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What sustains informality?

A study of the interactions between formal- and informal-sector firms

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Abstract: We consider two vertical links between informal- and formal-sector firms and study their implications. In one case, the final products produced by the formal- and informal-sector firms are vertically differentiated in terms of quality, and the size of the informal sector demand is related to the income distribution. Our paper studies the implications of this quality choice for the size of the informal sector. In the other case, the informal-sector firm produces an intermediate good as an input for the formal-sector firm. This has several possible implications for the growth of the informal sector in terms of both output and productivity.

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1   Introduction

Various researchers have pointed out that while the informal sector is expected to give way to the formal sector during the course of development, this has not been the case.[1] This has serious implications for the living standards of a large section of the population associated with this sector, because the informal sector is likely to be less productive and earnings are lower. There have been several policy interventions aimed at encouraging formality, but these have not met with the required level of success. Our understanding of the informal sector is incomplete due to our failure to recognize the enormous heterogeneity in the informal sector and the complex ways in which the formal and informal sectors interact.[2]

Firms' decisions to operate in the informal sector (or to keep part of their business in the informal sector) have been studied following mainly two approaches. Operation in the formal sector entails certain fixed costs, such as costs of obtaining licences (including extortion payments to licence-issuing bureaucrats), taxes of several kinds, and other costs of meeting various regulatory standards. In addition to these fixed costs, other factors such as the complexity of the tax system and the high degree of regulatory burden are also cited as barriers to entry to the formal sector. This view, often termed as the *exclusion view* (Perry et al. 2007), highlights the role of reduction in bureaucratic costs and tax simplification in reducing informality.[3] Depending on the nature and size of the fixed costs, one would expect small (often poor) firms to benefit from being in the informal sector.

Informality can also be treated as an enforcement problem, not very different from the classical tax evasion problem (Dabla-Norris et al. 2008; Rauch 1991). A firm's choice boils down to evaluating the various costs and benefits associated with informality. By choosing to be in the informal sector, a firm forgoes the benefits of formality but avoids the costs mentioned earlier, but it runs the risk of being caught and penalized. If small firms are more likely to avoid detection, then the informal sector is likely to be composed of small firms.

However, all these models are silent on where the demand for these informal firms comes from. If the informal sector is characterized by lower productivity, how do informal firms compete with more productive, bigger firms that have scale benefits? While the literature has focused on the possible cost advantages for informal-sector firms, there is inadequate attention paid to the demand for these firms. We consider two instances of formal–informal interactions that influence the demand structure for informal-sector firms.

In many industries, goods produced in the formal and informal sectors are imperfect substitutes. Often, goods produced in the informal sector are of lower quality, and are also low-priced. As is well known, coexistence of different quality levels (vertical product differentiation) is possible when there is unequal distribution of income and the willingness to pay for quality depends on an individual's income level. We wish to integrate into the study the quality choice of informal-sector firms with the occupational decision.

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[1] According to La Porta and Shleifer (2014), as countries develop, more and more formal-sector firms join to change the formal–informal mix. Even though informal-sector firms may not turn formal, over time the proportion of informal activity falls (see also Danquah et al. 2019).

[2] This heterogeneity of the informal sector has been emphasized by various authors in different contexts (e.g. Basu et al. 2017; Blades et al. 2011).

[3] The evidence on this is quite mixed. While Bruhn (2011) finds that such reforms had a negligible impact in Mexico, Fajnzylber et al. (2011) note a significant rise in registration under the SIMPLES programme in Brazil. See de Mel et al. (2013) for a similar field experiment in Sri Lanka.

A tractable model is likely to generate a number of results concerning the nature of quality provisioning at lower levels of development and the impact of income inequality on the profitability and size of the informal sector. There is some cross-country empirical evidence to suggest that inequality and the size of the informal sector are related. Our model will lead to some clear predictions regarding the strength and sign of this relationship. However, it must be pointed out that inequality and informality may be related in other contexts too, when credit markets are imperfect and there is wealth inequality (Mishra and Ray 2012).

It is also possible that formal and informal firms do not necessarily compete in the product market. Rather, the informal-sector firm supplies inputs and intermediate goods to the formal sector. We examine this interaction and discuss how informality is affected by growth in the formal sector. Broad cross-country evidence may suggest that the formal sector grows at the expense of the informal sector in the context of development (La Porta and Schleifer 2014), but this is not borne out in certain cases where the informal sector has grown too.

This aspect of formal–informal interaction has not received much attention. Productivity growth in the formal sector can lead to improvements in the input-supplying informal-sector firms (assuming specific production relations), but if formal-sector productivity reaches a very high level that informal-sector firms are unable to achieve, there is a chance that informal firms will be replaced.

Section 2 provides a benchmark model to summarize the main approaches in the literature. Section 3 contains the main analysis of the distribution-induced demand for informal-sector goods. Section 4 discusses the case of intermediate goods produced by informal-sector firms, and Section 5 concludes.

2 Determinants of informality

We first consider a simple benchmark model of informality that summarizes the various approaches mentioned earlier, following Mishra and Ray (2012). Note that informality can be defined in different ways. In several studies, the focus is on informal employment where labour is employed without a proper contract and without the normal social security benefits. In the Indian context, the Economic Survey (2017–18) used both tax registration (GST, goods and services tax) and employees provident fund contributions to re-examine the size of the informal sector. First, firms are classified as formal when they are providing some kind of social security to employees. According to the second definition of formality, firms are considered formal when they are part of the tax net. Since new data on the GST is available, one can define tax formality as firms having registered under the GST. The Economic Survey reports that 87 per cent of firms, representing 21 per cent of total turnover, are purely informal, outside both the tax and social security nets. On the other hand, less than 1 per cent of firms are purely formal, with both social security and GST. Clearly, the extent of informality is huge. Our model does not include any employer–employee aspects, so we take a purely tax and regulatory definition of the informal sector.

There is a set of potential entrepreneurs differing in asset (wealth) (A). We could alternatively consider different productivity levels. Production can take place either in the formal sector (F) or in the informal sector (I).[4] Should it choose to produce, it makes an investment K and produces output $R_s K$, $s = F, I$; $K \leq A, R_F > R_I$.[5] Operation in the formal sector involves fixed non-production cost f, which captures the costs of obtaining various licences and permits to undertake production, and costs of compliance

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[4] A potential entrepreneur can get a fixed payoff by not undertaking production at all. We don't model these outside options.

[5] The scale K matters when we are talking about credit market imperfections and borrowing costs of firms. In the present analysis, it does not play any role.

with government-stipulated rules and regulations. It could also include bribe payments (extortion) that the entrepreneur might have to make to obtain the permits and licences. Formal-sector profits are taxed at a constant rate t. However, by locating in the informal sector an entrepreneur avoids incurring these costs f and payment of taxes. But entrepreneurs in the informal sector always run the risk of being apprehended by an inspector and losing their entire profit.

Each firm is inspected with probability θ by an inspector. An honest officer would report the non-compliant firm. Assuming risk neutrality, payoffs (expected payoffs) in the formal (V_F) and informal (V_I) sectors can be easily derived:

$$V_F(A) = R_F(A - f)(1 - t), V_I(A) = (1 - \theta)R_I A$$

In addition to assuming the formal sector to be more productive, we also assume that taxes are not high enough to drive out all potential firms, $(1 - t)R_F > (1 - \theta)R_I$. It can be shown that entrepreneurs with $A \geq A^*$ will choose to be in the formal sector, where A^* is given by

$$A^* = \frac{R_F(1 - t)f}{(1 - t)R_F - (1 - \theta)R_I} \tag{1}$$

Additionally, let A_0 be the marginal entrepreneur who is indifferent between producing (in the informal sector) and taking up non-production activities. For a given distribution of assets, we can say that entrepreneurs with $A_0 < A \leq A^*$ choose to be in the informal sector.[6] This formulation summarizes the well-known exclusion and enforcement approaches to the determinants of the informal sector. Higher taxes t mean larger A^*, hence a smaller formal sector.[7] Rule of law and better enforcement lead to higher θ and consequently a lower A^* and a smaller informal sector. However, not all informal-sector firms will cross over to the formal sector; it is possible that the reduction in profits in the informal sector drives them away from production altogether. Increases in various lump-sum taxes and non-production costs due to regulation and compliance subsumed under f lead to a rise in A^* and a larger informal sector.

It is clear that in terms of determinants, several institutional and technological factors affect A^*. In the process of development, technology and productivity will be improved, leading to higher R_F. As informal-sector firms do not have similar access to technology, skilled labour, credit, insurance, and other government-provided services, the gap $R_F - R_I$ should get bigger, leading to lower A^*. This, coupled with the fact that development would bring about improvements in enforcement and compliance, means it is expected that informality will give way to formality over the course of economic development. Of course, there can be several frictions that go against these improvements. Mishra and Ray (2012) consider corruption and bribery, where following apprehension by the enforcement authority, an informal-sector firm can escape punishment by paying a bribe. If we interpret R_I as the expected payoff from being in the informal sector, then corruption can raise R_I by reducing the expected penalty of a firm caught by the enforcement authority.

Several policy prescriptions and experiments have been suggested to influence the potential entrepreneur's choice of sector by affecting these determinants. But the above analysis ignores the demand side completely. R_I implicitly assumes that there is a market for this produce, fetching good returns. Demand for informal-sector output can be either final demand or intermediate. We discuss these next.

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[6] This is an oversimplification. There will be some who would prefer to be in neither sector, depending on other opportunities. Second, size and formality need not be monotonic.

[7] It can be shown that $\frac{\partial A^*}{\partial t} > 0$, and $\frac{\partial A^*}{\partial \theta} < 0$.

3 Income distribution and demand for informality

We consider a stylized economy with two groups of consumers with different levels of income but identical preference for a particular good. A consumer in group i has income Y_i, $i = m$(middle), h (high); $Y_h = \alpha Y_m$, $\alpha > 1$.[8] The good can be produced at two different quality levels, advanced (a) and basic (b). Consumers purchase either one unit or none. Since non-purchase can mean managing with a substitute or own production, we say that it yields utility $u_0 Y$. The purchasing decision is denoted by $j = a, b, 0$. The corresponding utility to consumer in group i and buying good j is given by $u_j Y_i$. Purchase decisions will be guided by comparison of the actual price against the reservation price. For example, the high-income group consumer's reservation price for good a is given by π_{ha} such that $u_a(Y_h - \pi_{ha}) = u_0 . Y_h$.[9] Hence, reservation prices of group i for goods a, b can be given as

$$\pi_{ia} = \frac{u_a - u_0}{u_a} Y_i, \pi_{ib} = \frac{u_b - u_0}{u_b} Y_i, \tag{2}$$

Also, we can define $\pi_{ia}(P_b)$ as the maximum price that the consumer in group i is willing to pay for good a when substitute good b is available at price P_b. It can be shown that

$$\pi_{ia}(P_b) = \frac{Y_i(u_a - u_b) + u_b P_b}{u_a} \tag{3}$$

Clearly, for consumers to buy good a it must be the case that its price $P_a \leq \pi_{ia}(P_b), P_a \leq \pi_{ia}$.

Let us consider two firms, 1 and 2, who have to make decisions regarding which good to produce. As in Banerji and Jain (2007), there is dualism in the economy such that the informal-sector firm has access to technology that can produce good of quality b. The formal sector uses modern technology to produce good a. To begin with, we ignore costs of production, except the fixed cost of production f, for the formal-sector firm. In the present model it does not have a strategic role, but once we consider firms that are non-homogeneous, costs would play an important role. The firm's decision is made in two stages: first, the decision to locate in F or I, and then the choice of price. Each firm maximizes profits. When both firms produce the same good, we assume that they share the market equally. Our aim is not so much to study price competition in the market; rather, we wish to ask if and when a firm will locate in the informal sector.

Consider the following price pair: $P_a^* = \pi_{ha}(P_b^*)$, $P_b^* = \pi_{mb}$. Given these prices, it can be seen that h customers are happy to purchase a and have no incentive to switch to b at price P_b^*. Middle-income customers buy good b at price P_b^* and have no incentive to switch to a. If they switch to a, they will be strictly worse off since

$$u_a(Y_m - P_a^*) < u_b(Y_m - P_b^*). \tag{4}$$

Using equations (2) and (3), it can be shown that $u_a(Y_m - P_a^*) - u_b(Y_m - P_b^*) = (u_a - u_b)(Y_m - Y_h) < 0$. Additionally, it can be verified that both groups of customers do not gain by not purchasing at all.

Recall that firms choose sector $s = F, I$ and after observing these decisions, choose P_a if $s = F$ and P_b if $s = I$. Suppose, as discussed above, that firm 1 locates in the formal sector and firm 2 in the informal sector. This will often be denoted as $\{F, I\}$. Let prices be

$$P_a^* = \pi_{ha}(P_b^*) \text{ and } P_b^* = \pi_{mb}$$

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[8] We can introduce a third group of consumer, the low-income consumer l with income $Y_l < Y_m$.

[9] It is essentially a slight variation of the price competition model studied by Gabszewicz and Thisse (1979) and several others in later years. Banerji and Jain (2007) study quality dualism and use a similar formulation. Many different variations can be used without affecting the qualitative results.

The informal-sector basic good producer is charging the middle-income customers their full reservation price, and the formal-sector advanced-good producer is charging a price that will make the high-income customers indifferent between buying the advanced good at this price and buying the basic good at the lower price. Their profits will be given by

$$R_1 = V_F = n_h(P_a^*) - f = n_h \frac{Y_h(u_a - u_b) + (u_b - u_0)Y_m}{u_a} - f \qquad (5)$$

$$\text{and } R_2 = V_I = n_m \frac{u_b - u_0}{u_b} Y_m. \qquad (6)$$

We are interested in seeing when this outcome can be supported as an equilibrium outcome, with no incentives by the firms to locate in the other sector.[10]

3.1 Example 1

Let $u_0 = u, u_b = 1.5u, u_a = 2u$, and $Y_h = 3Y_m, f = 0$. Note that we have taken $\alpha = 3$ for this example; we consider high inequality to mean higher values of α and a significant number of middle-income customers. When both firms are in the formal sector, two outcomes are possible. In Case 1, only the high-income customers are serviced, with P_a being the highest possible with $P_a = \frac{u_a - u_0}{u_a} Y_h$. There is also another case, Case 2, which occurs when both groups of customers buy good a at price $\frac{u_a - u_0}{u_a} Y_m$. We can show that $\{F, I\}$ is an equilibrium. The I-sector firm, producing b and charging $P_b^* = \pi_{mb}$ will have an equilibrium profit $n_m \frac{u_b - u_0}{u_b} Y_m$. If it deviates and chooses F and charges $P_a^* = \pi_{ma}$, its profit is will be lower iff

$$n_m \frac{u_b - u_0}{u_b} Y_m \geq \frac{n_m + n_h}{2} \frac{u_a - u_0}{u_0} Y_m \qquad (7)$$
$$\text{Or, } n_m \geq 3n_h$$

Likewise, the F-sector firm will not deviate and choose I iff

$$V_F = n_h \frac{Y_h(u_a - u_b) + (u_b - u_0)Y_m}{u_a}$$
$$\geq V_I(1,2) = \frac{n_m + n_h}{2} \frac{u_b - u_0}{u_0} Y_m \qquad (8)$$
$$n_m \leq n_h(\alpha + 0.5) = 3.5n_h$$

It is clear that $\{F, I\}$ is an equilibrium for market sizes with $3.5n_h \geq n_m \geq 3n_h$.

However, for $\alpha < 2.5$, it is not possible to get an equilibrium with one firm in the informal sector and the other in the formal sector. We can have equilibria where both are in F or in I. It can be shown that $\{F, F\}$ is an equilibrium when the middle-income group is small, $\frac{n_m}{n_h} < \min(3, 0.75\alpha)$. This is intuitively plausible since a deviation from being in the formal sector to I can only be attractive when good b has a large market. Given the utility specification in this example, if $\alpha > 4$, then for $\frac{n_m}{n_h} \in [0.75\alpha, \alpha + 0.5]$, firms $1, 2$ locating in the formal and informal sector respectively, $\{F, I\}$, is an equilibrium. Similarly, for $4 > \alpha > 2.5$, it is an equilibrium for values of group sizes given by $\frac{n_m}{n_h} \in [3, \alpha + 0.5]$.

3.2 Example 2

Now consider a scenario in which customers do not care so much for quality differences. We can capture this by considering $u_0 = u, u_b = 1.25u, u_a = 1.5u$. Using the discussion in the previous paragraph, and $\alpha = 3$, we can show that $\{F, I\}$ cannot be sustained as an equilibrium. Recall that market sizes

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[10] We do not provide formal details of equilibrium analysis here; these are available upon request.

are such that we have Case 2: $n_m \geq n_h(\alpha - 1) = 2n_h$. The I sector firm's no-deviation condition, inequality (5), can be rewritten as $n_m \geq 5n_h$ and the no-deviation condition for the F-firm, inequality (6), becomes $n_m \leq n_h(\alpha + 1)$. It is not possible to satisfy both conditions. Hence we cannot have $\{F,I\}$ as equilibrium.

We summarize the above discussion in Proposition 1.

Proposition 1 *Consider a two firm, two-sector economy with two groups of consumers, low (m) and high (h) income, with group sizes n_m and n_h. The informal-sector firm can produce the good with basic quality (b), whereas the formal-sector firm produces it at a higher quality (a). Consumers get greater utility from the advanced good, and the intensity of preference for a over b is higher for the high-income group. (1) For high levels of inequality (ratio of high-income to low-income consumers), there exists a range of group sizes such that both firms locating in different sectors $\{F,I\}$ and producing the same good of different qualities is an equilibrium. (2) For the same parameter values, $\{F,I\}$ is less likely to be an equilibrium when the intensity of preference for a over b is lower.*

3.3 Which firm locates in the informal sector?

The above discussion does not identify which firm locates in the informal sector as we have not incorporated any firm characteristics. This is where various supply-side determinants come into play. Our discussion in Section 2 suggests that the smaller firm is likely to be in the informal sector. This can be easily captured by adapting our analysis to the benchmark model in equation (1). We have ignored fixed costs f in our analysis of product market competition, but with high borrowing costs it will be easy to show that firms at the higher end of assets A will be the ones locating in F. Likewise, if we interpret A as some productivity parameter that works to reduce the cost of producing the advanced-quality good a and productivity is not crucial in the production of the basic-quality good b, then again we can show that in the $\{F,A\}$ equilibrium, the more productive types are likely to be in the formal sector.

To see this, consider a case in which $A_1 > f > A_2$. So firm 2 has to access the credit market to enter the formal sector and this will disadvantage it. Its fixed costs of operation now will be $f + (f - A_2)r$, where r is the interest rate. In fact, when credit markets are imperfect, as will be the case in several developing countries, the smaller firm may not be able to raise enough capital and this may be a constraint too. Now, if we use this in Example 1, we can see why it is possible that firm $\{F,I\}$ is an equilibrium but not $\{I,F\}$.

3.4 Implications

The previous analysis does not claim that inequality and the size of the informal sector are positively related. What it shows is that, in many sectors, informal-sector firms can coexist with formal-sector firms in the presence of income inequality and income-dependent preference for quality. As mentioned in the introduction, there is some evidence to suggest that the size of the informal sector is positively related to inequality, but the relationship can be due to several other factors.

It is also clear that market structures will vary across industries, depending on the extent of quality premia. This is evidenced in our analysis of the case studies from India.

It also shows why informal-sector firms may not benefit from income growth of consumers. Suppose firm 2 is constrained to stay in the informal sector due to lack of credit access, and the equilibrium $\{F,I\}$ does not change. It is clear that an increase in the number of high-income customers and/or the income level of high-income customers will raise firms 1's profits but not those of the informal-sector firm. In fact, a drop in the number n_m will reduce their profits. When this happens, it is not the case that firm 2 transitions to the formal sector—it may stop production altogether. One end of the market may not be served.

3.5 Empirical observations

As mentioned earlier, there is evidence of a negative relationship between inequality and informality at the cross-country level.[11] Here we try to look at some state-level evidence for India. We look at per-capita expenditure in different states to try to see if these expenditure patterns are related to informal-sector output. Informal GDP figures for each state were estimated from the Survey on Unincorporated Non-agricultural Enterprises (Excluding Construction) 67th round (2010–11).[12] The 'inequality' measure used is more like a measure of the *lower middle class* from whom we will see maximum demand for low-quality informal-sector goods. This measure is estimated from the Household Consumer Expenditure Type-1, NSS 66th round (2009–10). This survey collects information on the expenditure of the household and collects data on the monthly per-capita expenditure (MPCE), both uniform recall period (URP) and mixed recall period (MRP). The poverty line considered is the poverty line for 2009–10, based on the Tendulkar methodology. The idea behind this poverty line, as specified in the report highlighting it, is to include non-food expenses, which are best captured by MRP. Hence we shall use the MPCE based on the MRP. So the measure of inequality here, more specifically for the lower middle class, is the proportion of individuals whose monthly consumption falls in the range of the poverty line and the median all-India MPCE, calculated separately for each state. The all-India poverty line is the simple average of the rural and urban poverty lines as specified by the Tendulkar Committee for 2009–10. The rural poverty line is INR673 per month, and the urban poverty line is INR860 per month.

As Table 1 (and Table A1 in Appendix A) shows there is a positive and significant correlation between the size of this middle class and the size of the informal sector

Table 1: Correlation between inequality and proportion of informal-sector GDP, state/UT level values: India (*n* = 32)

	Inequality (2009–10)	Proportion of informal-sector GDP (excluding construction) (2010–11)
Inequality (2009–10)	1.00	0.2686
Proportion of informal-sector GDP (excluding construction) (2010–11)	0.2686	1.00

Source: author's compilation based on NSSO data.

3.6 Industry examples of formal–informal mix

Retail

The retail sector in India is a very good example of both the formal and informal sectors serving the market. This sector is dominated by the unorganized sector, characterized by *kirana* stores, owner-managed general stores, mom-and-pop stores, *beedi/pan* shops, and pavement and handcart vendors, which accounts for almost 88 per cent of the retail market. The organized sector includes publicly traded supermarkets, corporate-backed hypermarkets, and retail chains. Organized retail accounts for 12 per cent of the market (CARE Ratings 2018).[13]

But within the umbrella of retail, the share of organized or modern retailing is higher for certain categories than for others. In our model language, this depends on $(u_a - u_b)$. Where the quality premium is high, one expects the formal or organized sector to dominate. The share of organized retail under the

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[11] Various papers have looked at this relationship in different contexts (see Chong and Gradstein 2007; Dobson and Ramlogan-Dobson 2012; Mishra and Ray 2012).

[12] The survey provides the gross value added (GVA) of the unincorporated enterprises, but since the corresponding state GVA measure wasn't available for 2010–11, the data on subsidies and indirect taxes, also part of the survey, were used to derive estimates of the size of the informal sector.

[13] This is likely to change in the post-COVID scenario, as the e-commerce segment has expanded considerably.

fashion category, which includes clothing, accessories, and footwear, was 24 per cent as of 2017, while in the food and grocery category it accounts for only 3 per cent. This is probably because individuals are, in general, more conscious about brands and quality with regards to clothes and footwear and prefer to spend more on these if they can. Given the growth in income levels, we expect to see growth of fashion retailing. In contrast, for the food and grocery category, convenience is desired more; hence the prevalence of kirana stores. Other advantages of unorganized retailing include credit availability, personal relationship with the retailer, bargaining possibility, and home delivery.

A survey conducted by Joseph et al. (2008) to ascertain the impact of the growth of organized retail on unorganized retail makes similar observations. The survey finds that unorganized retail hasn't shut down in the light of the growth of the organized sector. Hence, both organized and unorganized retail can find it profitable to coexist even in light of the rapid growth of the organized sector. This is because demand for both of these enterprises exists. This could be answered by another finding of the survey, which says that consumers shopping at organized outlets have higher income levels than consumers shopping at unorganized outlets. However, the middle class, including the aspirers (covering monthly household income between INR10,000 and INR100,000), which is the mainstay for retail, shop at both organized and unorganized outlets. The decision to shop at the modern or the traditional retail store is also a result of the kind of product purchased, as noted earlier. The survey also throws light on the fact that shoppers do not shop exclusively at the organized or the unorganized outlets. They shop at both outlets and the share of spending varies from product to product. Among the consumers who were surveyed at organized retail shops, fruit and food items were purchased at unorganized outlets at shares of 44 and 41 per cent, respectively. For the consumers surveyed at unorganized retail stores, 59 per cent of their spending on toiletries was at organized retail stores.

Textiles

The Indian textile industry presents another case in which both formal and informal firms are present. This industry is extremely varied, with the handloom, power loom, and hosiery sector at one end of the spectrum, and the capital-intensive sophisticated mills sector at the other. The industry is dominated by small, fragmented, and non-integrated units, except for the spinning sector. The spinning sector's production is dominated by large units and has been able to undergo significant modernization at a rapid rate. The ginning, weaving, and processing sectors, on the other hand, lag in terms of modernization.

The spinning sector holds a prominent place as it is a highly consolidated and technically advanced sub-sector of the Indian textiles and clothing (T&C) industry. Spinning is the process of converting cotton or man-made fibre into yarn to be used for weaving and knitting. The most important feature of the spinning sector is that 92 per cent of the yarn is produced by an organized sector and only 8 per cent is produced by smaller firms. The organized sector of the textile industry represents the mills.

Weaving and knitting converts cotton, man-made, or blended yarns into woven or knitted fabrics. India's weaving sector is highly unorganized and dispersed, and is controlled by small-scale industries. This sector includes both handlooms and power looms. Only 5 per cent of its production takes place in the organized sector (Mahfuz et al. 2018). Fabric finishing includes dyeing, printing, and other cloth preparation prior to the manufacture of clothing. This is also dominated by many independent, small-scale enterprises.[14]

It is clear that there is enough room for these informal firms to operate. Firm productivity is an issue, as evident in the fact that share of India in global fabric production is only 20 per cent even though its share of looms stands at 60 per cent.

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[14] According to Sharma et al. (2014), an overwhelmingly large percentage of workers (about 92 per cent) are engaged in informal employment and a large majority of them have low earnings with limited or no social protection.

4 Intermediate goods

The formal–informal relationship could be of a different nature for intermediate goods, where the informal sector supplies inputs to firms in the formal sector. Given tighter labour regulations, this has become attractive for formal-sector firms. A formal-sector firm can contract with an informal-sector firm for supply of intermediate goods without having to expand its own labour force. Since the informal firm is non-compliant on many fronts, it can produce those intermediate goods at a lower cost and the formal firm also benefits from this lower cost of production.

However, in the Indian context there are two constraints on the growth of this relationship. The first one comes from the recently introduced GST. The formal-sector firm can claim input credit (taxes paid on the inputs) only if the informal supplier is registered for GST. Otherwise the formal-sector firm pays tax on the whole output and not only the value added. This has encouraged formal-sector firms to deal with registered firms only. However, this does not mean that these tax-registered firms are completely formal; they could still be outside the social security net. The second constraint is technological. If the formal-sector firm is technologically advanced, the intermediate goods have to be technologically compatible. As the formal–informal technology gap increases, the formal-sector firm is more likely to source its inputs from other smaller formal-sector firms with compatible technology.

However, different segments in the production chain may use different technologies. As we shall see for the auto-components industry, informal-sector firms do provide parts and components that are not technology-intensive.

4.1 Auto-components

The auto-components industry in India is another example of coexistence of organized and unorganized firms. The organized or formal sector caters to the original equipment manufacturers (OEMs) and consists of high-value precision instruments, while the unorganized/informal sector is composed of low-value products and caters mostly to the aftermarket category. 'Aftermarket' refers to spare parts (replacement parts) and accessories wanted by consumers after the sale of automobiles by the OEMs. However, post-GST there has been an increase in organized players in the replacement market. OEM demand for components accounts for 65 per cent of the total demand, while aftermarket sales account for 16 per cent of the demand for FY2019. The remain 19 per cent is accounted for by exports. There are disproportionately more unorganized firms than organized firms in the auto-component industry. As per 2016–17 data from the ACMA (Auto Component Manufacturers Association), there are about 10,000 unorganized firms as opposed to 700 organized firms, but organized firms account for 85 per cent of the turnover.[15] If we look at the various segments of this auto-component industry, the informal unorganized sector dominates the residual segment (plastic moulding, metal sheets), which is not very technology-intensive.

The automotive supply chain includes a multitude of tier 1, 2, and 3 suppliers or manufacturers with many assembly operations and a number of dealerships. Tier 1 suppliers are large firms equipped with advanced technology that can manufacture multiple components. Tier 2 consists of medium-sized firms with comparatively less access to the latest technology. Like the tier 1 firms, these firms also manufacture multiple auto-components. Tier 3 consists of small, single auto-component manufacturing firms, which are largely unorganized players and constitute the informal sector.

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[15] The ACMA is the apex body representing the interests of the Indian auto-component industry.

4.2   A model with final and intermediate goods

It is clear that both types of links operate across different industries. While combining both in a model makes it harder to analyse formally, we can outline a model and present its heuristic analysis. Suppose that each final-good firm in the formal sector (producing advanced goods) requires an intermediate input, which costs c (per unit) if produced in-house by the formal-sector firm. It can be produced independently in the informal sector and purchased at a price $p < c$. This is due to the fact that formal-sector labour is more expensive and there are other compliance costs. Moreover, a firm with A will have to borrow $(f - A)$ to produce in the formal sector, at gross interest rate r. As discussed in Section 3.3, this makes the firm with a lower A (firm 2) more likely to be in the informal sector.

Consider a situation in which firm 1 is producing good a in the formal sector. Can we get an outcome where firm 2 chooses to locate in the informal sector but to produce the intermediate good? Note that firm 2 has three choices: (1) to produce the final good in the formal sector; (2) to produce the final good in the informal sector; and (3) to produce the intermediate good in the informal sector. Since firm 2's costs of operation in the formal sector are higher because of the capital costs $((f - A)r)$, it is likely to be producing the final good in the informal sector. But its profit will depend crucially on the size of the middle-income group and their income level. With income growth, rise in Y_h and (n_h/n_m) will mean production of the final good in the informal sector may not be attractive compared to the formal sector. Given the large market, it may be profitable to produce the intermediate good and supply firm 1. This is an important aspect of the informal sector because this can augment technological capability in the informal sector and improve productivity. However, if the technology gap between the formal and informal sectors increases the link may be broken.

4.3   Example 3

Let us revisit Example 1. Let $u_0 = u$, $u_b = 1.5u$, $u_a = 2u$, $f = 200$, $r = 0.2$, $c = 25$, and $A_2 = 0$. There are more high-income customers, $n_h = 100$, $n_m = 40$. Consider firm 1 producing good a and supplying the whole market of 140 customers. Firm 2 produces the intermediate good and sells at price $p = 20$. This is an equilibrium outcome. Firm 2's equilibrium payoff is 2,800. By deviating to final-goods production in the formal sector, it can get $70(Y_m/2 - 20) - 240$, which is worse for $Y_m \leq 120$. If it were to produce the final good in the informal sector, it would have to charge a lower price. Recall that firm 1 is charging 60 and servicing the entire market. Using equation (4), highest price that firm 2 can charge would be 40 when $Y_m = 120$. Even when we assume that informal-sector final-goods production does not require the intermediate input, profits (1,600) will be lower. We can consider the alternative scenario where firm 1 is serving only one segment, $n_h = 100$. Here, firm 2's payoff from producing intermediate inputs will be 2,000. This will dominate payoffs from both possible deviations, producing final goods in the formal sector and informal sector.

Proposition 2 *With income growth and dominance of the upper-income and advanced-goods customers, the smaller firm is more likely to produce intermediate goods for the formal sector while being located in the informal sector, rather than competing with the formal-sector firm for the final good.*

5   Concluding remarks

In many countries, including India, the size of the informal sector is significantly large, and despite recent economic growth it remains so. Even though its output share is falling, the employment share of the informal sector remains very high. The recent pandemic induced lockdowns and subsequent cessation of economic activities, which exposed the size and vulnerability of the informal-sector workforce. There are two major concerns: first, the skill level, human capital, and productivity of informal-sector

workers remain low. This obviously affects aggregate output and income. More importantly, the large majority of informal-sector workers have no social security of any kind. The recent pandemic has shown that they are not even able to access government welfare schemes because they are not registered in any databases.[16] What we need is semi-formalization of the informal workforce, and informal-sector firms must be incentivized to help in this process. As formal–informal links—as buyer and supplier of intermediate goods and services—exist, even formal-sector firms may be used to influence informal-sector firms towards partial formalization.

Our analysis shows that we need to account for industry-level differences, specific product features, customer composition, and the product space to understand why the informal sector is so persistent. Take the example of a pressure cooker, a commonly used cooking appliance in India. The informal sector can supply a pressure cooker at one-third of the price of the more recognized brands from the formal sector. Yes, these are likely to be less durable and less safe to use, and may not have other modern features, but many low-income households would not hesitate to own them. Even if one is able to bring them into the tax net, they will be non-compliant on many fronts, given their small sizes and reduced visibility to the authorities. As we have mentioned, the biggest concern is the labour force employed by these firms; without threatening their closure, these firms have to be co-opted to provide security and benefits to their workers.

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[16] A study by Das and Mishra (2020) shows the extent of under-utilization of several welfare schemes targeted at slum dwellers during the lockdown.

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Appendix A: Inequality and proportion of informal sector GDP

Table A1: Inequality and proportion of informal sector GDP, state/UT level values: India

State/UT	Inequality (2009–10)	Proportion of informal sector GDP (excluding construction) (2010–11)
Andaman N.Islands	13.55097	7.174725
Andhra Pradesh	32.47089	9.647139
Arunachal Pradesh	31.6118	6.970359
Assam	30.38639	9.455896
Bihar	24.40476	8.795122
Chandigarh	11.63208	3.872394
Chhattisgarh	19.81279	5.215862
Delhi	15.43686	14.44751
Goa	11.19306	2.791297
Gujarat	31.91095	8.210999
Haryana	24.66961	6.716335
Himachal Pradesh	32.99666	6.837835
Jammu Kashmir	39.46287	15.53233
Jharkhand	25.14506	6.252295
Karnataka	27.2045	10.13094
Kerala	24.40354	12.89172
Madhya Pradesh	25	7.424243
Maharashtra	28.68937	7.407013
Manipur	54.97926	9.770974
Meghalaya	48.42812	6.531312
Mizoram	30.91461	8.369356
Nagaland	31.71604	2.913007
Odisha	22.22427	6.953283
Puducherry	20.37098	7.537948
Punjab	27.03818	8.147309
Rajasthan	40.1626	7.480866
Sikkim	34.34146	5.797206
Tamil Nadu	31.5625	11.23676
Tripura	41.68311	13.40841
Uttar Pradesh	28.8	11.26353
Uttaranchal	36.79205	6.129604
West Bengal	32.75632	10.67144

Source: author's compilation based on NSSO data.