Skill acquisition and economic development: Some comments

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Abstract
Deme, Franck and Naqvi (2005) showed that the increased government expenditure on education, training and skill acquisition leads to lower unemployment rate, expansion of the urban formal sector and the contraction of the urban informal sector. This was observed to be the case in Lesotho. The result is based on the two vital assumptions: public expenditure on education, training and skill acquisition should be very large; and the skill acquisition function is a rising step function. We present a general equilibrium model with perfect capital mobility to analyse the impact of government expenditure on skill acquisition on urban unemployment, the urban formal sector and the urban informal sector. We find that it is possible to derive the Deme, Frank and Naqvi(2005) result independent of the level of government expenditure and the nature of the skill function.

Keywords: efficiency-wage, job-matching, general equilibrium

1. Introduction
The informal sector is generally characterized by low productivity, bad working conditions, poor technology and an occupational risk to health and safety. It is natural to think that these problems would be solved if informal workers were to develop their skills. Fretwell and Colombano (2000) [3] have pointed out that skills and education have a positive rate of return for the informal sector. Burki and Ubaidullah (1992) [1] showed that investment in human capital yields the same return in both the formal and the informal sectors.

In general, informal sector workers have very little access to formal education and most of them are unskilled. In Mali, 76% of the informal sectors workers did not receive any education at all (Lautier, 2000) [5]. In Kenya, 85% of the informal sector's workers have not received any training. We find a similar situation in Uganda.

Workers in the informal sector can acquire skills through formal, non-formal and informal training. Formal training is provided by government organizations. However, formal training is not so useful for the informal sector for a number of reasons: often, such training programmes are too theoretical and biased towards white collar jobs; the fees for training are very high and the method of training is suitable only for the educated workers only; and further such training is not designed to satisfy the market demand outside the formal sector.

Non-formal training means training outside the formal education system and is generally provided by voluntary and non-government organizations. Such training programmes are flexible and start from the grassroots levels. One of the most innovative methods of providing non-formal training is mobile training. Despite its advantages, non-formal training has also some problems. For instance, such training is specific and limited to the potential workers. Often, the training staffs are inefficient. Further, it is often the case that there is a lack of

co-ordination among the various programmes conducted by the NGOs and duplicated activities are common.

Informal training is characterized by its lack of structure, the absence of underlying curriculum and the absence of a specified time period for learning. The most commonly used method of informal training is the apprenticeship training. Such training is flexible, dynamic, self-regulating and costs nothing to the government. Entry into such programmes require little in the way of prior skills and experience. In West Africa, 60% of the informal workers have acquired skills through the apprenticeship. The figure is 55% in Ghana (World Bank, 1995) [9], 67%to76%i n Kenya (Nelson, 1997) [8], and 70% in Africa (Mauro, Gerard and Parod, 1999) [6]. Inspite of its many advantages, the informal apprenticeship training does have limitations. Such training is weak on theory and outdated. The quality and extent of training depend on the skill, willingness and ability of the master. Further, the range of skills acquired is limited and is difficult to adapt to changing situations.

Apprentices may receive some payments during the training period. However, the low apprenticeship fees paid to the master is the main motivator for employers of informal workers to recomend apprenticeship training to the workers (Ferej, 1996) [2]. Th apprenticeship fees are not a problem for the informal sector workers entering training (Nelson, 1997) [8].

We here present a model for skill acquisition in a general equilibrium frame work with perfect mobility of capital within the economy. The model is motivated by Deme, Franck, and Naqvi (2005) [7] who showed that if the government expenditure on education, training and skill acquisition is very large and the skill acquisition function is a rising step function, then increased government expenditure on education, training and skill formation lowers urban unemployment and the urban formal sector expands, where as

urban informal sector contracts. We show here that the same result can be obtained theoretically, independent of the level of such public expenditure and the specific form of the skill acquisition function.

The basic model is developed in Section 2. Section 2 also deals with the comparative static effect of rising government expenditure on education, training and skill formation. Section 3 concludes.

2. The Model

We consider a three-sector model of a small open economy. The three sectors are: urban formal sector (u), urban informal sector (i) and the rural sector (r). The products of the three sectors (X_u, X_i, X_r) are traded internationally. The product prices (P_u, P_i, P_r) aregiven exogenously by the rest of the world.

We consider two types of labour: skilled and unskilled labour. The source of skilled labour is the urban informal sector, where workers acquire skills (h) through apprenticeship training. The apprentices (L_a) get some amount of pocket money (W_a) and at the same time they have to pay fees (e) to their masters. The fees motivate the masters to train the apprentices and the apprentices have no problems in paying them. The skill acquired by the apprentices depends on the net payment to them. It is assumed that the apprentices require a fixed wage. The master cannot charge high fees, because this would lower the rate of skill acquisition in the urban informal sector. Thus, even if not all the applicants for apprenticeship training get an opportunity to training at the existing net apprentice wage, the masters cannot raise the fees because this hurts the skills of the apprentice workers. Hence, unemployment exists in the urban sector.

It is assumed that after completing their training all the apprentice become skilled workers. All of them are absorbed by either the mother sector or in the urban formal sector. There is no unemployment of the skilled workers and the skilled workers are mobile between the formal and the informal sectors. Thus, the skill wage rates (W_s) are equalized in the two sectors.

The urban formal sector uses organized labour (L_u), skilled labour (L_{su}) and capital (K_u) as inputs. The variables for production in the urban informal sector are apprentice workers (L_a), skilled workers (L_{si}) and capital (K_i). However, the rural sector uses only ordinary labour (L_r) and capital (K_r) in their production activity.

The endowments of labour (L) and capital (K) are fixed. Capital is fully employed and perfectly mobile among the three sectors, but labour is not fully employed. The perfect capital mobility gives a uniform rate of return (r) to capital in all the three sectors.

Workers migrate from the rural sector to the urban sector. It is assumed that migration takes place over two periods. In the first period, the migrants may obtain employment in the urban formal sector or may train as apprentices in the urban informal sector or may remain unemployed. In the second period, the apprentices are employed as skilled workers, either in the urban formal sector or in the urban informal sector. In migration equilibrium, the average actual rural wage (W_r) is equalized to the average urban formal wage (W_u^*) for the unskilled workers, the average net payment to the apprentice

workers in the urban informal sector and the discounted wage (W_s / v) of the skilled workers.

The production structures of the three sectors are as follows:
$$X_u = L_{su} f_u (L_u / L_{su}, k_u)........................(1);$$
$$X_i = L_{si} f_i (hL_a / L_{si}, k_i)........................(2); \text{ and}$$
$$X_r = L_r f_r (k_r)....................................(3).$$

Where $f'(.) > 0$ and $f''(.) < 0$ and k_u, k_i, k_r are the factor intensities in the three sectors.

The level of skills acquired by the apprentices depends upon the apprentice wage less the apprenticeship fees paid to their masters. Thus, we have:
$$h = h (W_a - e)................................(4) \text{ with } h' > 0, h'' < 0.$$

The cost of minimization of the apprenticeship training implies:
$$(h' / h)(W_a - e) = 1...............................(5).$$

The competitive equilibrium gives the following price equations:
$$P_u = C_u (W_u^*, W_s, R)...........................(6);$$
$$P_i = C_i (W_a - e, W_s, R)..........................(7); \text{ and}$$
$$P_r = C_r (W_r, R)....................................(8).$$

The rural-urban migration equation is:
$$W_r = (L_u /(L - L_r)) W_u^* + (L_a /(L - L_r)) (W_a - e) + (W_s / v)...........(9).$$

The employment functions of the non-trained labour in the urban formal sector is given by:
$$L_u = \beta + \alpha (W_u^*)....................................(10).$$

Where β is a shift parameter and α is the resonse of non-trained labour in the urban formal sector.

The supply function of the skilled labour (L_a) depends on the net income of the apprentices and the government expenditure on education, training and the skill acquisition (E) in the urban informal sector:
$$L_a = L_a (W_a - e, E)................................(11).$$
Where $La1 > 0$, $La2 > 0$.

The endowment equations of the labour force of the entire economy is:

$$L_u + L_a + L_r + U = L........................(12).$$
Where *U* is the level of urban unemployment.
The full employment of the skilled labour is given by
$$L_{su} + L_{si} = L_a................................(13).$$

Using Equation (11) into Equation (13) we get,
$$L_{su} + L_{si} = La (Wa - e, E)......................(13.1).$$

The full employment of the capital is given by:
$$K_u + K_i + K_r = K..........................(14).$$

Interms of capital intensity equation (14) may be written as:
$$k_u L_{su} + k_i L_{si} = K - k_r L_r..................(14.1).$$

2.1 Working of the Model
We can solve for fourteen unknowns from fourteen equations. Equation (5) determines *e* and then *h* is obtained from

Equation (4). Given Pu, W_u *, P_i, W_a and e, Equations (6) and (7) determine W_s R. W_r can be obtained from Equation (8), given, P_r and R. L_u is obtained from Equation (10), given β, α and W_u *. L_a is derived from Equation (11), given W_a, e and E. Equation (9) yields L_r, given W_r, L_u, W_u *, e, W_a, W_s and v Equilibrium U is obtained from Equation(12), given L_u, L_a, L_r and L. Equations (13.1) and (14.1) determine L_{su} and L_{si}.

2.2 Effects of Increased Government Expenditure
Proposition
Increased government expenditure on education, training and skill acquisition may lead to expansion of the urban formal sector at the cost of rural and the urban informal sector and a fall in urban unemployment. Empirical support for this result may be found by considering the situation in Lesotho.

Proof
Suppose government expenditure on education, training and skill acquisition is increased. Equation (11) shows that L_a will rise because this expands the scope of apprenticeship training in the informal sector. Since L_a does not enter in the determination of any factor prices and fixed employment of urban formal non-trained labour due to the rigid formal wage, L_r must fall with the increase in L_a to restore the migration equilibrium condition. Given k_r, capital will move out of the rural sector to the urban sector. Thus in the urban region, the capital-intensive sector expands and the Labour-intensive sector contracts.
Capital and labour thus move to the urban formal sector. Given L_u and k_u, L_{su} must rise and L_{si} falls.
Using Equations (9) and (12) we get, $(W_u * - W_r + W_s / v) L_u - (W_r - W_s / v - W_a + e) L_a = (W_r - W_s / v)U$. Given factor prices, L_u, v and e a rise in L_a due to increased E implies a fall in U. So, the rise in L_a exceeds the fall in L_r. Thus, we have the proposition.

3. Conclusion
The role of government in education, training and skill acquisition is very important in many developing countries, such as Lesotho. Increasing government expenditure in this direction results in there being more skilled workers. Deme, Franck and Naqvi (2005) [7] showed that the increased government expenditure on education, training and skill acquisition leads to lower unemployment rate, expansion of the urban formal sector and the contraction of the urban informal sector. This has been found to be so in Lesotho. Their analysis is based on the two vital assumptions: government expenditure is very large and the process of skill acquisition is discontinuous. They showed that small infusion has nothing to do with generating highly skilled work force. This is applicable to Lesotho. However, this paper shows that, theoretically, the same results can be obtained independent of the level of government expenditure on skill acquisition and the specific nature of the skill acquisition function. In the present paper, we supplemented simple three sector mobile capital model developed by Harris-Todaro (1970) [4] with apprentice training in the informal sector. The implication of this paper is that an increased government expenditure on education, training and skill formation, no matter whether the level is high or low, gives a rising urban formal sector, disappointing urban informal sector and lower urban unemployment, irrespective of the nature of the skill acquisition function.

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