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INTERNAL MIGRATION, MINIMUM RURAL WAGE AND EMPLOYMENT GUARANTEE: RECASTING HARRIS-TODARO

Sugata Marjit
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Internal Migration, Minimum Rural Wage and Employment Guarantee: Recasting Harris-Todaro

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Abstract

We explore the theoretical implications of the largest employment guarantee in the world, implemented by India through the Mahatma Gandhi National Rural Employment Guarantee Act, in terms of a modified Harris-Todaro (1970) model. We show that the scheme which prescribes a minimum rural wage along with employment guarantee can have ambiguous effects on propensity to migrate from rural areas and may increase aggregate unemployment. We further explore the effects of these distortions by constructing an elaborate general equilibrium model that incorporates an informal sector.

JEL: F11, O17, O18
Keywords: Rural Minimum Wage, migration, employment guarantee, MGNREGA

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1 Introduction

Harris and Todaro published their seminal work on rural-urban migration and laid the foundation of an immensely durable research avenue in development economics. Basic thrust of the analysis was based on Arthur Lewis's (Lewis , 1954) concern about industrial growth and employment with unlimited supplies of labor in poor countries. The development path modeled and proposed by Lewis Lewis (1954) had many potential hurdles which Lewis himself had pointed out. Harris and Todaro (1970) explicitly demonstrated that industrial growth may not solve the problem of unemployment as rural workers line up and wait for better jobs in urban areas leading to greater open unemployment. Employment subsidy can increase unemployment as workers migrate to urban areas. Such a paradox and its causes and consequences were analyzed by many scholars, so was the resolution of the problem. See Khan (2007) for an informative survey of this literature and its background. This rich literature continued to this day for various aspect of industrialization and unemployment with rural-urban migration, including Bhagwati and Srinivasan (1974), Khan (1980), Beladi and Naqvi (1988), Marjit (1991), Fields (2005), Gupta (1993), Margit and Beladi (2003), and more recently Beladi and Oladi (2014).

The government of India initiated the National Rural Employment Guarantee Act (NREGA) in 2005. NREGA is a social security scheme that attempts to provide employment and livelihood to rural laborers in the country. In an effort to make inclusive and overall development a reality, the NREGA was passed as a labor law and implemented across 200 districts in 2006. By 2008, it came to cover the entire country. The scheme was

designed to provide any adult who registers for rural employment a minimum job guarantee of 100 days each financial year at an administered wage rate, i.e., practically at a minimum wage rate. This includes non-skilled work, making it one-of-its-kind across the world. It was later renamed the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). The MGNREGA is an entitlement to work that every adult citizen holds. In case such employment is not provided within 15 days of registration, the applicant becomes eligible for an unemployment allowance. The central (federal) government bears the entire cost of wages of unskilled manual workers, 75 percent of the cost of material and wages of skilled and semi-skilled workers with State bearing the remaining.

Azam (2011), based on field level insights from the selected villages from Telangana and Maharashtra under Village Dynamic Studies in Asia (VDSA), villages of Semi Arid Tropics (SAT) India, shows that the real wages both for farm and nonfarm works exhibited upward trend especially after implementation of MGNREGA in both the states. Some studies considered the effect of MGNREGA on cost of production, and in particular labor costs. For example, Reddy et al. (2014) indicate that this policy resulted in higher agricultural wages, leading to an increase to a significant increase in production costs for most crops and lowering competitiveness of such food crops.

The purpose of the present paper is to re-craft the standard Harris and Todaro model to study implications of MNREGA theoretically. The objective of MNREGA has been to address the problem of rural poverty, income inequality, and employment of rural work force. Government neated scope for building up public assets for the rural economy by building village roads, water storages, irrigation projects, etc. However, at the very basic level, this is like introducing a minimum wage and job guarantees. Our paper is about employment guarantee in relation to HT model, rather than all other aspects of the policy such as social security, inequality ,etc.[1] Such dual policies have counteracting effects on rural employment, hence incentives to migrate, and urban unemployment. We mainly focus on the aggregate unemployment and its composition. We also consider the presence of an informal sector which has come to significance much later than the original work of Harris and Todaro (1970), and has generated a voluminous literature. See Marjit and Kar (2011) and Acharyya and Kar (2014) for detailed background. Several other scholars have contributed to the literature on informal labor market with or without the context of migration, see Rauch (1991), Carruth and Oswald (1981), Agenor and Montiel (2015), Marjit (2003), and more recently Marjit and Mandal (2016). We introduce an informal labor in the context of MNREGA to delineate its impact compared with our benchmark model.

[1] In that, our paper is related to Basu et al. (2009, 2010), albeit not in HT framework.

2 A Simple HT Model with Rural Unemployment

Consider a small open economy with two sectors: rural and urban. Rural sector produces agricultural good A and urban sector produces manufacturing good X. Sector A uses capital (K) and labor (L_X), while A uses land (T) and labor (L_A). Production functions exhibits constant returns to scale with diminishing marginal productivity. Urban wage, denoted by $\bar{w}_u$, is fixed as in the standard Harris-Todaro model. In our model, the government also introduces a minimum wage in rural area, denoted by $\bar{w}_r$. In line with MGNREGA in India, we shall introduce guaranteed rural employment later. Before introducing a rural minimum wage, the standard H-T model can be formulated by the following equations:

$$\bar{w}_u a_{LX} + r a_{KX} = P_X \tag{1}$$

$$w_r a_{LA} + \rho a_{TA} = P_A \tag{2}$$

$$\bar{w}_u \frac{a_{LX} X}{\bar{L} - a_{LA} A} = w_r \tag{3}$$

$$a_{KX} X = K \tag{4}$$

$$a_{TA} A = T \tag{5}$$

where a_{ij} is unit demand for factor i in sector j, r is rental rate of capital and ρ is the return to land. Given our small open economy assumption, P_X and P_A are constant, and five equations determine w_r, r, ρ, X and A. Note that w_r clears the rural labor market with equilibrium urban unemployment is given by $\bar{L} - (a_{LX} X + a_{LA} A)$. $a_i j$s are determined by w_r/ρ and $\bar{w}_u/r$.

The policy of a minimum rural wage with no employment guarantee raises w_r up to $\bar{w}_r > w_r$, with the following immediate consequences: First, ρ falls due to equation (2), implying from equation (5) that A must fall since a_{TA} rises. Note that the urban sector is not disturbed since r does not change, as is evident from equation (1), and a_{LX} and a_{KX} remain the same with $\bar{w}_u/r$ remaining intact. Hence, X remains unchanged.

In equation (3), the left-hand-side falls with a decline in L_A while its right-hand-side rises with $\bar{w}_r > w_r$. Hence, reverse migration takes place from urban to the rural region. Note that now there seems to be nothing that adjusts equation (3) as L_X does not change and L_A falls to accommodate a rise in w_r up to $\bar{w}_r$. Workers move in the rural region not to be employed, hoping for job at a higher wage on the margin. Hence, we have to introduce open rural unemployment. That is, people start migrating into rural economy and reverse of what H-T presumed will happen. Therefor, we have to alter equation (3) in the following way:

$$\bar{w}_u \frac{a_{LX} X}{\bar{L} - a_{LA} A - U_r} = \bar{w}_r \frac{a_{LA} A}{\bar{L} - a_{LX} X - U_u} \tag{6}$$

The left-hand-side (right-hand-side) of equation (6) represents expected wage in the urban (rural) area with the usual interpretation. Note that $a_{LA}A + U_r$ is the number of people who are located in the rural region and that $a_{LX}X + U_u$ people are located in the urban region.

Note that with X and A being determined by equations (4) and (5), respectively, and X not changing with imposing a rural minimum wage, $a_{LX}X$ remains the same. Hence, using equation (5), we get:

$$a_{LA}A = \frac{a_{LA}}{a_{TA}}T \tag{7}$$

a_{LA}/a_{TA} has declined as w_r/ρ has risen, leading to a drop in L_A. Thus, $L_A + L_X$ being determined, though at a lower level, $\bar{L} - (L_X + L_A)$ is determined. Hence, total unemployment $U \equiv \bar{L} - (L_X + L_A)$ is determined, where:

$$U = U_u + U_r \tag{8}$$

Equation (6) can be re-written, in its implicit form, as:

$$f(U_r; \bar{w}_r, K, T) = g(U_u; \bar{w}_r, K, T) \tag{9}$$

where clearly, $\partial f/\partial U_r > 0$ and $\partial g/\partial U_u > 0$.. Hence, the relationship between U_r and U_u is positive: A rise in U_r must mean less people in the urban region, raising job expectation in the urban area. To match such a change, U_u should also rise. Figure 1 depicts equilibrium U_u and U_r, using equations (8) and (9), where fg denotes the graph of equation (9). Once total unemployment is determined after determination of L_A through equation (7), regional unemployment level must meet equation (8), denoted by UU in Figure 1. Then, equations (8) and (9), simultaneously determine equilibrium levels of regional unemployment, denoted by U_r^* and U_u^* in the figure. Conceptually, to start with before the imposition of the rural minimum wage, w_r would have cleared rural labor market with an equilibrium unemployment level $U_r = 0$. But then urban unemployment would have been $U_{u2} < U_{u1}$ because with higher $\bar{w}_r$ total unemployment has increased. As expected, $\bar{w}_r$ has led to a pool of open unemployed people in the rural region.[2]

[2]An inquisitive reader may wonder whether HT paradox, whereby any policy that supports sector X will increase urban unemployment, can occur here given binding rural minimum wage. To explore this suppose rural and urban wages are institutionally fixed and binding. Assume that due to a policy that supports X (e.g., a tariff on imports of X), sector X expands. Hence, L_X increases. It can be shown that:

$$\hat{U}_u = \frac{(1-\pi_u)U_r - (1-\pi_r)L_X}{\Omega}\hat{L}_X$$
$$\hat{U}_r = -\frac{(1-\pi_u)(L_X + U_u}{\Omega}\hat{L}_X$$

where $\Omega = (1-\pi_u)U_u + (1-\pi_r)U_r > 0$, π_u and π_r are employment rates in urban and rural regions, respectively. Moreover , for any variable Z, we define $\hat{Z} = dZ/Z$. Clearly, the signs of $\hat{U}_u$ and total unemployment are both ambiguous. That is, HT paradox may not occur in our setup.

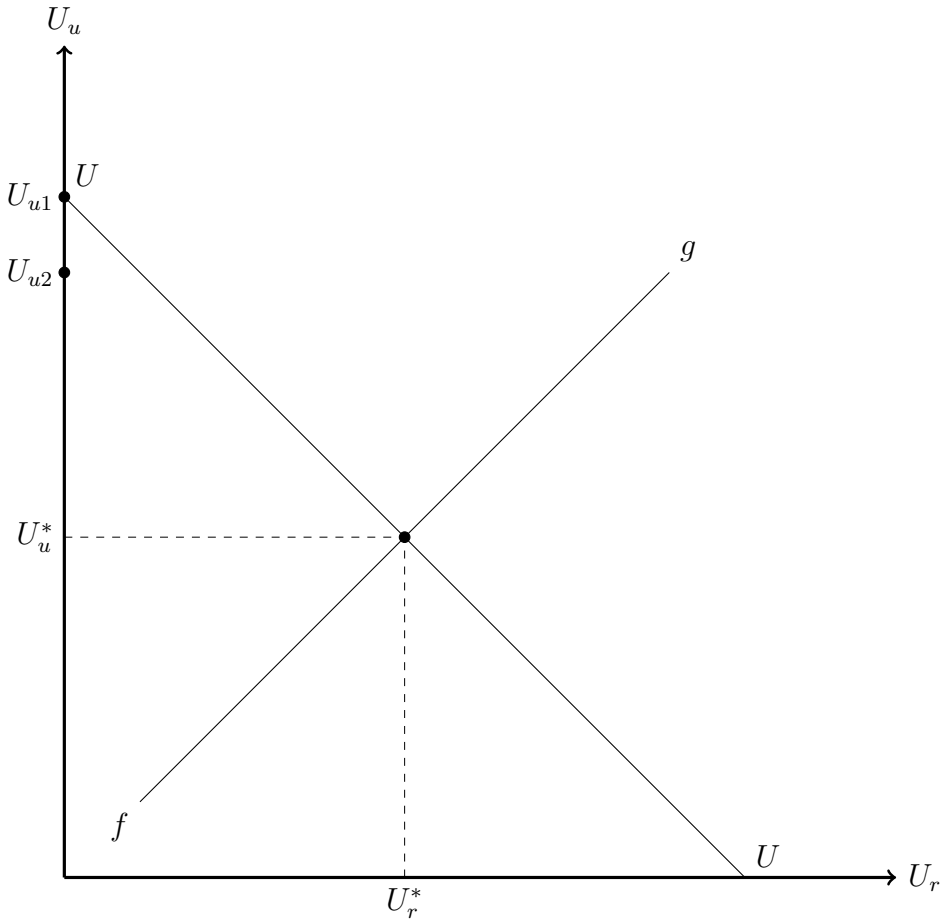

Figure 1: Equilibrium unemployment levels.

No doubt this was anticipated in the policy making circle as the concern for rural unemployment tends to be a rational consequence of higher w_r. Thus, introduction of an employment guarantee policy was necessary. We reformulate our setup to incorporate rural employment guarantee policy in the next section.

3 Minimum Employment Guarantee

We formulate rural employment guarantee policy through a tax financed balanced budget mechanism, keeping in mind that agricultural income is not taxed in India. Thus, urban income will be taxed to finance a public sector which employs workers for public projects. We are concerned with unemployment and immigration over the short and medium run. Also, we shall abstract from the productivity augmenting effects of such public investments. Let t be a proportional tax imposed on sector X. Therefore, the balanced budget constraint implies that:

$$t(\bar{w}_u L_X + rK) = \bar{w}_r L_g \tag{10}$$

where L_g is the level of government employment in the public projects. Since the government actually provides 100 days of work each year, L_g is given. Hence, t is determined by equation (11). Note that if a worker migrates to the urban region, she has to pay t. Hence, equation (6) has to be modified to:

$$\bar{w}_u(1-t)\frac{a_{LX}X}{\bar{L} - a_{LA}A - Lg - U_r} = \bar{w}_r \frac{a_{LA}A + L_g}{\bar{L} - a_{LX}X - U_u} \tag{11}$$

Note that introducing $L_g > 0$, ceteris paribus, increases the probability of getting a job in the urban region, though now the urban minimum wage is less lucrative due to the urban tax. However, the right-hand-side also goes up as more jobs are provided in the rural sector. Recall that in the entire process r does not change to keep L_X frozen and the private rural sector responds only with respect to $\bar{w}_r$. Then L_A also does not change. All adjustments take place in U_r and U_u. Equation (11) can be rewritten as:

$$\frac{L_X}{L_X + U_u} = \frac{\bar{w}_r}{(1-t)\bar{w}_u}\left(\frac{1}{1 + \frac{U_r}{L_A + Lg}}\right) \tag{12}$$

Equation (12) states that a rise in L_g and hence in t will reduce the denominator of the right-hand-side. To keep up U_u must fall in the left-hand-side for migration equilibrium to hold.

Figure 2 summarizes our findings. First note that E_1 is the equilibrium with the introduction of minimum wage $\bar{w}_r$, which definitely increases aggregate unemployment as the economy moves from U_{u2} to E_1. It also reduces urban unemployment and increases rural unemployment. As L_g is put into operation, aggregate unemployment falls and the

downward slping curve UU shifts down. However, depending on the size of L_g and the ability to raise tax, through tax base (i.e., total urban income), unless L_g is large enough to reduce unemployment beyond the level associated with $U_{u2}U_{r2}$, total unemployment will increase compared with absence of this dual rural policies. Proportional effects will vary. For example, compared to E_1, rural unemployment will rise in E_2 and reduce in E_3.

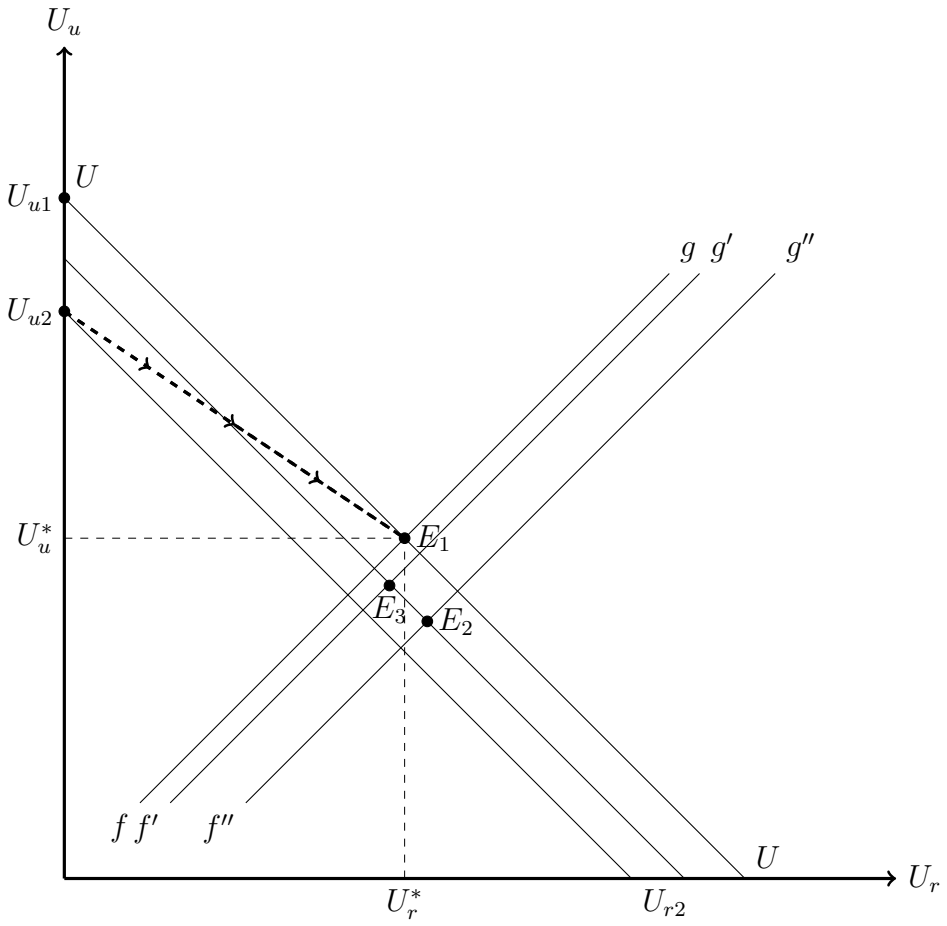

Figure 2: Equilibrium unemployment levels under minimum employment guarantee.

We now turn to the case which captures the Indian condition more closely when there is no open unemployment in the rural sector as the rise in L_g forces excess demand for labor and allows w_r to adjust to clear the market. Shortage of agricultural workers following NREGA has been a serious concern in many regions of India. We consider this scenario in the next section.

4 Market Clearing Rural Wage

It is quite plausible, as in the Indian case, that L_g is such that rural labor market clears at $\bar{w}_r$, that is:

$$L_A + L_g \geq \bar{L} - (L_X + U_u) \tag{13}$$

Hence, we do not have open unemployment in the rural area anymore. Let us denote by $\tilde{w}_r$ the market clearing rural wage such that:

$$L_A(\tilde{W}_r) + L_g = \bar{L} - (L_X + U_u) \tag{14}$$

This is simply the old HT structure with augmented rural demand by L_g. Therefore, we can retain the usual HT migration condition:

$$\bar{w}_u \frac{L_X}{L_X + U_u} = \tilde{w}_r \tag{15}$$

For convenience of interpretation, we rewrite (15) as:

$$\bar{w}_u \frac{L_X}{\bar{L} - L_A - L_g} = \tilde{w}_r \tag{16}$$

Note that the equilibrium arrives through a further contraction in L_A as $\tilde{w}_r < \bar{w}_r$. The left-hand-side in equation (16) is a decreasing function of $\tilde{w}_r$ as L_A declines with rising w_r. Figure 3 captures this idea, where the left-hand side is denoted by LHS. The right-had-side is depicted by the 45-degree line, denoted by RHS. At $\bar{w}_r$, $LHS > RHS$ implying immigration to the urban sector. As labor leaves rural region, w_r rises, A and L_A shrinks, and urban unemployment goes up. The equilibrium settles at $\tilde{w}_r > \bar{w}_r$. On the other hand, if $LHS < RHS$ at $\bar{w}_r$ (not shown in Figure 3), some workers will move to the rural sector and if w_r is not allowed to adjust, then $\tilde{w}_r < \bar{w}_r$, which will violate the minimum wage condition . Hence, there will be open unemployment in the rural area. The driving force behind $\tilde{w}_r > \bar{w}_r$ is a sizable L_g and a low $\bar{w}_r$ compared with $\tilde{w}_r$. Market clearing $\tilde{w}_r$ takes care of the excess demand for labor in the rural region at $\bar{w}_r$. Thus, a situation arises when farms look for workers but workers are in short suply because of the vibrant employment guarantee program.

One can easily perceive how income effect may work in the rural sector when both w_r and L_g increase labor income too substantially. Our assumption of an exogenous supply of labor is tradition driven since dual economy models of development usually have labor surplus at the core of their analysis.

Suppose labor responds to income effect such that rising labor income increases demand for leisure and hence lowers labor supply. Using the definition of aggregate labor income $[w_u(1-t)L_X + \bar{w}_r(L_A + L_g)]$ and the balanced budget condition (10), we obtain the following expression for labor income, denoted by Y_L:

$$Y_L = \bar{w}_u L_X + \bar{w}_r L_A + trK \tag{17}$$

If L_A does not respond too adversely with rising w_r, Y_L must increase. If this reduces L due to income effect, the left-hand-side of equation (16) will shift up, leading to an even

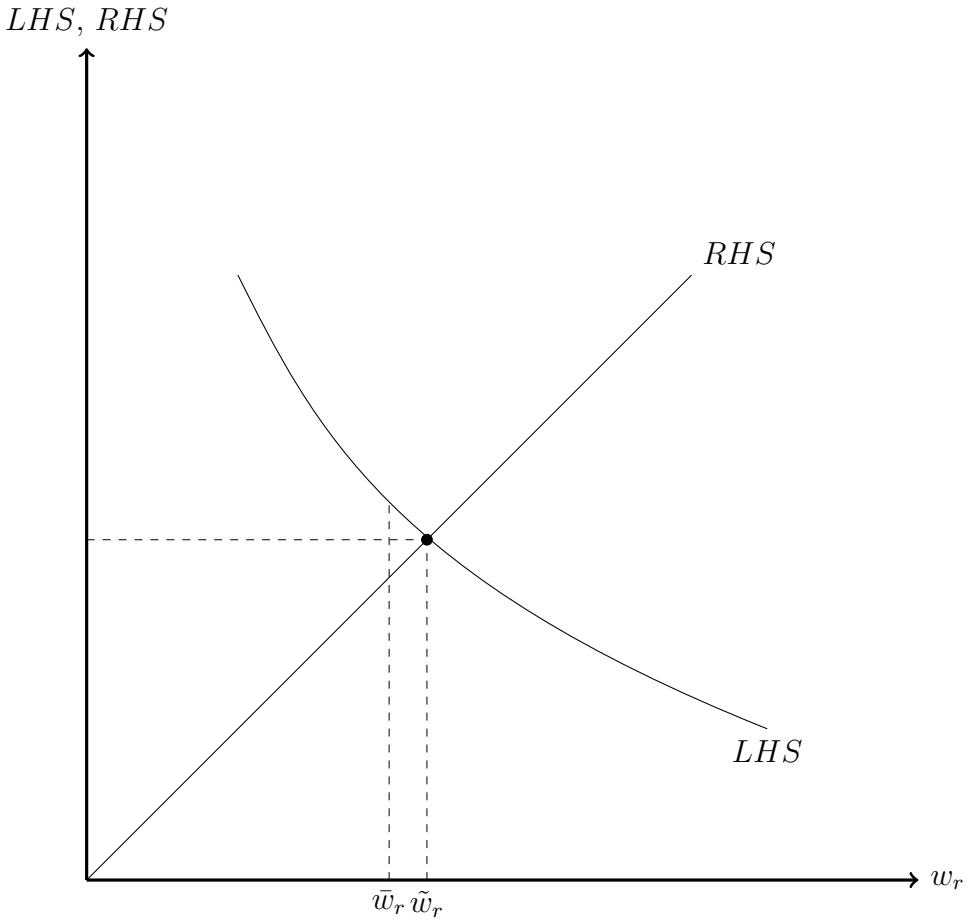

Figure 3: Market clearing rural wage

higher $\tilde{w}_r$. This is a case of labor shortage in rural sector due to two counts. First, L_g itself can be substantial and in case of overestimation of excess supply of labor in the rural region. w_r will rise beyond $\bar{w}_r$ and eventually with no open unemployment in the rural sector. Second, the labor supply effect due to rising income of the workers may reinforce the impact leading to an even higher $\tilde{w}_r$ and resulting in labor shortage in the rural region.

Higher rural wage is likely to reduce urban unemployment as L_X does not does not change in the process during adjustment of w_r. Without the MNERGA Program, the urban unemployment would have been larger. Also rural labor market condition is tighter due to the employment guarantee program and/or the income effect on labor supply, rural-urban migration will decline.

5 Informal Sector

Now, consider a three-good HT model with an informal urban sector. As in preceding sections, X is the manufacturing good and A is the agricultural good. The urban informal sector produces good Y, using capital and labor, with constant returns to scale production technology. Competitive assumption, along with migration equilibrium, imply that:

$$\bar{w}_u a_{LX} + r a_{KX} = P_x \tag{18}$$

$$w a_{LY} + r a_{KY} = P_Y \tag{19}$$

$$w a_{LA} + \rho a_{TA} = P_A \tag{20}$$

$$\bar{w}_u \frac{a_{LX} X}{\bar{L} - a_{LY} Y - a_{LA} A - U_r} = w \tag{21}$$

$$\bar{w}_r \frac{a_{LA} A}{\bar{L} - a_{LX} X - a_{LY} Y - U_u} = w \tag{22}$$

where now w is the competitive wage paid by informal urban sector and $\bar{w}_r$ is the rural minimum wage. Capital mobility between urban sectors, labor mobility across all three sectors, with land being a specific factor, along with presence of both urban and rural unemployment, imply that:

$$a_{kX} X + a_{Ky} Y = \bar{K} \tag{23}$$

$$a_{LX} X + a_{Ly} Y + a_{LA} A + U_u + U_r = \bar{L} \tag{24}$$

$$a_{TA} A = \bar{T} \tag{25}$$

Our general equilibrium is well defined with equations (18)-(26) and our eight endogenous variables. Throughout the rest of the paper we assume that formal urban sector is capital intensive.

We shall follow to a similar lines of arguement as in section 2, starting with when there is no rural minimum wage. Suppose now that rural wage is raised institutionally above the initial market clearing wage, i.e., $\bar{w}_r > w$. It follows from equation (20) that ρ must fall, while r and w remain unchanged according to equations (18) and (19). As wage-rental ratio rises in rural sector L_A, hence A, must fall. A wage rate that is higher than market clearing informal wage encourages workers to leave the informal sector and migrate to the rural sector with the prospect of higher agricultural fixed wages, generating rural open unemployment. Since w/r remains the same, so does k_Y, implying that capital must also move from informal to the formal urban sector. Again, since $\bar{w}_u/r$ does not change, L_X must also rise. To see the impact of raising rural wage above the initial market clearing level on rural unemployment, use equations (21) and (22) to get:

$$\bar{w}_u \frac{L_X}{L_X + U_u} = w = \bar{w}_r \frac{L_A}{L_A + U_r} \tag{26}$$

Initially, when rural labor market is at clearing wage, $U_r = 0$ and the right-hand-side of equation (26) collapses to w. As rural wage is institutionally raised above w, clearly U_r must rise above zero. That is, as $\bar{w}_r$ rises above w, $L_A/(L_A + U_r)$ must fall. Since We already established that L_A falls, U_r must also rise above zero. On the other hand, the left hand side must not change, implying that U_u must also rise when the rural wage is raised above the initial market clearing wage. Total unemployment increases.

Next, we explore how introducing guarantee rural employment works at the presence of an informal urban sector. In doing so we have to modify equations (10) and (11) to, respectively:

$$t(\bar{w}_u L_X + rK_X) = \bar{w}_r L_g \tag{27}$$

$$\bar{w}_u(1-t)\frac{a_{LX}X}{\bar{L} - a_{LY}Y - a_{LA}A - Lg - U_r} = \bar{w}_r \frac{a_{LA}A + L_g}{\bar{L} - a_{LX}X - a_{LY}Y - U_u}. \tag{28}$$

Notably, using equation (24) and (28), it can be shown that that equation (12) holds. Hence, we conclude as in the previous section that a rise in L_g must lower urban unemployment. The intiution is similar to what we presented in Section 3. An increase in L_g will leave private rural demand for labor intact so long as $\bar{w}_r$ remains binding. Hence, total rural demand for labor must rise. Since both r and w do not change, the increase in rural demand for labor must be met with reverse migration of labor from urban to rural region, which results in a reduction in U_u. The impact on rural unemployment is ambigious while total unemployment must also fall. Again, this can be be seen in Figure 2, where at equilibrium E_2, rural unemployment rises while it falls at E_3.

Finally, we reconsider a case which is more in line with Indian situation, where an increase in L_g clears the agricultural labor market. Hence, $\bar{w}_r$ is no longer binding, i.e., $\tilde{w} > \bar{w}_r$, where $\tilde{w}$ is the market clearing wage which also prevails now in the urban

informal sector. Under this scenario, as in the preceding section, we no longer have rural unemployment. Equation (16) will be modified to:

$$(1-t)\bar{w}_u \frac{L_X}{\bar{L} - L_A - L_Y - L_g} = \tilde{w}_r \tag{29}$$

In addition to contraction of the agricultural sector as in the preceding section, we now also have a decrease in rental rate of capital as implied by equation (19). Now both L_A and L_Y in equation (29) are decreasing in $w > \bar{w}_r$, and Figure (3) still depicts the right-hand-side and the left-hand side of this equation. As far as the urban sectors are concerned, assuming that formal sector is capital intensive, formal urban sector expands and the informal sector contracts. Note that both w/r and $\bar{w}_u/r$ rise, lowering both k_X and k_Y, which in turn imply that the informal sector sheds both capital and labor. While the shed capital is fully absorbed by the urban formal sector, shed workers are only partially move to the formal urban sector, since informal sector is labor intensive, while the rest reversely migrate to rural region to be employed by the public sector or join the pool of urban unemployed.

6 Concluding Remarks

This paper celebrates 50 years of the Harris-Todaro model by incorporating the theoretical implications of the largest operational rural employment guarantee program in the world, the MNERGA in India. The paper focuses entirely on migration and unemployment aspects of the problem and attempts to extend the HT structure with minimum rural wage, employment guarantee and informal labor market. All of these have significant impact on the basic results of HT model having implications for open unemployment in both rural and urban sectors. To recap, the HT model was proposed to pinpoint a failure of the Lewisian process of economic growth and development by asserting that increasing job opportunities in the urban sector may increase unemployment in the urban sector through aspiring migrants. We are aware of the fact that the HT way of characterising the probability of finding a job suffers from some anomalies such as hiring and firing everyday or no favour for existing employees, etc., but our intention is to use the HT model by retaining its basic structure.

Minimum wage and employment guarantee in the rural sector generates open unemployment in the rural area but aggregate unemployment might fall. Migration can happen either way with the possibility that a new market clearing rural wage above the minimum rural wage can emerge as equilibrium. This is fundamentally a labor shortage equilibrium which captures a serious issue of rising labor costs in Indian agriculture.

Further extensions include the existence of informal labor market with market clearing informal wage that produces a labor intensive good, a feature that is a fundamental

characteristic of the entire developing world and definitely that of India. Overall unemployment rises once we have a minimum wage in the rural sector and some rural workers move out of this sector due to its market clearing wage is less that the rural sector minimum wage. The informal (formal) urban sector contract (expands). Hence, some workers leave the informal sector as its market clearing wage is now less the rural minimum wage. Since informal (formal) urban sector is labor (capital) intensive, only some of these workers are absorbed by the formal urban sector. The rest will join the public sector or will join the pool of unemployed. Again the employment guarantee scheme as in vogue in India seems to have an inherent tendency to make agriculture a costly venture and that comes out quite clearly in any version of our exercise.

A possible extension of our paper is substantial heterogeneity in India in terms of regional analysis is to incorporate regional variations as economic conditions of regions vary substantially and sequential migration. The policy implications can be very different in different regions with labor demand and supply getting affected differently by a minimum wage and the quantum of job guarantee.

References

Acharyya, Rajat, and Saibal Kar (2014) *International trade and economic development.* Oxford University Press, USA.

Agnor, Pierre-Richard, and Peter J. Montiel (2015) *Development macroeconomics.* Princeton university press.

Azam, M. (2011), "The impact of Indian job guarantee scheme on labor market outcomes: Evidence from a natural experiment," *SSRN* 1941959.

Basu, Arnab K., Nancy H. Chau, and Ravi Kanbur (2009), "A theory of employment guarantees: Contestability, credibility and distributional concerns," *Journal of Public Economics* 93, no. 3-4: 482-497.

Basu, Arnab K., Nancy H. Chau, and Ravi Kanbur (2010), "Turning a blind eye: Costly enforcement, credible commitment and minimum wage laws," *The Economic Journal* 120, no. 543: 244-269.

Bhagwati, Jagdish N., and Thirukodikaval N. Srinivasan (1974) "On reanalyzing the Harris-Todaro model: Policy rankings in the case of sector-specific sticky wages." *American Economic Review* 64, no. 3: 502-508.

Beladi, Hamid, and N. Naqvi (1988) "Urban unemployment and non-immiserizing growth." *Journal of Development Economics* 28, no. 3: 365-376.

Beladi, Hamid, and Reza Oladi (2014) "Technical progress, urban unemployment and heterogeneous firms." *Economics & Politics* 26, no. 3: 519-529.

Carruth, Alan A., and Andrew J. Oswald (1981) "The determination of union and non-union wage rates." *European Economic Review* 16, no. 2: 285-302.

Harris, John R., and Michael P. Todaro (1970) "Migration, unemployment and development: a two-sector analysis." *American Economic Review* 60, no. 1: 126-142.

Fields, Gary S. (2005) "A welfare economic analysis of labor market policies in the Harris?Todaro model." *Journal of Development Economics* 76, no. 1: 127-146.

Gupta, Manash Ranjan (1993) "Rural-urban migation, informal sector and development policies A theoretical analysis." *Journal of Development Economics* 41, no. 1: 137-151.

Khan, M. Ali (1980) "The Harris-Todaro hypothesis and the Heckscher-Ohlin-Samuelson trade model: A synthesis." *Journal of International Economics* 10, no. 4: 527-547.

Khan, M. Ali (2007) "The Harris-Todaro hypothesis." *MPRA Paper* 2201.

Lewis, W. Arthur (1954). "Economic development with unlimited supplies of labour." The manchester school 22, no. 2: 139-191.

Marjit, Sugata (1991) "Agro-based industry and rural-urban migration: a case for an urban employment subsidy." *Journal of Development Economics* 35, no. 2: 393-398.

Marjit, Sugata (2003) "Economic reform and informal wage?a general equilibrium analysis." *Journal of Development Economics* 72, no. 1: 371-378.

Marjit, Sugata, and Hamid Beladi (2003) "Possibility or impossibility of paradoxes in the small country Harris-Todaro framework: a unifying analysis." *Journal of Development Economics* 72, no. 1: 379-385.

Marjit, Sugata, and Saibal Kar (2011) "The outsiders: Economic reform and informal labour in a developing economy."Oxford University Press, UK.

Marjit, Sugata, and Biswajit Mandal (2016) "International Trade, Migration and Unemployment?The Role of Informal Sector." *Economics & Politics* 28, no. 1: 8-22.

Rauch, James E. (1991) "Modelling the informal sector formally." *Journal of Development Economics* 35, no. 1: 33-47.

Reddy, D. N., Reddy, A. A., and Bantilan, M. C. S. (2014) "The impact of Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) on rural labor markets and agriculture," *India Review* 13(3), 251-273.