done since 'informal' production is 'illegal' due to its violation of labour laws and hence calls for punitive measures from the state.

For the producer, the probability of being apprehended while producing in the informal sector will depend upon the size of the informal sector. In our model, the probability of getting caught increases with the visibility of such a sector, that is, due to an increase in employment levels. Clearly, when the product serves as an import-competing good and is protected, the level of employment in each sector depends on the level of protection. If the producer gets caught while producing in the formal sector, he has to pay either a bribe or the punitive cost. He will have to pay the bribe to the monitoring officer, who receives a salary otherwise independent of his monitoring capabilities.

We now analyse the collusive game between the potentially bribing producer and the potentially corrupt monitoring officer. As a firm's profit level is a function of the prevailing tariff rate, and that all monitoring officers are corruptible, the punitive cost is assumed to be severe in that the producer is pushed to his reservation pay-off. Then the interesting part is to obtain the optimal level of bribing through a 'Nash-bargaining' approach. The net profit of the dishonest producer with tariff protection would be the profit at the given tariff rate less the bribe. But if he does not pay a bribe, he is punished and the net profit falls to the reservation pay-off level. On the other hand, if the monitoring officer takes a bribe his total income increases by the amount of the bribe; otherwise it remains at the level of his salary.

The producer will try to rationally allocate the total production into two different sectors in order to maximize his total profit, under the condition that he might get caught with some probability if operating in the informal sector. Using the Nash-bargaining solution regarding the optimal bribe paid, which is increasing in the level of tariff protection, one can show that if tariff protection falls, total production and, hence, total labour requirements will fall. This is a conventional result. But what is more striking is that labour requirements in the informal sector will rise while labour requirements in the formal sector will fall.

Intuitively, as the tariff rate goes down, the equilibrium amount of bribe also goes down. Therefore, the effective marginal cost facing the informal segment also goes down which leads to a change in the composition of production in favour of the informal sector. Declining tariff and the resultant fall in bribes indicates the beneficial effect of reformatory policy. However, this also increases the extent of extra-legal

activity, that is, the size of the informal output. Needless to say, this is the natural outcome when labour market reforms are kept on hold while trade reforms are prioritized.

Apart from reforms in the external sector, it is also possible that internal economic readjustments also engender similar shifts in the production organization, with interesting twists as one encounters in the presence of large informal arrangements. For example, consider the plausible consequences of introducing reforms in the capital market, that is, lowering interest rates. We introduce a notion of 'working capital' in the basic model. The notion of working capital has become quite significant in recent discussions of firm-level investments with an imperfect credit market (interested readers may look at Fazzari and Peterson 1993). The firm under consideration needs to pay workers at the beginning of the period and then repays the principal and interest at the end of the production period. This is the standard idea of working capital or credit which affects the profitability of firms in a big way. To prove our point we need not distinguish between formal and informal interest rates. So we keep them the same at $r$. Once again, maximizing the objective function of the producer where the choice is between labour allocation between the formal and informal segments with the probability of getting apprehended for such activities and the consequent punitive cost/bribe leads to the following outcome: As the rate of interest goes down, total labour employment should increase. However, sectoral reallocations take an interesting turn. We observe that a fall in the rate causes formal employment to expand and informal employment to shrink.

In brief, therefore, if the market interest rate falls given unchanged tariff protection, total labour requirements will rise along with an increase in formal employment and a fall in informal employment. As the per-worker investment is more in the formal sector as workers have to be paid higher wages, a fall in the interest rate lowers the relative cost of hiring formal workers and therefore the formal sector expands. Our earlier assumption suggests that the amount of bribe depends on the tariff rate because in case the entrepreneur has to close down his business, he will lose the protection induced incentive.

In this case, however, as the interest rate goes down, the overall profit of the firm goes up and now the enforcement officials in this sector may ask for more bribes if the informal activities are to continue. This discourages the use of informal workers further. Nevertheless, there is a possibility that albeit the size of the informal sector contracts, the total

bribe may actually go up. Our main intention here is to focus on the size of the informal sector. What we have shown so far is that a drop in the tariff rate will increase informal employment while a drop in the interest rate will reduce the same. Therefore, if one is looking at reforms driven by two different instruments, one should expect offsetting effects on the size of the informal segment as we have discussed in Chapter 4.

<p style="text-align:center">★ ★ ★</p>

This chapter constructed a political support model and an interlinked reforms–bribery model to generally show that the level of 'informality' can, on the one hand, be the outcome of a conscious choice of society and, on the other, may behave unexpectedly in the presence of corruption in the system. In such societies where income levels in the informal sector depend significantly on the level of governance adopted by the state, the government chooses lower levels of governance and tax rates. As poverty increases in these economies, similar choices are manifested by state authorities. Introduction of the informal sector in such models plays a pivotal role in challenging the prediction of conventional political economy models where more poverty and inequality triggers a choice of higher tax rates at the political equilibrium.

The first model discussed in this chapter shows a way to capture more than one policy variable—variables that are independent of each other in political economy models of general interest. It also shows their interdependence in policy formulation and relates closely to empirical observations. In this chapter we also considered the case where the government is constrained in its choice of tax policy. We find that as the constraint on the choice of tax rate becomes more binding, the government reacts by choosing a lower level of governance.

The term 'governance' has been conceptualized essentially as security of a tax payer's right over property and public life. Improvement in the governance level has a positive impact on income levels in the formal sector, while it has a negative impact on income levels in the informal sector. However, incomes in the formal and informal sectors could show complementarities as well if the existence of the informal sector helps the formal production process. In developing economies with widespread informal sectors, empirical evidence on this abounds where the presence of the informal sector reduces the cost of production in the formal sector. In such a situation, a lower governance level benefits incomes in both the formal and informal sectors. Following the logic

of the first model, under such circumstances, the government should choose the lowest possible level of governance and the highest possible level of tax rate.

On the other hand, when it comes to a choice between labour allocation to the formal and informal segments, which coexist in many cases for the same product category, this chapter discussed a model with simple intuitive arguments. To begin with, a firm is assumed to take advantage of the wage differential between the formal and informal units, a feature quite common in most developing countries. However, like most other cases where flouting of norms comes at a price, here too, there is either a high punitive measure or a bribe for corrupt officials, non-zero but lower than the punishment allowing the set-up to continue operations. Interestingly, if the same product is in the nature of an import-competing good, and is protected by a tariff, withdrawal of protection lowers the stake for such producers, who can settle for lower bribes and, therefore, reallocate labour favourably to the informal segment. Conversely, a drop in the rate of interest reduces the cost of working capital and with cheaper credit, formal employment goes up. Thus, capital market reforms have a potential to reduce the size of informal output unlike in the previous case.

On the whole, therefore, political and economic choices made by governments and firms can be of significant interest and credence when the issue rotates around the prevalence of the informal sector in a country. An elaborate description of the characteristics and equilibrium conditions was supported by some explicit modelling in this chapter and we are mindful of several other possible directions that this analysis may adopt, including possible modifications of the results through the introduction of other crucial agents like labour unions.

## NOTES

1. The assumption of two-party democracy makes the analytical solution easier compared to a multi-party democracy. See Myerson (1999) for further details.

2. We assume truthful reporting of income level. For all practical purposes, the post-tax income is positive.

3. We assume the transfer to take the form of impure public good, like free roads and free health facilities, which are not excludable but rival and that the marginal cost of providing these goods is 1.

# 3     Informal Wages in the Presence of Agricultural and Manufacturing Sectors

So far we have restricted the analysis of informal activities to those mainly within the industrial sector and sought complementary relationships with their formal counterparts. In this chapter we study the overall welfare implications of changing wage and employment situations in the informal sector by constructing a comprehensive model. The structure involves an agricultural sector and incorporates several allied issues central to the considerably neglected analytical relationship between agriculture and informal activities. While we emphasize that our intellectual debt goes back to the early work by Harris and Todaro, the results obtained under this framework yield unconventional implications. In particular, it is well known that better prospects for agricultural exports and productivity should increase agricultural wages. However, we argue that such an outcome depends on capital movement between the formal and informal manufacturing sectors. The inter-relationship sought between the agricultural and manufacturing sectors offers added value to a general set of results that focus on effects of external shocks to movements in informal wages and employment.

## THE LINK BETWEEN AGRICULTURE AND THE INFORMAL SECTOR

Agriculture constitutes the backbone of many developing countries in Asia, Latin America and Africa. This is in spite of the fact that the

share of agriculture in GDP has been declining, making way mainly for the service sector. Yet, in large countries, such as India and China, the rural sector absorbs a significant chunk of the workforce. Typically, agricultural workers represent a segment of 'informal' labour. Together with informal workers in manufacturing and services, they occupy a formidable share of the workforce. For example, in India their share is about 90 per cent. That is, less than 10 per cent of the workforce is employed in the organized or formal sectors. Agenor (1996) provides a detailed survey of literature, which estimates the size of the informal labour market in developing countries. The share of the informal workforce is simply overwhelming everywhere.

Given that there is a natural link between informal urban and rural workers, through migration or otherwise, it is commonly perceived that rural and informal wages should be close in magnitude, if not the same. At least, one can safely assume that they will tend to move together. Liberal trade policies and/or land reforms can unleash the productive potential of agriculture and are likely to improve agricultural wages.[1] While such an assertion is fairly instructive, we would put this to test in a framework that explicitly models the link between formal and informal manufacturing, mobility of informal workers between the rural and urban sectors and, most important, mobility of capital within the urban sectors. Given this backdrop, the simple relationship between agricultural productivity and agricultural wages turns out to be more complex and fairly interesting. Our analytical structure is primarily one of simple general equilibrium *a' la* Jones (1965, 1971). The framework for modelling formal–informal labour markets has been drawn from earlier work by Carruth and Oswald (1981) and Agenor and Montiel (1996). Related work also includes Agenor (2006), Fields (1990), Gupta (1997), Kar and Marjit (2001), Marjit (1991, 2003), Marjit and Beladi (2002) and Marjit et al. (2001, 2007b). These contributions, however, have not looked into the relationship between agriculture and informal wages.

The model and the results are discussed in the next section. The section that follows confirms the robust nature of the results under various alterations. The last section provides concluding remarks.

## BASIC MODEL AND RESULTS

There are three sectors in our economy—agriculture, formal manufacturing and informal manufacturing. Agriculture uses land and labour. The formal manufacturing sector uses labour, hired at a unionized fixed

nominal wage rate and capital. The informal manufacturing sector uses labour with market determined wages and capital. Formal wages are higher than informal wages. Agriculture and informal manufacturing pay the same wages. If workers cannot find jobs in the urban formal sector, they find alternatives in either agriculture or in urban informal sectors. Consistent with the typical assumption about 'informal' labour, both agriculture and informal manufacturing represent the informal segment. It is a small open economy with exogenously given prices. Markets are competitive and technology represents CRS and diminishing marginal productivity.

The following symbols are used to describe the model.

$\bar{w}$    Fixed formal wage

$w$    Informal-rural flexible wage

$r$    Return to capital

$R$    Return to land

$X$    Agricultural sector output

$Y$    Formal manufacturing output

$Z$    Informal manufacturing output

$P_i$    Price of $i^{th}$ good, $i = X, Y, Z$.

$\bar{L}$    Total workforce

$\bar{K}$    Total supply of capital

$\bar{T}$    Total supply of land

$a_{ij}$    Input–output coefficients

Competitive equilibrium implies:

$$wa_{LX} + Ra_{TX} = P_X \qquad (3.1)$$

$$\bar{w}a_{LY} + ra_{KY} = P_Y \qquad (3.2)$$

$$wa_{LZ} + ra_{KZ} = P_Z \qquad (3.3)$$

Full-employment conditions:

$$a_{LX}X + a_{LY}Y + a_{LZ}Z = \bar{L} \qquad (3.4)$$

$$a_{KY}Y + a_{KZ}Z = \bar{K} \qquad (3.5)$$

$$a_{TX}X = \bar{T} \qquad (3.6)$$

Two points to be noted here are that capital moves freely between $Y$ and $Z$ and $L$ is fully employed even if there are differential wages, that is, by assumption of $\bar{w} > w$. There is no open unemployment in the model. This is the difference between the present structure and the traditional Harris-Todaro type frameworks.

Given $(P_Y, P_Z)$, from (3.2) we can get $r$ and from (3.3) we can get $w$. Then from (3.1) given $P_X$ we solve for $R$. Once factor prices are determined, $a_{ij}$'s is determined as well. We can solve for $X, Y, Z$ from (3.4) – (3.6). The exercise we are interested in is the impact of a rise in $P_X$ or in the productivity of agriculture on $w$, the informal wage. We assume that our small open economy exports $X$ and $Z$ and imports $Y$.

## Rise in Price of X

Suppose, due to brightened export prospects, $P_X$ rises. Note that as $(P_Y, P_Z)$ are given, there is no change in $w$ and $r$. Therefore, a rise in $P_X$ will raise $R$ and not $w$. In fact, $R$ will rise by a magnified amount.

$$\hat{R} = \frac{\hat{P}_X}{\theta_{TX}} \tag{3.7}$$

'^' denotes proportional change and $\theta_{ij}$ is the share of $i^{th}$ factor in the unit cost of producing good $j$.

PROPOSITION 3.1. *A rise in $P_X$ does not raise $w$, the agricultural or informal wage*

*Proof.* See the discussion above. QED

As $P_X$ goes up, production of $X$ demands more workers. However, workers can only be hired from $Z$ as those working in sector $Y$ for $\bar{w} > w$, would not obviously relocate. This in turn implies that there is a pressure of excess demand for informal workers. Naturally, one should expect $w$ to rise. But such tendency is thwarted by capital leaving $Z$ for $Y$, since capital can earn the same $r$ in both the places. This helps to keep the capital–labour ratio constant in sector $Z$ even if there is an initial exodus of labour. Thus, perfect mobility of capital between formal and informal manufacturing does not allow a jump in rural wages even if there is a rise in $P_X$. As capital goes into $Y$, it employs more labour in the sector as well. A similar result will be obtained if one considers a rise in productivity in sector $X$.

Now consider the case where capital does not move between $Y$ and $Z$. Therefore, equations (3.2), (3.3) and (3.5) change in the following way, such that (3.10) and (3.11) now offer elements of a specific factor model: