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THE RELATIVE PERFORMANCE OF FORMAL AND INFORMAL SECTORS IN INDIA

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We evaluate the relative performance of formal and informal sectors in India by looking into their productivity difference. Recognizing the intersectoral linkages in the economy, the competitive general equilibrium prices are computed; these signal the productivities. Our model synthesizes frontier analysis with the general equilibrium approach to generate shadow prices. The formal activities are found to be more productive than the informal. However, the informal services sector is as efficient as the formal one. There would be an overall productivity gain of 22% to the economy if factors were allocated to productive activities. The shadow prices from the model indicate that the formal capital and informal capital are scarce factors, while it has been the opposite for formal (regular) and informal (casual) labour. Formal labour is more productive than its informal counterpart; formal capital and informal capital are equally productive.

Keywords: Productivity; Formal and informal sectors; Competitive prices; General equilibrium

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1 INTRODUCTION

The existence of formal and informal sectors, particularly in developing countries, has led to much research on defining their differences.[1] Studies have shown that the formal sector is more productive than the informal sector because of size, the capital-intensive nature of production, self-selection by more productive employers for formal activities, taxation and productive public distribution to the formal sector (Esfahani and Salehi-Isfahani, 1989; Loayza, 1996; Webser and Fidler, 1996; Schaefer, 2002; Rogers and Swinnerton, 2004; Kenyon and Kapaz, 2005). Our study attempts to look into the relative performance of formal and informal activities producing similar commodities with different technologies in India, by way of evaluating their productivity levels.[2] We measure total productivity and account for intermediate inputs. As ten Raa and Shestalova (2006) contend that the main conceptual difference among alternative measures of total factor productivity turns out to be prices, we measure it with competitive prices instead of observed prices. Observed prices are generally not efficient as they are marked by distortions of several kinds. Competitive prices are the result of the removal of distortions with efficient

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[1] Morrisson (1995), and Fortin et al. (1997) described the differences in terms of scale, legal obligations and wage dualism.

[2] Instead of considering total factor productivity growth, which is useful for inter-temporal comparisons, we use relative productivity levels more suitable for the comparison of formal and informal industries.

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utilization and allocation of resources when the economy is pushed to its production frontier. The observed prices in the productivity accounting framework are replaced by the shadow prices derived from a general equilibrium approach that incorporates intersectoral linkages. These shadow prices reflect the potential factor productivities under perfect competition. We focus on the productivity of existing technologies and do not address technological change induced by free trade. Besides finding the productivity differential between the formal and informal activities, this approach yields the potential productivity gain to the aggregate economy, if the resources were reallocated to the most productive activities.

The formal–informal division in developing countries is an important manifestation of the coexistence of traditional technologies and family enterprises on the one hand, and modern technology on the other (Stifel and Thorbecke, 2003). Like most of the sub-Saharan Africa and Latin American countries, the informal sectors in India contribute more than 60% of GDP and employ 87% of the labour force (Sinha et al., 2003; Gibson et al., 1986; Meagher, 1995; Schneider and Enste, 2000). Does this mammoth share of the informal sector contribute significantly to the health of the economy? The formal sector is generally thought to be more productive due to a better market, services accessibility and capital-intensive production (Webster and Fidler, 1996). It is often argued that the existence of the informal sector hinders the potential growth in productivity of the formal sector. In India, like some other developing countries, this debate has gathered currency at the outset of the new economic liberalization policy since the beginning of the 90s. Farrell (2004) contended that informal software companies in India reduce the overall industry's productivity and profitability by 90% and that Indian informal apparel makers gain a 25% cost advantage over their law-abiding formal counterpart.

The informal sector is defined as the unregistered sector with self-employed micro-enterprises and family-owned activities. The informal sector is marked by less or no tax payment, less capital endowment, lower technology, less capital, lower wages and producing wage-goods compared to that of the formal sector (Gerxhani, 2004). The formal sector could feature mark-up pricing due to the existence of unionization, concentration in industries, and underutilization of capital (Gibson and van Seventer, 1995; Schaefer, 2002). Current measurement of the productivity differential between the formal and the informal activities requires removal of these mark-ups. The goods produced by formal and informal sectors can significantly compete with each other, as in Latin America, or they can be completely complimentary to each other, as in Africa (Kelley, 1994; Schaefer, 2002). We assume perfectly substitutable formal and informal commodities produced with different technologies. An efficient allocation of resources in a competitive environment would lead either to complete submission of production of some goods and services to one activity (formal or informal), or to sharing by equally productive activities. We evaluate the observed formal and informal activities at their potential competitive prices.

We draw our basic model from ten Raa and Mohnen (2001, 2002), which synthesizes Solow's growth accounting and the frontier data envelopment analysis (DEA) in an augmented input–output optimization model to measure aggregate productivity of the economy at shadow prices.[3] We maximize aggregate real consumption demand of the

[3] DEA measures sectoral efficiency by using distance functions with respect to the production possibility frontier (Färe et al., 1985, 1994).

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households with given commodity and factor constraints for both the formal and the informal activities. With the assumption of no technical change, the productivity level is solely due to utilization of inputs. Our index of productivity level is defined as the ratio of value-added to total factor input cost all evaluated at shadow prices. Value-added is the sales value of produced output net of purchased materials, i.e. intermediate use. The value added concept is closely comparable to the amount of factors of production required, i.e. gross factor cost. Gross value added can be rationalized as a measure of output by imposing certain conditions on the production function. Bruno (1978) and Diewert (1978) had shown that if producers behave in a profit-maximizing manner, then the replacement of gross output by deflated value-added can be justified under conditions that inputs are used in fixed proportions to gross output, or the original gross-output production is functionally separable into the intermediate and all primary inputs, or if the prices of outputs and intermediate inputs vary in strict proportion. Given the Leontief type of production function in our analysis with respect to intermediate and factor inputs, the pattern of our productivity indices across the activities and between the sectors based on either gross value- added or gross output would be unbiased (see Theorem 2 from Diewert, 1978). The productivity index requires aggregation among inputs and within outputs with their relative importance or weights. Shadow prices generated by the competitive equilibrium explain the relative contribution of each factor input to the unit production at the frontier. Value added of an efficient-productive sector should account for its entire factor cost. The productivity index takes a value between zero and one. The inefficient industries, which do not match their productivity their high factor cost over the output prices, will have a productivity index less than one.

The rest of the paper is organized as follows. The next section gives an overview of the Indian formal and informal industries. Data and the structure of the Indian economy with respect to formal informal sectors are discussed in Section 3. Section 4 sets up the basic model, while the fifth section presents the empirical results. Section 6 concludes the paper.

2 THE FORMAL AND INFORMAL SECTORS IN INDIA

Before presenting a quantitative analysis of productivity differences between formal and informal sectors, we take a cursory look at the performance and prospects of Indian formal and informal industries in recent years. In our study, there are nine commodities and services in the economy. ‘Agro processing’, ‘readymade garments’, ‘rice milling’, ‘other manufacturing’ and ‘other services’ are produced by both the formal and the informal sectors. Besides these, ‘agriculture’ and ‘construction’ are all informal, and ‘capital goods’ and ‘government administration’ are all formal. The informal ‘rice milling’ industry, a separate unit from ‘agro processing’ is part of the rural economy. Once domestic and international competition was allowed for agriculture products (including rice) this industry started to grow in size with total investment of US$1.5 billion by the end of 2002, of which US$253.5 million was foreign investment. This induced the growth of the formal sector in the milling industry. ‘Agro processing’, which has been in the nascent stage in the 1990s, has been a key focus area for its value addition to agricultural produce. This industry consists of many fragmented units, namely diary sector, food, fish and meat processing sectors, etc, for which the share of the formal and informal sectors vary.

The industry structure and ongoing transformation offer opportunities for organized players of the 'agro processing' (including 'rice milling') to grow (IBEF, 2006). Ready-made garments constitute around 40% of the Indian textile industry, consisting of both large and small production retailing units. A study by Hashim (2005) shows that the textile industry is marred by inefficiency, contributing to the unit cost growth, and large-scale production (particularly in the ready-made garment sector) should be encouraged to make it more cost effective.

Subscribing to the terminology used by Gereffi (1994), the above-mentioned three activities ('rice milling', 'agro-processing' and 'readymade garments') could be treated as part of buyer-driven chains, where retailers govern the production. Traditionally, an overwhelming proportion of the retail market is occupied by the unorganized sector. But in order to cope with the intensifying competition and growing demand, the organized retail market is estimated to grow by 20% a year from the year 2000 (A.T. Kearney, 2006). Generally, 'other services' could comprise of small informal transport sectors, informal trade, and restaurants, self-employed software units, and other miscellaneous services. At the same time, the big enterprises, such as large transport and trading companies, hotels, banking and big software industries are also part of the 'other services'. This sector has marked a significant growth in the 1990s. Business services, communication, community services (education and health), hotels and restaurants have been fast rising growth sub-sectors (Gordon and Gupta, 2003).[4] These authors argued that this significant productivity gain in the service sector has been due to high-income elasticity of demand, increased use of input of services by other industries and economic reforms.

3 DATABASE AND STRUCTURE OF THE ECONOMY

The basic data are drawn from the formal-informal social accounting matrix for 1999–2000 (Sinha et al., 2004), with some modifications. There are five commodities and services produced by both the formal and the informal sectors. Besides these, 'agriculture' and 'construction' are all informal, and 'capital goods' and 'government administration' are all formal. The informal sector activities use 'casual labour' and 'informal capital' (owned by self-employed), while the formal activities use both casual and regular labour, 'informal capital' and 'formal capital', owned by entrepreneurs.[5] Casual labour (as opposed to regular labour) works on a short-term basis and can be easily displaced. Regular labour could be either relatively more efficient or at a more advantageous step of the job ladder. Part of the commodities is used as intermediate demand by both the formal and the informal sectors and the rest is absorbed by final demand. We assume intermediate consumption has the same pattern in the informal and formal sectors. There are

[4] The average growth rate of service sector value added has been 7.5% per annum while the average aggregate GDP growth has been 5.8%.

[5] Capital is defined on the basis of its ownership, namely self-employed or employer (entrepreneur). 'Formal capital' is solely used by formal sector. Only the informal 'construction' activity requires 'formal capital' for its production. 'Informal capital' in the formal sector is owned by the self-employed, which is also an employer hiring less than six workers.

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TABLE 1. Factor distribution across household groups.

Household groups	Casual labour	Regular labour	Informal capital	Formal capital	Profit
Rural – Casual Labour	0.63				
Rural – Regular Wage Earner		0.50			
Rural – Self-employed			0.26		
Rural – Entrepreneur				0.03	0.03
Urban – Casual Labour	0.37				
Urban – Regular Wage Earner		0.50			
Urban – Self-employed			0.74		0.24
Urban – Entrepreneur				0.97	0.73
Total	1.00	1.00	1.00	1.00	1.00

Source: Authors' calculation based on Sinha et al. (2004).

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eight categories of household groups, namely casual labour, regular labour, self-employed and entrepreneurs, all rural or urban; these coefficients are defined on the basis of ownership of factor endowments. Profit generated from each activity is distributed among the 'self-employed' and 'entrepreneur' households. Profit comes more from the formal activities than the informal.

The distribution of households' factor endowments is obtained from the SAM. Table 1 shows that casual labour is concentrated in the rural area, while regular labour is equally shared by the rural and the urban households. Most of the capital, both formal and informal, is held by urban households.

Table 2 shows that casual labour is mostly used by the informal sector ('agriculture', 44%; 'construction', 15%; 'other services', 17%), while regular labour is largely used by the formal sector 'other services' and 'government services'. Although there is not a big gap between the share of informal capital in the formal and informal activities, this factor is concentrated in a few sub-sectors, namely 'agriculture' (26%), informal 'other services' (21%), formal 'other services' (30%). The 'other services' in the formal sector takes the major chunk of formal capital (62%), followed by the formal 'other manufacturing', (22%). The formal sector generates more profit for the entrepreneurs. Production of 'other manufacturing goods' is the most profitable activities in both formal and informal sectors, followed by the 'capital goods' in the formal sector. Finally, for our experiment, we assume a 7% unemployment rate (Government of India, 2000) and a 70% capital utilization rate for the Indian economy.

4 ASSUMPTIONS AND THE MODEL

Since we assume the same intermediate technology for both formal and informal sectors, the technological heterogeneity comes from differences in the intensities of primary factors of production. We model informal labour (casual) and informal capital qualitatively differently than their formal counterparts. While casual labour can freely move between the formal and informal sectors, regular workers are mobile only within the formal sector; the two types of labour are complements and regular workers have the capacity to perform

TABLE 2. Distribution of factors and output across formal and informal activities.

Sectors	Casual labour	Regular labour	Informal capital	Formal capital	Profit	Output
Informal						
Agriculture	44.04		26.14		2.00	15.73
Agro Processing	0.86		1.11		0.36	1.79
Rice Milling	0.33		0.42			0.19
Readymade Garments	0.08		0.10		0.09	0.14
Other manufacturing goods	4.11		5.26		23.92	7.54
Capital Goods	0.00		0.00			0.00
Construction	14.74		2.49	6.00		6.40
Other Services	16.88		21.00			13.74
Government Services	0.00		0.00			0.00
Subtotal	81.04		56.52	6.00	26.37	45.52
Formal						
Agriculture	0.00	0.00	0.00			0.00
Agro Processing	0.46	0.97	1.27	2.80	0.69	2.35
Rice Milling	0.26	0.00	0.29	0.60		0.14
Readymade Garments	0.08	0.23	0.26	0.70	0.27	0.43
Other manufacturing goods	3.90	6.90	9.72	22.28	50.83	16.04
Capital Goods	0.21	2.34	2.02	5.34	21.83	4.09
Construction						0.00
Other Services	4.03	33.26	29.91	62.27		21.43
Government Services	10.01	56.31	0.00	0.00		10.00
Subtotal	18.96	100.00	43.48	94.00	73.62	54.48
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Authors' calculation based on Sinha et al. (2004)

tasks of casual labour (if they are left unemployed in the regular formal work), but not vice-versa.[6] This asymmetry generates a non-negative competitive premium for regular labour in the formal sector over the wage of casual labour. 'Formal capital' and 'informal capital' are mobile across the activities and both types of capital are complements. However, if formal capital is found to be in excess supply, it can perform the tasks of 'informal capital', not the other way around, resulting in a premium for 'formal capital'.

Productivity measurement requires competitive valuations of commodity and factors, which we derive from the following general equilibrium model. Assuming Leontief preferences and noting that the conditions of the second welfare theorem hold, the competitive allocation can be determined by the maximal expansion of total final

[6] Stark (1982) assumed the existence of a 'downward linkage' between the formal sector and the informal sector in order to capture the impact of formal sector job creation on the informal sector.

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household consumption subject to the commodity and factor constraints, while preserving the composition of the vectors of private consumption of the household groups.

$$\text{Max } D\mathbf{e}\sum_{h}^{8}\mathbf{f}d_h$$

$$D, \mathbf{x}^f, \mathbf{x}^i \geq 0$$

$$\mathbf{x}^f + \mathbf{x}^i \geq \mathbf{A}^f\mathbf{x}^f + \mathbf{A}^i\mathbf{x}^i + \sum_{h}^{8}\mathbf{f}d_h D + \mathbf{g} \qquad (\mathbf{p})$$

$$\mathbf{l}^f\mathbf{x}^f \leq N^f \qquad (\omega)$$

$$\boldsymbol{\lambda}^{\mathbf{f}}\mathbf{x}^{\mathbf{f}} + \boldsymbol{\lambda}^{\mathbf{i}}\mathbf{x}^{\mathbf{i}} \leq N^i + (N^f - \mathbf{l}^{\mathbf{f}}\mathbf{x}^{\mathbf{f}}) \qquad (w)$$

$$\mathbf{k}^{\mathbf{f}}\mathbf{x}^{\mathbf{f}} + \mathbf{k}^{\mathbf{i}}\mathbf{x}^{\mathbf{i}} \leq K^f \qquad (\rho)$$

$$\boldsymbol{\kappa}^{\mathbf{f}}\mathbf{x}^{\mathbf{f}} + \boldsymbol{\kappa}^{\mathbf{i}}\mathbf{x}^{\mathbf{i}} \leq K^i + (K^f - \mathbf{k}^{\mathbf{i}}\mathbf{x}^{\mathbf{i}} - \mathbf{k}^{\mathbf{f}}\mathbf{x}^{\mathbf{f}}) \qquad (r)$$

Endogenous variables

D:	Aggregate household consumption demand in the economy
$\mathbf{x}^f$, x^i:	Column vector of formal and informal 'output

Exogenous variables

$\mathbf{e}$:	A unit row vector.
d_h:	A scalar of share of hth household's demand in the total (consumption weights).
$\mathbf{f}$:	Column vector of household's share of consumption demand for a commodity.
$\mathbf{g}$:	Column vector of fixed final demand other than household consumption demand.
$\mathbf{A}^{\mathbf{f}}$, $\mathbf{A}^{\mathbf{i}}$:	Intermediate demand coefficients matrices of the formal and informal activities.
$\boldsymbol{\lambda}^{\mathbf{f}}$, $\boldsymbol{\lambda}^{\mathbf{i}}$:	Row vector of technical coefficients of casual labour in the formal and informal sectors.
$\mathbf{l}^{\mathbf{f}}$:	Row vector of technical coefficients of regular labour in the formal sector.
$\boldsymbol{\kappa}^{\mathbf{f}}$, $\boldsymbol{\kappa}^{\mathbf{i}}$:	Row vector of technical coefficients of informal capital in the formal and informal sectors.
$\mathbf{k}^{\mathbf{f}}$, $\mathbf{k}^{\mathbf{i}}$:	Row vector of technical coefficients of formal capital in the formal and informal sectors.
N^f, N^i:	Total supply of formal (regular) and informal (casual) labour in the economy.
K^f, K^i:	Stock of formal and informal capital.

The first constraint is the commodity constraint; total demand is constrained by the perfectly substitutable formal and informal commodities. The shadow price of it, $\mathbf{p}$, reflects the uniform shadow price for both the formal and informal sectors. The two labour constraints reflect the downward mobility of the labour. The casual labour constraint sets the base wage, w, for regular labour in the formal sector. This constraint

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shows that demand for casual labour is constrained by the sum of its supply and also the unemployed regular labourers. The third constraint is the constraint for regular labour. The shadow price of this constraint gives the wage premium (ω) for regular labour over the casual labour. The fourth constraint is for the demand and supply of informal capital, where demand of informal capital is constrained by the sum of its supply and the surplus of formal capital. Its shadow price sets the competitive rent (R) for the informal capital. The final constraint generates the formal capital premium, ρ.

National income and hence the household income and consumption on the frontier are evaluated at shadow prices. The equilibrating mechanism involves maintaining the propensity to consume at competitive prices with respect to the observed level for each household group with the adjustment of household consumption weights. In the equilibrium, the ratio of new propensity to consume to observed one should be the same for each household group. This is because, if the household's propensity to consume at the optimum exceeds the benchmark propensity to consume more than the other household, then the general equilibrium welfare maximization requires that the former household should be assigned with higher consumption share than the later. This is compatible with the welfare maximization program that shows that a competitive equilibrium can be represented through a welfare optimum with non-zero welfare weights (consumption weights) such that all consumers satisfy their budget constraints (Negishi, 1960).

The optimum incomes of formal and informal households are written as $Y_f = r\gamma_K^j K^i + (r+\rho)\gamma_K^f K^f + w\gamma_N^j N^i + (w+\pi)\gamma_N^f N^f$ and $Y_i = r\gamma_K^{jh} K^i + (r+\rho)\gamma_K^f K^f + w\gamma_N^j N^i$, given household groups' shares $\gamma_K{}^f$ and $\gamma_K{}^i$ of formal and informal capital, and $\gamma_N{}^f$ and $\gamma_N{}^i$ of regular and casual labour. The new propensity to consume at competitive prices is $m_h^1(d) = \mathbf{pf}d_h D/Y_h^1$, where the subscript h stands for both formal and informal household groups ($h = 1,\ldots,8$). The observed propensities to consume, $m_h^0(d)$, valued at competitive prices are similar, but with the optimal consumption baskets $\mathbf{f}_h d_h D$ replaced by the observed baskets. Now the equilibrating mechanism is $m_h^N(d)/m_h^0 = m_{h+1}^N(d)/m_{h+1}^0$, where $h = 1,\ldots,7$. The maximization program is iteratively recomputed with adjusted consumption weights resulting in final optimum values for the endogenous variables.

We thus find the optimum pattern of formal and informal production along with the supporting shadow prices of commodities and factors of production. We use shadow prices to compute the productivity index for each activity in the observed economy. Given below are the productivity indices based on the value-added concept.

$$\Pi^f = \frac{(\mathbf{x_0^f} - \mathbf{A^f x_0^f})\mathbf{p}}{(r+\rho)\mathbf{k^f x_0^f} + \mathbf{r\kappa^f x_0^f} + (w+\omega)\mathbf{l^f x_0^f} + \mathbf{w\lambda^f x_0^f}}$$

$$= \frac{(\mathbf{I} - \mathbf{A^f})\mathbf{p}}{(r+\rho)\mathbf{k^f} + r\boldsymbol{\kappa}^\mathbf{f} + (w+\omega)\mathbf{l^f} + \mathbf{w\lambda^f}}$$

$$\Pi^i = \frac{(\mathbf{x_0^i} - \mathbf{A^i x_0^i})\mathbf{p}}{(r+\rho)\mathbf{k^i x_0^i} + r\boldsymbol{\kappa}^\mathbf{i}\mathbf{x_0^i} + w\boldsymbol{\lambda}^\mathbf{f}\mathbf{x_0^i}} = \frac{(\mathbf{I} - \mathbf{A^i})\mathbf{p}}{(r+\rho)\mathbf{k^i} + r\boldsymbol{\kappa}^\mathbf{i} + w\boldsymbol{\lambda}^\mathbf{f}}$$

where $\mathbf{x_0^f}$ and $\mathbf{x_0^i}$ are observed formal and informal production respectively. Our dual program, where factor costs are minimized subject to price constraints, besides

normalizing the prices, defines the shadow prices in the following constraints.

$$\mathbf{p}(\mathbf{I} - \mathbf{A^f}) \leq (r + \rho)\mathbf{k^f} + r\boldsymbol{\kappa}^{\mathbf{f}} + (w + \omega)\mathbf{l^f} + w\boldsymbol{\lambda}^{\mathbf{f}}$$
$$\mathbf{p}(\mathbf{I} - \mathbf{A^i}) \leq (r + \rho)\mathbf{k^i} + r\boldsymbol{\kappa}^{\mathbf{i}} + w\boldsymbol{\lambda}^{\mathbf{f}}$$

This shows that value added of an activity must be less than or equal to factor costs. Equality holds for the active sectors due to complementary slackness (see ten Raa, 2005). This establishes that our productivity indices take the value between 0 and 1. The inefficient production activity is marked by the index less than 1. If we use gross output instead of the value-added, the productivity indices will become

$$\Pi^f = \frac{\mathbf{p}}{(r + \rho)\mathbf{k^f} + r\boldsymbol{\kappa}^{\mathbf{f}} + (w + \omega)\mathbf{l^f} + w\boldsymbol{\lambda}^{\mathbf{f}} + \mathbf{A^f p}},$$
$$\Pi^i = \frac{\mathbf{p}}{(r + \rho)\mathbf{k^i} + r\boldsymbol{\kappa}^{\mathbf{i}} + w\boldsymbol{\lambda}^{\mathbf{f}} + \mathbf{A^i p}}$$

We can also notice from our dual program that the values of these indices vary between 0 and 1.

The maximization of final consumption demand in the primal program gives us the expansion factor, $c = D^*/D_0$, which is considered as an inverse measure of efficiency, which compares the potential of the economy against the actual performance. The D^* is the value of total consumption demand, D, at the optimum while D_0 is the observed value. We could also see from the objective values of primal and dual that the productivity level (ratio of total final demand to the total factor cost evaluated at shadow prices) of overall economy is the inverse of the optimal expansion factor (see ten Raa, 2006).

Given the difference in technology between formal and informal activities to produce homogeneous commodities and services, the pattern of specialization at the frontier will depend on our substitutability and mobility assumptions for factors of production. The gain in production efficiency is achieved through better production and allocation of resources. However, if there exists an observed underutilization of resources, the full utilization of them at the frontier results in an additional gain in efficiency.[7] The varying degree of utilization rates among different factors of production affects the competitive factor prices and, hence the productivity differentials. This also additionally decides the pattern of sectoral productivity and specialization.[8]

5 MODEL RESULTS

Our productivity level, i.e. the ratio of value added to factor cost at competitive prices, ranges from 0 to 1. A unit productivity level implies that given the competitive prices, the particular technology is efficient and hence is able to recover the factor costs as value added.

[7] This can be defined as X-efficiency (ten Raa, 2006).

[8] Besides the degree of underutilization, alternative assumptions regarding the mobility and substitutability of factor of production would generate different patterns of specialization at the frontier.

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TABLE 3. Productivity levels and shadow prices.

	Productivity		Shadow Prices				
Activities	Informal	Formal	Output	Casual labour	Regular labour	Informal capital	Formal capital
Agriculture	1.00	X	0.93	1.69	5.80	11.05	11.05
Agro Processing	0.93	1.00	1.05	1.69	5.80	11.05	11.05
Readymade Garments	0.97	1.00	1.00	1.69	5.80	11.05	11.05
Rice Milling	0.96	1.00	1.05	1.69	5.80	11.05	11.05
Other manufacturing	0.97	1.00	0.75	1.69	5.80	11.05	11.05
Capital	X	1.00	0.58	1.69	5.80	11.05	11.05
Construction	1.00	X	0.63	1.69	5.80	11.05	11.05
Other Services	1.00	1.00	1.12	1.69	5.80	11.05	11.05
Government	X	1.00	0.62	1.69	5.80	11.05	11.05
Expansion Factor		1.38					

Note: 'X' stands for a commodity not at all produced by either of the sectors.

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Productivity level less than one suggest that it is costly to produce that commodity or service by that technology (formal or informal). The formal and the informal activities could be equally efficient in producing any goods and services if both have productive level of unit ratio. Table 3 shows that formal activities producing all goods and services are more productive than the informal activities. Only in the production of 'other services', the informal sector is as productive as its formal counterpart. Shadow prices for the factor of production that the model generates reflect the factor productivities at the frontier. Table 3 shows that both formal and informal capitals are the economically scarcest primary inputs, having highest competitive rewards, and the casual labour is the least.

It is also observed that optimum allocation yields no competitive premium for formal capital over informal capital, indicating that they are equally productive, while regular labour is more productive than casual labour. We see from Table 2 that almost 94% of formal capital, 43% of informal capital and all regular labour are used by formal activities. Hence, it is expected that the overall formal sector would be more productive than the informal. We could also notice that the observed economy is operating at an efficiency level of 0.88, which is the inverse of the expansion factor, 1.38. This implies that there would be a potential gain in efficiency for the economy by 22% if factors were reallocated to productive sectors.

6 CONCLUSION

We use shadow prices instead of observed inefficient prices to evaluate productivity differences between the formal and informal activities in the Indian economy. Our model synthesizes the frontier analysis with the general equilibrium approach to generate shadow prices. Our major finding is that formal sector activities are strictly more productive than the informal ones. However, there is an exception for the 'service sector', where the formal and the informal production technologies are equally efficient. Capitals are scarcer factors than labours, indicating higher competitive rents than wages. Formal

capital is as productive as informal capital and formal labour is more productive than informal labour. If factors were efficiently allocated to the productive activities, there would be a potential productive gain of 22% for the economy. We admit that the results can be refined with the help of a more disaggregated classification of production sectors.

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