

Public Firms Merger, Employment and Welfare in Developing Countries: A General Equilibrium Analysis

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Abstract

In this paper, we want to examine how the sizes of public firm sector trim via public firms' merger affect the wage gap, employment and social welfare in a general equilibrium setting? We find that for the dual developing economy with public firms in the urban sector, mergers via a reduction in the number of the urban public firms can reduce the cost of capital. It then lowers the skilled wage rate through the factor substitution effect, while raises the unskilled wage by the inflow of capital to the rural sector and hence lowers urban unemployment. In addition, the reduction in the number of the urban public firms can yield a scale effect to the urban public firms. The beneficial effects on higher urban output and less urban unemployment improve social welfare of the developing economy.

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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.

Many studies in labor economics and international trade have investigated the reasons for worsening wage inequality between skilled and unskilled labor in advanced countries. The analysis on skill premium mainly focusses on the rising skilled wages by skilled-biased technologies, 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. 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 (1988) 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 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. The important question remains: 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?

China is a good 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 have 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 sector 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 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. 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.

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.

In a general equilibrium setting, Beladi and Chao (2006) consider the employment and welfare effects of mixed ownership via partial privatization of state-owned enterprises for a developing economy. An increase in the private ownership lowers the production and, hence, worsens urban unemployment in the short run. However, in the long run, capital moves to the rural region, alleviating the problem of urban unemployment. The employment effect can have a positive contribution to social welfare in the long run. Chao et al. (2015) consider a dual developing economy model with skilled and unskilled labor, while skilled workers provide managerial services and unskilled workers produce goods. They find that in the short

run with entry regulation of urban public enterprises, increased privation 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.

In this paper, we want to examine how the sizes of public firm sector trim via public firms' merger affect the wage gap, employment and social welfare in a general equilibrium setting? We find that for the dual developing economy with public firms in the urban sector, mergers via a reduction in the number of the urban public firms can reduce the cost of capital. It then lowers the skilled wage rate through the factor substitution effect, while raises the unskilled wage by the inflow of capital to the rural sector and hence lowers urban unemployment. In addition, the reduction in the number of the urban public firms can yield a scale effect to the urban public firms. The beneficial effects on higher urban output and less urban unemployment improve social welfare of the developing economy.

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, we examine how the sizes of public firm sector trim via public firms' merger affect the wage gap, employment and social welfare in section 3. Section 4 offers concluding remarks.

2. A model of developing economies with public firms

There are n public firms in the urban sector. A merger is simply modeled as a reduction in n . Following Farrell and Shapiro (1990), we focus on the welfare and resource allocation effects of mergers.

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: $U(D_X, D_Y) = aD_X - D_X^2/2 + D_Y$, where a is a positive parameter. Utility maximization subject to the budget constraint, $I = pD_X + D_Y$, yields the inverse demand function for good X : $p = p(D_X) = a - D_X$ with $p_X (= \partial p / \partial D_X) = -1$. In equilibrium, demand for good X is equal to its supply from domestic public firms, denoted respectively by X , i.e., $D_X = X$. Since there are n public firms in the urban manufacturing sector, by imposing a symmetry condition, we have $X = nx$, where x is output per firm.

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 :

$$g(w_R, r) = 1, \tag{1}$$

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, with capital cost $f(w_S, r)$, which is a fixed cost 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: $c(w_U, r, x, z) = f(w_S, r) + m(w_U, r)x$. By the envelope property, the employments of skilled administrative and unskilled production workers for individual firm in sector X are: $s = f_w(w_S, r)$ and $l_x = m_w(w_U, r)x$, while the use of capital is: $k_x = f_r(w_S, r) + m_r(w_U, r)x$. The profit of each firm is therefore: $\pi = p(X)x - c(w_U, w_S, r, x)$. 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 but also wage payment to production workers, $\pi + (1 - \alpha)w_U l_x = p - w_S s - r k_x - \alpha w_U l_x$, where $\alpha \in [0, 1]$. The inclusion of wage payment in the firm's target is equivalent to a wage subsidy to unskilled worker by $(1 - \alpha)$. Hence, an increase in α by reducing the wage subsidy expresses more privatization of the public firm in the urban manufacturing sector.

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:

$$p(X) + p_x(X)x + \alpha w_U m_w(w_U, r) = m(w_U, r). \quad (2)$$

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 an extra benefit for unskilled production workers in the third term. When more privatization takes place by an increase in α , 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 $L_X = n l_x$. 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:

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

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

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

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 $w_S > w_U > w_R$.

The model specified in (1) – (6) describe the dual structure of a developing economy, in which the six equations determine unknowns, w_R , w_S , r , μ , x and Y , with a given number of urban firms n .

3. Merger, Wage Inequality and Welfare

Facing the twin objectives of profit and employment maximization, a reduction in the number of the urban public firms in sector X can be solved from (1) – (6).

Letting “ $\hat{}$ ” over a variable denote its percentage change, by totally differentiating (2) we obtain the change in firm’s output as:

$$-(1 + 1/n)\hat{x} = \hat{n} + \varepsilon b \theta_{KX}^m A \hat{r}, \quad (7)$$

where $b = m/p$ is marginal cost to price ratio, $h = \alpha w_u m_w / p$ 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 $A = 1 - (1 - \alpha)\theta_{LX}^m \sigma_X^m > 0$ 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 (7) for a given capital cost r , firm output of good x rises in face of a reduction of the number of public firms.

In addition, as expressed in the last term in (7), there is a second-round effect through the change in capital cost, measured by r , on output x . 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:

$$\hat{w}_R = - (\theta_{KY}/\theta_{LY}) \hat{r}, \quad (8)$$

$$\hat{w}_S = \hat{r} + \hat{n}/s_{SX}^F, \quad (9)$$

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 . Note that from (8), 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 (8). In contrast, higher capital cost causes a substitution from capital to skilled labor in sector X . This raises the skilled wage rate in (9).

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:

$$\hat{\mu} = - [(1 + \mu)/\mu] \hat{w}_R. \quad (10)$$

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:

$$(1 + \mu) \lambda_{LX}^m \hat{x} + \lambda_{LY} \hat{Y} = - (1 + \mu) \lambda_{LX}^m \hat{n} - [(1 + \mu) s_{LX}^m + s_{LY}] \hat{r} + s_{LY} \hat{w}_R - \mu \lambda_{LX}^m \hat{\mu}, \quad (11)$$

$$\lambda_{KX}^m \hat{x} + \lambda_{KY} \hat{Y} = -\lambda_{KX} \hat{n} + (s_{KX}^F + s_{KX}^m + s_{KY}) \hat{r} - s_{KY} \hat{w}_R - s_{KX}^F \hat{w}_S, \quad (12)$$

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 . Note that $|\lambda^m| = \lambda_{KX}^m \lambda_{LY} - (1 + \mu) \lambda_{LX}^m \lambda_{KY}$ is positive (negative) if the manufacturing sector X is capital (labor) intensive relative to the agricultural sector Y in variable inputs. For stability of the model, it requires that $|\lambda^m| > 0$.

Solving (7) – (12), the output effects of the reduction in the number of public firms is:

$$\hat{x}/\hat{n} = -[B + \varepsilon b \theta_{LY} \theta_{KX}^m A(|\lambda| + \lambda_{LY})]/D < 0, \quad (13)$$

As expected, the public firm's output x will be higher when less public firms are allowed.

Similarly, the reduction of the number of the public firms release capital from the fixed inputs. This in turn decreases the rate of returns on capital as follows:

$$\hat{r}/\hat{n} = \theta_{LY} \theta_{KX}^m (|\lambda| - |\lambda^m| + \lambda_{LY})/D > 0, \quad (14)$$

where $|\lambda| > |\lambda^m|$. Utilizing (8) and (9), we obtain the consequent changes on the wages of unskilled and skilled labor:

$$\hat{w}_R/\hat{n} = -(\theta_{KY}/\theta_{LY})(\hat{r}/\hat{n}) < 0, \quad (15)$$

$$\hat{w}_S/\hat{n} = \hat{r}/\hat{n} > 0. \quad (16)$$

Thus, merger via a reduction of the number of the public firms 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 (10), the rise in the rural unskilled wage rate can lead to a reverse migration, which lowers the urban unemployment ratio for the developing economy:

$$\hat{\mu}/\hat{n} = -(1 + \mu)/\mu (\hat{w}_R/\hat{n}) > 0. \quad (17)$$

Using the results on outputs and unemployment, we can evaluate the welfare impact of the reduction of the number of the public firms in the 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: $I = w_U L_X + w_R L_Y + w_S S + rK + n\pi$.

Totally differentiating the indirect utility function and then using (1) – (6), we obtain the change in social welfare for the economy:

$$dV/dn = n(p - m)(dx/dn) - w_R L_X (d\mu/dn) < 0, \quad (18)$$

where $dx/dn < 0$ and $d\mu/dn > 0$. Thus, for the developing economy, mergers via the reduction of the public firms can raise firm output, which enjoys the production scale effect. In addition, the rise in the rural unskilled wage leads to less unemployment in the urban sector. These two beneficial forces make the welfare impact in (20) positive.

In summary, we have:

Proposition 1. *For the dual developing economy with public firms in the urban sector, mergers via a reduction in the number of the urban public firms can reduce the cost of capital. It lowers the skilled wage rate through the factor substitution effect, while raises the unskilled wage by the inflow of capital to the rural sector and hence lowers urban unemployment. In addition, the reduction in the number of the urban public firms can yield a scale effect to the urban public firms. The beneficial effects on higher urban output and less urban unemployment improve social welfare of the developing economy.*

4. Concluding Remarks

In this paper, we find that for the dual developing economy with public firms in the urban sector, mergers via a reduction in the number of the urban public firms can reduce the cost of capital. It then lowers the skilled wage rate through the factor substitution effect, while raises the unskilled wage by the inflow of capital to the rural sector and hence lowers urban unemployment. In addition, the reduction in the number of the urban public firms can yield a scale effect to the urban public firms. The beneficial effects on higher urban output and less urban unemployment improve social welfare of the developing economy.

In the future researches, privatization coupling with public merger deserves for attention and needs to further analyze its impact on wage inequality, income distribution and social welfare.

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