LIBERALISATION, WAGES AND SECTOR GROWTH:

General Equilibrium Analysis for India

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EXECUTIVE SUMMARY

The term 'globalisation' most commonly defines a process of integration with the rest of the world. Such integration is routed through increasing volume of foreign trade and investment. Since 1980s, trade liberalisation has become an important agenda of many countries' development strategies. Supporters of liberalisation argue that opening up domestic markets to foreign competition and foreign direct investment can contribute to more competition and efficiency gains of domestic industries, resulting in a more efficient allocation of resources and greater overall output. Opponents warn that domestic producers may be unable to achieve efficiency gains, since they fail to successfully adapt foreign technologies to indigenous methods of production that has been subcontracted to the local small-scale (informal) industries or because of the distortions in domestic factor markets that often prevent expansion of efficient industries as well as investments in new technology. Which of these two views is closer to the truth has important implications for trade policy.

In 1991, after decades of pursuing an import-substitution industrialization strategy, India introduced a radical reform of her external sector. In addition to tariffs, India has also reduced non-tariff barriers (NTBs) from 1991. However, in order to understand the implications of such large-scale liberal trade policies on the structural change of the entire economy, it is needed to explicitly take into account the structural features of labour markets in developing countries like India. It is well-known that in a developing economy like that of India, the 'informal sector' hosts a substantial proportion of the workforce in unregistered activities, primarily characterised by the ease of entry and unregulated markets; while only less than10% of the workforce is employed in the organised or formal sectors. Whereas organised workforce can negotiate and use bargaining strength to affect the unionised wage, the informal labour market usually responds to competitive conditions. Labour market rigidities usually lead to the hiring of informal workers who are hired at a wage rate lower than the one prevailing in the formal sector.

In such scenario, this study enlightens different channels through which liberalised trade policies can have differential impact on the organisation of production indifferent sectors that subsequently seep into the relatively larger share of the workforce, employed in the agricultural or non-agricultural informal

sectors with wage earnings below or just above the poverty line. The interaction between the formal and the informal labour markets provides an interesting twist to the standard neoclassical general equilibrium models and lead to interesting relationship between commodity and factor prices. In fact, the informal segment can accommodate voluntary and involuntary employment at the same time and trade reform tends to affect their incentives in different ways. Standard trade theory models have not been adopted to capture the characteristics of factor markets in developing countries like India. For example, various issues of the National Sample Survey of India (for instance, issues published from 1989–90 to 2010-11) suggest rising real wage in the informal sector in the post-reform period. Therefore, expansion of employment in the informal sector does not necessarily reflect growing impoverishment in the informal sector. In addition, the nature of capital mobility between formal and informal segments also appears to be crucial; since dualism in domestic capital (credit) market often arrest free capital movement from formal to informal sectors that subsequently alters the demand for low-skilled labour, the associate factor of production, in the informal sector. Along with these features, existence of the internationally non-traded goods, another salient feature of a developing country like India, with the domestic market clearing condition, significantly changes many standard results of the trade theory models.

Hence, this study purports to explore thread of channels through which a range of aspects of liberalisation (trade policy, inward foreign investment, imported foreign technology, Special Economic Zones and so on), in conjunction with rapid urbanisation, could affect income (wages) of the relatively marginalised workers with respect to the specific economic and policy conditions designed to represent a developing country such as India. These conditions alternatively allow for differences in the international tradability of different types of goods and services; for differences in the formality of production and unionisation of labour across sectors of the economy; and for differences in the scope for factor (labour and capital) mobility. The novel aspect of this occasional paper would, therefore, be to bring in all these salient features of a developing dual economy (like India) altogether into tractable analytical long-run (steady-state) general equilibrium models of production in open economy. The key contributions of this study, in the lights of existing research, can be illustrated in terms of the following table.

Table 1:How This Study Fills the 'Gaps' in Existing Research?

Sector Definitions		Factor Market Characteristics				Vertical Production Linkage with Formal Sector	Use of Imported Intermediate Input (Middle Products) in Formal Sectors
		Substitutability between Land & Labour	Capital Market	Unskilled Labour Market	Skill Differences		
Informal Sector	Agricultural (in Rural Area) – Models with Urban Unemployment	Not Considered in Existing Literature Such as Hazari&Sgro (1991), Chaudhuri (2007)	Perfect (Hazari & Sgro 1991; Chaudhuri, 2007), although imperfection could have been addressed	Perfect	All the informal sector workers are equally unskilled and perfectly mobile within the informal sectors (b/n different sub sectors)	No (Hazari&Sgro 1991; Chaudhuri 2007)	N/A
	Non-agricultural (in Urban or Semi-urban Area) – Models with Full Employment of Unskilled Labour	N/A	Often imperfection in informal credit market is addressed by restricted capital mobility between informal & formal sectors (Marjit 2003; Marjit et al. 2007).			Yes (Marjit 2003)	
						No (Jones 1974; Marjit et al. 2007; Marjit& Maiti 2005)	
Formal (Non-agricultural) Sector		N/A	Perfect	Unionised (Marjit& Maiti 2005; Marjit et al. 2007; 2008)	Yes (Marjit&Acharyya 2003)	N/A	Not considered in the literature discussed (except Jones 2012) and in most of the existing literature
					No (Marjit 2003; Marjit& Maiti 2005; Marjit et al. 2007, 2008)		

Key Policy Implications of the Findings

1. Liberalisation and 'Jobless Growth' with Agricultural Dualism

Why a developing country may experience a jobless growth in the organised sectors during liberalised regime in an economy with agricultural dualism and a non-traded intermediate input? To answer this question within the framework of a three-sector mobile capital version of the Harris-Todaro (Harris and Todaro, 1970) type general equilibrium model. Main findings support the fact that as a consequence of different trade reform policies, organised sectors have experienced increased competition from foreign markets which has forced them to lax labour laws, with the freedom to switch towards more capital intensive techniques of production, resulting retrenchment of the relatively less productive workers and ending up with a jobless growth under the liberalised regime.

2. Formation of Special Economic Zones and Structural Change

This study explores a controversial policy debate in developing countries including India, concerning acquisition of agricultural land to set up Special Economic Zones (SEZs) in order to promote industrialisation. This study critically analyses the implications of this policy, using a three-sector HT type general equilibrium model with the SEZ sector characterised with increasing returns to scale (IRS) sector, having an imperfectly competitive market. It is found that following an inflow of foreign capital due to the government policy of easing the entry criteria for FDI, the industry expands through spill-over effects

and in turn, the agricultural sector may expand for a sufficiently higher degree of scale economies in the SEZ sector through the general equilibrium implication on resource reallocation. The magnitude of urban unemployment may fall, albeit the workers in general will be worse-off due to reduction in the wage income. National income of the economy may increase and export by the SEZ sector may rise simultaneously, given a negligible income-elasticity of demand for the SEZ-good.

3. Technological Progress and Structural Change with Factor Market Segmentation

Motivated by a set of stylised facts based on provincial data for India, this study, by utilising a four-sector general equilibrium framework with segmented labour and capital markets (domestic), proposes that factor-specific technological progress only in the capital-intensive segment of the urban formal sectors may affect the urban informal workers adversely, while a technological progress (trade-induced) in the vertically integrated skill–intensive formal sector benefits them. This helps understand trends in urban poverty given the strong association between urban informal wage and the degree of urban poverty.

4. Input Trade Reform Policy and Wage-inequality

This study develops a multi-sector full-employment general equilibrium model with internationally non-traded goods and international fragmentation in skill-intensive production, to understand the mechanism how trade-induced productivity improvement in the skill-intensive sector gets channelized to the informal sector(s) (in terms of real wages and employment conditions) through the existence of finished non-tradable and the corresponding domestic demand-supply forces. The underlying developing economy is characterised by dual unskilled labour market with unionised formal and non-unionised informal sectors, consistent with the empirical literature on developing economies like India. Numerical analysis has also been performed to simulate how the changes in elasticities of factor substitution in production of different sectors account for the movement in informal wage and therefore the movement in skilled–unskilled wage gap. This study challenges the view that the relative wage-inequality in a developing country like India with rigid organised sector labour market has unequivocally been governed only by the increase in the skilled wages. An extension with involuntary unemployment of skilled labour using the 'fair wage hypothesis' has also been presented that effectively demonstrates the robustness of the results obtained under the full-employment model.

1. Liberalisation and 'Jobless Growth' with Agricultural Dualism[1]

According to the most recent 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 there form period. As a result of increased competition, the labour laws have been weakened with greater substitution from labour to capital that generates 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.

Since withdrawal of the non-tariff barriers has been 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 do 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 makes it tempting to analyse the impact of economic reform on welfare and open unemployment in a developing economy in terms of a general equilibrium framework.

1.1 Research Context

The simple two-sector mobile capital version of HT (Harris and Todaro, 1970) model, as laid in Corden and Findlay, 1975; may not appropriately describe the complex nature of a low income developing economy, since the

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[1] This chapter outlines the crux of the model and the analytical results of Mukherjee (2014).

presence of agricultural dualism and non-traded goods remain the two important features of such an economy. The non-traded goods may be either intermediate inputs or final commodities. Such commodities are restricted to cross international borders by the domestic government for two main reasons: firstly to control domestic prices, and secondly to ensure the sufficient supply of such important inputs to the agro-based industries (Mukherjee, 2012). In fact, India has imposed a restriction on cotton exports on 2012 to ensure the sufficient supply of fibre to the textile industries, despite higher demand from the U.S. and other Western trading partners and the reason was attributed to the fact that India was not using imported fibres in her textile industries (*The Wall Street Journal*, 2012).

Removal of protectionist policy and structural reforms like deregulating the labour market make the labour in the organised manufacturing sector more competitive by curbing the bargaining strength of the labour unions in determining the unionised wage in their liberalisation policy packages. But relaxing the labour laws is a politically sensitive issue. This is because, labour unions can apprehend that if government intervenes by imposing a partial or complete ban on reformulating employment security laws to curb the power of trade unions, the union's power to mark up wages over the supply of labour falls. Consequently, the unionised wage falls, inducing workers to migrate back to the rural (or informal) sectors, depressing the general wage of the poorer group of the working population engaged in these sectors. Therefore, along with the implications of a trade reform policy on welfare and urban unemployment of the economy, it is equally important to know how far is the conventional wisdom that reforms in organised sector labour market depress the competitive rural wage is valid.

In lights of the above-mentioned facts this study examines the consequences of the policies, pertaining to the trade reform measures and deregulating unionised labour market, on competitive rural wages and urban unemployment problem in terms of a general equilibrium set-up with rural-urban migration and open unemployment, with agricultural dualism and a non-traded intermediate input, where capital has partial mobility between formal and informal agricultural sectors (since one of the two informal agricultural sectors, namely the backward agricultural sector, uses capital apart from labour and land to produce intermediate input for the agro-based manufacturing sector). This, however, has not been considered in existing related models (with agricultural intermediate input-producing local informal sector) such as Marjit (2003) or Chaudhuri and Banerjee (2007); since all of

these models considered the short-run situation with immobility of capital between formal and informal sectors 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 the rural informal wage and urban unemployment.

1.2 The Modelling Framework

A compact outline of the general equilibrium modelling environment has been provided in **(Table 1.1.)**

Table 1.1: Model Environment

No of Sectors	Sector Definitions		Input Usage		Relative Factor-intensity Ranking
	Traded	**Non-traded**	**Agricultural Sectors (Sectors 1 & 2)**	**Registered Agro-based Manufacturing Sector (Sector 3)**	
3	• **Sector 1 →** 'Advanced' agricultural sector within the rural area. Producing primary exportable.	• **Sector 2 →** 'Backward' agricultural sector, providing local agricultural intermediate inputs for sector 3.	• **Labour Market→** Competitive labour market – labourers are perfectly mobile between sectors 1 & 2, since both of them 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 1 & 2, using two common factors – land and labour. • In this HO-nugget, it is assumed sector 1 is relatively more land-intensive than sector 2.
	• **Sector 3 →** Organised 'agro-based' industrial sector within the urban area. Producing import-competing goods (for e.g., sugar)		• **Land Usage →** Sectors 1 & 2 use land in production of agricultural products. • **Capital Usage →** Sector 2 uses capital, on the top of using land in its production.	• **Capital Usage →** Sector 3 uses capital, on the top of using labour and intermediate input (provided by Sector 2) in its production.	

1.3   Comparative Static Responses.

(a) *Tariff reduction may lead to stagnant employment situation in the urban manufacturing sector if the employment share in this sector is the least and sector 1 is relatively land-capital intensive than sector 2 in physical and value terms.*

Intuitive Argument.   A reduction in import tariff depresses the domestic price of the finished agro-based manufacturing good produced by urban manufacturing sector, leading to the contraction of sector 3. The capital-intensive urban sector now demands less capital which in turn lowers the return to capital. This contraction of sector 3 reduces both demand for and supply of the non-traded input produced by advanced agro-processing sector; but as long as the urban manufacturing sector accounts for significantly low share of total employment, the demand-effect dominates and domestic price of the non-tradable falls. Now in the '*Heckscher-Ohlin nugget*' formed by the two agricultural sectors (using two mobile factor: labour and land), the fall in the price of non-tradable induces a *Stolper-Samuelson effect*, inducing competitive rural wage to fall but return to land-capital goes up if sector 1 is more land-intensive relative to sector 2, vis-à-vis labour.

Note that there will be four different impacts on social welfare: total wage income decreases (since the average wage of the economy in a HT model equals rural competitive wage, total wage income gets depressed as competitive wage falls); rental income from land-capital rises; return to mobile capital falls; and as sector 3 contracts, the cost of tariff protection of the import-competing sector 3 falls. Therefore, there is a possibility to achieve an increase in the economy-wide social welfare: if the initial tariff rate is large enough so that the net effect of reduction in distortion costs of tariff becomes dominant.

Given that (i) sector 3 contracts, and (ii) labour-output ratio in sector 3 falls (since wage-rental ratio in sector 3 rises), the number of jobs available in the urban sector 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 to leave the rural sectors and to join the urban unemployment pool. This is the 'centrifugal force' worsening the problem. If the relative strengths of these two opposite forces are more or less equal 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 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'[2] 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 study adds insight into why for a developing country like India trade liberalisation might be welfare improving but there may be significant job losses or stagnation in urban employment.

(b) *Competitive wage rises following a policy of labour-market reform if $\lambda_{K2} \cong 0$ and sector 1 is relatively more land-capital intensive than sector 2 in physical and value terms.*

Intuitive Argument. Government intervention to curb the bargaining power of labour-union, leading to a reduction in the unionised wage, makes it possible for the urban sector (sector 3) to save on labour input and raises the effective price of the commodity (net of labour cost) as faced by the manufacturing producers. This may help sector 3 to expand (as long as proportion of workforce employed in sector 3 is negligible). As a result, the demand for capital would go up given supply as the capital-intensive sector 3 would demand more capital for its expansion. That should make capital relatively dearer. At the same time sector 3 will demand more of the non-traded input produced by sector 2. As output of sector 2 is used in a fixed proportion in sector 3, that will enable sector 2 to expand. But since capital is costlier, domestic price of the non-tradable would be pushed downwards to satisfy the competitive equilibrium condition for sector 3. However if the proportion of capital employed in sector 2 is negligible, the price of non-tradable should rise. This would induce a Stolper-Samuelson effect in the HO-nugget formed by sectors 1 and 2, owing to which competitive rural wage rises as sector 1 is relatively land-capital intensive than sector 2 in physical and value terms.

Note that this again points to the possibility of 'jobless growth' in the urban manufacturing sector:

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[2] 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.

(i) Joblessness: So from the above discussion it is clear that if the proportion of capital employed in sector 2 is negligible and sector 1 is relatively more land-capital intensive than sector 2: (i) sector 3 will expand, (ii) both labour (unorganised) and capital would become costlier, while (iii) unionised wage would fall. As the wage-rental ratio in the unionised sector falls, producers in sector 3 will switch to more labour-intensive techniques of production than before. In other words, labour-output ratio in the organised manufacturing sector 3 and consequently, the number of jobs available in the urban sector, rises. As a result, every prospective rural migrant will be lured to migrate to the urban sector (sector 3) which accentuates the urban unemployment problem (centrifugal force). However since the unionised urban wage falls and competitive rural wage rises (under the sufficient conditions mentioned above), the rural-urban wage gap falls. This prevents the rural workers from joining the urban unemployment pool (centripetal force).

It is again possible that these two opposite forces more or less equal, resulting stagnation in urban employment. Also sufficiently stronger centrifugal force could lead to enormous number of job losses.

(ii) Growth Effect: Therefore, as the resultant implications total wage-earnings rises, total rental income from land-capital falls while return to capital remains unchanged. However as sector 3 expands, the cost of tariff-protection on the supply side increases which works negatively on welfare. Of course social welfare may increase if the positive impact of rise in aggregate wage earnings outweighs the negative forces. But that benefit will not accrue to the job losers if in the economy there is no net job creation / significant loss in productive jobs. So the economy will again experience a 'jobless growth'.

1.4 Policy Implications of the Results

The comparative static results show
   a) impact of trade liberalisation policy in presence of labour market imperfection on the competitive rural (informal) wage when there exists agricultural dualism in the rural economy; and
   b) labour market reforms, contrary to the conventional wisdom, may raise the competitive wage.

These results suggest that government needs to be very careful in the implementation of these different liberalisation policies to achieve welfare gains, while the latter result is extremely crucial as it suggests why labour market reform is an important liberalisation policy in the context of an agro-dominated developing economy. 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'. So this theoretical analysis just restates the fact mentioned at the outset of this study 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 organised sector have been opened up for competition too rapidly that contributed to weakening the labour laws and allowed the employers to replace capital for labour, leading to increased productivity of the remaining workers and lower share of employment in the organised sectors. Therefore, it has been the case that the 'growth-effect' does not 'trickle down' to the job losers, leading to 'jobless growth' in the organised 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).

2. Formation of Special Economic Zones and Fate of Agriculture: An Alternative Theorisation

Special Economic Zones (SEZs) are specifically defined duty-free enclaves and that are considered to be foreign territory for the purposes of trade operations, and duties and tariffs. In order to avoid import substitution strategy, many developing countries (including India) have adopted more external-looking-export-oriented industrialisation (Mukherjee, 2012). Formation of export processing zones (EPZs) has been the most prominent feature of this export-oriented development strategy.In addition to exemption from import and export duties, establishments in SEZs get sufficient incentives in terms of benefits in income tax, service tax and other obligations to the central and state governments. Therefore, it is not at all surprising that a large number of enterprises have queued up either to develop an SEZ or to enter an already established SEZ in India. Although well-implemented and designed SEZ can benefit a host-country in different ways: increases in employment, FDI attraction, general economic growth, foreign exchange earnings, international exposure and transfer of new technologies and skills; the policy has come under substantial criticism. New SEZs have to be established on continuous bases to keep up the rate of employment which is not possible all the time. At the same time, it is very difficult to assess the extent of benefit the workers gain from SEZs, the reason is that there is no clarity in how the benefits are measured.

Across different provinces of India during the recent years, thousands of farmers protested against the government's compulsory land acquisition at some sites, claiming they had not been compensated adequately (Fernandes, 2007). The protesters insisted that the policy would not be able to create the number of jobs as suggested by the government. Concerns have also been expressed on the displacement of farmers by land acquisition, loss of fertile agricultural land, a huge revenue loss to the exchequer and adverse consequences of uneven growth. Such a dilemma has been observed in many predominantly agricultural countries, including India, that intend to industrialise using agricultural land (see Bhaduri, 2007; Sarma, 2007; Reddy and Redyy, 2007).

The relevant existing theoretical literature in this context have prescribed SEZ as a second best policy and provide the basis for much of the criticism

against SEZs. There is need to extend theoretical foundations of SEZs for a better understanding of their contribution to the economic growth.The major questions in this context are:

- To what extent are SEZs effective in promoting industrial development, without hurting agriculture, in the context of a liberalised investment policy?

And,

- How are the workers affected (in terms of real wage and employment conditions) due to this policy?

2.1. Research Context

The welfare effects of export zones can be of two types: volume of trade effect and a factor terms-of-trade effect. The second effect improves welfare while the first effect is ambiguous and depends critically on factor intensities of the protected sectors in the economy (Devereux and Chen, 1995). It is also true that in the absence of sufficiently large government spending on irrigation projects and other infrastructural development to improve the productivity of agricultural land, formation of the SEZ may affect agriculture adversely (Chaudhuri &Yabuuchi, 2010).

One potential pitfall in the general equilibrium modelling on SEZ/EPZ is the assumption of perfect competition and constant returns to scale (CRS) production technology in the SEZ sector and thus ignoring the possibilities of having increasing returns brought about by positive externalities, which, in turn, are arising due to the clustering of more and more similar firms within one industry facilitated by SEZs. Hence, there are output gains owing to increased number of firms within the SEZ-industry. These economies are external to the firm but internal to the industry.

This piece specifically incorporates this issue where the production technology in the SEZ sector is characterised by increasing returns to scale (IRS) generated from positive spill-over at within-industry level. Such framework is quite relevant for a developing Asian country like India.

2.2. The Model[3]

A brief outline of the general equilibrium modelling framework has been provided in **(Table 1.1.)**

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[3] The modelling framework is based on the illustration in Mukherjee and Zafar (2016).

Table 2.1: Model Characteristics

| No. of Sectors	Rural Sectors		Urban Sector	Factors of Production		Assumptions
	Agricultural Sector	SEZ Sector		Labour Market	Other Inputs	
4	Sector 1 → produces X_1 with inputs (L, T) using CRS	Sector 2 → produces X_2 by costless assembling of an array of locally produced imperfectly substitute intermediate inputs x_i – increasing returns to the no. of varieties → IRS external to the firm, internal to the industry	Sector 3 → produces a manufacturing commodity, X_3 with (L, K) using CRS	Unorganised 'informal' rural labour market in sectors 1 & 2; with competitive wage (W) – both sectors are in close vicinity – so perfect labour mobility b/n the 2 sectors	Land (T) used in sectors 1 & 2	**Model-specific Assumptions:** (a) Domestic and foreign varieties of capital are perfect substitutes (b) Sector m (that is within the SEZ), is more land-intensive than sector 1.
		Each variety of x_is gets produced by monopolistically competitive producers using a composite factor bundle, m; which, in turn, gets produced using factors (L, T, K) with CRS		Unionised (imperfect) labour market in sector 3; with workers receiving contractual wage (W^*), determined by prior negotiations b/n representative firm and representative trade union	Capital (K) is used in sectors 2 & 3	**Simplifying Assumption:** Land-output ratio in sector m (a_{Tm}) is constant.

2.3 Comparative Static Responses.

(a) *Liberalised FDI policy increases the output of the SEZ sector under IRS but reduces competitive wage in the rural sector in a stable equilibrium. On the other hand, easing of FDI restrictions may increase the output of the agricultural sector (sector 1) for a*

sufficiently high degree of scale economies in the SEZ sector for a stable equilibrium, while urban unemployment may fall.

Intuitive Explanation. First, an inflow of foreign capital, ceteris paribus, leads to an expansion of the capital-intensive composite factor-bundle producing sector m and a contraction of sector 3 following a Rybczynski effect. This contraction of sector 3 the expected urban wage falls, leading to a reverse migration of workers from the urban back to the rural sector.

Figure 2.1 – Equilibrium in the Domestic Market for the Composite Factor - bundle (m)
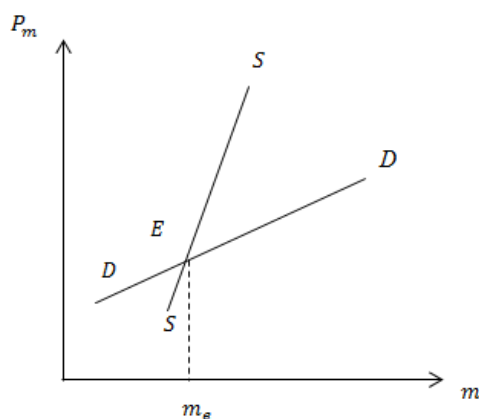
Therefore, in sector 1, labour-output ratio rises while land-output ratio falls. In sector m, land-output ratio is assumed to be constant. Therefore, given the available land-endowment of the economy, for given output-composition, land becomes relatively surplus in the nugget, resulting in an increase in the supply of m. This gives a positively sloped supply curve SS in the above figure with equilibrium at E. The way the DD and SS curves are drawn in **Figure 2.1**, it has been presumed that the equilibrium is Marshallian stable.

Now as m increases, at constant price of the m-good (P_m), the supply curve drawn in **Figure 2.1** shifts rightwards with higher new equilibrium values for both m and P_m. Higher P_m in new equilibrium necessarily implies higher return to the land-capital and lower wages, leading to contraction of relatively labour-intensive sector 1 in the nugget.

The expanded sector m now hosts more capital and labour (released by sector 3, although some labour may still migrate to the urban sector since competitive rural wage falls). But since land productivity is constant in sector m, some of the additional labour and capital in sector m become surplus and they move to sectors 1 and 3 respectively[4]. This induces expansions of sectors 1 and 3.

So the effects on outputs in sectors 1 and 3 are ambiguous. However, *if willingness of the producers in sector m to substitute capital by labour is sufficiently low* (and not greater than the requirement of labour in the agricultural sector to be used with land in per-unit production); then even though labour is available at cheaper cost, sector m producers would still release some labour to the agricultural sector *that would be adequate for the expansion of agricultural sector*.

Since sector 3 contracts under the sufficient condition mentioned above, the expected urban wage for every prospective rural migrant falls. This will induce a reverse migration back to the rural sector (centripetal force). But competitive wages also fall, which may persuade some rural workers to migrate and join the urban unemployment pool (centrifugal force). However, the centripetal force may be strong enough to more than offset the centrifugal force so that the rural workers may prefer to accept new jobs created in the rural area at lower wages, rather than remaining unemployed for an indefinite period and so urban employment may fall.

(b) *Inflow of foreign capital following easing of FDI restrictions improves national income of the economy and increases export by the SEZ-sector if the following two conditions hold:*
   (i) *the relative distributive share of income from land-capital to labour in sector 1 is higher than that of the entire economy, and*
   (ii) *the income-elasticity of demand for the SEZ-good is significantly low.*

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[4] Note that sector m does not contract as a result of this. However, if land productivity were not constant in sector m, there would be a Rybczynski effect in the nugget and sector m would also contract as a result of this effect. In that case, the net expansion of sector m would become a bit ambiguous.

Intuitive Explanation. Inflow of foreign capital following easing the entry criteria for FDI reduces wages but increases return to land-capital. However, the net effect will be an increase in the economy-wide national income at domestic prices (under balanced trade), if the relative distributive share of income from land-capital to labour in sector 1 is higher than that of the entire economy.

Now returning to the effect on exports by SEZ, it can be deduced that the production of the SEZ-good would go up along with the national income of the economy under the sufficient condition mentioned above. Therefore, this triggers a demand-side effect as well on the exportable, by raising the domestic demand for the SEZ-good. If the income-elasticity of demand for the SEZ-good is sufficiently low, then the supply-side effect (i.e. expansion of the SEZ-good production) would dominate the demand-side effect, and exports by the SEZ-sector would increase.

This study proposes that agricultural sector would expand and sector 3 would contract for a sufficiently higher degree of scale economies in the IRS sector (SEZ). However, the impact on the net agricultural export (of good 1) and net manufacturing import (of good 3) depend on the domestic demands for these two commodities. It can easily be shown that in the long-run equilibrium model under consideration, trade is always balanced under both steady-state situations (so that total net export becomes always equal to the total net import of sector 3) and therefore, the increase in SEZ exports always gets adjusted.

2.3. Policy Implications of the Results

This study finds that, by incentivising multinationals to relocate investment to the SEZ sector, through easing the entry criteria of FDI, for a sufficiently higher degree of scale economies in the IRS sector (SEZ), both SEZ and agricultural sectors may expand simultaneously. However, competitive wage rate falls in real terms while there are possibilities of reduction in urban unemployment. National income of the economy may go up and export by the SEZ sector may improve as well, if the income-elasticity of demand for the SEZ-commodity is negligible. This study uses static general equilibrium structure to demonstrate these results, by utilising the positive externalities generated in the IRS sector, however without considering the presence of any additional subsidy policy directed to the agricultural and or SEZ sector. Thus, this model re-establishes the main claim put forward empirically by

several authors in the context of India and other alike densely populated Asian economies that is, starting from the same initial conditions, a small, open economy with SEZs is more likely to attain 'efficient equilibrium' in terms of substantial growth effect (Murayama and Yokota, 2009; Aggarwal, 2011) compared to an economy without SEZs, albeit the rural workers (non-migrants) will suffer from the reduction in real wage-income (Aggarwal, 2004; Murayama and Yokota, 2009; Jayanthakumaran, 2003). Therefore, this policy essentially indicates a mixed outcome and calls for government support for displaced people and rural workers. An extension (currently in progress) of the discussed general equilibrium structure is to consider wage-subsidies given to the rural workers by the local government, where the cost of providing subsidies is financed by the tax-revenue of the government earned from the tax on foreign capital income.

3. Technological Progress with Segmented Factor Markets and Welfare Implications for the Urban Poor [5]

One important insinuation of the 1991 economic reform in India has primarily been the productivity enhancement, primarily capital-using (i.e. labour-saving) in nature, in the organised (formal) manufacturing and service sectors of the urban area; as evidenced in Pattnayak and Thangavelu (2005), Hulten and Srinivasan (1999) and so on. As evidenced in various contributions (see for example, Hasan, 2002; Topalova, 2010) such productivity swell in the Indian skill-intensive registered industries during the liberalised regime has primarily been driven by greater access to the newer varieties of imported inputs from abroad, owing to the lowering of input tariffs. However, following such a technological change in the urban formal sectors, organisation of production between the organised and unorganised (informal) segments of the urban economy should be affected; which would, in turn, impart informal activities, wages and employment.

While it is difficult to assess such an impact at the micro level and in terms of various indicators of poverty and human development, by exploring the general equilibrium impact of productivity take-offs in the formal manufacturing sectors on the informal wage and employment, this study, according to the definition of income poverty (people are poor if they earn abysmally low wages, which is common among the informal sector workers in developing countries like India), serves to draw an inference on the well-being of the 'poor' urban workers working in the informal sectors. This works in the present context because these workers do not have to be necessarily unemployed in order to be considered poor; prevalence of very low market determined wages describes the impoverishment of those people, who are engaged in informal activities. Vertical production linkages within the domestic urban economy as well as international outsourcing (fragmentation) of production in the formal (skill-intensive) sector have been incorporated within an encompassing general equilibrium model (of production and trade) for the urban economy of a developing country like

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[5] This chapter serves also as an excerpt from Mukherjee (2016).

India; while regarding the factor markets, the model not only allows for having formal-informal segmentation in domestic labour markets, but also for having imperfection in the informal sector capital (credit) market to execute this crucial issue.

3.1 Some Stylised Facts

India experienced productivity take-off in the organised urban manufacturing (formal) sectors (primarily service sectors, covered under the Annual Survey of Industries (ASI) act) over the ten-year period from 2000 to 2010 in almost all the provinces.

Figure 3.1: Total Factor Productivity Growth in Organised Sectors (State-wise)
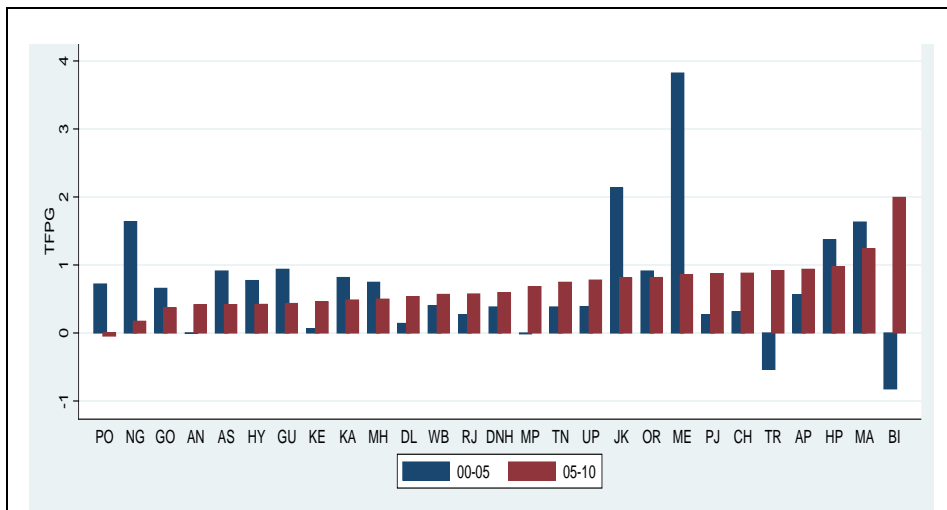
NOTES:

(1)   Abbreviations of the name of the provinces:

AN – Andaman &Nikober; AP – Andhra Pradesh; AS – Assam; BI – Bihar; CH – Chandigarh; DL – Delhi; DNH – Dadra-Nagar-Haveli; GO – Goa; GU – Gujrat; HP – Himachal Pradesh; HY – Haryana; JK – Jammu & Kashmir; KA – Karnataka; KE – Kerala; MA – Manipur; ME – Meghalaya; MH – Maharashtra; MP – Madhya Pradesh; NG – Nagaland; OR – Orissa; PJ – Punjab; PO – Pondicherry; RJ – Rajasthan; TN – Tamil Nadu; TR – Tripura; UP – Uttar Pradesh; WB – West Bengal.

(2)   The growth is the *annual average rate* of growth.

Source: *Author's calculation using Annual Survey of Industries (ASI) survey data, various rounds.*

Furthermore, labour productivity in the organised formal sectors has increased fairly evenly across the provinces of India between 1989 and 2010 as revealed in **Figure 3.2** below.

Figure 3.2: Annual Growth Rate in Labour Productivity
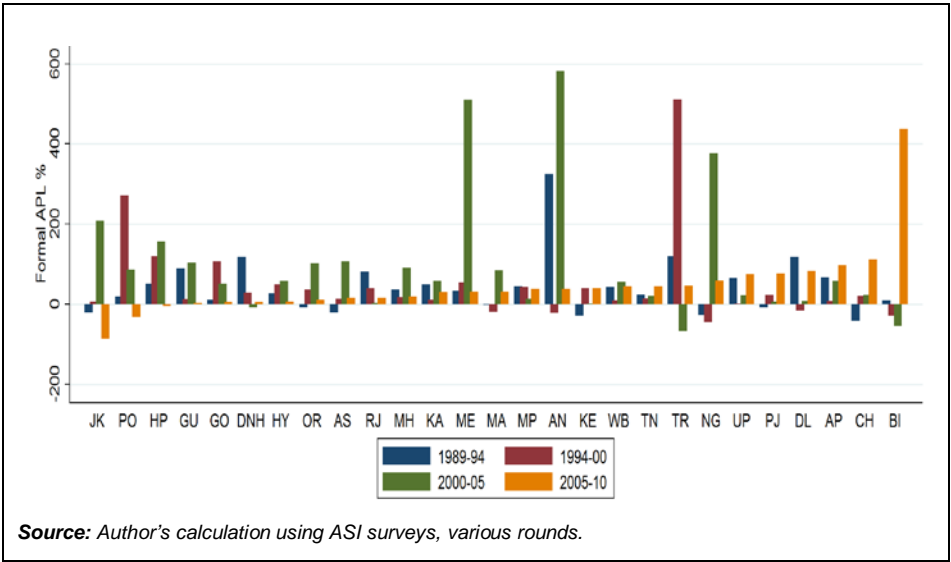
However, a sharp increase is observed in real informal wages in the urban areas during this period as observed in the following figure. To construct the variables for urban unorganised informal sector in the context of the sample under consideration, data from various rounds of surveys conducted by 'National Sample Survey Organisation' (NSSO) of the Government of India for Non-Directory Manufacturing Establishments (NDMEs) (not covered under the ASI act and having strong inter-linkages with the organised sectors) in the urban areas have been utilised in this study. The NSS surveys for 1989-90, 1994-95, 2000-01, 2005-06 and 2010-11 across twenty-seven Indian provinces are utilised for this purpose.

Figure 3.3 : Annual Growth of Real Urban Informal Wage (State-wise)
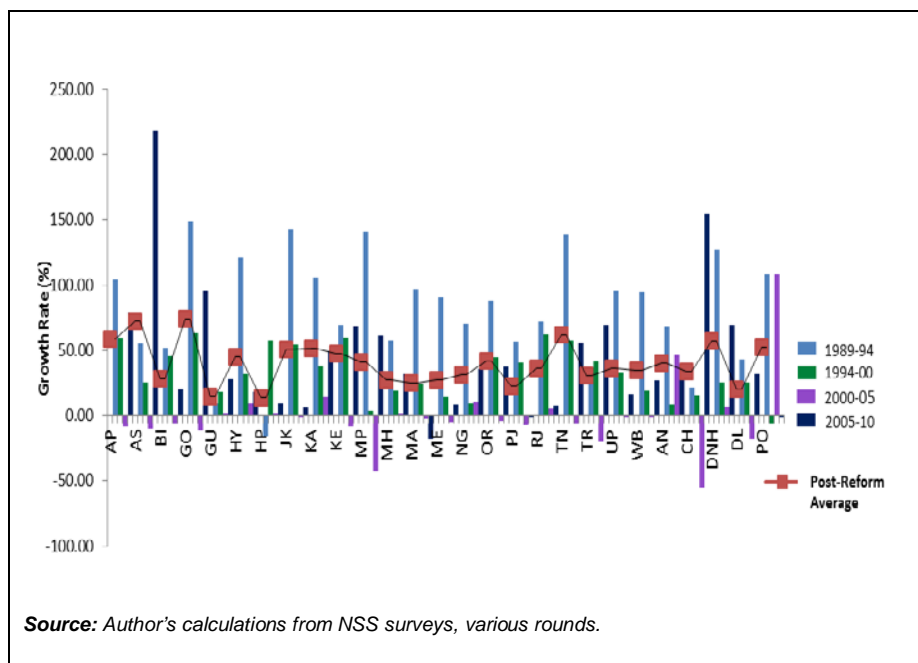
This seems a puzzle since improvement in labour productivity in the formal sectors and increase in informal wages is observed concurrently during the liberalised regime in Indian provinces.

Sundaram et al. (2012) found strong positive correlation between formal and unorganised (informal) sector activities (employment, output and value added) at the industry-province level, which supports significantly the inter-linkage between formal and informal sectors. Also the reliance of formal sectors on informal sectors is much higher where labour laws are more stringent and organised sectors are relatively human capital (or skill) - intensive (Sundaram et al., 2012). This is because the formal sector firms with rigid labour markets and higher skill-requirement often find it is profitable to farm out a part or whole of their production to the informal sector firms (that enjoy advantages of cheap labour supply) to avoid various regulations and associated costs. On the other hand, the informal firms are also dependent on formal firms for marketing their products and, in particular, for the supply of credit from the formal sector firms since the formal firms usually have an advantage over the informal firms in the credit market.

In this context, this study constructs a broad measure of input purchases by the formal sectors from local informal firms. This variable, capturing the notion of vertical production linkages between urban formal and informal sectors, is the sum of:

(a) Value of products sold by the registered factories in the same condition as purchased from the other local firms; and

(b) Cost of contract and commission work done by others on materials supplied by the factory.

(c) Total delivered value of all other materials (other than fuel), which have not been produced by the registered factories.

The first two items together constitute a measure of subcontracting[6].

However, value added has been rising over time in both the informal and formal manufacturing sectors. On the other hand, employment in the formal sector has remained static or has even been slightly declining, while in the informal sector it has been rising steadily. Therefore, in case of value added, a percent-to-percent match in the growth of formal and informal manufacturing has been obtained, which is indicative of some degree of complementarity between the two sectors, while the growth in population or labour force has mainly been absorbed by the informal manufacturing sector. The positive growth rate in subcontracting activity during the liberalised regime in most of the Indian provinces can be observed in **Figure 3.4[7]**.

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[6] Ramaswami (1999) measured subcontracting intensity in formal sectors in a similar fashion. He used the ratio of the value of goods sold in the same condition as purchased to value-added as a measure, but this excludes other forms of subcontracting recorded as contract work performed on materials supplied.

[7] Although for some of the provinces, for some particular year-interval(s), a negative annual growth rate in subcontracting activity is observed, such as for Assam during 2005-10. This means that the growth rate of the variable comprising total value of products sold by the registered factories in the same condition as purchased from the other local firms, together with the costs of contract and commission work done by others on materials supplied by the factory, declined from 2005 to 2010 for Assam. This, in turn, implies over this time period, registered factories of Assam have lesser reliance on local resources for their production.

Figure 3.4: Annual Growth Rate in Subcontracting Activity
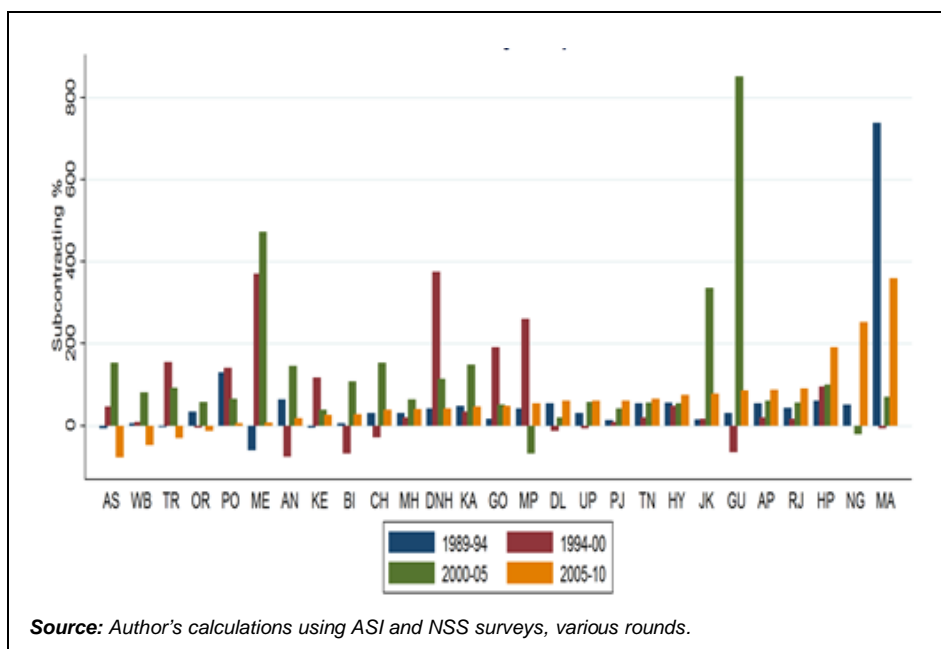
A high rate of growth is also observed in accumulation of real fixed assets of urban NDMEs (relative to that in the registered factories), an approximation to capital accumulation in the urban informal sectors relative to that in formal sectors,[8] across almost all the 27 provinces **(Figure 3.5)** during the liberalised regime.

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[8] Other more appropriate variable, such as 'Working Capital' in the urban NDMEs to provide a proper notion of 'Capital' could not be utilised, due to data-unavailability. However, the overwhelming fixed assets formation in the informal sectors definitely indicates that a large portion of the investments (previously in the formal sector) has flown into the informal segment. Kar and Marjit (2009) have also used this empirical approximation. For some provinces, however, a negative annual growth rate of relative capital accumulation for some particular time-interval is observed. That means, over this particular time-interval, lesser capital has been reallocated to the informal sectors from the formal sectors in these provinces.

Figure 3.5: Annual Growth Rate in Capital Stock for NDMEs of Indian States

*Source: Author's calculations using NSS surveys, various rounds.*
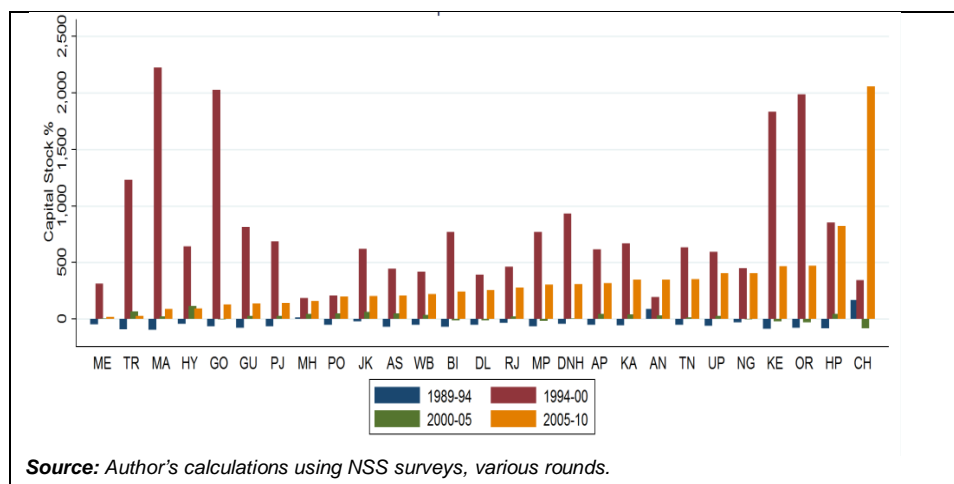
Therefore, four concurrent events are observed across Indian provinces during the liberalised regime: productivity improvement in the organised sectors, formal-informal production linkages in the urban area, movement of both capital and labour to the informal sectors, and sharp increase in informal wages. Hence, it becomes a challenge to the trade-theorist to explore channel(s) through which technological progress in the organised sectors can plausibly lead to increase in urban informal wage and subsequently impart employment in the urban informal sectors for a small, open developing economy like India – that typically suffers from rigid organised sector labour market and imperfection in credit market of the informal sector.

Against this backdrop, this study explores the association between the urban informal wage and urban poverty at the provincial level to motivate the main research agenda, calculating the poverty head count ratios in the urban areas of Indian provinces for the years 2004-05 and 2011-12. As demonstrated in **Figure 3.6** (below), the head count ratio has dropped across all the provinces except Nagaland. The increase in the urban informal wage between 2005 and 2010 (as shown in **Figure 3.3**) in these Indian states can plausibly be one significant reason for the decrease in urban poverty headcount ratio, given the fact that the majority of the urban

poor in India are engaged in the non-agricultural urban informal sector. This observation substantiates the choice of informal wage as a reasonable benchmark to conclude on the welfare implications of 'urban poor'.

Figure 3.6: Change in the Incidence of Poverty across Indian Provinces between 2004-05 and 2011-12

Source: Planning Commissions and NSSO data, various rounds and author's calculations.
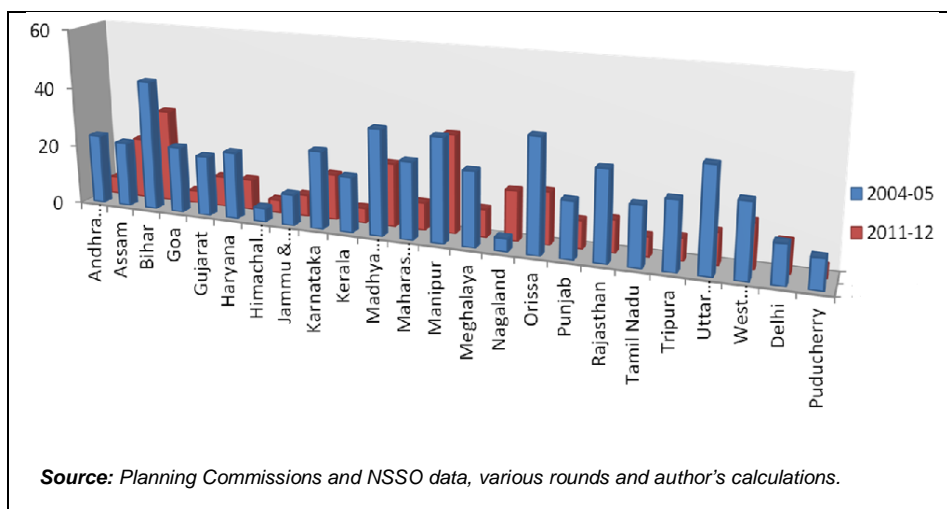
Given the concentration of informal workers in the urban economy and presence of urban poverty, the theoretical exercise enables to obtain an overall view of the well-being of the 'urban poor' as a consequence of productivity take-offs in the organised sectors.

3.2 Research Context

It has been demonstrated in different studies that informal sector firms are integrated to the formal sector firms on a contractual basis. Therefore, it would be unrealistic to assume that the informal sector produces internationally traded final goods, capital is sector-specific and that the informal and formal credit markets are completely disintegrated even in the short-run. This is because the informal sector money-lender borrows capital from the formal credit market for re-lending. Hence a part of the formal credit enters the informal credit market. Therefore, the 'zero mobility' case in Marjit and Kar (2008a; 2009) papers is unlikely to happen in reality. This study has specifically attempted to address such 'gap' in the existing research.

There has been a consistent debate on the appeal of various types of technological progress among labour economists and trade-theorists (Jones, 2006; Krugman, 2000). Trade-theorists, emphasising the importance of relative factor intensities in different sectors (Jones, 1965; Oladi and Beladi, 2009; Beladi, Chaudhuri, and Yabuuchi, 2008) argue that a labour-augmenting type technological change in the labour-intensive sector will push the wages up. This result is in contradiction to the usual predictions of labour economists. Findlay and Jones (2000) argued that trade and labour theory outcomes will be merged for a major modification of production structure consequent upon such a technological progress. The most recent attempt has been made by Beladi, De la Vina, and Marjit (2012) in terms of a simple two-sector static general equilibrium model with formal/organised (unionised wage) – informal/unorganised (flexible wage) labour markets to show that technological progress leads to opposite movement in informal wage independent of relative factor-intensity ranking between organised and unorganised labour sectors.

But the simple two-sector set-up in Beladi et al. (2012) was not quite generic to portray the conditions of urban informal sector in a developing economy. It would be more realistic to classify the urban informal sector as comprising of an industrial segment that uses labour and capital to provide an intermediate input such as leather and rubber products, electrical equipment etc. to the formal sector firm, with the urban informal firm being tied to the formal firm by the system of subcontracting. Another aspect of the informal service sector comprises producing non-traded services such as street-vendors with almost no use of capital.

These possibilities have been considered in Kar and Marjit (2009).However, Kar and Marjit (2009) did not consider any dualism in the domestic capital market. The dominant feature of dualismin the capital market is the fragmented interest rate structure, featuring lower allocation of loanable capital to the informal sectorat a higher relative rental rate. The informal producers lack access to credit from formal institutions. Therefore, they generally depend on the informal sources of credit, such as informal money lenders, who charge extremely high interest rates. This is the precise idea that has been put forward in the theoretical literature invoking the informal capital (credit) marketas imperfect (for example, Basu and Bell, 1991; Basu, 1998; Chaudhuri, 2003). This study specifically incorporates such dualism incapital (credit) market, thus capital mobility between the formal and informal sectors is triggered by the interest rate differential between the two

capital (credit) markets, departing from the existing relevant theoretical contributions in this context. In fact, this is the best possible treatment of incorporating credit market dualism in the present set-up. In order to avoid paradoxical circumstances, without any loss of generality, this study models the informal intermediate input producing sector as having Leontief production technology (and thus fixed capital requirement in production).

3.3 The Model

Table 3.1: Model Environment

No of Sectors	Sector Definitions		Factor Markets		Relative Factor-intensity Ranking
	Non-traded	**Traded**	**Labour Market**	**Capital Market**	
4	**Sector 1→** • Finished non-tradable producing sector; absorbs surplus labour among the migrants coming to city; represents very low-skilled activities such as domestic help or small vendors with little or no use of capital. • Leontief Production technology.	**Sector 3→** • Export sector, vertically integrated with sector 2, use (relatively) skilled labour and capital, along with the 'middle product' imported from the ROW and the local inputs supplied by Sector 2. • CRS production function.	**'Informal' Labour Market in Sectors 1 & 2→** Competitive (unskilled) labour market with flexible wages (unskilled).	**Imperfect capital (credit) market in informal sectors (Sectors 1 & 2)→** Interest rate is steeply higher from the one prevails in the formal competitive credit market. Capital (credit) allocated to the informal sector is positively related to the return differential between the two (informal & formal) credit markets.	Only applicable for the traded formal sectors, Sectors 3 & 4 – that is, the sectors using two common factors – Skilled Labour & Capital – therefore, forming the required Heckscher-Ohlin 'Nugget'. • Sector 3 (export sector) <u>is relatively skilled-intensive</u> thanSector 4 (import-competing sector) (with respect to capital). • No factor-intensity
	Sector 2→ • Non-agricultural intermediate input producing	**Sector 4→** • Import-competing sector; uses	**'Formal' (Skilled) Labour Market in Sectors 3 & 4→** Rigid	**Perfect credit market in formal sectors (Sectors 3 &**	

	sector, using relatively unskilled labour and capital, providing intermediate inputs ranging from leather and rubber products to electronic equipment to the export sector (Sector 3). • Leontief Production technology.	skilled labour and capital. • CRS production function.	(skilled) Labour Market in formal sectors (Sectors 3 & 4) with institutionally given higher (skilled) wage fixed by prior negotiations (however, the wage-bargaining is not explicitly modelled given the focus of the model).	4)→ Competitive credit market with market-determined interest rate.	reversal.

3.4 Comparative Static Results

Let us now explore the implications of factor-specific technological progress in sector 4, ceteris paribus, on the urban informal workers. This can be summarised in the following proposition.

(a)   Factor-specific technological progress in the relatively capital-intensive formal sector ceteris paribus, unambiguously raises formal and informal interest rates but reduces wages in both informal sectors. However, as a result of either a capital-saving or a capital-using technological progress in the capital-intensive import-competing formal sector, the intermediate input producing informal sector may contract but the finished non-tradable producing informal sector may expand in terms of both output and employment.

Intuitive Explanation. If the relatively capital-intensive import-competing formal segment (sector 4) undergoes capital-saving technological progress, it will raise only the formal interest rate (given the fixed skilled wage and fixed price of the imported intermediate product). As a result of this, the transformation schedule of the Heckscher-Ohlin (HO) 'nugget' shifts outward, with expansion of the output of the capital-intensive sector 4 and contraction of the output of relatively (skilled) labour-intensive sector 3, along with the reduced (skilled) wage-rental ratio at the new production point

on the new transformation schedule, naturally with different slope than the initial equilibrium point. Noticeably, such technological progress contributes to the cost-saving of the relatively capital-intensive industry in the nugget (sector 4) by changing the zero-profit condition in Equation (4), like subsidising the industry, and to the relative surplus of capital in the HO 'nugget' given the product-mix.

Therefore, the demand for non-traded intermediate input falls given the supply. This reduces the price of the intermediate input, whereas rental costs paid by the informal producers rise (since the formal interest rate goes up). As a result, from the zero-profit condition of sector 2 (the intermediate input producing sector), it is clear that competitive unskilled wage rate should fall. At the same time, since intermediate input is used in a fixed proportion in the export sector production, which cannot be supplemented by other factors of production in sector 3, this implies that sector 2 must shrink as well. Hence, sector 2 releases unskilled labour to be absorbed in sector 1, but at a lower competitive wage than before. This will be called as the 'first round' effect.

However as formal interest rate rises, formal-informal interest rate differential goes up as well. This depresses the supply of capital to the formal capital market, inducing a Rybczynski effect in the nugget that tends to expand sector 3 and sector 2 given and this will be termed as the 'second round' effect. However, as long as the proportion of capital reallocated to the informal sector falls short of the proportion of capital used in sector 4, the 'first round' effect dominates and both sector 3 and sector 2 may contract as a consequence. If that happens, then the finished non-tradable producing informal sector (sector 1) would expand and the retrenched workers from sector 2 would join sector 1. However, such outcome would be welfare reducing from various points:

(i)   The downward pressure on wages of informal workers has a clear impact on aggravating poverty in the urban areas. This is because a large share of the urban poor in developing countries (such as above 78% in India) work in the informal sector and any reduction in the wages of the informal workers may significantly increase the incidence of poverty.

(ii) Sector 2 contracts in terms of both output and employment. Hence workers are forced to leave the unregulated manufacturing firms and

take up insecure non-traded service sector jobs with lower earnings and hence greater likelihood of poverty.

In case of a (skilled) labour –saving (i.e. capital-using) technological progress in the capital-intensive sector 4; there is now a relative surplus of skilled labour in the HO 'nugget' given the product-mix, which helps the vertically integrated (skilled) labour-intensive sector 3. However, increase in the capital cost of production in sector 3 discourages Sector 3 producers to expand thereby lowering the demand for the sector 2 output and hence the price of intermediate good 2 and the competitive unskilled wage (informal) fall unambiguously. But there will also be another channel of impact, namely the increase in formal-informal interest rate differential (due to the increase in formal interest rate) that should also help the vertically integrated sectors (sectors 2 and 3) to expand. However, as long as the net credit availability in the HO nugget remains positive and $\hat{r}$ has a lower bound; sector 3 may contract in this case as well. (Q.E.D.)

Lowering of input tariffs during the liberalised regime in the skill-intensive Indian service industries enables greater access towards increased varieties of foreign-technology embedded imported input (M) calls for capital-using (i.e. skilled labour –saving) technological progress in the skill-intensive sector 3. Therefore, it would be sufficient (given the focus of this study) to trace out the implications of a capital-using technological progress (brought about by uniform tariff reduction on imports of (M) insector 3, ceteris paribus, on informal sector wage and employment conditions.

(b) A uniform tariff reduction on the imported input in the export sector, ceteris paribus, induces a capital-using technological progress in that sector, resulting expansion in product prices and competitive real unskilled wage of the informal workers in the two informal sectors. However, the unskilled workers now move to the local intermediate input producing informal sector since this sector expands in terms of both output and employment at the cost of the finished non-tradable producing informal sector.

Intuitive Explanation. Since the return to capital in the formal sector is already determined from the zero-profit condition for sector 4; a capital-using technological progress in sector 3, brought about by the uniform tariff reduction on the imports of capital goods as inputs, acts like an increase in

the price of commodity 3, or more accurately, like a set of industry subsidies. Therefore, there is now a parallel outward shift of the transformation schedule of the HO 'nugget', with higher exportable production and lower importable production, for the same (skilled) wage-rental ratio at the new production point on the new transformation schedule. Hence, the excess demand for the product of sector 2 (by sector 3 producers) contributes to an increase in the domestic price of the intermediate product of sector 2. However, labour-output and capital-output ratios of sectors 1 and 2 do not change (owing to the fixed-coefficient production technology in sectors 1 and 2). Therefore, sector 2 expands unequivocally and unskilled labourers are reallocated from sector 1 to sector 2. Thus, sector 2 expands both in terms of output and employment at the cost of sector 1. From the zero-profit condition of sector 2, it is imminent that the real informal wage increases.(Q.E.D.)

It is also evident in this framework that if government would intervene aiming to reduce the degree of imperfection in informal credit market and hence the informal rental return,[9] that would tend to reduce the capital-cost of production for intermediate input producers. However, this would also bring down the formal-informal interest rate differential to some extent and prevent credit reallocation towards informal sector. Nevertheless, from the zero-profit condition for the intermediate input producing sector, it is clear that this would contribute positively to the increase in informal wage.

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[9] Government intervention aiming to integrate the formal and informal credit institutions through appropriate linkages is the most feasible way to achieve this. Since credit is not directly accessible from formal sources, the focus should lie on the provision of microfinance and related services to informal sector enterprises, strengthening of the institutional framework in this area, creation of alternative sources of credit and developing alternative delivery mechanisms. Most of these interventions in different countries have focused on alleviating credit constraints for the rural poor, but some have also targeted the urban poor. Among these, the following are widely known: Grameen Bank in Bangladesh; Bank Rakyat Indonesia (BRI); and Prodem (the Fundaci´on para la Promoci´on y Desarrollo de la Microempresa) in Bolivia. (See Jackelen and Rhyne, 1991 for details). Apart from governmental initiatives, self-help groups can also have a considerable role in alleviating the problem of obtaining credit. A self-employed women's association (SEWA) in Ahmedabad and the Working Women's Forum (WWF) in Madras (both in India) have created their own banks along the lines of cooperatives to cater to the credit needs of poor women; they follow mechanisms similar to those described above and reach well over half a million people.

3.5. Policy Implications of the Results

The present research stems from the observation that the 1991 economic reform in India has contributed to the technological improvement in the organised sectors which has been quite substantial over the recent years. Albeit the existence of strong production inter-linkage between formal and informal sectors; the concurrency of productivity take-offs in the organised sectors and sharp increase in informal wages in recent years still remains a puzzle since both capital and labour flow to the informal sectors. Hence, in order to propose a plausible answer to this puzzle, this study investigates the general equilibrium implications of trade-induced technological progress in the formal non-agricultural sectors of the economy on the urban informal wages with segmentation in factor markets.

In this simple general equilibrium model, the urban formal sectors wages are pegged at a higher level than competitive wages by prior negotiations with labour unions; while dualism in the capital market is characterised by the fragmented interest rate structure, featuring lower allocation of loanable capital to the informal sector at a higher relative rental rate. Informal sector producers, however, use capital and labour in fixed proportions. The inter-linkage between the formal and informal credit markets (that has been evidenced and demonstrated in different theoretical and empirical literature), has been ignored in earlier related works (Kar and Marjit, 2009; Marjit and Kar, 2008a; 2009) in course of examining the impact of trade reform measures in the formal sectors on the informal wages in such four-sector general equilibrium model in presence of finished non-tradable and non-traded intermediate inputs.

In sum, the present research highlights the importance of credit-product inter-linkage between the urban formal and informal non-agricultural industries in order to trace out the implications of trade-induced productivity surge in the formal sectors on the wages and employment conditions of the economically marginalised urban workers working under informal arrangements.

The policy implications of the present analysis are straightforward to infer. It has already been discussed in the text that reform, induced by government intervention, in the informal sector credit market tends to prevent capital reallocation towards informal sector in this framework. On the other hand,

reform in the formal sector labour market would reduce the net returns to the formal sector workers and thus, owing to the productivity improvement in the formal sectors, increase in the interest rate prevailing in the formal sectors would be more pronounced in that scenario and therefore, formal-informal interest rate gap would be more widened in this context, leading to a greater reallocation of capital from formal to the informal sectors.

Moving to the issue of empirical testability of the key relationships identified in the theoretical model, one needs to narrow down attention to longitudinal sector (industry) specific data for formal and informal production activities. However, such empirical analysis is presently beyond the scope of this study, primarily due to the unavailability of suitable and adequate data for India, although the available limited sample has been utilised to provide a set of stylised facts to motivate the theoretical analysis of this study. Moreover, it is another challenge to construct any direct measure of capital (credit) allocation between formal and informal industries, using the secondary survey data on informal sector available from National Sample Surveys (NSS). These issues have been laid for future research.

But this analysis has undoubtedly been able to addresses the crucial policy-question, which is often the subject of intensive debate: whether and under what economic conditions could the benefits of productivity improvement in the formal sectors would trickle down to the marginalised workforce in the urban areas working in so-called 'informal sectors' (through the impact on their real wages and employment conditions).

4. Input Trade Liberalisation and Wage-inequality with Non-traded Goods[10]

As documented in number of literature, access to newer varieties of foreign inputs owing to trade reform has fuelled such growth in India's service industries during the liberalised regime. Therefore, there should be an increased demand for skilled labour, due to the increase in demand by the skill-intensive service industries both at the extensive margin and due to the skill-biased technological change at the intensive margin owing to the increased skill content of imported inputs that are then assembled for export. Therefore, the contribution of this study is to adopt a tractable but encompassing general equilibrium structure to trace out the implications of such productivity surges.

4.1 Research Context & Contributions

Developing countries like India do suffer from the incidence of labour market rigidity, which has been documented in a number of empirical literature (such as Topalova, 2010; Besley and Burgess, 2004). This hinders free mobility of unskilled and skilled labourers across sectors. Since developing countries are generally deficient in effective employment insurance schemes, the displaced workers from the sector experiencing decline in relative price can hardly afford to remain unemployed. Absorption of labour retrenched from the more regulated sectors by this sector is, therefore, likely to be a major reason behind the concurrent increase in inequality and informalisation, as well as the relatively jobless patterns of growth observed in many developing countries in the recent years, including India (Razmi, 2009). The share of the informal sector in total employment is typically quite high in developing countries (Razmi, 2009). The share of the informal sector in total output can also be quite high. For example, Nagaraj (2004) reports a figure of 40% for India. Unfortunately, most of the relevant literature in this context has neglected the special nature of the informal sector in developing countries' labour markets

Liberalised economic policies generally shift resources away from the non-traded sectors to the traded sectors of the economy. Since the non-traded production by definition must match its domestic demand, trade liberalisation

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[10] The insights outlined in this chapter is based on Mukherjee (2017).

induced expansion of activities in the traded sectors will be possible only through a fall in the demand for and supply of non-tradable. Therefore, as pointed out by Acharyya and Marjit (2000) and Marjit and Acharyya (2003) that whether non-traded production is organised in the informal sector with unorganised (unskilled) labour market or in the formal sector with unionised (unskilled) labour market should be crucial to determine the impact on wage inequality.

Typically, the formal non-traded sector produces internationally non-tradable including all public services, hotel accommodation, real estate, construction, hair-cut and commodities produced to meet special customs or conditions of the country. Similarly, the non-tradable produced in the unorganised informal sectors include items such as small domestic industries, services provided by petty traders or street-side vendors and so on. If the non-tradable is produced in a formal sector with unionised wage, the non-traded price may be determinedsolely by the cost of production independent of the demand for non-tradable. In such a case demand variation consequent upon trade liberalization induced real income changes alters only the non-traded production. Subsequently, any change in the wage gap is triggered by the consequent resource reallocation across the non-traded and traded sectors. But if the non-traded sector is an informal sector, variations in the demand for non-tradable are followed by the changes in both production and price of the non-traded good. Accordingly, trade liberalisation will have quite different implications on the wage-gap between skilled and unskilled workers.

This study sketches out the implication of input trade liberalisation on wage-inequality with dual labour markets, large informal sectors and non-traded goods. The purpose of such a comparative static exercise is two-fold. Firstly, the accelerated growth in Indian manufacturing and service sectors has largely been attributed to dramatic reduction in tariffs and NTBs on the imports of intermediate inputs as emanates from recent empirical evidence (Goldberg et al., 2009; 2010). Secondly, the recent empirical literature (Panagariya, 2004; Kotwal et al., 2011) suggests that skill-intensive manufacturing and service industries such as communication services, financial services and business services in India experienced significant growth in exports during the liberalised regime, where software accounted for the highest share of all service exports. Dehejia and Panagariya (2012) argued that imports of capital-intensive foreign inputs (embodying foreign technology) by the skill-intensive service sectors (primarily software services

and IT-enabled services) facilitated the growth of these sectors in India in the post-reform period. At the same instance, Hasan (2002) provided evidence from panel data on Indian manufacturing firms in favour of a significant effect of imported technology on productivity. Hence, access to newer varieties of foreign input sowing to trade reform has fuelled such growth in India's service industries during the liberalised regime. Therefore, there should be an increased demand for skilled labour, due to the increase in demand by the skill-intensive service industries both at the extensive margin and due to the skill-biased technological change at the intensive margin owing to the increased skill-content of imported inputs that are then assembled for export. Therefore, the contribution of this study is to adopt a tractable but encompassing general equilibrium structure to trace out the implications of such productivity surges in the skill-intensive service sector, brought about by tariff reform on the imports of capital-intensive inputs, on the non-traded sector, and subsequently, on the unskilled labour market and informal unskilled wage.

The general equilibrium framework used in this study follows the available empirical evidence that low-skilled workers cannot afford to remain unemployed and the retrenched unskilled workers from the organised formal sectors get absorbed in the unorganised informal sectors at market-determined lower wages. Our modelling approach, closely follows Marjit and Acharyya (2003) with organised (formal) and unorganised (informal) non-traded sectors respectively to enlighten the role of non-tradable in determining the implications on unskilled informal wage and consequently on the relative wage-gap. The framework used in this study can be viewed as a generalisation of Marjit et al. (2007) with additions of skill-intensive sector and non-traded final good producing sector.

4.2 Non-traded Production in Formal Sector with Contractual Money WagesFigure

4.1: Structure of the Baseline Model
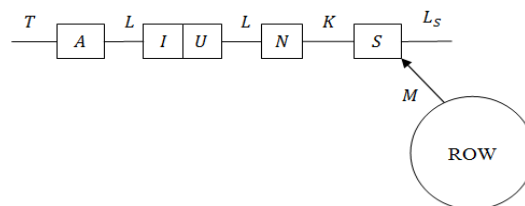
For the analysis the first assumption is that this finished non-tradable is produced in the formal sector where unskilled labour is hired at a contracted nominal wage (institutionally given by prior negotiations), as considered in Marjit and Acharyya (2003) and in Acharyya and Marjit (2000). Examples of such non-tradable include services such as construction, hair-cut, infrastructure (comprising telecommunications, electricity, water and sewerage, natural gas and transportation) and so on – where existence of higher institutionally given nominal wage is observed. Therefore, only the agricultural sector is modelled as the informal sector where the unskilled labour gets a lower market-determined nominal wage. However, the price of non-traded final commodity N, P_N, is determined in this case by the labour cost given the unionised unskilled nominal wage and therefore the production of the non-traded good N is determined by the domestic demand for N.

Following is assumed:
(i)   Per-unit requirement of the non-traded intermediate input in the production of sector U is constant

and

(ii) Per-unit requirement of the imported input in sector S is also constant.

Although these two assumptions are simplified assumptions, they are not without any basis. If sector U is imagined as an automobile industry that always uses four tyres as the intermediate input to build one car and sector S is imagined as a software industry that always has a fixed requirement of automatic data processing machine or computer data storage units in the production process, then these two assumptions are perfectly legitimate.

Following Marjit and Acharyya (2003) and Marjit et al. (2011) a simplifying assumption is made, that α-proportion of the total urban income is spent on the non-traded good N. This is also consistent with the assumption that urban consumers have Cobb-Douglas preferences over consumption bundle of tradable goods T (consumption vector of U & S) and non-traded consumption bundle N.

The price of the non-traded good in this set-up is given by the labour cost, which is the product of fixed input-coefficient and the contracted unskilled-wage, independent of the demand for non-traded good. Once the nominal

skilled wage and the rate of return to capital are determined, total skilled labour force determines the skill-intensive manufacturing production and this together with the total domestic capital stock yields the production of the unskilled labour-intensive manufacturing good and consequently the production of the non-traded intermediate input, I, by dint of the complementarity in production process between these two sectors. The non-traded output, on the other hand, is demand-determined given the equilibrium values of the factor prices (determined independently of factor endowments, being a decomposable general equilibrium system).

Therefore, the formal sectors form an independent subsystem of the economy under consideration.

The output and prices of the factors used in production of U, I, S and N are all determined independent of the informal agricultural sector in this set-up. But the informal wage rate, the rental to land-capital and production in sector A are determined once the equilibrium values in the formal sectors of the economy are obtained. In this set-up, the production activities in sector A will be constrained by the outputs and hence by the demand for unskilled labour in the formal sectors. This depicts the importance of the non-traded good N. Because of the presence of the non-traded final good N, production of agricultural exports and the consequent demand for unskilled labour are constrained by the demand for N, which otherwise could have been satisfied through imports. Finally, given such an output level of agricultural exports, the informal competitive wage and the return to the specific factor, land-capital, must satisfy the competitive product market equilibrium condition for the agricultural commodity producers in sector A and the full-utilisation condition for land-capital.

4.2.1. Comparative Static Exercise – Tariff Reduction on Imported Intermediate Input

The key comparative static exercise in this study is to consider a reduction in the *ad valorem* rate of tariff (t) on the import of the intermediate input M.

Figure 4.2: Movements in non-traded production (N) & informal wage (W) following 24% tariff-cut on imports of M under Institutional Wage in Sector N

Movement in Informal Wage for Different σ_S

Change in Non-tradable for σ_S
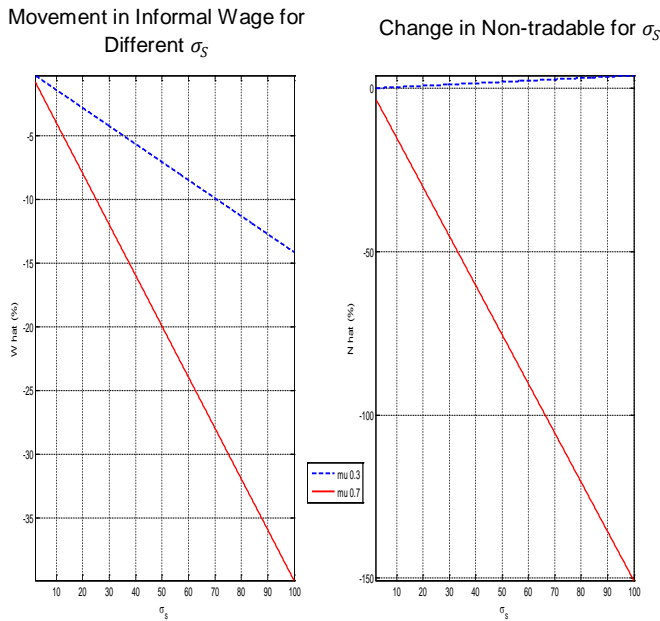
Figure 4.2 quantifies in the two panels respectively the changes in the production of non-tradable N and the consequent movement in informal wage for different values of the elasticity of substitution between skilled labour and capital in the skill-intensive sector S (denoted as σ_S) owing to a reduction in tariff on the imported input by 24 percentage points (as estimated by Goldberg et al. 2010 during 1989-1997 in India) under plausible ranges of values of the model parameters (see Mukherjee, 2017 for the parameter values). When the skilled wage increases owing to a tariff cut of 24% on the import of input M, with increase in the elasticity of substitution between skilled labour and capital, producers in sector S would be more tempted to substitute capital for skilled labour and sector S would expand even more and consequent contractionary impact on the vertically integrated sector U would be higher as well since additional units of capital sector S demands must come from sectors I and U, thereby both direct and indirect capital usage by sector U would decline at higher rate. Therefore income from sector S (sector U) increases (decreases) at an increasing rate with increase in σ_S.

For the blue dashed locus, the scenario when urban population earning from sector S would spend relatively larger share of their income on the non-tradable, N, compared to the urban population earning from the vertically integrated sector U is observed. Sector S expands more with the increase in σ_S; when the share of urban income from sector S spent on the non-tradable N is relatively higher, the decrease in the demand for N by the urban people earning from the vertically integrated sector U would be outweighed by the increase in demand for N by the people receiving income from sector S and consequently a modest increase in the production of sector N with increase in σ_S is observed. Therefore, there would be two forces operating on the demand for unskilled workers in the formal sectors and consequently on the informal wage: one is decrease in demand for the unskilled workers at a higher rate by sector U with the increase in σ_S and another is the increased demand by the non-traded sector N, which is however, modest. Therefore, demand for unskilled workers in the formal sectors is not increased as a net effect and informal wage would decline, but the rate of decrease in informal wage is quite modest.

However, along the red locus, share of urban income from the vertically integrated sector U spent on N is much higher compared to the people earning from sector S. So the contractionary impact on the vertically integrated sector U would now be much more pronounced in determining the demand for N by the urban population with the increase in σ_S. Therefore, demand for non-tradable N would now decline as a net effect with the increase in σ_S. Consequently, demand for unskilled workers in the formal sectors would unambiguously fall and the informal wage would fall sharply.

Implications on the Employment in the Informal Sector

Since informal unskilled wage falls, total employment of unskilled workers in sector A rises in this scenario with unionised wage in sector N. This is because, the reduction in flexible unskilled wage does not have any impact on determining the production in sector N (due to the unionised unskilled labour market in sector N) and thus, all the retrenched workers from sectors U, I and N now join sector A.

Non-traded Production in Unorganised Informal Sector
However, majority, about 70 per cent of the informal workers are employed in the unorganised smaller enterprises (not covered under the Annual

Survey of Industries (ASI) and employ less than six workers) of urban or semi-urban areas, at lower competitive wages to produce and sale domestically (National Sample Survey Report No. 557, 2011-12). Therefore, another alternative feature of the underlying economy should be to consider the scenario where the finished non-traded good being produced in the informal sector with unorganised labour market where unskilled labour receives market-determined (flexible) nominal wage (W). Typically, the non-tradable produced in the unorganised informal sectors[11] include items such as small domestic industries, services provided by petty traders or street-side vendors and so on. Therefore, variations in the demand for non-tradable are followed by the changes in both production and price of the non-tradable. The implications of input trade liberalisation in sector S on the wage earnings of the informal sector workers will be guided accordingly.

In case of contractual wages in the formal non-traded sector N, non-traded price was held fixed by the unionised unskilled money wage. But in case of non-traded good being produced in the informal sector with unorganised labour market where unskilled labour receives market-determined (flexible) nominal wage, production of N is no longer demand-determined. Consequently, P_N is not just cost-determined. It is assumed that labour-output ratio is fixed in the non-tradable producing sector N (simplifying assumption). The determination of equilibrium (N, P_N) is depicted in the following figure.

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[11]Typically this study is confined to characterising the informal sector as the sector with unorganised unskilled labour market in line with other theoretical papers such as Marjit and Acharyya (2003), Acharyya and Marjit (2000), Chaudhuri (2005), Chaudhuri and Banerjee (2010) and so on.

Figure 4.3: Equilibrium in the Market for N
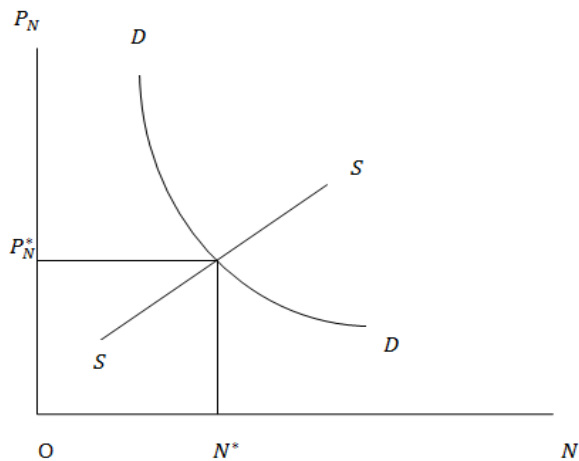
4.2.2. Comparative Static Exercise – Decline in Tariff on Imports of M under Flexible Wage Production in Non-traded Sector

This interaction of demand for and supply of non-tradable N in determining its price and output levels has important implications on the wage-gap between skilled and unskilled labour. Whether the wage-gap widens or declines following tariff cut on imports of M depends crucially on the movement of P_N. At the initial P_N and hence at the initial competitive unskilled wage and A, unskilled labour released from the contracting sectors U and I relaxes the (net) labour constraint for the non-traded sector and thereby raises its supply. This additional supply effect imposes a downward pressure on unskilled wage and therefore reduces P_N. **Figure 4.4** demonstrates the possibility where both demand for and supply of non-traded good increase but since supply increases by more than the increase in demand, price of the non-tradable falls from P_N^1 to P_N^2 while production of non-tradable rises from N_1 to N_2.
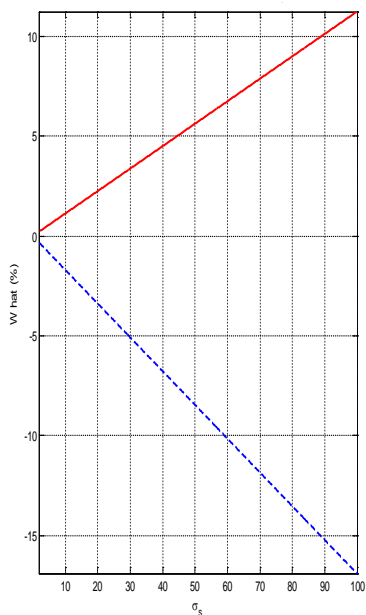
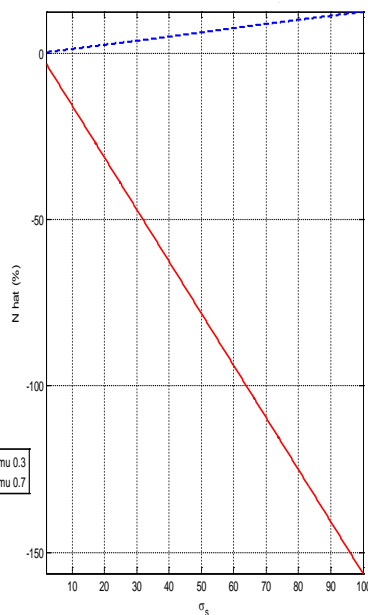## Figure 4.4: Comparative Static Response in the Domestic Market for N under Flexible Unskilled Wage
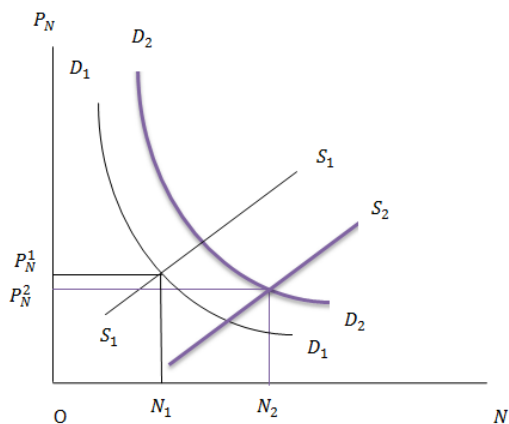
Sensitivity Analyses under Flexible Wage in Sector N

Figure 4.5: Movements in non-traded production (N) & informal wage (W) following 24% tariff-cut on imports of M under Flexible Wage in Sector N

Movement in Informal Wage for Differentσ_S

Change in Non-tradable for σ_S

Figure 4.5 represents similar kind of sensitivity analysis as performed in **Figure 4.2**, however now under the assumption of flexible unskilled wage in the non-tradable sector. When urban population earning from sector S spends 70% of their income (blue dashed locus), share of total urban income from sector S spent on non-traded good N is relatively high and hence there is a net increase in the demand for N (since sector S expands at the expense of sector U) at initial P_N. However, the increases in the supply of unskilled labour to sectors A and N depress the competitive unskilled wage and therefore price of non-tradable. This yields the same scenario as the one depicted in **Figure 4.4**. Hence, as σ_S rises, expansion of sector S and consequent contraction of sectors U and I induce increase in non-traded production by dint of higher supply of unskilled labour, but reduction in competitive unskilled wage.

However, when urban population earning from sector S spends only 30% of their income (red locus), there is a net decline in the demand for and supply of non-tradable at initial P_N. But this dominant supply effect leads to an increase in P_N (supply curve shifts upwards by more than the downward shift in demand curve, as shown in **Figure 4.6** below). Therefore competitive unskilled wage also increases and this latter effect outweighs the former contractionary impact on the competitive unskilled wage. Hence, a net increase in the flexible unskilled wage but a decline in non-traded production along the red locus is observed.

Figure 4.6: Comparative static response in the domestic market for N under flexible unskilled wage when urban population earning from sector S spends only 30% of their income
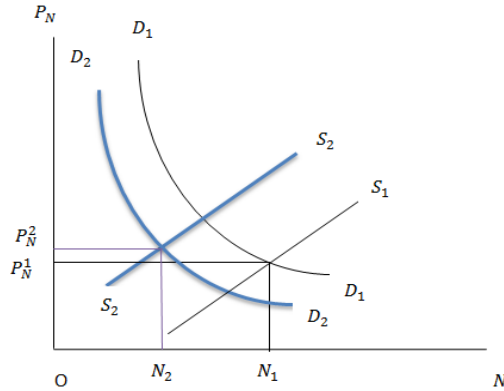
Employment of Unskilled Workers in the Informal Sector

Note that, now there are two sectors with 'informal' labour market: one is sector A and another is sector N.

(i)   If unskilled labour and land-capital are imperfect substitutes in sector A, informal employment changes in the same direction of change in W if $\theta_{LN}\theta_{TA} > \sigma_A$.

(ii)   However, if unskilled labour is substitutable for land-capital (and vice-versa) in sector A, direction of change in informal employment would be opposite to that in W.

This is because, when W falls P_N falls and that reduces demand for the non-tradable, which, in turn, affects non-traded production; while in case (i), producers in sector A would be quite willing to minimise production cost by substituting retrenched unskilled labour for capital and that can boost employment of unskilled workers in the informal labour market of sector A. However, in case (ii), sector A producers would also be unwilling to employ additional units of retrenched worker for capital. Therefore, total employment in the informal sector also falls in that case.

4.3 An Extension – Tariff Reduction on Imports of M with Unemployment of Skilled Labour

This section incorporates unemployment of skilled labour using efficiency wage hypothesis, in a similar fashion of Gupta and Dutta (2011) where efficiency of a skilled labourer varies positively with its wage rate and the unemployment rate in the skilled labour market.[12] A higher wage rate motivates the skilled worker to work hard; and a higher unemployment rate accentuates the disutility in the presence of a threat of firing and subsequently makes the skilled worker more disciplined.

Table 4.1: Structure of the Extended Model

No. of Primary Sectors	Sector-definitions				Skilled Labour Market	Unskilled Labour Market	Particulars regarding other Inputs
	Name of the Sectors	Tradability of the Sectors	(In)Formality of the Sectors	Factor Usage			
4	A	Internationally traded	Informal	L, T	There exists unemployment of skilled labour at the rate $v > 0$. Efficiency of a skilled worker, $h = h(W_S, v)$, with $h_1 > 0, h_2 > 0, h_{11} < 0, h_{22} < 0$. Skilled wage per efficiency unit $= \left(\frac{W_S}{h}\right)$.	**Formal Sectors:** Unionised labour market, with institutionally given wages set by prior negotiations.	Capital (K) perfectly mobile between U (with sub-sector I) &S
	U (with sub-sector I)		Formal	L, K			Land (T) is specific to sector A.
	S			L_S, K, M		**Informal Sector(s):** Non-unionised labour market with flexible competitive wages.	There is an *advalorem* rate of tariff (t) on imports of M.
	N	Internationally non-traded	Formal/Informal	L			

12 In this context, one may also consult works of Agell and Lundborg (1992, 1995), Gupta (2000), Chaudhuri and Banerjee (2010) and so on.

Results in A Nutshell

A decline in tariff on the imported input M encourage sector S producers to expand by hiring more skilled labour, since skilled labour is specific input used in sector S. This raises wage received by every skilled worker *per efficiency unit*. Consequently, effective rate of unemployment of skilled labour also falls. Thus, there are two effects operating on the efficiency of each skilled worker employed: one is the positive impact of higher money wage received; the other is a negative effect due to decline in the effective rate of unemployment. Therefore, the producers in sector S can now economise production costs by paying higher money wages only to the efficient skilled workers and replacing the relatively less efficient workers by cheaper capital. However, this is possible only if the substitutability between capital and skilled labour is sufficiently high. In that case, sector S will expand but sector U and I contract by releasing additional units of capital to sector S. If the relative share of urban income from the vertically integrated sector U spent on N is sufficiently small, then only the resultant demand for the finished non-tradable will be guided by the increase in demand for the urban population working in the skill-intensive sector at higher effective wages.

As in the full-employment scenario, there is an additional supply-effect that depresses informal unskilled wage and thereby P_N and thus adds to the ambiguity in non-traded production as well. Therefore, as before, the effect on real income of the urban population and the demand for the non-tradable will be ambiguous. Consequently, the direction of change in competitive informal wage and thereby the direction of change in income-inequality measure (Gini coefficient) will also be ambiguous in this extended model as well for either of the scenarios – with unionised unskilled labour market in sector N and with flexible unskilled wage in sector N.

Therefore, in qualitative terms, the resultant implications on unskilled informal wage and the relative income-inequality are very similar to the results obtained under the full-employment model considered earlier, which demonstrates the robustness of the results obtained under the full-employment model.

4.4 Policy Implications & Remarks

Growth acceleration in skill-intensive sectors has been one of the most prominent features of the liberalisation experience in India.

On the other hand, liberalisation has facilitated import of capital goods and thus the foreign technology embedded within those imported inputs. To utilise those inputs, or equivalently, to use the foreign technology embedded within those inputs in the most effective way, demand for additional skills has been generated. This leads to increased demand for skilled workforce driving their wages up. This study explores the general equilibrium impact of such trade-induced growth in the skill-intensive sector on informal sector wages and employment and most importantly, how this impact is mediated through the existence of finished non-tradable and the corresponding domestic demand-supply forces. The numerical analysis performed in this study also re-establishes the claim put forward by Marjit and Acharyya (2003) that the organisation of production of the non-traded final good, with varying elasticities of factor substitution in skill-intensive and agricultural production respectively, is indeed important in quantification of the impact on unskilled informal wage and subsequently, on the degree of wage-inequality. Therefore, this study challenges the view that the relative wage-inequality in a developing country like India with rigid organised sector labour market has unequivocally been governed only by the increase in the skilled wages. The sector-level general equilibrium approach adopted in this study has not only been able to enlighten the role of various degrees of factor substitutability in production organised in different sectors, but also to highlight the role of non-traded consumption goods in determining the supply of unskilled labour to the informal (unorganised) sector and consequently the implication on competitive unskilled wage and subsequently, the direction of the relative wage-gap. Finally, an extended framework with unemployment of skilled labour has also been presented that effectively yields similar conclusions obtained under full-employment model and thus demonstrates the robustness of the full-employment results. Therefore, the relationships and results are indeed important to formulate policies aiming at betterment of the position of the unskilled poor workers. However, one future extension of this exercise could be introducing skill-formation and capital-adjustment costs into the basic full-employment static general equilibrium model under consideration.

5. Policy Implications of the Study & Overall Message

This study has attempted to reconcile seemingly puzzling concurrent outcomes observed in post-liberalization, post-reform India, such as: 'jobless' pattern of growth in urban formal sector, increasing informalisation, volatile income (wage) inequality and poverty in the presence of dualism in domestic factor markets. This study illuminates different channels through which liberalised trade policies can affect differently the organisation of production in different sectors and subsequently percolate to the relatively larger share of the workforce, employed in the agricultural or non-agricultural informal sector with wage incomes below or just above the poverty line. The novelty of this study is to bring together salient features of a developing dual economy like India, namely the dualism observed in domestic factor markets and coexistence of internationally non-traded goods, within the ambit of general equilibrium framework that captures structural features of trade and production patterns for a developing country like India. This study has also demonstrated credible scenarios in which increasing wage-wage and rental-wage disparities can co-exist with informalisation and/or retarded formal sector job creation following liberalised trade policies. The results are consistent both with the within industry as well as between industry shifts in employment compositions (from formal to informal).

Agricultural dualism and retardation in job creation in the urban area are the two common symptoms of an agro-dominated developing dual economy like India. The small and marginal farmers in the rural area produce internationally non-traded agricultural products that can either be consumed domestically, or utilised as intermediate inputs to produce agro-based industrial products (such as use of locally produced fibre in Indian textile industries). Existing theoretical literature in this context, namely Hazari and Sgro (1991) and Chaudhuri (2007), considered only one side of the coin: where the backward agricultural sector is engaged in producing finished non-tradable. Chapter 1 incorporates the existence of non-traded intermediate input, rather than the finished non-tradable, to examine the consequences of not only the removal of protectionist policy but also of the structural reform policy, namely deregulating the organised sector labour market, on the competitive rural wage and the pool of retrenched workers

from the urban agro-based manufacturing industries with unionised labour market. Interestingly, the analysis in this study demonstrates that labour market reforms, contrary to the conventional wisdom, may raise the competitive wage. Such findings illuminate the insight that owing to the increased competition during the liberalised regime, the labour laws have been enfeebled with greater substitution from labour to capital that generates the opportunity of the organised sectors' employers to pay their 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 been reduced.

Chapter 2 takes up the challenge to provide an analytical framework for an agro-dominated developing dual economy like India with agriculture and industries aided by Special Economic Zones (SEZs). The purpose of such theoretical framework serves two crucial purposes. The first is to evaluate the efficacy of SEZs to promote industrial development, without hurting agriculture, in the face of a liberalised investment policy. On the other hand, such modelling exercise can also help to understand implications on rural workers of this policy in terms of real competitive wage and employment conditions. The study, therefore, uses the three-sector Harris-Todaro type general equilibrium model with the SEZ sector characterised by increasing returns to scale (IRS) sector and an imperfectly competitive market; in order to enlighten the role of external economies generated by the SEZ sector in driving the results. The results obtained show that by incentivising multinationals to relocate investment to the SEZ sector, through easing the entry criteria of FDI, for a sufficiently higher degree of scale economies in the IRS sector (SEZ), both SEZ and agricultural sectors may expand simultaneously. The magnitude of urban unemployment may fall, albeit the workers in general will be worse-off due to reduction in the wage income, in the absence of any supportive government intervention. National income of the economy may increase and export by the SEZ sector may rise simultaneously, given a negligible income-elasticity of demand for the SEZ-good. Therefore, this policy essentially indicates a mixed outcome where the economy gains from the perspective of 'growth effect' but in the absence of any government intervention, the policy fails to help the rural workers and the 'land-losers'; thereby calls for government support for displaced people and rural workers (such as wage-subsidy policy).

The most salient feature of a developing country including India has been the coexistence of formal and informal sectors. Liberalisation in India has contributed to a productivity boom in the formal (service) sectors. Given the consistency with the empirical evidence that poor informal workers must be employed for survival, it is certainly appropriate to use a full-employment model (at least for unskilled informal workers) in a general equilibrium setting with formal-informal dualism and labour market segmentation. So Chapter 3, traces out the implications of technological progresses in the urban formal sectors on the wages and employment conditions of urban informal workers. Therefore, the analysis in Chapter 3 helps assess well being of the poor urban informal workers. The formal sectors typically employ relatively high-skilled workers who enjoy higher contractual wage, whereas producers in the urban informal sectors hire relatively low-skilled workers at market-determined wages. On the top of that, the informal capital (credit) market is imperfect, while the formal credit market is perfectly competitive. The salient feature of such dualism in the capital market is the fragmented interest rate structure, featuring lower allocation of loanable capital (credit) to the informal sector at a higher relative rental rate. This, in turn, implies that a part of the formal credit always enters the informal market and hence the two credit markets are not fully distinguishable or separable. In sum, the research has successfully highlighted the importance of credit-product inter-linkage between the urban formal and informal non-agricultural industries in order to trace out the implications of trade-induced productivity surge in the formal sectors on the wages and employment conditions of the economically marginalised urban workers working under informal arrangements.

In the final chapter, a multi-sector full-employment general equilibrium model with agricultural, informal manufacturingand skill-intensive sector and finished non-tradable producing sector; in order to illustrate the mechanism how growth, induced by tariff reform on the imports of capital-intensive inputs in the skill-intensive sector, is mediated to the informal sector wages and employment through the existence of finished non-tradable and the corresponding domestic demand-supply forces. The sector-level general equilibrium approach adopted in this chapter has not only been able to enlighten the role of various degrees of factor substitutability in production organised in different sectors, but also to highlight the role of non-traded consumption goods in determining the implication on competitive unskilled informal wage and subsequently, the direction of the relative wage-gap.

Therefore, this chapter challenges the view that the relative wage-inequality in a developing country like India with rigid organised sectorlabour market has unequivocally been governed only by the increase in the skilled wages. The conclusions obtained under full-employment model remain similar to those obtained under the extended framework with unemployment of skilled labour, which, therefore, demonstrates the robustness of the full-employment results.

There is, however, further scope to extend the models presented in this study in different directions. For example, in the informal credit market there are segments where the moneylenders compete with each other. Therefore, it would be more realistic to model informal credit market considered in Chapter 3 as monopolistically competitive or fragmented oligopolistic. Moreover, skill-formation and capital-adjustment costs should be introduced into the model presented in Chapter 4 with skilled-unskilled divisions. In the full-employment models presented in Chapters 3 and 4, wage-bargaining may be modelled explicitly and consequences of reforming the organized labour market in the framework under consideration may be evaluated. However, these issues have been avoided primarily for the sake of analytical tractability and making the models friendlier for identifying the key channels for general equilibrium impacts.

Moving to the issue of empirical testability of the key relationships identified in the models presented in Chapters 3 and 4, it is required to narrow down attention to longitudinal sector (industry) specific data for formal and informal production activities. However, such empirical analysis is presently beyond the scope of this study, primarily due to the unavailability of suitable and adequate data. Moreover, it is another challenge to construct any direct measure of capital (credit) allocation between formal and informal industries, using the secondary survey data on informal sector available from National Sample Surveys (NSS). It is also extremely difficult to provide proper estimates for elasticities of factor substitution in different industries for formal and informal production activities. Turning back to the SEZ issue discussed in Chapter 2, there is difficulty in accessing longitudinal data on utilised foreign direct investment, exports and industrial output by foreign invested enterprises within the location-specific SEZs of India; except some scattered reports available in the Fact Sheets on SEZs (Ministry of Commerce and Industries, Government of India). Therefore, suitable empirical analysis that corroborates the theoretical analysis could not be performed in this study. It

has also been beyond the scope of this research to collect any time-series or longitudinal data on backward agricultural or rural non-farm sectors. However, all these issues have been recognised and identified as future research agenda.

However, this study delivers tractable theoretical models and plausible predictions at hand that should rejuvenate empirical testability of liberalisation-structural change-welfare (in terms of wage-employment conditions) nexus. What have been identified here are the avenues through which trade can impact on real informal wage with dual labour market. One crucial channel is, of course, existence of internationally non-traded goods. Although competition (perfect competition and monopolistic competition, where the latter has been assumed in Chapter 2 within the SEZ-sector) has been assumed in product markets, rather than more realistic assumptions of oligopoly and strategic behaviour, the general equilibrium models of trade and production presented in this study have been able to incorporate the salient features of a developing dual economy like India including large agricultural and non-agricultural informal sector(s), dualistic factor markets and non-traded activities in tractable manner to elicit testable policy implications.

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