Chapter 9
Liberalisation and Structural Change with Rural–Urban Dichotomies: A General Equilibrium Outlook

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Abstract This chapter deals with the structural change and employment outcomes of welcoming FDI and opening the import-competing sector of the economy to more foreign competition within the framework of a three-sector mobile capital version of Harris–Todaro (HT hereafter) type general equilibrium model, describing rural–urban migration, with the existence of a rural nonfarm sector producing non-traded intermediate input. Main findings support the fact that because of different trade reform policies, registered urban manufacturing sectors have experienced increased competition from foreign markets which has forced them to switch towards relatively capital-intensive techniques of production, resulting in the retrenchment of relatively less productive workers and ending up with jobless pattern of growth in these sectors during the liberalised regime. These results are predominantly fascinating for the counterintuitiveness of the predictions, as opposed to the standard HT model.

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9.1 Introduction

Dualism has a long intellectual history in development economics, famously in the seminal work of Nobel Laureate Arthur Lewis in the 1950s: how does one develop a modern manufacturing sector in a poor economy dominated by an underdeveloped rural (agriculture, largely subsistence) sector. Developed (or Northern) countries achieved this transformation following agricultural and industrial revolutions. Developing countries had to achieve this same agricultural transformation (to a commercial agriculture that would support industrial growth) without the benefit of their own (endogenously generated) revolution, which required coordinated sector policies. However, from the 1950s in many developing countries the emphasis was solely on industrialisation with neglect of agriculture. This failure is pronounced in sub-Saharan Africa, where the failure to support agriculture undermined economic development in the whole economy; economic policies had not recognised the importance of agriculture in low-income countries (Morrissey 2007) and had often generated disincentives to agricultural producers (e.g. on Tanzania see Morrissey and Leyaro 2009). Similar neglect can be observed in India and other South Asian economies.

This neglect of dualism and agriculture in particular, is also reflected in the literature on economic growth. Although there is an established literature on economic dualism that allows for the economy having distinct sectors with different characteristics (e.g. Banerjee and Newman 1997), most of the standard cross-country empirical literature on economic growth considered the economy as only one sector (e.g. Barro 1991; Mankiw et al. 1992). Recent papers (e.g. Eberhardt and Teal 2011, 2012; Lin 2011; McMillan and Rodrik 2011; Vollrath 2009) highlight the importance of allowing for the economy as comprising distinct sectors with differing characteristics (building on the older literature on economic dualism).

In order to understand why a developing open economy, with emerging importance of rural nonfarm sectors (as opposed to the household own-account enterprises to factories) supporting non-agricultural activities (ranging from mining and quarrying, processing, repair, construction, community and personal services, transport and other services) in villages and an urban registered manufacturing sector to migrate, this piece explores the thread of channels through which liberalised trade policy and inward foreign investment, in conjunction with rapid urbanisation and open unemployment, could affect income (wages) and employment scenarios of the relatively marginalised workers with respect to the specific economic and policy conditions designed to represent a developing country such as India.

Available empirical evidence such as Bhaduri (2007) and Bhalotra (1998), is suggestive of the fact that India observed stagnation in organised sector employment

in the late 1980s. Surprisingly, even after extensive economic reforms in 1991, India continues to face substantial adjustment costs in implementing economic liberalisation programs (Jha 2003). As demonstrated in Goldar (2000), Nagaraj (2004) and so on; after reform, India immediately witnessed a boom for 4 years, 1992–1996, followed by a retrenchment, but soon India experienced loss in employment of 15% of the workforce employed in 11 major industry groups in organised manufacturing in 17 major states from 1996 to 2001. According to the National Sample Survey (NSS) round conducted from July 2009 to June 2010, organised sector employment declined dramatically between 2004–2005 and 2009–2010, especially when compared to the earlier five-year period. This is quite unanticipated given that this was a period of very rapid GDP expansion and points to the growing possibility of 'jobless growth' in the organised manufacturing sectors in the reform period. Resulting from increased competition, greater substitution from labour to capital has engendered the opportunity of the organised sectors' employers to pay the workers at a rate closer to the market-determined one, which, in turn, would make easier for these employers to fire the relatively less productive workers without much protest, since the wage-differences to the outside options has declined. According to the relevant NSS rounds (NSSO 1989–2010), the labour force growth rate in the organised sectors was 2.43% per annum (p.a.) between 1983–84 and 1993–94, and then it came down to 1.31% p.a. between 1993–94 and 1999–2000.

Therefore, one can infer that trade liberalisation during the 1990s did not result in any significant increase in productive job opportunities for the organised sector labour force. This records typically similar outcome as Dani Rodrik's concept of 'Premature Deindustrialisation' from the employment front in the organised sectors,[1] where registered manufacturing experiences more rapid productivity growth than the rest of the economy. Since withdrawal of the non-tariff barriers coupled with significant reduction in import tariffs, the domestic organised sector firms which have been protected as yet have not been able to cope with foreign competitors and have been forced to pull their shutters down leading to widespread open unemployment. The unorganised sector expanded but has not been able to absorb all retrenched workers from the organised sector. The consequence has been a steep increase in the level of open unemployment. On the other hand, this will not hamper the growth of the economy as the organised sector benefits from the higher productivity of the remaining workforce and can emerge as competitive in the international market. This has generated scepticism regarding the allocation of the benefits of growth owing to reform. The growth India is experiencing in this liberalised regime, is indeed 'jobless' (Sen 2005). This may tempt us to analyse the impact of economic reform on welfare and open unemployment in a developing economy in terms of a general equilibrium framework.

Owing to speedy urbanisation and globalisation, coupled with improved transport and communication networks, rural nonfarm producers of agro-dominated developing dual economies like India can facilitate successful backward linkages as

[1] See Rodrik (2016) in this context.

suppliers of intermediate inputs and services ranging from leather and rubber products to repair services as downstream industry. This enables developing important economic linkages between urban and rural areas, creating new opportunities for rural households to withstand their livelihoods. Notable works like Fan et al. (2003), Mukherjee and Zhang (2007) etc. have discussed in detail how the nonfarm sector has played a crucial role in the process of economic development in China.

On the other hand, even though the welfare aspects of FDI and removal of protectionist policy have been widely studied in multi-sector general equilibrium models of production and trade under different settings, the interactions between the rural farm and nonfarm sectors and the resultant implications on per-capita GDP and the urban unemployment problem have not yet been explored.

In this chapter, we intend to execute these exercises using a three-sector Harris–Todaro type general equilibrium model for a 'price-taking' open economy with rural-urban dichotomy with a non-traded intermediate input, where capital has partial mobility between nonfarm and the industrial sectors. In other words, the rural nonfarm sector uses capital apart from labour and land to produce intermediate input for sector 3. This, however, has not been considered in existing related models (with intermediate input-producing local rural/informal sector) such as Marjit (2003) or Chaudhuri et al. (2018); since all these models considered the short-run situation with immobility of capital to address similar research question. Here lies the contribution of this modelling set-up in the context of analysing implications of trade reform measures on rural competitive wage and urban unemployment. We are intending to use a holistic setting that blends Heckscher-Ohlin-Samuelson (HOS) type economy with sector-specificity of the factors and rural–urban migration with open urban unemployment.

The remainder of the chapter is organised as follows. Section 9.2 discusses the model environment, Sect. 9.3 analyses the comparative static responses, while Sect. 9.4 concludes.

9.2 The Model

Consider a small open economy, broadly divided into an urban manufacturing sector and a rural sector, which is subdivided into an agricultural exportable producing sector (sector X) and a rural nonfarm sector, sector N, producing an internationally non-traded intermediate input for the import-competing urban manufacturing sector, sector M. Sector X uses labour and land as inputs. Sector N uses land, labour and capital. Sector M uses labour, capital and the intermediate input. Sector M is the import-competing sector of the economy and is protected by an import tariff, imposed at an *ad-valorem* rate.[2] The per-unit requirement of the intermediate input

[2]We assume ad-valorem equivalence of any quantitative or other restrictions on imports, such as quotas.

is assumed to be technologically fixed in urban sector.[3] Workers in the urban sector earn an institutionally given wage, W^*,[4] while the wage rate in the other two sectors, W, is market determined. Since the two rural sectors are in close vicinity, labour is perfectly mobile between the agricultural and the nonfarm sectors; but there exists imperfection (owing to unionisation) in the urban manufacturing labour market. The capital stock of the economy includes both domestic and the foreign capital and they are perfectly substitutable to each other. Production functions exhibit constant returns to scale with diminishing marginal returns. The two wages are related by the Harris–Todaro (Harris and Todaro 1970) condition of migration equilibrium with $W < W^*$.[5] Agricultural exportable is chosen as numeraire, so its price is set equal to unity.

The following notation is used:

W = competitive rural wage rate for labour (L);
W^* = institutionally given wage rate in urban sector;
R = rate of return to land (denoted by T in this chapter);
r = rental rate return to capital (K);
a_{ji} = amount of the jth input used to produce 1 unit of the ith good;
I = output of sector I, $I = X, N, M$;
L_U = urban unemployment level;
P_N = domestic price of non-traded intermediate input;
P_M = international price of good 3;
t = ad-valorem rate of tariff;
θ_{ji} = cost share of jth input in the production of good i (for example, $\theta_{LN} = Wa_{LN}/P_N$);
λ_{ji} = share of sector i in the total employment of factor j (for example, $\lambda_{TX} = a_{TX}X/\overline{T}$);
$\wedge$ = proportional change.

The three zero-profit conditions are given by

[3]It rules out the possibility of substitution between the non-traded input and other factors of production in urban sector.

[4]This is a simplifying assumption. Assuming each urban sector firm has a separate labour union, the unionised wage function can be derived as a solution to a Nash bargaining game between the representative firm and the representative union. This function has been derived in Mukherjee (2016: 56, Appendix 2.3).

[5]See Bhagwati and Srinivasan (1974), Fields (1975), Corden and Findlay (1975), Calvo (1978), Bhatia (1979), Khan (1980, 1982), Batra and Naqvi (1987), Beladi and Naqvi (1988), Chaudhuri (1989), Grinols (1991), Chandra and Khan (1993), Gupta (1993, 1994, 1995), Chao and Yu (1995), Yabuuchi (1993, 1998) and Basu (2000); for implementations and extensions of the Harris–Todaro (HT) condition of rural-urban migration in general equilibrium models of production and trade. However, a significant omission in the HT model has been the absence of proper treatment of non-traded goods, which we have considered explicitly here in our settings.

$$Wa_{LX} + Ra_{TX} = 1 \tag{9.1}$$

$$Wa_{LN} + Ra_{TN} + ra_{KN} = P_N \tag{9.2}$$

$$W^* a_{LM} + ra_{KM} + P_2 a_{NM} = (1 + t)P_M \tag{9.3}$$

Factor Market Equilibrium conditions are given by

$$a_{LX}X + a_{LN}N + a_{LM}M + L_{\mathrm{U}} = L \tag{9.4}$$

By Harris–Todaro Migration Equilibrium condition,

$$(W^* a_{LM}M/(a_{LM}M + L_{\mathrm{U}})) = W \tag{9.5}$$

This equation tells that the average wage of all workers in a Harris–Todaro economy must be equal to the rural wage. This is termed as the 'envelope property' in a Harris–Todaro model.

Note that this HT equilibrium is 'Pareto-suboptimal' because

(a) The wages are not equalised across sectors so that rural–urban wage differential persists.
(b) There exists unemployment in migration equilibrium (this is essential to yield average wage over the labour force to be equal to rural wage).

Inserting $(a_{LM}M + L_{\mathrm{U}}) = (W^* a_{LM}M/W)$ in Eq. (9.4) we obtain

$$\left(\frac{W^*}{W}\right) a_{LX}X + a_{LN}N + a_{LM}M = L \tag{9.6}$$

$$a_{KN}N + a_{KM}M = K_{\mathrm{D}} + K_{\mathrm{F}} \tag{9.7}$$

$$a_{TX}X + a_{TN}N = \overline{T} \tag{9.8}$$

The left-hand sides of Eqs. (9.7) and (9.8) respectively represents the level of demand for capital and land. K_{D} is the stock of domestic capital in the economy, K_{F} is the economy's foreign capital endowment: both are parametrically given. Therefore, these two equations are the full-utilisation conditions for these two factors of production. The full-utilisation conditions for these two factors are ensured by the perfect flexibility in the prices of these factors.

The demand for the non-traded input must equal its supply. Therefore,

$$N^{\mathrm{D}} = N = a_{NM}M \tag{9.9}$$

$a_{23}X_3$ denotes the level of demand for the intermediate input. Perfect flexibility of the domestic price of the internationally non-traded input ensures this equality in equilibrium.

$$M = D_M(P_N, P_M, Y) \tag{9.10}$$

The economy's social welfare is measured by a strictly quasi-concave social welfare function[6]

$$U = U(D_X, D_M) \tag{9.11}$$

where

D_X = Domestic consumption of agricultural exportable X by the society.
D_M = Domestic consumption of the final manufacturing product M by the society.

(We implicitly assume that the non-tradable produced by advanced agricultural sector are not used for consumption purpose).

Balanced trade implies[7]

$$D_X + P_M D_M = X + P_M M$$

In terms of domestic prices,

$$\begin{aligned} D_X + P_M(1+t)D_M &= X + P_M(1+t)M + tP_M(D_M - M) \\ &= WL + R\overline{T} + rK_D + tP_M(D_M - M) = Y \end{aligned} \tag{9.12}$$

Y stands for national income at domestic prices. It is not a decomposable system since the factor prices cannot be solved from the three zero-profit conditions alone.

The working of our general equilibrium model is as follows:

We have eight endogenous variables in the system: W, R, r, P_N, X, N, M and L_U. L, T, K_D and P_M are the exogenous variables to the model; while the policy parameters are t, W^* and K_F. Our general equilibrium setting does not comprise a decomposable system. Regarding the determination of endogenous variables, given W^*, P_M, t; W, R and r are determined from our price-system given by Eqs. (9.1)–(9.3) as functions of P_N. Once factor prices are determined, factor coefficients are also determined as functions of P_N. Then from Eqs. (9.6)–(9.8) X, N and M are determined as functions of P_N. Finally, P_N is obtained from Eq. (9.9).

Quite realistically, we assume that sector X is relatively more land intensive than sector N with respect to labour in physical and value terms.

Now let us proceed to our comparative static exercises, namely (1) inflow of foreign capital, and (2) reduction in tariff (imposed on the importable commodity

[6]Assuming homogeneity in preferences of the individuals—a typical assumption in this literature. See Mukherjee (2012, 2014, 2017); Mukherjee and Zafar (2016); Mukherjee and Banerjee (2018) for details.

[7]In this class of static general equilibrium models, we are typically concerned about post-trade situations in a small, open economy under steady-state equilibrium. Hence, all the endogenous variables and policy-parameters are always adjusted to maintain steady-state equilibrium such that the trade is balanced.

M), on the competitive real wage rate, welfare (per-capita GDP) and urban unemployment.

9.3 Comparative Statics

9.3.1 Effect of Foreign Capital Inflow

Differentiating Eqs. (9.6)–(9.8), one may obtain the following expressions:

$$\widehat{N} = \left(1/|\lambda|\right)\left[\left(\lambda_{TX}\lambda_{KM}A_1 + \lambda_{LX}\lambda_{KM}A_2 + \widetilde{\lambda}_{LM}\lambda_{TX}A_3\right)\widehat{P}_N + \widetilde{\lambda}_{LM}\lambda_{TX}\widehat{K}_F\right] \tag{9.13}$$

$$\widehat{M} = \left(1/|\lambda|\right)\left[(|\lambda|A_3 - \lambda_{LX}\lambda_{KN}A_2 - \lambda_{TX}\lambda_{KN}A_1)\widehat{P}_N + (\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX})\widehat{K}_F\right] \tag{9.14}$$

where,

$$|\lambda| = (\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX}); A_1 < 0; A_2 < 0; A_3 < 0.$$

Total differentiation of Eq. (9.8) and using Eqs. (9.13) and (9.14) with some simplifications, we obtain,

$$\widehat{P}_N = -\left(\widehat{K}_F/\Delta\right)\left(\lambda_{LX}\lambda_{TN} - \lambda_{LM}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right) \tag{9.15}$$

where

$$\widetilde{\lambda}_{LM} = \left(\frac{W^*}{W}\right)\lambda_{LM}$$

and

$$\Delta = \left[A_3\left(\lambda_{LX}\lambda_{TN} - \lambda_{LM}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right) - \lambda_{L1}A_2 - \lambda_{N1}A_1\right] \tag{9.16}$$

After this, applying 'hat algebra' to the total differentiation of Eqs. (9.1)–(9.3); applying envelope conditions for the competitive producers[8] and then solving by Cramer's Rule, substituting Eq. (9.15) and collecting terms, it can be obtained

[8]See Mukherjee (2016: 55, Appendix 2.1) for details.

$$\widehat{W} = (\theta_{TX}/|\theta|)\left[(\theta_{KM} + \theta_{KN}\theta_{NM})\left(\widehat{K}_F/\Delta\right)\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right)\right] \quad (9.17)$$

$$\widehat{R} = (\theta_{LX}/|\theta|)\left[(\theta_{KM} + \theta_{KN}\theta_{NM})\left(\widehat{K}_F/\Delta\right)\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right)\right] \quad (9.18)$$

$$\widehat{r} = \theta_{NM}\theta_{KN}\left(\widehat{K}_F/\Delta\right)\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right) \quad (9.19)$$

where

$$|\theta| = \theta_{KM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN}) \quad (9.20)$$

Given our assumption of sector X's being relatively land intensive compared to sector N with respect to labour in *both* physical *and* value terms, $\lambda_{LX}\lambda_{TN} < \lambda_{LN}\lambda_{TX}$ and $\theta_{LX}\theta_{TN} < \theta_{TX}\theta_{LN}$; or, equivalently, both $|\lambda| < 0$ and $|\theta| < 0$. Owing to the inflow of foreign capital, return to capital, r, must fall. Hence, from (9.19), given that $\left(\widehat{r}/\widehat{K}_F\right) < 0$, we must have $\Delta > 0$. This can also be verified from the stability condition for equilibrium in the market for commodity 2.[9] Hence, Eq. (9.15) yields $\widehat{P}_N > 0$, whenever, $\widehat{K}_F > 0$. From (9.17) and (9.18) we find that $\widehat{W} > 0, \widehat{R} < 0$, whenever $\widehat{K}_F > 0$. This leads us to the following proposition.

Proposition 1 An inflow of foreign capital leads to:

(a) an increase in the rural wage rate;
(b) a decrease in the return to land;
(c) an increase in the price of the intermediate input produced by the nonfarm sector.

Intuitive Explanation Given the perfect substitutability between domestic and foreign capital, the capital stock of the economy rises. Therefore, both the capital-using sectors (sector N and sector M) expand. Given the expansionary effect of sector M, demand for the intermediate inputs produced by sector N rises (as the intermediate input cannot be substituted by other factors of production). As a result, real return to capital (r) falls, leading to a hike in P_N in order to satisfy the zero-profit condition for sector M.

Given the rise in P_N, by *Stolper-Samuelson effect in the Heckscher-Ohlin nugget* formed by sectors X and N, the competitive rural wage rate (W) increases and return to land (R) falls. With the consequent increase in the capital-labour ratios in both sectors N and M, producers of these two sectors are trying to substitute labour by capital. Therefore, in both sectors, capital-output ratio rises and labour-output ratio falls. This creates a relative shortage of capital in both these capital-using sectors and consequently, both the sectors would contract. If the primary effect (expansion of both capital-using sectors) dominates this secondary effect, both sectors N and M will expand.

[9] See Appendix 4 for the detailed derivation.

Since only the price of non-traded intermediate input is varying, we can measure the effect of foreign capital inflow on social welfare by variations in per-capita GDP at domestic prices alone. An inflow of foreign capital with full repatriation of its earnings produces two effects on the welfare in this model. First, the competitive rural wage increases, but both rental to land and rate of interest to domestic capital go down. So, the aggregate factor income rises (as the increase in aggregate wage income outweighs the decrease in the rental income to land and real capital earnings) and it produces a positive effect on welfare. Finally, an inflow of foreign capital leads to an increase in the domestic production of commodity M and therefore tends to lower the import demand. Thus, the cost of tariff protection of the supply side increases, working negatively on welfare. The net result of these two effects would be an increase in social welfare if the magnitude of the first positive effect would be stronger than the second effect. Therefore, the following proposition now can be established.

Proposition 2 *In an economy with rural nonfarm sector, providing intermediate inputs to the tariff-protected import-competing urban manufacturing industry, an inflow of foreign capital with full repatriation of its earnings may improve social welfare.*

Effect on Urban Unemployment

$$\widehat{L}_{\mathrm{U}}/\widehat{K}_{\mathrm{F}} = -[W^*/(W^* - W)|\theta|\Delta] \times \left[\{\theta_{TX}(\theta_{KM} + \theta_{KN}\theta_{NM})\} - \left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right)|\theta|\Delta\{(W^* - W)/W^*\}\right] \tag{9.21}$$

From (9.21), one can infer that $\widehat{L}_{\mathrm{U}} < 0$, when $\widehat{K}_{\mathrm{F}} > 0$, if and only if $\omega \leq 0$, where $\omega = \left[\{\theta_{TX}(\theta_{KM} + \theta_{NM}\theta_{KN})\}\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right) - \{(\quad W^* - W) \times |\theta|\Delta/W^*\}\right]$.

This leads to the final proposition of the model.

Proposition 4 FDI depresses the level of urban unemployment if and only if $\left[\{\theta_{TX}(\theta_{KM} + \theta_{NM}\theta_{KN})\}\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right) - \{(\quad {}^{W} - W)|\theta|\Delta/W^*\}\right] < 0$.

In fact, foreign capital inflows do not necessarily accentuate unemployment in a developing economy. It is quite possible that $\omega \cong 0$. If this is the case, the country will experience a 'jobless growth'. In fact, many of the developing countries, including India, will experience such type of growth during the liberalised regime.

9.3.2 Reduction in Protection in Import-competing Sector

In order to evaluate the impact of the liberalised trade policy (reduction in the *ad-valorem* rate of tariff protection), on the real wage, welfare and unemployment scenarios, we are going to implement 'hat algebra' for Eqs. (9.1)–(9.3) and apply envelope conditions, but this time we are taking into account the capital stock and land endowment as given/exogenous to the economy.

$$\widehat{W} = -\frac{\theta_{TX}}{|\theta|}\left[(\theta_{KM} + \theta_{NM}\theta_{KN})\widehat{P_N} - \theta_{KN}\widehat{T}\widehat{t}\right] \tag{9.22}$$

$$\widehat{R} = \frac{\theta_{LX}}{|\theta|}\left[(\theta_{KM} + \theta_{NM}\theta_{KN})\widehat{P_N} - \theta_{KN}\widehat{T}\widehat{t}\right] \tag{9.23}$$

$$\widehat{r} = \theta_{KM}\left(\left(\frac{t}{1+t}\right)\widehat{t} - \theta_{NM}\widehat{P_N}\right) \tag{9.24}$$

where

$$|\theta| = \theta_{KM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})$$

Similarly, totally differentiating Eqs. (9.6)–(9.8), substituting (9.21)–(9.23) and solving by Cramer's rule we get

$$\widehat{N} = \frac{1}{|\lambda|}\left[\left(\lambda_{TX}\lambda_{KM}B_1 + \lambda_{LX}\lambda_{KM}B_2 + \lambda_{TX}\widetilde{\lambda}_{LM}B_3\right)\widehat{P_N} - \left(\lambda_{LX}\lambda_{KM}B_4 + \lambda_{TX}\lambda_{KM}B_5 + \lambda_{TX}\widetilde{\lambda}_{LM}B_6\right)\widehat{t}\right] \tag{9.25}$$

$$\widehat{M} = \frac{1}{|\lambda|}\left[(\lambda_{LX}\lambda_{TN}B_3 - \lambda_{LX}\lambda_{KN}B_2 - \lambda_{LN}\lambda_{TX}B_3 - \lambda_{TX}\lambda_{KN}B_1)\widehat{P}_N - (\lambda_{LX}\lambda_{TN}B_6 - \lambda_{LX}\lambda_{KN}B_4 - \lambda_{LN}\lambda_{TX}B_6 - \lambda_{KN}\lambda_{TX}B_5)\widehat{t}\right] \tag{9.26}$$

Note that we have all of the $B_1, B_2, B_3, B_4, B_5 < 0$.[10] Under the condition $\widetilde{\lambda}_{LM}$ is negligible,[11] $B_6 < 0$. Since the output of sector N is relatively more labour-intensive

[10] See Appendix 3 for these expressions.

[11] This is a realistic assumption since for most of the low-income developing countries share of employment in the registered sector is likely to become negligible over time, as bulk of the workforce are engaged in informal jobs, including agriculture. For example, in India, more than 90% people are engaged in agriculture, rural nonfarm and other informal activities. The focus of this paper is on such LDCs. This assumption has also been used in Marjit (2003). The assumption is about share of employment in the registered sector. To assume share of employment in the registered sector is negligible compared to the other sectors of the economy does not rule out the existence of unemployment in sector *M*, nor reduce the importance of sector *M*. Empirically it only indicates that productivity has improved in sector *M*.

compared to land vis-à-vis sector X, we have $|\theta| = \theta_{KM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN}) < 0$ and $(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX}) < 0$. Therefore, $\Omega = \left[B_3\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \lambda_{TX}\widetilde{\lambda}_{LM}\right) - \lambda_{LX}B_2 - \lambda_{TX}B_1\right] > 0$. It can be shown that by the stability condition in the market for non-traded input $(\Omega/|\lambda|) < 0$. This implies $|\lambda| < 0$ as $\Omega > 0$.

Also, it is straightforward to obtain

$$\widehat{P_N} = \frac{\widehat{t}}{\Omega}\left[B_6\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \lambda_{TX}\widetilde{\lambda}_{LM}\right) - B_4\lambda_{LX} - B_5\lambda_{TX}\right] \tag{9.27}$$

So if (1) $\widetilde{\lambda}_{LM} \cong 0$, (2) $|\theta| = \theta_{KM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN}) < 0$ and $(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX}) < 0$, $\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX}) < 0$, then $\widehat{P_N} < 0$, $\widehat{N} > 0$ and $\widehat{M} < 0$.

Differentiating (9.11) and (9.12) we get

$$\frac{dU}{U_1} = dD_X + (1+t)P_M dD_M = J\left[(1-L_X)W\widehat{W} + tP_M\left(tP_M\widehat{St} - M\widehat{M}\right)\right]$$

where $U_1 = \frac{\partial U}{\partial D_X}$, $J = \frac{1+t}{\{1+(1-c)t\}}$, $S = \left(\frac{\partial D_M}{\partial P_M}\right) + \left(\frac{\partial D_M}{\partial Y}\right)D_M$ is the Slutsky's pure substitution term, and $c = (1+t)P_M\left(\frac{\partial D_M}{\partial Y}\right)$ is the marginal propensity to consume good M.

$$\frac{dU}{U_1\widehat{t}} = J\left[\left\{(1-L_X)W\frac{\widehat{W}}{\widehat{t}} - tP_M M\left(\frac{\widehat{M}}{\widehat{t}}\right)\right\} + (tP_M)^2 S\right] \tag{9.28}$$

represents the impact of tariff reduction on welfare.

Substituting $\widehat{P_N}$ from Eq. (9.27) into (9.22), we obtain

$$\widehat{W} = -\left(\frac{\theta_{TX}\widehat{t}}{|\theta|}\right) \times \left[\left\{\begin{array}{c} B_6\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{NX}\right) \\ -B_4\lambda_{LX} - B_5\lambda_{TX} \end{array}\right\}\left(\frac{\theta_{KM} + \theta_{NM}\theta_{KN}}{\Omega}\right) + \theta_{KN}\left(\frac{t}{1+t}\right)\right] \tag{9.29}$$

So $\widehat{W} < 0$ when $\widehat{t} < 0$, iff $|\theta| < 0$ and $(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX}) < 0$.

Now, From HT migration equilibrium we have,

$$L_U = \left[\left\{\left(\frac{W^*}{W}\right) - 1\right\}a_{LM}M\right]$$

Totally differentiating the migration equilibrium condition we otain

$$\widehat{L_U} = \frac{\lambda_{LM}}{\lambda_{LU}} \left[\underbrace{\left(\frac{W^*}{W} - 1 \right) \left(\widehat{a_{LM}} + \widehat{M} \right)}_{<0, \text{centripetal force}} + \left\{ \underbrace{-\left(\frac{W^*}{W} \right) \widehat{W}}_{>0, \text{centrifugal force}} \right\} \right] \tag{9.30}$$

These lead to the following proposition:

Proposition 3 *Tariff reduction may lead to stagnant employment situation in the urban manufacturing sector if* $\left|\widehat{M}\right| \cong \left|\widehat{W}\right|$ *provided* $\widetilde{\lambda}_{LM} \cong 0$ *and sector X is relatively land-capital intensive than sector N in physical and value terms.*

Proof It is evident from Eqs. (9.25), (9.26), (9.28) and (9.39) when $\widetilde{\lambda}_{L3}$ is negligible,$|\theta| < 0$ and $(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX}) < 0$; we have $B_6\langle 0 = \rangle \widehat{M} < 0$; $\widehat{P_N} < 0; \widehat{W} < 0$ when $\widehat{t} < 0$. Therefore, Eq. (9.29) indicates the possibility of zero net job creation in the urban sector during liberalised regime. The intuition is as follows:

A reduction in import tariff depresses the domestic price of M, leading to a contraction of this sector. The capital-intensive urban sector now demands less capital, which, in turn, depresses the return to capital (r). This contraction of sector M lessens both demand for and supply of the non-traded input produced by rural nonfarm sector; but with the urban manufacturing sector being accounted for significantly low share of total employment, the demand-effect dominates and P_N falls. Now in the '*Heckscher-Ohlin nugget*' formed by the rural agricultural and the rural nonfarm sectors (using two mobile factor: labour and land), the fall in P_N induces a Stolper-Samuelson effect, inducing W to fall but R (return to land) to go up under the assumption $|\theta| < 0$.

Note that there will be four different impacts on social welfare: total wage income decreases as W falls; rental income from land rises; return to mobile capital falls; and as M falls, the cost of tariff protection of the import-competing sector, $tP_M M$, falls. Therefore, the possibility to achieve an increase in the economy-wide social welfare arises: if the initial tariff rate is large enough so that the net effect of reduction in distortion costs of tariff becomes dominant.

Now let us explore Eq. (9.29) to understand the effect on urban unemployment: (1) sector M contracts. (2) Since (W^*/r) rises, labour-output ratio in sector M, a_{LM}, falls. Therefore, the number of jobs available in the urban sector, $a_{LM}M$, falls. This decreases the expected urban wage for every prospective rural migrant leading to a reverse migration from urban to rural sector. This is the '*centripetal force'* reducing the extent of urban unemployment. However, as competitive rural wage falls, that will induce the rural workers leaving the rural sectors and joining the urban unemployment pool. This is the '*centrifugal force'* worsening the problem. If the relative strengths of these two opposite forces approximate to each other, there may be no net job creation in the urban sector. Also, if the magnitude of the centrifugal force is larger, the economy might experience significant job losses in the urban sector even after adopting this policy of tariff reform.

However as pointed out before, the economy-wide social welfare may improve. This indicates the possibility of the economy to experience 'jobless growth'[12] in this liberalised regime.

The organised manufacturing sector accounts for a small share of total employment in most of the low-income developing countries and this extension adds insight into why for a developing country like India trade liberalisation can enhance growth prospects but at the risk of significant job losses or stagnation in urban employment.

9.4 Concluding Remarks

This chapter predicts about the structural change and employment outcomes of allowing for FDI and opening the import-competing sector of the economy to more foreign competition for a developing dual economy facing competitive world markets with imperfect labour mobility, rural–urban migration possibility and open urban unemployment. Such liberalisation policies have been interpreted in various contesting manner, especially in the context of South Asian emerging economies, for instance, India or Bangladesh. The key comparative static exercises considered in this chapter are the consequences of liberalised investment and trade policies. The contribution of this modelling structure, with respect to the earlier related works (namely, Hazari and Sgro 1991; Marjit 2003; Chaudhuri 2007) has been to incorporate partial capital mobility between rural (informal) and urban (formal) sectors,[13] albeit with existence of urban unemployment. The different theoretical models here try to show that economic reforms may lead to output expansion without a growth in productive employment in the organised sector. However, none of these policies can rule out the prediction of 'jobless growth' as implied from Proposition 2 and is explained in Proposition 3. Therefore, the theoretical analyses presented in this chapter point to the notion that trade reform measures have made India increasingly dependent on extremely volatile external economic events, as a result of which, markets for the products of registered manufacturing sector have been opened up for competition too rapidly that allowed employers to replace labour for capital, leading to lower share of employment in the registered sectors (which has been captured by the sufficient condition $\widetilde{\lambda}_{LM} \cong 0$ in our model). Therefore, it has been the case that the 'growth-effect' does not 'trickle down' to the job losers, leading to 'jobless growth' in the registered sectors. That is precisely why increasing productive employment becomes a real challenge for a developing economy like India during this liberalised regime (World Development Report 2013).

[12]However, because this is a static (steady-state equilibrium) model, 'growth' means sectoral expansion from initial equilibrium point to the final/resultant long-run steady-state equilibrium point, without considering the instantaneous dynamic adjustment between these two equilibrium points.

[13]In particular, capital is mobile between rural nonfarm sector and urban sector.

Appendix 1: The Tables Summarising Model Characteristics

Table 9.1 Model characteristics

No of sectors	Sector definitions		Input usage		Relative factor-intensity ranking
	Traded	Non-traded	Rural sectors (Sectors X & N)	Registered manufacturing sector (sector M)	
	• Sector X → Exportable producing agricultural sector within the rural area	• Sector N → Rural nonfarm sector, providing local intermediate inputs for sector M	• Labour market → Competitive labour market—Labourers are perfectly mobile between sectors X & N, since both are situated in close vicinity within the rural area	• Labour market → Unionised (imperfect) labour market, with workers receiving contractual wage	• Heckscher–Ohlin (HO) 'nugget' → Formed by the sectors X & N, using two common factors—Land and labour • In this HO-nugget, we assume sector X is relatively more land intensive than sector N
	• Sector M → Registered industrial sector within the urban area. Producing agro-based finished import-competing goods (for e.g. sugar)		• Land usage → Sectors X & N use land in production of agricultural products	• Capital usage → Sector M uses capital, on the top of using labour and intermediate input (provided by sector N) in its production	
			• Capital usage → Sector N uses capital, on the top of using land in its production		

Table 9.2 The General Equilibrium System

Variables			Key equations describing the model		
Endogenous	Exogenous	Policy parameters	Price subsystem (price = unit cost)	Quantity (output) subsystem (full employment/ utilisation of factors)	Simplifying assumption
$W, R, r, P_N, X, N, M, L_U$	$\overline{K_D}, L, T, P_M$	K_F, t, W^*	Equations (9.1)–(9.3)	Equations (9.6)–(9.10)	a_{NM} is constant

Appendix 2: Details of Some Algebraic Expressions

$$A_1 = (1/|\theta|)\begin{bmatrix}\theta_{KM}\left(\lambda_{LX}S^X_{LT} + \lambda_{LN}S^N_{LT}\right) - \theta_{TX}\theta_{KM}(1-\lambda_{LM}) - \\ \theta_{NM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\widetilde{\lambda}_{L3}S^M_{LK}\end{bmatrix} < 0 \tag{9.31}$$

$$A_2 = (1/|\theta|)\left[\theta_{KM}\left(\lambda_{TX}S^X_{TL} + \lambda_{TN}S^N_{TL}\right)\right] < 0 \tag{9.32}$$

$$A_3 = \left(S^M_{KL}/|\theta|\right)[\theta_{TX}(\theta_{KM} + \theta_{NM}\theta_{KN}) - (|\theta|.\theta_{NM}/\theta_{KM}) + \theta_{TX}\theta_{LN}] \tag{9.33}$$

where S^I_{jk} is the degree of substitution between factors j and k in the I$^{\text{th}}$ sector (j, $k = L, T, K$ and $I = X, N, M$). For example, $S^N_{KL} = (\partial a_{KN}/\partial W)(W/a_{KN})$. $S^I_{jk} > 0$ for $j \neq k$ and $S^I_{jj} < 0$. Note that since the production functions are linearly homogenous, the factor coefficients $a_{jI}s$ would also be homogenous of degree zero in factor prices. Therefore, the sum of these elasticities for any factor of production in any sector with respect to factor prices must be equal to zero. As an example, for labour in the agricultural exportable sector we have $\left(S^X_{LL} + S^X_{LT}\right) = 0$.

Appendix 3

$$B_1 = (1/|\theta|)\left[(\theta_{KM}+\theta_{NM}\theta_{KN})\left\{\overline{\lambda}_{LI}\overline{S}^H_{Lj} + \theta_{TX}(1-\lambda_{LM})\right\} - \theta_{NM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\left(\lambda_{LN}S^N_{LK} + \widetilde{\lambda}_{LM}S^M_{LK}\right)\right] \tag{9.34}$$

$$B_2 = (1/|\theta|)\left[(\theta_{KM} + \theta_{NM}\theta_{KN})\overline{\lambda}_{TI}\overline{S}^H_{Tj} - \theta_{NM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\lambda_{TN}S^N_{TK}\right] < 0 \tag{9.35}$$

$$\overline{\lambda}_{TI}\overline{S}^H_{Tj} = \left(\lambda_{TX}S^X_{TL} + \lambda_{TN}S^N_{TL} + \lambda_{TN}S^N_{TK}\theta_{LX}\right) > 0 \tag{9.36}$$

$$B_3 = \left(\frac{1}{|\theta|}\right)\left[(\theta_{KM} + \theta_{NM}\theta_{KN})\left(1 - S^N_{KK}\theta_{LX}\right)\lambda_{KN}\right.$$

$$\left. -\theta_{NM}(\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\lambda_{KN}\left(S^N_{KL} + S^N_{KT}\right)\right] < 0 \tag{9.37}$$

$$B_4 = \frac{t}{(1+t)|\theta|}\left[\overline{\lambda}_{TI}\overline{S}^H_{Tj}\theta_{KN} - (\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\lambda_{TN}S^N_{TK}\right] < 0 \tag{9.38}$$

$$B_5 = \frac{t}{(1+t)|\theta|}\Big[\theta_{KM}\bar{\lambda}_{LI}\bar{S}^H_{Lj} - (\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\Big(\lambda_{LN}S^N_{LK} + \widetilde{\lambda}_{LM}S^M_{LK}\Big)\theta_{KM}\bar{\lambda}_{LI}\bar{S}^H_{Lj} - (\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\Big(\lambda_{LN}S^N_{LK} + \widetilde{\lambda}_{LM}S^M_{LK}\Big)\Big] < 0 \tag{9.39}$$

$$B_6 = \frac{t}{(1+t)|\theta|} \times \Big[\theta_{KM}\widetilde{\lambda}_{LM}\big(\theta_{LX}S^N_{KK} - 1\big) - (\theta_{LX}\theta_{TN} - \theta_{TX}\theta_{LN})\lambda_{KN}\big(S^N_{KL} + S^N_{KT}\big)\Big] \tag{9.40}$$

Appendix 4: Stability Condition in Product Market for Nonfarm Sector

P_N, the price of non-traded intermediate input (produced by the rural nonfarm sector) must adjust to clear its domestic market. Therefore, the stability condition for equilibrium in this market needs

$$\big\{d\big(N^D - N\big)/dP_N\big\} < 0 \tag{9.41}$$

That means around equilibrium, initially, $N^D = N$. Therefore,

$$\Big\{\Big(\widehat{N^D}/\widehat{P_N}\Big) - \Big(\widehat{N}/\widehat{P_N}\Big)\Big\} < 0 \tag{9.42}$$

Now $N^D = a_{NM}M$ is the demand for non-traded input. Total differentiation gives, $\widehat{N^D} = \widehat{M}$. **For FDI**, using Eqs. (9.13) and (9.14), we respectively obtain

$$\left(\frac{\widehat{N}}{\widehat{P}_N}\right) = \left(\frac{1}{|\lambda|}\right)\Big(\lambda_{TX}\lambda_{KM}A_1 + \lambda_{LX}\lambda_{KM}A_2 + \widetilde{\lambda}_{LM}\lambda_{TX}A_3\Big) \tag{9.43}$$

$$\left(\frac{\widehat{N^D}}{\widehat{P}_N}\right) = \left(\frac{1}{|\lambda|}\right)(|\lambda|A_3 - \lambda_{LX}\lambda_{KN}A_2 - \lambda_{TX}\lambda_{KN}A_1) \tag{9.44}$$

Using Eqs. (9.43) and (9.44) we get the required stability condition

$$\big(\Delta/_{|\lambda|}\big) < 0 \tag{9.45}$$

where

$$\Delta = \left[A_3\left(\lambda_{LX}\lambda_{TN} - \lambda_{LM}\lambda_{TX} - \widetilde{\lambda}_{LM}\lambda_{TX}\right) - \lambda_{L1}A_2 - \lambda_{N1}A_1\right]$$

For tariff reduction in the import-competing sector, we equivalently obtain,

$$\left(\frac{N}{\widehat{P}_N}\right) = \left(\frac{1}{|\lambda|}\right)\left(\lambda_{TX}\lambda_{KM}B_1 + \lambda_{LX}\lambda_{KM}B_2 + \lambda_{TX}\widetilde{\lambda}_{LM}B_3\right) \tag{9.46}$$

$$\left(\frac{N^D}{\widehat{P}_N}\right) = \left(\frac{1}{|\lambda|}\right)(\lambda_{LX}\lambda_{TN}B_3 - \lambda_{LX}\lambda_{KN}B_2 - \lambda_{LN}\lambda_{TX}B_3 - \lambda_{TX}\lambda_{KN}B_1) \tag{9.47}$$

Using Eqs. (9.46) and (9.47) we get the required stability condition

$$(\Omega/\lambda) < 0 \tag{9.48}$$

where

$$\Omega = \left[B_3\left(\lambda_{LX}\lambda_{TN} - \lambda_{LN}\lambda_{TX} - \lambda_{TX}\widetilde{\lambda}_{LM}\right) - \lambda_{LX}B_2 - \lambda_{TX}B_1\right]$$

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