

Forward-Falling Labor Supply Implications for Wage Rigidity, Unemployment, and Plan Failure*

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Recent empirical evidence suggests that a large majority of workers in labor abundant LDCs work at very low wage rates under conditions of economic distress, and display a forward-falling, rather than the conventional upward-sloping, labor supply function. In this paper, we demonstrate that, given such behavior of individual workers, the market and the aggregate labor supply functions may also be forward-falling. These forward-falling functions, then, are used to provide some theoretically plausible and intuitively meaningful explanations for wage flexibility, wage rigidity, involuntary unemployment, and failures of development plans.

I. Introduction

Recent studies of labor supply in labor abundant less developed countries (LDCs) show that a large number of workers live in absolute poverty, work in the unorganized sectors under conditions of economic distress generated by depressed wage rates, and display a forward-falling labor supply function (Anderson and Frantz, 1984; Sharif, 1989; 1991; 1991a). Labor income is the only source of living for these poor workers; unemployment compensation, minimum wage legislation, labor union protection, and social security and other forms of welfare benefits are non-existent for them; hence, as the wage rate declines,

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these workers are compelled to work longer hours to earn their survival living (Myint, 1971; Rottenberg, 1952; Sharif, 1991a; 1993a).

Studies also show that a smaller number of workers who belong to relatively well-to-do households, enjoy some alternative sources of income, and generally work at higher wage rates, display a conventional upward-sloping labor supply curve with a backward bend (Lal, 1976; Sharif, 1991). The distressed workers' supply function is also observed to change from forward-falling to upward-sloping as their economic condition improves to subsistence and above with higher wages (Sharif, 1989; 1991; 1991a).

The objective of this paper is to examine the nature of the market and the aggregate labor supply functions,¹ given the shapes of the individual supply functions, and then to analyze their implications for some market and aggregate phenomena observed in LDCs. We argue that if the forward-falling individual supply behavior of the working poor at low wages dominates the upward-sloping behavior of a relatively smaller number of well-to-do workers, the market and the aggregate supply functions, contrary to deriving the generally accepted upward-sloping shapes, are expected to be forward-falling. If, indeed, this forward-falling shape obtains in the aggregate, the function will have important implications for macroeconomic phenomena, such as wage rigidity, involuntary unemployment, and the continuous failure of economic development plans.

The nature of the market and the aggregate labor supply is discussed in the next section. Section III uses forward-falling supply functions to provide some explanations for wage rigidity, involuntary unemployment, and plan failure. The study is concluded summarizing the main findings in Section IV.

II. Market and Aggregate Labor Supply

Conventional analysis of individual labor supply, which underlies the market and aggregate supply functions, is based on the assumption of a reservation wage rate, below which the worker does not work, and

¹ In modern developed economies, non-market labor supply is small; therefore, total supply of labor in the market is generally assumed to approximate aggregate labor supply. However, in traditional economies where subsistence family farming predominates all other activities, a substantial portion of the total labor employed is not supplied to the market; hence, the aggregate labor supply is obviously larger than the market labor supply.

above which the worker displays an upward-sloping supply, possibly with a backward bending segment at sufficiently high wage rates.² The notion of a reservation wage is meaningful only if the work enjoys nonlabor earnings or transfer incomes, or institutional constraints, such as trade unions or legal minimum wages are present in the labor market. However, if an individual does not have access to nonlabor income, and institutional constraints are absent, nondecreasing labor supply and the reservation wage depicting a threshold of nonzero hours of work on the function are not meaningful. Because the worker must depend on wages for a living, there is a limit to how far he can reduce his labor supply with the falling wage rate and still maintain a minimum standard of socially acceptable decent living generally known as subsistence; further reductions in the wage rate will induce the worker to expand, rather than contract or cease labor supply.³ This implies that the minimum wage rate offering the subsistence income to the worker provides the demarcation between the upward-sloping and the forward-falling segments of his supply curve — below-subsistence wage rates generating the forward-falling and the above-subsistence wage rates the upward-sloping segment. The nature of the total supply function, therefore, will be determined by the extent and importance of the forward-falling relative to the upward-sloping supply behavior displayed by the workers.

A. Market Labor Supply

Assume that the workers participating in the market face wage rates W in the domain — $W_q \leq W \leq W_h$, and that there exists, for each worker, a wage rate W_{si} , such that $W_q < W_{si} < W_h$, which yields his subsistence income F_{si} at labor supply L_{si} . Suppose also that each worker displays a labor supply function with a forward-falling segment at low wages and an upward-sloping section at higher wages with a turning point at the subsistence wage rate and labor supply, W_{si} and L_{si} , respectively, such that,

² The conventional market/aggregate labor supply function derives a strictly positive-sloping shape, because the upward-sloping behavior of workers dominates their backward-bending behavior at higher wage rates.

³ Since an expansion in labor along the forward-falling curve means a reduction in nonwork time below its level at subsistence, forward-falling supply also implies a lower consumption of both income and nonwork time when wage rates decline. (For evidence on labor supply elasticity supporting this contention, see Sharif, 1991a). The reservation wage might still be applicable to labor supply; however, it will apply to the lowest point of the forward-falling supply curve showing labor supply up to the maximum limit of physical tolerance at the lowest acceptable wage rate.

$$(1) \quad L_i = f_i(W) \quad i = 1, \dots, n,$$

where $f'_i < 0$ for $W_q \leq W < W_{si}$, $f'_i = 0$ for $W = W_{si}$, $f'_i > 0$ for $W_{si} < W \leq W_h$, and $f''_i > 0$ for all values of W . The total labor supply (TL) function for the market will be given by

$$(2) \quad TL = \sum f_i(W).$$

Since $(\delta TL / \delta W) = \sum f'_i$, the elasticity ϵ_i of total labor supply can be written as a weighted average of individual labor supply elasticities, ϵ_i for $i = 1, \dots, n$. Thus,

$$(3) \quad \begin{aligned} \epsilon_i &= (\delta TL / \delta W)(W / TL) = \sum \{f'_i(W / L_i)\} \{L_i / TL\} \\ &= \sum [\epsilon_i (L_i / TL)]. \end{aligned}$$

Evidently, the algebraic value of ϵ_i will depend on the sign and magnitude of each ϵ_i and its respective weight (L_i / TL). Since the subsistence income, F_{si} , can differ among workers because of differences in household characteristics and individual preferences, f'_i and therefore, ϵ_i at a given wage rate, might be negative for some and positive for others, and (L_i / TL) at that particular wage rate might also differ.⁴ Obviously, at a given wage rate, ϵ_i will attain a negative value, if the weighted sum of negative ϵ_i 's dominates that of positive ϵ_i 's.

However, our concern in this paper, is the value of ϵ_i at the weighted average of W , the weight for W_i being the ratio of the quantity of labor supplied at that wage rate to the sum of the quantities of labor supplied at all the wage rates.⁵ If the weighted average wage rate falls below the W_{si} of a relatively larger number of workers in the market, ϵ_i can reasonably be expected to derive a negative value. This result stems from the fact that, (i) for $W_i < W_{si}$, $f'_i < 0$ and therefore, $\epsilon_i < 0$, and (ii) since $W_i < W_{si}$ implies distress sale of labor, $\sum (L_i / TL)$ for all workers supplying labor at $W_i < W_{si}$ will be greater than that for those working at $W_i > W_{si}$.

⁴ Note that although this F_{si} , and therefore, W_{si} and L_{si} , might be different for different workers depending on their preferences, amount of asset income, and extent of dependency, they are not expected to vary widely, as F_s is a social datum, and the workers under consideration generally live a poor life in a given social environment.

⁵ Although the labor used in traditional activities are generally unskilled, wage rates differ depending on the nature of activities; in agriculture, for example, transplantation pays a higher wage than weeding.

B. Empirical Considerations

Whether the weighted average of the market wage rates will actually fall below the W_{si} of a majority of workers and ϵ_i will attain a negative value will depend on the degree of modernization within the market economy and the extent of poverty among the workers participating in it. Empirical evidence from labor abundant LDCs suggests that unorganized traditional sectors dominate these economies in terms of both absorbing labor and generating income, and absolute poverty is widespread and staggering predominately among the workers engaged in traditional sector activities. Traditional agriculture is the main-stay of these economies; if other unorganized sectors in both the rural and urban areas are included, traditional sectors provide the principal source of employment opportunities.

The daily wage rates for workers in these sectors are observed to be pitifully low (Rodgers, 1975; Cain and Mozumder, 1981). Moreover, the rates earned by the assetless poor are substantially lower than those earned by the assetholding workers; but both the labor supply and actual work time of the former are found to be significantly greater than their respective values for the latter (Hart, 1986; Sharif, 1991). Also, the actual work time is observed to negatively correlate with the extent and level of modernization of the economy (Farouk, 1980; Farouk and Ali, 1975).

The evidence, thus, suggests that, in labor abundant LDCs, a larger number of workers work in traditional unorganized sectors, suffer absolute poverty — obviously living below their subsistence, display a forward-falling supply behavior, and work longer at lower wages than those who enjoy levels of living above subsistence and show a positive-sloping supply. This observation suggests that the weighted average of the market wage rates will be smaller than the subsistence wages for the majority of workers, and therefore, the total labor supply at this average wage is likely to display a negative elasticity. This observation is supported by the estimates of market supply elasticity, obtained by Rosenzweig (1984), for male workers in rural India.⁶

⁶ See Appendix Tables A.1 for his estimates. Resenzweig (1984) derives his estimates by using employment figures as labor supply under the assumption of full-employment in a perfectly competitive market. Since involuntary wage-unemployment is generally observed in these economies, Rosenzweig's assumption and therefore, his findings are questionable. However, since male workers in poor economic conditions are required to work full time and even overtime to earn survival income for their families, the estimates for the males may be approximately correct. His elasticity estimates for the females, nevertheless, may

Studies of labor force participation by workers of different sex and age groups from various assetholding households provide additional support for this conclusion. Participation in the labor force by different members of households is generally observed to be significantly inversely correlated with the economic status of their households (Hart, 1986; Sharif, 1991). At poor economic conditions, all the members of the households including men, women, and children are found to participate in the labor force. However, as the economic conditions improve with higher value, women and children who also show forward-falling supply, are observed to quit the labor market, leaving the responsibility of supporting the household to the adult male workers (Bardhan, 1984; Sharif, 1991). This means that, at low wage conditions, while the regular participants expand their labor supply, the number of participants also increases, thereby strengthening the forward-falling nature of the total supply function.

C. Aggregate Labor Supply

Conventionally, total market supply of labor is also considered to constitute the aggregate supply of labor; for economies which are widely modernized and commercialized, this is a reasonable approximation. But, in predominantly traditional economies where subsistence family farming is an important economic activity, a substantial portion of the aggregate labor is not supplied to the market; therefore, aggregate supply is essentially different from the market supply. However, there are indications that, in these economies, workers' overall — market and family farm — labor supply is also a function of the workers' standard of living and, for most, is forward-falling (Sharif, 1991). Thus the aggregate supply is also expected to display a behavior similar to that of the market supply. Although, the shape of the aggregate supply will not differ from that of the market supply, the former is expected to be flatter, since a majority of subsistence peasant farmers fall below the standard of subsistence, and participation on the family farm is also observed to decline with the holding of assets and economic status of the household (Hart, 1986; Sharif, 1991).

III. Some Implications of Forward-Falling Supply

This section uses the forward-falling function to explain some of the suffer from mis-specification due to the pattern of female labor force participation. Note that Rosenzweig estimates positive elasticities of market labor supply for females, which is counter intuitive, and might be the result of this mis-specification.

market and aggregate phenomena observed in the traditional economies of labor abundant LDCs — the coexistence of involuntary unemployment and wage rigidity in the market and the failure of development plans in aggregate are these phenomena.

A. Involuntary Unemployment and Wage Rigidity

Recent theoretical studies offer explanations for the coexistence of involuntary unemployment and wage rigidity using individual worker's behavior generated by the conditions of their living in absolute poverty under economic distress (McGregor, 1990; Dasgupta and Ray, 1986; Sharif, 1993; 1993a). Our objective, here, is to elaborate on this theoretical approach using the forward-falling supply in a labor market which may have either a perfectly competitive or a monopsonistic structure.

NMW_q in Figure 1 is a market supply curve with a forward-falling segment (NM) and a horizontal segment (W_qM), and the distance W_qM showing the largest quantity of labor supplied at the minimum acceptable wage rate W_q . There is a minimum level of survival income for which the workers would be willing to work; if this minimum cannot be obtained by working to the maximum of physical limit, workers will quit the labor market. Therefore, W_q is assumed to represent the quit wage rate, below which the workers would refuse to work, since begging might be a preferred alternative to working at pitifully low wage rates (Ahmed, 1981).⁷

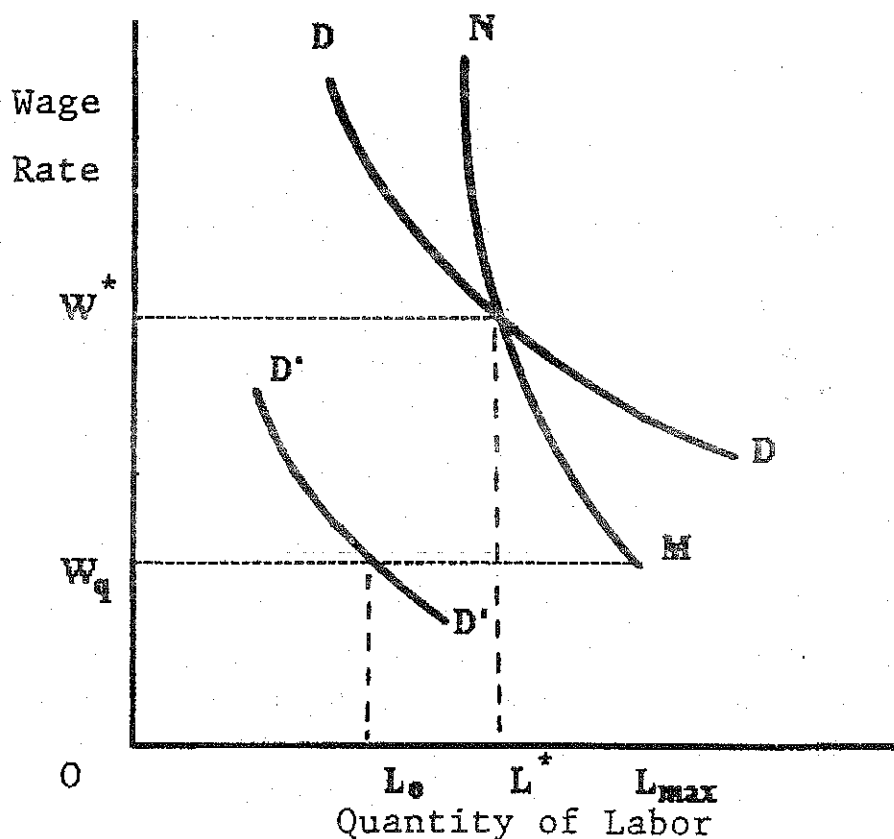
(i) Perfectly Competitive Market: If the market is perfectly competitive, the labor demand curve must intersect the supply curve from below in order to offer a Walrasian-stable equilibrium at any point on the forward-falling segment of the supply curve;⁸ however, if demand is so low such that the demand curve intersects the horizontal segment of the supply curve, employment takes place at the quit wage rate, obviously the level of involuntary unemployment depending on the size of demand. Thus, if DD in Figure 1 is the demand curve, equilibrium wage

⁷ Since poor workers, surviving under desperate economic conditions in a given socio-cultural environment, face similar alternatives to wage-income, either from self-employment or from begging, W_q may reasonably be assumed to be the same for all workers.

⁸ Although we do not have supply and demand elasticity estimates for a given market, the estimates for a cross section of markets compiled and listed in Appendix Tables A.1 and A.2 appear to be consistent with Walrasian stability — demand elasticities are generally higher in absolute values than supply elasticities.

Figure 1

Forward-Falling Supply in a Competitive Labor Market:
Wage Flexibility, Rigidity, and Unemployment



rate W^* is determined at full-employment of labor L^* . Alternatively, if the demand curve is given by $D'D'$, an underemployment equilibrium is obtained with OL_0 level of employment and L_0L_{max} involuntary unemployment at quit wage rate W_q .

Assuming that the labor supply remains stable, changes in the demand for labor allow the possibility of wage flexibility with full-employment on the forward-falling, and wage rigidity with involuntary unemployment on the horizontal segment of the supply curve. Note that an increase in demand for labor, for example, during peak seasons of agricultural activities, would raise the wage rate, but equilibrium employment might increase or decrease depending on the nature of the initial equilibrium. This analytical result is consistent with the empirical observation of a smaller quantity of labor supplied but full equilibrium employment at higher wage rates during busy seasons, and a larger quantity of labor supplied and involuntary unemployment at lower wage rates during slack seasons (Ahmed, 1981; India, 1976; Sharif, 1991a). During lean periods of farming, when demand declines drastically and

the wage rate falls to its minimum, workers supply larger quantities of labor, but are employed for a fraction of their desired work-time; thus they suffer involuntary unemployment.⁹

However, if labor supply displays temporal shifts with seasonal changes in labor demand, employment will change in the direction of the change in demand; but the nature and extent of change in the wage rate will depend on the relative shifts in the supply and demand for labor. For example, an increase in demand for labor during peak seasons raises market participation among existing workers (total labor participation, however, might decrease), and induces in-migration of workers from other areas with different cropping cycles, thereby expanding the supply of labor in the local market. This will expand employment; however, the wage rate will rise only if the increase in demand is greater than that in supply; otherwise, it will remain unchanged, or may even decline. These theoretical possibilities of increasing, constant, or decreasing wage rate with rising demand for labor are consistent with empirical phenomena observed in LDC agriculture (see Bardhan, 1977 for a survey of the literature on India).

The use of forward-falling supply behavior in a competitive labor market, thus, can explain wage-flexibility with equilibrium full-employment during busy seasons, and downward wage rigidity with involuntary unemployment during slack seasons of agricultural activities. Moreover, the framework can explain cases of larger or smaller full-employment at higher wage rates with a stable labor supply, and an increased, decreased, or unchanged wage rate at a higher level of employment with unstable labor supply.

(ii) Monopsonistic Market: Alternatively, if the labor market is organized under monopsonistic conditions, such as a larger agricultural landlord employing most or all of the workers, forward-falling market supply of labor always results in the employment of labor at the quit wage rate, with or without involuntary unemployment. Given the nature of the supply curve, the monopsonist can increase his appropriated surplus by employing a larger number of workers at a lower wage rate. Here the traditional optimization rule of equating the marginal factor cost (MFC) with the marginal value product (VMP) of labor does not operate, as the MFC of labor is always less than the VMP of labor; the

⁹ Under such circumstances, these workers cannot afford to remain unemployed, and therefore, engage in low productive self-employment activities to supplement their wage-income. This implies that involuntary unemployment for these poor workers is wage-unemployment only. See Sharif (1993, 1993a) for an analysis, and Bardhan (1977) and Ahmed (1981) for discussions on these activities.

limit of employment is determined by the VMP of labor only.

In Figure 2, NMW_q again represents the labor supply curve and RR is the VMP of labor curve.¹⁰ As the monopsonistic employer moves down RR to employ more and more labor at a lower and lower wage rate, his profit continuously increases, since the MFC of labor curve (not drawn) always lies below the VMP of labor curve. Consequently, the optimum level of employment, $W_q b$, occurs at W_q wage rate, with bM showing the level of involuntary unemployment. The optimum levels of wage rate and employment, in this case, is a boundary solution for the monopsonistic employer.

It should be noted that the short-run determination of the level of employment at W_q rests on the assumption of perfect knowledge on the part of the employer about the workers' quit wage rate. If the employer lacks this information, employment could conceivably take place at a higher wage rate, such as W_1 , with $W_2 e$ level of employment and ea involuntary unemployment.¹¹ A situation like this could occur if the monopsonistic employer is risk-averse and tends to over-estimate the quit wage rate, fearing that any lower wage rate will drive the workers out of the market to self-employment or will lead to worker out-migration. To this, add the fact that the workers in such labor markets do not normally bid the wage rate down in their attempt to gain additional employment (Dreze and Mukherjee, 1987); rather they simply wait for a call to work and failing to get it by the morning of the day, engage themselves in some form of nonmarket activities for the rest of the day in order to survive.

However, as the nonmarket activities available to these workers are usually much less productive than market employment with the monopsonist, a more likely scenario of wage rate and employment determination for the employer is to immiserate the workers by pushing the wage rate downward until his economic profit begins to fall due to workers withdrawing from the market, and then to adjust his wage rate upward

¹⁰ Although the monopsonist is a competitive producer, he is a large farmer who typically uses a more capital-intensive technology than the small farmer employers in the competitive labor market. Deep tubewells, power pumps and power tillers are some examples of large farm technology, while small farmers generally use traditional labor-intensive methods of irrigation and plowing. While capital-intensive methods raise labor productivity on the large farms, it reduces factor substitutability; therefore, the marginal productivity of labor is expected to fall faster on large farms, resulting in a steeper VMP curve for the monopsonistic employer.

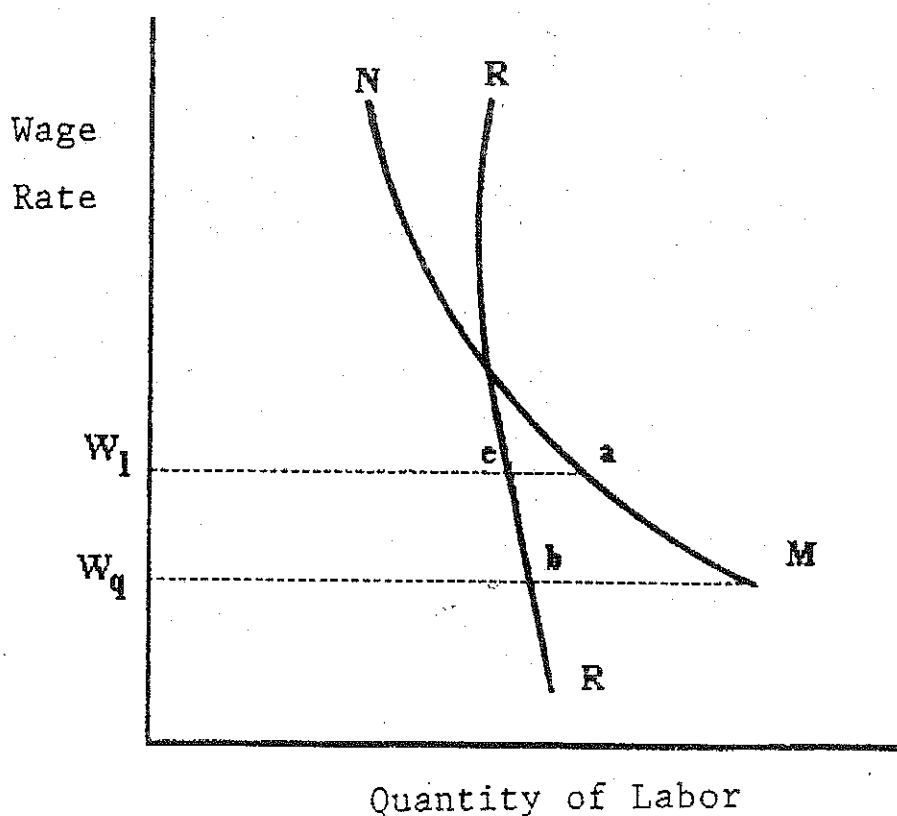
¹¹ Note that this does not necessarily mean unemployment of workers; unemployment of work time, or a combination of workers and work time can consistently explain this situation. See Sen (1966) and Sharif (1993).

to a sustainable level. Thus, in terms of a long-run adjustment, the wage rate will be set by the monopsonist at the quit rate W_q .

(iii) Empirical Considerations: The above analyses suggest that, in a market with forward-falling labor supply, monopsonistically determined wage rate will be generally lower than the one determined competitively. Empirical evidence compiled by Dasgupta (1977) from a larger number of village studies tends to support this analytical assertion. Dasgupta reports that villages in poor LDCs vary widely with respect to concentration of landholdings, incidence of landlessness and tenancy, availability of land per head of population, types and intensity of cropping, and availability of nonfarm and self-employment activities. The villages with the least concentration of land, smallest incidence of landlessness and tenancy, high per capita land, wide variety and high intensity of cropping, and ample self-employment opportunities offer a market structure ideal for perfectly competitive analysis. On the other hand, villages with the opposite features offer an environment ideal for monopsonistic analysis.

Figure 2

Forward-Falling Supply in a Monopsonistic Labor Market:
Wage Rigidity and Unemployment



Dasgupta specifically suggests that while the majority of villages in India, for example, might have competitive labor markets, at least 30 percent of them have markets which are monopsonistic, and wage rates are found to be lower in these monopsonistic villages. The models of perfectly competitive and monopsonistic labor markets presented in this paper, therefore, appear to be relevant, and the analytical results derived provide plausible explanations for the labor market behavior of such economies as those of rural India.

B. Failure of Development Plans

An examination of the growth performances of development plans of two labor abundant LDCs shows that most of these plans fail to achieve their target rates of growth in output. Figures in Appendix Tables B.1 and B.2 show that four out of five of the five-year development plans in India and four out of five five-year plans in Pakistan suffered shortfalls in the realized from their planned growth rates. These failures seem paradoxical considering the fact that, for almost all the plans suffering the shortfalls, actual rates of gross capital formation were greater than the target rates needed to achieve the planned growth rates — only one plan failed to meet the target of investment and another one just made it.

Planners generally try to rationalize these failures by saying that the target growth rates were based on an overestimation of the performance of the agricultural sector and/or of the efficiency of planned investment (India, 1980). But this overestimation is very hard to justify plan after plan. Another reason provided for these failures is a shortfall in the mobilization of foreign resources. The data compiled in Tables B.1 and B.2, however, do not support this generalk contention. There are only four plans, two in India and two in Pakistan in which actual foreign resources fell short of their targets. Even in these cases, the growth of domestic savings more than offset the shortfall in foreign resources, and thereby made the actual rates of gross capital formation larger than, or at least equal to, their target rates. To sum up, while the cited reasons might partially account for the failures, there might be other factors contributing to this result. We add one possible explanation for the failure in terms of forward-falling aggregate supply of labor.

Development plans and growth estimates are based on the projections of the growth of different factors of production. The projection of the aggregate supply of labor is the one that bears important implications in this respect. Development plans in LDCs are generally formulated and implemented with very little attention to the growth of the

labor force and its market and nonmarket participation. The prevailing notion of an horizontal or upward-sloping aggregate labor supply function is responsible for this lack of attention. This presumption implies that, with the execution of development plans, as the demand for labor increases, additional supplies of labor will always be forthcoming. Consequently, aggregate labor supply is completely ruled out as a development constraint, and virtually, all the vital considerations in development planning are directed towards procurement, formulation, and investment of capital. If the forward-falling labor supply, in fact, does exist, the growth process is retarded in a manner not expected by the planners. We present a simple model of an aggregate economy to demonstrate this point.

We assume that aggregate output Y is a function of capital K and labor L . Thus,

$$(4) \quad Y = Y(K, L)$$

Assuming K as an exogenous variable, L can be expressed as a function of the size of population P and the average real wage rate W ,

$$(5) \quad L = L(P, W)$$

Since W is determined by the marginal productivity of labor (given the supply of labor) and the marginal productivity of labor is determined by the level of capital formation and the size of population, W can be written as a positive function of K and a negative function of P ,

$$(6) \quad W = W(K, P)$$

Substituting (5) and (6) into (4) yields,

$$(7) \quad Y = Y[K, L\{P, W(K, P)\}]$$

Taking the time derivative of Y , dividing by Y , and with some algebraic manipulations, output growth rate G_y is written as,

$$(8) \quad G_y = \epsilon_{yk} G_k + \epsilon_{yl} \epsilon_{lp} G_p + \epsilon_{yl} \epsilon_{lw} (\epsilon_{wk} G_k + \epsilon_{wp} G_p)$$

where G_k = rate of capital formation, G_p = population growth rate,

ϵ_{yk} = capital elasticity of output,

ϵ_{yl} = labor elasticity of output,

ϵ_{lp} = population elasticity of labor,

ϵ_{lw} = wage elasticity of labor,
 ϵ_{wk} = capital elasticity of wage rate, and
 ϵ_{wp} = population elasticity of wage rate.

For the purpose of our analysis, the crucial element in the G_y function is ϵ_{lw} in its third term. The horizontal or upward-sloping labor supply implies that ($0 < \epsilon_{lw} \leq \infty$); therefore, as W increases with developmental activities [implying that $(\epsilon_{wk}G_k + \epsilon_{wp}G_p) > 0$], G_y is expected to increase. However, if ($\epsilon_{lw} < 0$) as implied by the forward-falling supply, ϵ_{lw} will exert a negative effect on G_y . Hence, G_y with positive ϵ_{lw} is bound to be greater than G_y with negative ϵ_{lw} . Since the planned growth rates are based on a positive ϵ_{lw} , and the actual growth rates are possibly determined by a negative ϵ_{lw} , along with others, the discrepancies between planned and realized growth rates are obvious.

The failures of development plans, even with vigorous mobilization of resources from both domestic and foreign sources, have become a major source of frustration for some LDC policy makers, development planners, and administrators. A recognition of the phenomenon of forward-falling aggregate labor supply should eliminate, or at least mitigate, this frustration, and the costly mistakes of shifting from one strategy to another may be avoided. Although the aggregate amount of labor supplied may decline when development activities boost wage rates, the distressed workers' welfare will always increase as a result of a higher level of consumption and a greater provision of physical rest.

This underscores the necessity of empirical research on the effects of changes in wage rates on growth performance and worker welfare through changes in aggregate labor supply. However, before any work of this kind can be done, national accounts for LDCs must incorporate data on aggregate supply, rather than stock, of labor.

IV. Conclusions

In this paper, we have shown that, if the economy is dominated by traditional sectors, and a majority of workers make distress sale of labor, both the market and the aggregate supply of labor will be forward-falling. Labor abundant LDCs, where an overwhelmingly large number of workers suffer absolute poverty, seem to be the logical candidates for the application of the forward-falling labor supply function.

We have analyzed a perfectly competitive and a monopsonistic labor market using the forward-falling labor supply function. The analysis under the competitive framework has generated results which are quite

consistent with various phenomena observed in the labor abundant LDC agriculture. For example, the framework consistently explains wage flexibility with equilibrium full-employment during peak seasons of agricultural activities, and downward rigidity in wage rate with involuntary unemployment during slack seasons. Moreover, it can explain cases of larger or smaller levels of full-equilibrium employment at higher wage rates with a stable labor supply, and an increased, constant, or even decreased wage rate at a higher level of employment with a shifting labor supply. A comparison of the monopsonistic with the competitive model suggests that the competitive wage rate will be generally higher than the monopsonistic wage rate. This also appears to be consistent with some observations in LDC labor markets.

The function is also used to suggest a possible explanation, in addition to the ones traditionally provided, for the chronic failures of development plans in labor abundant LDCs in achieving their target growth rates. We have argued that forward-falling aggregate labor supply does impede the process of economic growth, although the planners fail to recognize it. These results bear important implications for policy, and therefore, emphasize the need for empirical analyses of the market and aggregate phenomena using properly compiled data on labor supply.

Appendix Appendix Table A

Wage Elasticities of Demand for and Supply of Labor in Low-Wage Labor Markets

Table A.1
WAGE ELASTICITY OF LABOR SUPPLY

Study	Data Source	Functional Form	Worker Group	Estimate
Rosenzweig 1984	Indian NCAER	OLS-IV TOBIT-IV	Landless Male Landholding Male	-0.16 -0.18*
Sharif 1991	Indian National Sample Survey	Non-Linear Least Squares	Landless Male: Ages 15-44 years: At Lowest Obs. Wage At Mean Obs. Wage At Highest Obs. Wage Ages 45-59 years: At Lowest Obs. Wage At Mean obs. Wage At Highest Obs. Wage Near-Landless Male: Ages 15-44 years: At Lowest Obs. Wage At Mean Obs. Wage At Highest Obs. Wage Ages 45-59 years: At Lowest Obs. Wage At Mean Obs. Wage At Highest Obs. Wage	-0.33* -0.08* 0.08* -0.38* -0.16* 0.19* -0.48* -0.67* 0.06* -0.52* -0.02* 0.68*

Table A. 2
WAGE ELASTICITY OF LABOR DEMAND

Study	Data Source	Functional Form	Crop and Region	Estimate
Evenson and Binswanger 1984	Indian Management Studies	Normalized Quadratic	Northern Wheat: Unrestricted	-0.3472*
			Restricted	-0.4141*
			Restricted	-0.5886*
			Eastern Rice: Unrestricted	-0.6065*
			Restricted	-0.5347*
			Coastal Rice: Restricted	-0.2938
		Generalized Leontief	Semiarid Tropics: Unrestricted	-0.3106*
			Restricted	-0.3555*
			Northern Wheat: Unrestricted	-0.1994**
			Restricted	-0.1547**
			Eastern Rice: Restricted	-0.6610*
			Coastal Rice: Restricted	-1.2672*
			Semiarid Tropics: Unrestricted	-0.3541*
			Restricted	-0.3460*

* Significant at least at one percent.

** Significant at least at five percent.

Appendix Table B
Growth Performance in India and Pakistan

Table B.1
GROWTH PERFORMANCE IN INDIA

Five Year Plan	Annual Growth Rate in NI		Gross Capital Formation**		Gross Domestic Savings**		Gross Foreign Resources**	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
First	2.30	3.70	11.00	14.30	—	13.90	—	0.40
Second	5.00	4.01	10.68*	16.90	9.70*	13.50	0.98*	3.40
Third	5.00	2.60	14.00	18.20	11.50	15.60	2.50	2.60
Fourth	5.50	3.30	14.50	20.00	13.20	19.30	1.30	0.70
Fifth	4.40	3.90	19.80	23.70	18.84	23.90	0.96	-0.20

* As percentage of NDP.

** As percentage of GDP at current prices.

Sources: Five Year Plans and Plan Reviews of India (India, 1956, 1961; 1966; 1971; 1980).

Table B.2
GROWTH PERFORMANCE IN PAKISTAN

Five Year Plan	Annual Growth Rate in GNP		Gross Capital Formation**		Gross Domestic Savings**		Gross Foreign Resources**	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
First	3.00	2.50	9.80	10.90	6.00	5.90	3.80	5.00
Second	4.80	5.20	13.00	15.80	8.60	9.50	4.40	6.30
Third	6.50	5.60	18.20	13.50	13.60	.70	4.60	3.80
Fourth	6.50	3.10	15.50	18.30	12.50	8.70	3.00	9.60*
Fifth	9.20	6.30	19.65	19.45	13.13	15.95	6.52+	3.50+

* This figure includes foreign remittances.

** As percentage of GNP at factor cost.

+ Net Foreign Resources.

Sources: Five Year Plans of Pakistan (Pakistan, 1961; 1965; 1970; 1978; 1983).

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