{KX}^m A(|\lambda| + \lambda_{LY})]/D < 0, \quad (27)$$

$$\hat{x}/\hat{K} = \hat{x}/\hat{S} = \epsilon b\theta_{LY}\theta_{KX}^m \lambda_{LY}A/D > 0, \quad (28)$$

$$\hat{x}/\hat{L} = -\epsilon b\theta_{LY}\theta_{KX}^m \lambda_{KY}A/D < 0, \quad (29)$$

$$\hat{x}/\hat{Q} = -(1 - s)B/D < 0, \quad (30)$$

²⁰ Ghosh and Sen (2012) consider foreign investment and tariff liberalization as the complementary policies to privatization.

As expected, the public firm's output x will be higher when managerial service is downsized, less public firms are allowed, or trade is liberalized by having more foreign capital and skilled labor, but not foreign unskilled labor or direct exports.

Similarly to the explanations given in (16), the increased (lowered) production of good x by structural changes or policy reforms in (26) – (30) demands (reduces) more capital. This in turn raises (decreases) the rate of returns on capital as follows:

$$\hat{r}/\hat{z} = s(1 + 1/n)\theta_{LY}\lambda_{LY}(1 + \lambda_{KX}^F)/D > 0, \quad (31)$$

$$\hat{r}/\hat{n} = s\theta_{LY}\theta_{KX}^m (|\lambda| - |\lambda^m| + \lambda_{LY})/D > 0, \quad (32)$$

$$\hat{r}/\hat{K} = \hat{r}/\hat{S} = -s(1 + 1/n)\theta_{LY}\lambda_{LY}/D < 0, \quad (33)$$

$$\hat{r}/\hat{L} = s(1 + 1/n)\theta_{LY}\lambda_{KY}/D > 0, \quad (34)$$

$$\hat{r}/\hat{Q} = -(1 - s)\theta_{LY}|\lambda^m|/D < 0, \quad (35)$$

where $|\lambda| > |\lambda^m|$ in (32). Utilizing (9) and (10), we obtain the consequent changes on the wages of unskilled and skilled labor:

$$\begin{aligned} \hat{w}_R/\hat{z} < 0, \hat{w}_R/\hat{n} < 0, \hat{w}_R/\hat{K} > 0, \hat{w}_R/\hat{S} > 0, \hat{w}_R/\hat{L} < 0, \hat{w}_R/\hat{Q} > 0, \\ \hat{w}_S/\hat{z} > 0, \hat{w}_S/\hat{n} > 0, \hat{w}_S/\hat{K} < 0, \hat{w}_S/\hat{S} < 0, \hat{w}_S/\hat{L} > 0, \hat{w}_S/\hat{Q} < 0. \end{aligned} \quad (36)$$

Thus, unskilled (skilled) wage increases (decreases) through managerial downsizing, entry regulation, foreign investment, skilled inflows and foreign exports to the economy, but falls (rises) by unskilled inflows. This suggests that beneficial policies or changes for improving firm output as well as narrowing wage inequality include managerial downsizing, entry regulation, foreign investment and skilled inflows. These policies or changes can accompany privatization to avoid the reduction in output during the privatization process. Therefore, the net output effect of increased privatization becomes:

$$dx/dk = \partial x/\partial k + (\partial x/\partial i)(di/dk), \quad (37)$$

where $i = z, n, K$ or S , and $(\partial x/\partial i)(di/dk) > 0$. Thus, increased privatization can benefit the developing economy if the output effect of the complementary change or policy are strong.

We have the following proposition:

Proposition 3. *Increased privatization, combined with structural changes in managerial downsizing and entry regulation or policy reforms in attracting foreign capital or skilled labor, can improve welfare of the economy and also narrow wage inequality between skilled and unskilled labor.*

It is noted that increases in foreign exports or inflows of foreign unskilled workers aggravate output contraction during privatization, which can further harm the developing economy.

5. Conclusions

Using an oligopolistic competition model for an open, dual developing economy with public firms in the urban sector, this paper has examined the impacts of privatization on wage inequality and social welfare for the short and the long run. In the short run, privatization can narrow wage inequality between skilled and unskilled labor but reduce output of public firms. However, the favorable effect of privatization on lowering wage inequality vanishes or is reversed in the long run due to the excessive entry of public firms in the urban sector. Thus, a policy recommendation for privatization to improve a developing economy would be: to avoid rising wage inequality, entry regulation or closure of public firms should be imposed in the short run, and to mitigate the output contraction, complementary structural changes or policy reforms, like downsizing managerial services and increasing foreign capital or skilled labor, need to be combined to use during the transitional period of privatization for the developing economy. It should be noted that these results are obtained under the underlying assumption of homogenous products produced by domestic and foreign firms. This echoes the well-known excess entry outcome discussed in Mankiw and Whinston (1986) and Ghosh and Saha (2007). It would be of interest to examine whether the undesirable result of excess entry is still valid or not for the case of differentiated products.

The issues of privatization, wage inequality and welfare are of importance in the process of development in a globalizing world. The political economy considerations of satisfying the objectives of the central government, the state-owned enterprises, the workforce

and the local authorities are important if the full benefits of privatization are to be realized. In terms of future work on this problem, improvements in developing an accurate and timely labor statistical information system to report on key indicators, such as unemployment, would be useful to be able to judge the success of the privatization as would developing an effective social insurance programs that does not create work disincentives and has portable benefits.

ACCEPTED MANUSCRIPT

Appendix

Letting a dot over a variable denote the time derivative, the adjustments of the system in

(1) – (7) can be expressed as:

$$\begin{pmatrix} \dot{X} \\ \dot{Y} \\ \dot{w}_R \\ \dot{r} \\ \dot{n} \end{pmatrix} = H \begin{pmatrix} \hat{x} \\ \hat{Y} \\ \widehat{w}_R \\ \hat{r} \\ \hat{n} \end{pmatrix}$$

where the H matrix is:

$$\begin{bmatrix} -s(1 + 1/n) & 0 & 0 & -\varepsilon b \theta_{KX}^m A & -s \\ 0 & 0 & -\theta_{LY} & -\theta_{KY} & 0 \\ (1 + \mu) \lambda_{LX}^m & \lambda_{LY} & -s_{LY} - (1 + \mu) \lambda_{LX}^m & s_{LY} + (1 + \mu) s_{LX}^m & (1 + \mu) \lambda_{LX}^m \\ \lambda_{KX}^m & \lambda_{KY} & s_{KY} & -s_{KY} - s_{KX}^m & 1 + \lambda_{KX} \\ -(1 - 1/n)s - \varepsilon(1 - k)b \theta_{LX}^m & 0 & 0 & -\varepsilon[(1 - b) + b \theta_{LX}^m] & -s - \varepsilon(1 - b) \theta_{SX}^F / s_{SX}^m \end{bmatrix}$$

The principal minors of the above coefficient matrixes are, as follows:

$$\Delta_1 = -s(1 + 1/n) < 0,$$

$$\Delta_2 = 0,$$

$$\Delta_3 = -s \lambda_{LY} \theta_{LY} (1 + 1/n) < 0,$$

$$\Delta_4 = D = s(1 + 1/n)B + \varepsilon b \theta_{LY} \theta_{KX}^m A |\lambda^m| > 0,$$

$$\Delta_5 = \Delta.$$

$$\Delta_5 = \Delta.$$

The stability condition requires that the odd principal minors are non-positive and the even principal minors are non-negative. So, we need $|\lambda^m| > 0$ and hence $|\lambda| > 0$ for stability.

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