Induced Migration and Improved Absolute and Relative Livelihood: A Search for an Equitable Development[1]

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Abstract. *Two of the channels examined here are direct investment linkage and labor migration linkage. The former is treated exogenously, while the latter is induced by the investment and is the focus of this paper. Induced migration not only improves absolute livelihood but also enhances relative livelihood in the A-sector as wage rigidity exists in the M-sector. Prospective improvement in labor productivity of the M-sector becomes immaterialized as minimum wage engraves and embarks the rigidity. In other words, we can say eloquently that minimum wage in the M-sector improves relative distribution. The higher the mobility, the more likely that entire potential increase in agricultural labor productivity will be materialized. It is thus to the benefit of the whole nation if both the structure and the infrastructure of the national economy can be developed in such a way that make labor force are highly mobile in the national labor market. Development creates new things as well as changes the structure of the economy, while movement makes possible for all the potential net benefits to be materialized both for those who migrate and those who remain.*

1. INTRODUCTION

Fields (1992) summarized two different theoretical perspectives in dualistic development, where each suggests different ways of allocating economic resources for such a development. In sum, one tradition regards modern sector of the economy as the leading sector. And thus, it is an

engine of growth. The other tradition argues just the reverse, that the traditional sector is the leading sector. And so, as a direct consequence, each tradition disagrees in that the best use of additional development resources is to stimulate its corresponding sector of the economy.

The sine qua non of the matter is indeed the marginal productivity of the resources devoted for the development. As Pasay (1996) pointed out that "it has been well known in the literature of economic development that rapid economic growth can best be obtained by devoting resources to economic activity which bring about a high marginal productivity of the resources." And thus, each tradition acclaims that each sector has the highest marginal productivity.

Development economists have long been interested in the issue of growth and equality. Trickle down effect of economic growth has not been come into play. Yet, theoretical researches have not been succeeding in explaining as to why the effect does not come out and drip from economic growth. One of the reasons is attributable to the facts that we have been failing in harnessing, if not recognizing, deeper the channels through which the effect may have played an important role during the development process.

It is precisely these channels that I would like to see further here. Two of the channels that will be examined here are direct investment linkage and labor migration linkage. In spite of the facts that theory has been dealing with other channels,[2] I will focus the present study on the above two linkages, in particular the role of labor migration linkage. In order to be tractable, I will treat direct investment not endogenously determined in the model.[3] However, labor migration is induced by such an investment.

Given that the investment is undertaken in either modern (M) sector or traditional (A) sector of the economy, it will induce labor migration either from the A-sector or the M-sector of the economy. During the migration process, expectation formation does matter significantly in determining the impact of investment in either sector on the other sector; and thus its impact on the national economy.

In the asymmetric expectation formation case, where the M-sector's employers are fully informed concerning the existing probability of labor being employed in the sector while the potential migrants are not, its impact is to enlarge employment creation in the M-sector but without any change in the marginal productivity of labor in the sector (Pasay, 1996). The latter is owing

to the full informed expectation formation taken by the M-sector's employers that exist together with wage rigidity on the M-sector.

As the employers in the M-sector are as less informed as the potential labor migrants, employment is created less but the marginal productivity of labor increases by the same magnitude as in the A-sector. As stylized facts in Indonesia, we know that wage and labor productivity are higher in the M-sector than in the A-sector. And as a direct consequence, the wage and labor productivity in the A-sector will grow faster than in the M-sector; and thus, they tend to be equalized through labor migration induced by investment in either M-sector or A-sector.

2. BASIC MODEL: A RESTATEMENT

As in Fields (1992) and Pasay (1996), the economy is simply assumed to be dualistic in which a modern sector M exists concomitantly with a traditional agriculture sector A. The M-sector fabricates a single output by means of inputs capital K_M and labor E_M, as follows:

$$Q_M = F(K_M, E_M), \text{ where } F_1 > 0 \text{ and } F_2 > 0 \tag{1}$$

Similarly, A-sector produces a single output as represented by the following production process:

$$Q_A = G(K_A, E_A), \text{ where } G_1 > 0 \text{ and } G_2 \geq 0 \tag{2}$$

Observe that the marginal productivity of the A-sector's labor is permitted to equal to zero in order to take into account a possibility of surplus of labor in agricultural sector.

Following Pasay (1996), the expected wage rate paid by employers is allowed to change as they expect in the same way as the potential migrants, i.e. not fully knowledgeable about labor market condition in the M-sector. The wage rate in the modern sector is assumed to be rigid and above the market-clearing as in the Harris-Todaro (HT) model. Despite of employers good understanding about the marginal productivity of labor, they lack information on the probability of absorbing labor in the modern sector labor market. As the employers perceive an identical fashion as the potential migrants do, the expected wage rate paid is adjusted to what they have anticipated on the likelihood of hiring migrants given the prevailing rigid wage rate in the modern sector.

The M-sector's employers will hire labor until the expected wage rate equals to marginal productivity of labor. In general, the rule is expressed as follows:

$$h(E_M, L_M)W_M = \partial Q_M/\partial E_M = F_2 = f(K_M, E_M)$$

where $h(E_M, L_M)$ describes the wage expectation formation of the employers, L_M is labor force, and W_M is the rigid wage rate prevailing in the M-sector. It is further assumed that the marginal productivity of labor is increasing in K_M and decreasing in E_M, i.e. $f_1 > 0$ and $f_2 < 0$. Again, such an optimal decision rule of hiring workers follows Pasay (1996), and furthermore it differs from those of earlier works of Lewis (1954), Fei and Ranis (1964), Harris and Todaro (1970), and Fields (1992) in that the M-sector employers perceive some probabilistic make up in hiring and paying workers.

The simplest form of the probability of being absorbed in the M-sector, $h(E_M, L_M)$, is assumed to equal E_M/L_M so that the hiring rule followed by the M-sector employers is reduced to the following straightforward representation:

$$(E_M/L_M)W_M = F_2 = f(K_M, E_M) \tag{3}$$

which demonstrates an optimal amount of labor hired until the expected wage rate paid by the M-sector's employers equals to the compatible marginal productivity of labor.[2]

Accordingly, the prevailing wage rate in the A-sector (W_A) is assumed to straighten the agricultural labor market,[3] which is again increasing in the amount of capital devoted in the A-sector K_A and non-increasing in the amount of labor employed E_A:

$$W_A = \partial Q_A/\partial E_A = G_2 = g(K_A, E_A), \quad g_1 > 0 \text{ and } g_2 \leq 0 \tag{4}$$

Since the wage rate W_A is assumed fully flexible, i.e. it is the market-clearing wage rate, unemployment is absent from agriculture, meaning that all those who wish to find agricultural jobs could easily be engaged in:[4]

$$L_A = E_A \tag{5}$$

Total labor force available for the whole economy encompasses the M-sector's labor force (L_M) and the A-sector's labor force (L_A):

$$L = L_M + L_A \qquad (6)$$

And out of the total labor force in the M-sector, E_M are employed and U_M are unemployed, that is

$$L_M = E_M + U_M \qquad (7)$$

which will make sure that any labor migrant from the agricultural sector is either absorbed or unemployed in the M-sector.

The A-sector's labor migrates into the M-sector until the labor movement makes equal the expected wage rate of the latter sector to the certain wage in the former sector. The probability of getting hold of secured jobs in the M-sector comes up because not all of its labor force can be absorbed. As in the HT model, we assume that the probability is described by the ratio between the M-sector employment and its labor force (E_M/L_M). As a consequence, the wage rate expected by migrants will be the same with the existing wage rate in the A-sector:

$$(E_M/L_M)W_M = W_A \qquad (8)$$

in equilibrium.

In similar fashion with what Pasay (1996) had done for the case of symmetric expectation formation, the impacts on the economy of investment and employment creation in the A-sector and the M-sector simultaneously can be described by the following total differentials of national output and marginal productivity of labor in the two sectors:

$$dQ_A = G_1 dK_A + G_2 dE_A \qquad (9)$$
$$dQ_M = F_1 dK_M + F_2 dE_M \qquad (10)$$

which explain the total changes in sectoral output attributable to the changes in sectoral capital stocks and employment. As usual, they are all dependent on how productive the capital and labor are in the corresponding sectors.

Next, by total differentiating equations (5) and (7) and equating them, we have:

$$dE_A = dL_A = -dL_M = -dE_M - dU_M \qquad (11)$$

which articulates that increase or decrease in agricultural labor will raise or reduce labor force in the A-sector, which in turns reduce or raise labor force in the M-sector through labor out-migration or in-migration respectively. The latter implies that the M-sector's employment and unemployment will decrease or increase respectively.

3.   IMPACT ON LABOR PRODUCTIVITY IN AGRICULTURAL SECTOR

Next, let us look at the impact of the M-sector investment on the productivity of labor in the agriculture. Again, we follow Pasay (1996) that the impact is described as follows:

$$\delta G_2/\delta K_M = -f_1 g_2 W_M/[f_2(g_2 L_M - W_A) - W_M g_2] \qquad (12)$$

which is obviously positive. It is evidently apparent that, even though investment takes place in the M-sector, lesser amount of employees is now working to generate agricultural output due to out-migration of labor. The smaller number of the remaining agricultural laborers, doing the same agricultural activities, simply implies that they could bring home a larger quantity of agricultural output per head. It is thus wholly identified as a consequence of labor migration out of the A-sector induced by investment in the M-sector of the economy.

As wage is completely flexible in the A-sector, the rise in the marginal productivity of agricultural labor must be translated entirely into increase in the wage rate. Accordingly, this entails that agricultural workers experience an improvement in their absolute livelihood as they earn more than before the incidence of migration out of agricultural sector. Since this is implicitly in our model no other than a real change, the improvement in the livelihood of the remaining laborers in the A-sector is also in real terms.

As explained at the outset, our interest is not only limited to the enhancement in the absolute livelihood of agricultural laborers, but also how it is compared to that of manufacturing laborers. That is the relative distribution of earnings between agricultural laborers and manufacturing workers. Any improvement of the equity will of course contribute to the

harmony of the livelihood as jealousy tends to be reduced among them. Let us turn now to the same induced effect on marginal productivity of manufacturing labor.

4. IMPACT ON LABOR PRODUCTIVITY IN MODERN SECTOR

As usual, total change in marginal productivity of the M-sector's labor can be described in simple fashion as follows:

$$dF_2 = f_1 dK_M + f_2 dE_M = [(L_M dE_M - E_M dL_M)/(L_M)]W_M \qquad (13)$$

which says that total change in modern sector's labor productivity is attributable only by two central factors. The first factor is due to investment in M-sector itself; and the second one is owing to employment change in the sector.

Now, let us suppose that there is new investment in the M-sector of the economy. Then, it will bring about a change in the marginal productivity of labor as much as:

$$\partial F_2/\partial K_M = f_1 + f_2 \partial E_M/\partial K_M \qquad (14)$$

This describes that investment induced change in the marginal productivity of labor in the M-sector obtained is simply as a result of the modern sector investment that improves the marginal productivity of the available workers. It is in effect an investment induced upsurge in the marginal productivity of labor. The second cause is entirely attributable to the fact that the sector can only generate additional employment at the expense of reducing the productivity of labor. This is merely the employment driven decline in the marginal productivity of labor. At this moment the net impact of the expansion appears to depend on the relative strength of the two forces.

Pasay (1996) summarized the induced impact on marginal productivity of labor in the M-sector as follows:

$$\partial F_2/\partial K_M = f_1\{1-[f_2(g_2 L_M - W_A)]/[f_2(g_2 L_M - W_A) - W_M g_2]\} \qquad (15)$$

as the net effect. Furthermore, Pasay (1996) proved by contradiction that the net effect must be positive. Otherwise, he argued, it will contradict our basic

assumption that the marginal productivity of labor is decreasing with employment, i.e. $f_2 < 0$. In short, as investment is undertaken in the M-sector, an instantaneous consequence is to increase the marginal productivity of its laborers.

However, one must note that there exists rigidity in wage in the M-sector. As the M-sector's employers are not fully informed about the probability of hiring employees in the labor market but completely knowledgeable about the rigid wage, the increase in marginal productivity is not entirely realized into wage. As it will be clearer below, the impact will tend to go to zero.

Although the marginal productivity of labor in the M-sector has the potential to rise and the wage rigidity is supposedly put into effect downwardly, the stylized fact of the employers in the M-sector indicates that the employers play safe and take no risk by setting the actual wage on and around that imposed by law.[5] The only way out is that the employers tend to expand employment in the M-sector by paying the rigid regulated wage, instead of experiencing improvement in the marginal productivity of labor. As a direct corollary, the potential rise in the productivity is not materialized. And the upper boundary of the productivity is set by the law on minimum wage.

In accordance with our model, this necessarily means that the probability of hiring must be increasing. As the wage rate is rigid, the expected wage ought to be rising too on the part of potential migrants from the A-sector. Thus, expectation is higher, and the M-sector's employment must be growing at a higher speed rate than its labor force, which is reinforced in part by induced migration of labor. This is simply attributable to the facts that unemployment rate exists in the M-sector and the absolute increase in number of labor demanded is the same with that supplied in the labor market.

5. IMPACT ON RELATIVE MARGINAL PRODUCTIVITY OF LABOR

We have noted above that both marginal productivities of labor in the A-sector and the M-sector experience an increase at the outset of the migration process from the former to the latter sector. However, as the wage rate in the A-sector is fully flexible, the potential increase in its labor productivity is materialized. Meanwhile, due to the existence of wage rigidity in the M-sector, the potential increase in its labor productivity that appears on

the surface at the beginning becomes disappear at the end of the migration process.

The improvement in the M-sector's productivity depends only on whether negotiation between labor union and producers results in enhancement in the minimum real wage rate. That is whether the rate of increase in the minimum nominal wage rate is larger or lower than inflation rate. If it is larger one, then the potential enrichment in the productivity of manufacturing labor must be realized. However, the stylized fact shows that the nominal wage rate negotiated tends to be settled around the same real wage, i.e. inflation rate is generally agreed to be fully offset by both parties, usually after long and hectic negotiation. In this case, the minimum real wage rate is truly rigid, which lends support to our analysis that the potential increase in the labor productivity becomes invisible in the labor market.

As a direct consequence of the two impacts on sectoral labor productivity, real earning distribution of agricultural labor must be improving relative to that of manufacturing labor. Both the absolute and the relative livelihood of agricultural labor enhanced are due to induced labor migration from the A-sector into the M-sector of the economy. It is obvious that the rate of growth of agricultural labor productivity is larger than that of manufacturing labor, that is $dG_2/G_2 > dF_2/F_2 = 0$. As a result, relative marginal productivity of labor between the two sectors, G_2/F_2, must be increasing.

It is therefore obvious that not only the agricultural wage rates will be improving, the flexible wage in agricultural will catch up with the weighted average wage in the modern sector, which is in this case stagnant due to the existence of wage rigidity in the sector. There are at least two major factors that are responsible for the rigidity. The first one is the fact that modern sector's employers tend to behave by setting the wage equals to the minimum wage. And the second factor is the negotiation between producers' association and labor union has a tendency to settle around the same real wage rate, which is after taking into account the magnitude of inflation rate.

6. CONCLUDING REMARKS

Development economists have long been interested in the issue of growth and equality, in particular trickle down effect of economic growth. Yet theoretical researches have not been succeeding in explaining as to why the effect does not come out and drip from economic growth. One of

the reasons is that we have been failing in harnessing, if not recognizing, deeper the channels through which the effect may have played an important role during the development process.

Two of the channels examined here are direct investment linkage and labor migration linkage. In spite of the facts that theory has been dealing with other channels, none has scrutinized its impact on absolute and relative livelihood. I have focused the present study on the above two linkages, in particular the role of labor migration linkage, where migration is induced by direct investment.

We have seen that induced migration not only improves absolute livelihood but also enhances relative livelihood in the A-sector as wage rigidity exists in the M-sector. It is true that investment in the M-sector produces a potential increase in labor productivity in the sector. But this prospective improvement becomes immaterialized as minimum wage engraves and embarks the rigidity. In other words, we can say eloquently that minimum wage in the M-sector improves relative distribution.

Similarly, let us imagine that agricultural labor is not mobile by any means. The immobility simply insinuates that enlargement in agricultural labor productivity will not be turned into reality, albeit agricultural wage is fully flexible. It is thus necessary for agricultural laborers to be highly mobile. The higher the mobility, the more likely that entire potential increase in agricultural labor productivity will be materialized. In this wisdom, high mobility is good for the economy. Improvement in the structure and infrastructure of transportation and communication is then a must if advancement in both absolute and relative livelihood of agricultural laborers is truly anticipated at the beginning of the inducement process.

It is thus to the benefit of the whole nation if both the structure and the infrastructure of the national economy can be developed in such a way that make labor force are highly mobile in the national labor market. Development creates new things as well as changes the structure of the economy, while movement makes possible for all the potential net benefits to be materialized both for those who migrate and those who remain.

The most recent development in bio-energy is perhaps a good, if not the best, example of the inducement process. In this instance, investment in the M-sector that produces bio-energy not only induces the A-sector's laborers to migrate, but it also stimulates further investment in the A-sector in the form of plantation. The latter will tend to promote the productivity of

agricultural laborers even more beyond what is induced by migration as the plantation is closely related to manufacturing. An explicit example of such a contemporary development is the plantation of what is known in Latin as *ricinus communis.*

In this sense, this most recent development in agro-industry, in particular in bio-energy, highlights the focal point between one extreme idea of Schultz (1964) and Adelman (1984), who are in favor of investment in agriculture, and the tradition of Lewis (1954), Fei and Ranis (1964), and Jorgenson (1961), who are on the other hand supportive of investment in non-agriculture.[6] The recent development in a way mediates between the two opposing ideas.

Notes

1. A revised version of the paper was presented at the Seminar on Induced Migration and Improved Livelihood: In Search of an Equitable Development, undertaken by the Demographic Institute, Faculty of Economics, University of Indonesia, Depok, on 11th of May, 2005. The author sincerely extends gratitude to the seminar participants. However, any error is of course the author's own.
2. There are at least three more channels through which the trickle down effect will play an important role in looking at growth with equality. One obvious channel is through a financial linkage, in particular in the course of portfolio investment linkage, where a portion of profit and capital gain can be enjoyed by laborers. The second one is through trade linkage, where the linkage promotes a larger growth. The last one is indirect in nature, where confidence in one spatial or sectoral economy influences that in others.
3. In a more rigorous model, capital mobility can be treated in similar fashion as labor migration where expected rate of returns will determine the mobility.
4. This assumption is accord with the evidence that open unemployment rate in rural areas of Indonesia is around 7.98%, which was much lower than in Indonesia as a whole of 10.36%, in 2005.
5. This evidence has been particularly true for the case of Indonesian labor market where employers have been trying to avoid being taken a legal action both by employees and labor union.
6. See Fields (1992) for a more rigorous examination of the two extreme ideas in a development process.

References

Adelman, Irma. 1984. "Beyond Export-Led Growth", *World Development*, September.

Fei, John C.H. and Gustav Ranis. 1964. *Development of the Labor Surplus Economy*. Homewood, Illinois: Irwin.

Fields, Gary S. 1992. "Modern Sector Enlargement or Traditional Sector Enrichment?: GNP Effects with Induced Migration", *Journal of Population Economics*, Vol. 5 (2) pp. 101-112.

Harris, John R. and Michael P. Todaro. 1970. "Migration, Unemployment and Development: A Two Sector Analysis", *American Economic Review*, 9 (3) pp. 325-353.

Jorgenson, Dale W.A. 1961. "The Development of a Dual Economy", *Economic Journal*, Vol. 71 (282), pp. 309-334.

Lewis, W. 1954. *Economic Development with Unlimited Supplies of Labor*. Manchester School, May.

Pasay, N. Haidy A. 1988. *Growth, Technical Progress, Unemployment and Migration: A Wage Rigidity Model of Labor Market in Indonesia*. Ph.D. dissertation, University of Pittsburgh.

------, 1996. "A Model of Induced Migration Impacts on Labor Productivity and Economy", *Journal of Population*, Vol. 2 (1), June, pp. 2-19.

Schultz, T.W. 1964. *Transforming Traditional Agriculture*, New Haven, CT.: Yale University Press.

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