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What Sustains Informality? A Study of the Interactions between Formal and Informal Sector Firms

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ABSTRACT *This paper considers two vertical links between informal and formal sector firms and studies their implications. First, we model a situation where final products produced by the formal and informal sector firms are differentiated in terms of quality and consumption demand for the informal sector firm is related to the distribution of income. Less well-off consumers generate demand for the low-priced, low quality good produced by the informal sector. Our paper studies the implications of this link for the size of the informal sector. Second, we analyse a situation where, instead of competing with the formal sector firm, the informal sector firm produces an intermediate good for the other firm.*

KEYWORDS: Informal sector; income distribution; market size; quality choice; intermediate goods

JEL CLASSIFICATION: O15; O17; K4; H8

1. Introduction

The persistence of a large informal sector in many developing countries has been a subject of concern. 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 implications for living standards of the population because the informal sector is likely to be less productive and earnings are lower.[2] Naturally, there have been several policy interventions aimed at encouraging formality, but these have not met with the required level of success.

Firm's choice to be in the informal sector (or to keep part of its business in the informal sector) has been studied under mainly two approaches. Operation in the formal sector entails certain fixed costs like costs of obtaining licenses (including extortion payments to license issuing bureaucrats), taxes of several kinds and other costs of meeting various regulatory standards. In addition to these fixed costs, other factors like complexity of the tax system, high degree of regulatory burden are also cited as barriers to entry to the formal sector. This view,

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often termed as the exclusion view (Perry, Maloney, Arias, Mason, & Saavedra, 2007), highlights the role of reduction in bureaucratic costs and tax simplifications as a way of 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, Gradstein, & Inchauste, 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 and avoids the costs mentioned earlier, but it runs the risk of apprehension and penalties. If small firms are more likely to avoid detection, then the informal sector will comprise of small firms. Of course, enforcement efforts can be directed at enforcing labour regulations and other standards in the formal sector, and these are likely to have different implications in terms of formal and informal employment (See Almeida, Paz, & Poole, 2022).

While these various costs and benefits are considered to explain the sectoral location choice of the firm, not enough attention is paid to the interaction between informal and formal sector firms.[4] In this paper we consider two possible instances of such formal-informal interactions which influence the nature and *size of demand* for informal sector firms. By and large, the literature has focussed on the possible cost (dis)advantages or uncertain returns of the informal sector firms, but the demand pattern of these firms has not received the required attention.

In several industries, goods produced in these two sectors (formal and informal) are imperfect substitutes. Often, goods produced in the informal sector are of lower quality and are priced low. As is well known (i.e. Banerji & Jain, 2007; Gabszewicz & Thisse, 1979), 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 individual's income level. We integrate the study the quality choice by consumers with the sectoral location decision of firms. We show that, with a highly unequal distribution of income and a large number of less well-off consumers, we will see firms locating in the informal sector and competing with formal sector firms producing the same good but of different qualities. Here firms locate in the informal sector, not because of any bureaucratic or institutional costs, but to meet sizeable demand for the differentiated product.

This is naturally related to the much studied cross-country empirical evidence on positive relation between inequality and the size of the informal sector. However, it is not unequal wealth or asset distribution of potential entrepreneurs, but the income distribution of consumers, which matters in sustaining informality in our model context.

It is also possible that formal and informal firms do not compete in the product market. We find that when the size of the market for the high quality/formal sector good is larger and the market for the low quality good shrinks, firms do not find it profitable to locate in the informal sector to produce the final good. But it is not obvious that this leads to the informal sector firm shifting to the formal sector to produce the final good. Somewhat paradoxically, with a large market, marginal firms may still find it profitable to be in the informal sector. We present an example, where the informal sector firm supplies inputs and intermediate goods to the formal sector, rather than compete by producing the final good.

While our paper addresses the formal-informal interactions in the product space, several papers in this issue examine similar links in the labour market context. Similar to the increased market size effect, Almeida et al. (2022) examines the effect of demand shocks (through trade) on formal and informal employment. Intrerestingly, formal employment goes down in industries with stricter labour regulatory enforcement, in favour of increased self-employment.

The so-called transition from informal to formal, alluded to at the beginning, depends on the transformation in the formal-informal link, following changes in income distribution and technology. As we show, eventually, further growth in the market for high quality product will induce the informal sector firm to relocate in the formal sector; but it is not straight forward.

This transition, in the context of employment, has been analysed by Conover, Khamis and Pearlman (2022) in this issue and they document the various factors which influence this transition from informal employment to formal jobs.

Section 2 provides a brief summary of the key determinants of informality and the related literature. Section 3 takes up the main analysis of income distribution induced demand for informal sector goods and examines how firms in the two sectors co-exist and compete. Besides several numerical example, we use some Indian case studies to illustrate the main propositions. In Section 4, we extend the analysis to the transformed nature of informal-formal link and discuss the case of intermediate goods. The final section concludes with a few brief remarks.

2. Determinants of informality and related literature

Let us consider a simple benchmark model of informality which summarizes the various approaches mentioned earlier. 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 normal social security benefits. The definition varies across countries too. For example, in the Indian context, the Economic Survey (2017–18) used both tax registration (GST: Goods and Services Tax) and employees provident fund contributions (EPFO) to examine the size of the informal sector. First, firms are classified as formal when they are providing some kind of social security to employees. Second definition of formality requires firms to part of the tax net.[5] Our model below does not have any employer-employee aspect brought in, so we take a purely tax and regulatory definition of the informal sector, but several papers in this issue focus on the employment aspect of informality.

2.1. Dualitic views

In models of determinants of informality it is common to consider two distinct economic spaces- formal sector and informal sector with different technology, products, and markets. Potential entreprenurs choose one of these two spaces and further interaction between the firms is absent.

There is a set of potential entrepreneurs differing in asset (wealth) A. We could alternatively consider, as in Kanbur (2017) or Ulyssea (2020) different productivity levels. Production can take place either in the formal sector (F) or in the informal sector (I). Should it choose to produce, it makes an investment K and produces output R_sK, $s = F, I$; $K \leq A, R_{\mathrm{F}} > R_I$.[6] Operation in the formal sector involves fixed non-production cost f which captures the costs of obtaining various licenses and permits to undertake production, costs of compliance with government stipulated rules and regulations. It could also include bribe payments (extortion) that the entrepreneur might have to make to obtain the necessary permits and licenses. 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, and full utilization of wealth A, 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 too high 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

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

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 lower 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 bigger informal sector.

It is clear that in terms of determinants, it shows that several institutional and technological factors affect this cutoff A^*. In the process of development, technology and productivity will be raised leading to a higher R_F. The fact that 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^*.

Our paper goes beyond this dualism and studies the interaction between formal sector and informal sector firms. In this sense it is closer to the recent work by Ulyssea (2018, 2020), which allows for interacting sectors. Firms in these two sectors can compete by producing the final good or be complementary, in the sense of one supplying inputs to the other, or there can be movement of movement of worker or technology spillovers between these firms. While we focus on the market size for the informal sector firm, several papers in this volume study the interactions in the context of labour market dynamics.[9]

2.2. *Informality and inequality*

From (1), it is clear that in this highly stylized model with no borrowing, less wealthy will locate in the informal sector, suggesting a possible relation between disribution of wealth and the size of the informal sector. There have been quite a few studies looking at this relation. Chong and Gradstein (2007) show that inequality of (wealth or assets or investable income) leads to a higher informal sector, in the presence of imperfect credit market and rent-seeking (due to poor institutional quality).[10] Poor entrepreneurs would locate in the informal sector, because access to the formal sector requires resources being devoted to rent-seeking. An entrepreneur's investment in the formal sector is not highly productive if corresponding investment in rent-seeking is low. Consequently, richer entrepreneurs find it worthwhile to locate in the formal sector. This mechanism suggests two results: (i) rise in inequality (i.e. ratio of income of rich to poor) would lead to more entrepreneurs in the informal sector and (ii) this impact is stronger when rent-seeking has a greater effect on determining productivity in the formal sector.

Gutierrez-Romero (2021), concerned with historical inequality, finds a clear and strong evidence for the result that higher inequality leads to a larger informal economy in the long run. Strikingly, a 1% increase in the Gini index in 1700 would lead to a 3% increase in the informal economy over the period 1991–2015. She also finds that there is no evidence that countries converge to a steady state level of informality, rather initial inequality can lead to multiple steady states.

As mentioned in the introduction, our analysis of the market size for the informal sector firms, finds another channel through which inequality is related to informality. However, this is quite distinct from the papers in the literaure, which mostly refer to inequality amongst potential entrepreneurs and not consumers. In our model the relation between inequality and informality, does not depend on rent seeking or other institutional factors- rather it depends on the extent of quality differentiation and consumer tastes.

3. Income distribution, product choice and 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 $Y_i,\ i = m\,(\text{middle}), h$ (high); $Y_h = \alpha Y_m,\ \alpha > 1$.[11] Group sizes are denoted by n_h *and* n_m. 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 $u_0 Y$. Purchase decision is denoted by $j = a, b, 0$ and $u_a > u_b > u_0$. 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 $u_a(Y_h - \pi_{ha}) = u_0 Y_h$. Similarly, 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 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 $1, 2$ who have to make decisions regarding which good to produce. As in Banerji and Jain (2007), there is dualism in the economy such that only the formal sector has access to modern technology to produce good a and the infomal sector firm uses traditional technology to produce good of quality b. To begin with, we ignore costs of production, except the fixed cost of production f, for the formal sector firms. In the present model it does not have a strategic role but once we consider firms which are non-homogenous, costs would play an important role. Firm's decision is in two stages, first it chooses whether to locate in F or I, followed by its choice of price. Each firm maximises profit. When both firms produce the same good, locate in the same sector, we assume that they charge the same profit maximising price and 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* any firm will locate in the informal sector.

Consider the following price pair as possible equilibrium prices in markets for goods: $P_a^* = \pi_{ha}(P_b^*),\ P_b^* = \pi_{mb}$. This implies that the basic good producer in the informal sector is charging the middle income customers their full reservation price and the formal sector producer is charging a price which will make the high income customers indifferent between buying the advanced good at this price and buying the basic good at the lower price. 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^*. For the middle income customers, they 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 (2) and (3), it can be shown that $u_a(Y_m - P_a^*) - u_b(Y_m - P_b^*) = (u_a - u_b)(Y_m - Y_h) < 0$, hence (4) holds. Additionally, it can be verified that both groups of customers do not gain by not purchasing at all.

Recall that firms choose sector $s = F, \mathrm{I}$ and after observing these decisions, choose P_a if $s = F$ and P_b if $s = I$. Suppose, as discussed above, firm 1 locates in the formal sector and firm 2, in the informal sector. This will often be denoted as $\{F, I\}$. Given prices $P_a^* = \pi_{ha}(P_b^*)$ and $P_{\mathrm{b}}^* = \pi_{mb}$,

profits will be given by

$$R_1 = V_F = n_1 P_a^* - f = n_h \frac{Y_h(u_a - u_b) + (u_b - u_0) Y_m}{u_a} - f \tag{5}$$

$$R_2 = V_I = n_2 P_b^* = n_m \frac{u_b - u_0}{u_b} Y_m. \tag{6}$$

Since all high income customers buy from firm 1, $n_1 = n_h$. Likewise, $n_2 = n_m$. 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.[13]

3.1. Example 1

Let $u_0 = u, u_b = 1.5u, u_a = 2u,$ and $Y_h = \alpha Y_m, f = 0$. We consider high inequality to mean higher values of α and 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 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 a price $\frac{u_a - u_0}{u_a} Y_m$. We assume that $n_m > (\alpha - 1) n_h$ so that case 2 applies. 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 lower if

$$n_m \frac{u_b - u_0}{u_b} Y_m \geq \frac{n_m + n_h}{2} \frac{u_a - u_0}{u_0} Y_m \tag{7}$$

$$\text{Or, } \; n_m \geq 3 n_h$$

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

$$V_F = n_h \frac{Y_h(u_a - u_b) + (u_b - u_0) Y_m}{u_a}$$

$$\geq V_I(1, 2) = \frac{n_m + n_h}{2} \frac{u_b - u_0}{u_b} Y_m \tag{8}$$

$$n_m \leq n_h(\alpha + 0.5) = 3.5 n_h$$

Consider, $\alpha = 3,$ it is clear that $\{F, I\}$ is an equilibrium for $3.5 n_h \geq n_m \geq 3 n_h$. Suppose, $n_m = 65, \; n_h = 20, \; Y_m = 60, and \; Y_h = 180$. It is easy to verify that all the conditions (7 & 8) are satisfied and we have an equilibrium with one firm in the informal sector, producing the final low quality good and competing with the formal sector firm producing the high quality good. This example will be compared with Example 3 later in the paper.

3.2. Example 2

Now consider a scenario where customers do not care so much for quality differences. We can capture this by considering a lower quality premium: $u_0 = u, u_b = 1.25u, u_a = 1.5u$. 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 are such that we have Case 2: $n_m \geq n_h(\alpha - 1) = 2 n_h$.

The I sector firm 's no-deviation condition, inequality (7), can be rewritten as $n_m \geq 5n_h$ and the no-deviation condition for $F-$ firm, inequality (8), becomes $n_m \leq 4n_h$. It is not possible to satisfy both conditions. Hence we cannot have $\{F, I\}$ as equilibrium. This makes the formal-informal link highly industry specific- as seen in the case studies below.

We can summarize the above discussion in the following Proposition.

Proposition 1. Consider a two-firm, two-sector economy with two groups of consumers, low-medium (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), where as the formal sector firm produces it at a higher quality (a). Consumers get higher utility from the advanced good, 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), there exists a range of group sizes such that firms locating in different sectors $\{F, I\}$ and producing 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 the firm which locates in the informal sector as we have not incorporated any firm characteristics. This is where various supply side determinants come in to 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 (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, which 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 $\{F, I\}$ equilibrium, the more productive types are likely to be in the formal sector.

To see this consider a case where $A_1 > f > A_2$. 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 $f + (f - A_2)r$, 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. This will be revisited in the context of Example 3 where firm 2 becomes the input producer.

3.4. Empirical observations

The previous analysis does not claim that inequality and the size of the informal sector are positively related. But what it shows 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.

The cross-country evidence on the positive relation has been discussed earlier. Here we try to look at some state level evidence in India. We look at per-capita expenditure in different states to and try to see if these expenditure pattern is related to informal sector output. Informal GDP figures of each state were estimated from the Survey on Unincorporated Non-Agricultural Enterprises (Excluding Construction) 67th round (2010–11). 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). So the measure of inequality here, more specifically the lower middle class, is the proportion of individuals whose monthly consumption falls in the range of 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.

It turns out that there is a positive, significant correlation between the size this low-middle class and the size of the informal sector. Using figures for 32 States, the correlation cofficient between the proportion of informal sector GDP (excluding construction) and the above discussed inequality measure is 0.2686.

Apart from this aggregate relationship, our analysis suggests 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 or/and income level of high income customers will raise firm 1's profit but not the informal sector firm. In fact a drop in the number n_m will reduce their profit. When this happens, it is not the case that firm 2 transitions to the formal sector, it may stop production altogether. In Section 4 we consider another scenrio, where the informal sector firm produces intermediate good for the formal firm.

3.5. Industry examples of formal-informal mix

Retail: The retail sector in India is a very good example of both formal and informal sector 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, pavement and handcart vendors, which accounts for almost 88% of the retail market (CARE Ratings, 2019).[14]

But it is interesting to note that within the umbrella of retailing, the share of organized or modern retailing is higher for certain categories as compared to others. Where quality premium, $(u_a - u_b)$ is high, in line with our model, one expects the formal or organized sector to dominate. For example, share of organized retail under the fashion category, which includes clothing, accessories and footwear, is 24% as of 2017 while in the food and grocery category it accounts for only 3%. Given the growth in income levels, we expect to see growth of fashion retailing. But unorganized retailing will continue to thrive in food and grocery category due to its convenience, and other attributes like credit availability, personal relationship with retailer, and bargaining possibility; with implications for informality.

A survey conducted by Mathew, Soundararajan, Gupta, and Sahu (2008), to ascertain the impact of the growing organized retail on unorganized retail, makes similar observations. The survey finds that the unorganized retail hasn't shut shop in the light of growth of the organized sector, as there is demand for both these enterprises to exist. Consumers shopping at organized outlets have higher income levels than consumers shopping at unorganized outlets and the middle class (covering monthly household income between INR 10,000 and INR 1,00,000) which is the mainstay for retail, shop at both organized and unorganized outlets. Their share of spending on the informal sector outlets varies from product to product.

Textile: The Indian textile industry presents another case where both formal and informal firms are present. It is extremely varied, with the handloom, power loom and hosiery sector at one end of the spectrum, while the capital-intensive sophisticated mills sector is at the other end of the spectrum. The industry is dominated by small, fragmented and non-integrated units except for the spinning sector. In the spinning sector 92 percent of the yarn is produced by the organized sector and only a fraction of 8 percent is produced by smaller firms. At the other end of the spectrum, in case of weaving which includes handlooms and poowerlooms, only 5

percent of its production takes place in the organized sector.[15] It is clear that there is enough room for these informal firms to operate, though firm productivity is an issue, as evident in the fact that share of India in global fabric production is only at 20 percent when its share of looms stand at 60 percent.

Auto-components: The Auto-components industry in India is another example of such coexistence. The organised or formal sector caters to the Original Equipment Manufacturers (OEMs) and consists of high-value precision instruments while the unorganised/informal sector comprises of low-value products and caters mostly to the aftermarket category. Aftermarket refers to spare parts (replacement parts) and accessories which cater to the demand for components by consumers after the sale of automobiles by OEMs. The number of unorganised firms in the auto component industry is disproportionately higher than the organised firms. As per 2016–17 data from ACMA, there are about 10,000 unorganised firms as opposed to 700 organised firms, but organised firms account for 85% of the turnover.[16] If we look at the various segments of this auto-component industry, the informal unorganised sector dominates the residual segment (Plastic Moulding, Metal Sheets) which is not very technology intensive.

As this example shows, firms in these two sectors do not necessarily compete. The informal sector firms produce spare parts and components, and form sector firms produce finished products. We turn to the analysis of this link in the next section.

4. Intermediate goods

As discussed before and evidenced by the case studies, formal-informal link can operate through intermediate input supply. Given tighter and costly labour regulations, this has become attractive for the 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 can benefit from this lower cost of production. The phenomenon of such subcontracting has been studied by several scholars (Basole, Basu, & Bhattacharya, 2015; Moreno-Monroy, Pieters, & Erumban, 2012). Basole et al. (2015) report that, based on National Sample Survey data in India, approximately 30% of the 17 million informal manufacturing enterprises worked on subcontract (in 2005). This literature has focussed on the strong linkages between the two sectors in terms of productivity, as this can augment technological capability in the informal sector and improve productivity.

This is also related to the recent work by Ulyssea (2018, 2020) on the two margins of informality. In his study of Brazilian firms, a firm may locate in the formal sector by registering business, but at the same time may hire workers without a formal contract (off the books). The latter is identified as the intensive margin of informality. These two margins are not independent of each other. For example, Ulyssea (2018) shows that as crackdown on informal employment (intensive margin) went up, it led to an increase in the informal sector (extensive margin) as some of the smaller formal firms would find their cost of staying in the formal sector go up. In our model also, though the context is different, firms in these two sectors are interdependent. Procurement of intermediate inputs from the informal sector, by the formal sector firm, can also be viewed as another type of intensive margin.

4.1. A model with final and intermediate goods

While combining both final and intermediate goods production in a model makes it harder to analyse formally, we can extend the framework of previous section and present its heuristic analysis through two illustrative examples.

Suppose, each final good firm in the formal sector (producing advanced good) 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 (at cost $x < c$), and purchased at a price p, with $x < p < c$. This is due to the fact that formal sector labour is more expensive and there are other compliance costs.

Consider a situation when firm 1 is producing good a in the formal sector. As before, we assume that firm 1 does not have to borrow since $A_1 > f$. Its profit is given by

$$R_1 = n_1\left(P_a^* - \min\{\mathrm{c}, \mathrm{p}\}\right) - f, \tag{9}$$

where P_a^* is the price charge by firm 1 and n_1 is the number of consumers buying from firm 1, which depend on whether firm 2 produces good a, *or* b, or the intermediat input. Note that firm 2 has three choices: (i) to produce final good in the formal sector (ii) to produce final good in the informal sector, and (iii) to produce intermediate good in the informal sector. Consider the scenario of section 3, where we have firm 2 produces good b in the informal sector, selling to middle income customers. Assuming basic good production does not require any specific input, its profit from producing the final good in the informal sector will be given by

$$R_{2\mathrm{b}} = n_2 \frac{u_b - u_0}{u_b} Y_m \tag{10}$$

Similarly, profit of firm 2 in the formal sector, producing the advanced good, will be

$$R_{2\mathrm{a}} = n_2\left(P_a^* - \mathrm{c}\right) - (f - A_2)r - f, \tag{11}$$

Its profit from producing the intermediate good for firm 1, is given by

$$R_{2\mathrm{I}} = n_1(p - x), \tag{12}$$

where it sells at price p and produces at $x < c$.

Since firm 2 's costs of operation in the formal sector are higher because of the capital costs $((f - A)r)$, final good production in the informal sector (Eq. 10) can be more attractive. But subsequent profit will depend crucially on the size of the middle income group and their income level. With reduced inequality (lower α) and rise in (n_h/n_m), conditions for Proposition 1 are unlikely to be satisfied and production of the final good in the informal sector may not be an equilibrium choice. But can we get an outcome where firm 2 chooses to locate in the informal sector but to produce the intermediate good? Given the large market, it may be profitable (profit in (12) dominating others in (11) and (10)) to produce the intermediate good and supply firm 1 if the margin $(p - x)$ is sufficiently high. We illustrate this with the following example.

4.2. Example 3

Let us revisit Example 1. Let $u_0 = u, u_b = 1.2u, u_a = 2u$, $f = 200, r = 0.2, c > p = 20$, $\mathrm{x} = 5$, and $A_2 = 0$. Compared to the previous example, there are more high income customers, $n_h = 60, n_m = 60$ and income distribution is less unequal, $Y_m = 100$ & $Y_h = 150$, $\alpha = 1.5$. Consider firm 1 producing good a and supplying the whole market of size 120. Firm 2 produces the intermediate good and sells at price $p = 20$. We claim that this is an equilibrium outcome.

We simply verify that firm 2 does not benefit from any deviations. Firm 2's equilibrium payoff is $R_{2\mathrm{I}}{}^* = n_1(p - x) = 120\ (15) = 1800$. By deviating to final goods production in the formal sector, it can get (at most) $R_{2F} = 60(50 - 20) - 240 < 1800$, where $P_a^* = \frac{2u-u}{2u}100 = 50$ is the profit maximising price in the formal sector. If it were to produce the final good in the informal sector, it will have to charge a lower price. Recall that firm 1 is charging 50 and servicing the entire market. Using (4), highest price that firm 2 can charge would be given by 16, where

$2u(Y_m - 50) \approx 1.2u\ (Y_m - 16)$. Even when we assume that informal sector final goods production does not require the intermediate input, profits (960) will be less.[17] Firm 2 can price really low to attract high income customers also, but since basic good is low quality, for this example, high income customers will not buy the basic good for any positive price. Hence it is clear that firm 2 operates in the informal sector, and produces the intermediate good. The growth in the market size does not lead to the exit of the informal sector firm- rather it changes its production relation with the formal sector.

4.3. Example 4

However, as income grows this link may be broken and both firms will produce in the formal sector. Consider Example 3, with a 20% increase in incomes of both groups, $Y_m = 120$ & $Y_h = 180$. Since the total market size remains same, firm 2's profit from producing the intermediate good in the informal sector stays same at 1800. Now, firm 2's profit from operating in the formal sector will now be given by $R_{2F} = 60(60 - 20) - 240 = 2360 > 1800$. We have taken the cost of production of the input to be 20 but for any $c < 23$, this profit will dominate. We can verify that firm 2's profit from operating in informal sector and producing the basic good will also be lower than 2360. As in Example 3, firm 2 can charge a price of 20 for the basic good and attract all the middle income customers, since $2u(Y_m - 60) = 1.2u\ (Y_m - 20)$. The maximum it can earn is 1200. Hence, both firms producing good a in the formal sector is an equilibrium. We can summarise the analysis of these two above examples in the following proposition.

Proposition 2. *With a rise in the number of high-income consumers and reduction in inequality, the smaller firm is more likely to be producing intermediate goods for formal sector firm, while being located in the informal sector, rather than compete with the formal sector firm. However, for a sufficiently high growth in incomes, both firms operate in the formal sector.*

5. Concluding remarks

In many countries, including India, the size of the informal sector is considerably large and despite recent economic growth it continues to remain so. Even though its output share is getting reduced, employment share remains very high. There are two major concerns. Firstly, the skill level, human capital and productivity of informal sector workers remain low. This obviously affects aggregate output and income. More importantly, large majority of the 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 database. What we need is a semi-formalisation of the informal workforce. The informal sector firms must be incentivised to help in the process.

Additonally, the vertical relationship analysed in Section 4 can be used to improve productivity in the informal sector. But there are two key constraints to the growth of this relationship (in addition to the market sizes). The first one comes from the Goods and Services Tax (GST), adopted in several countries, where the formal sector firm can claim input credit (taxes paid on the inputs) only if the informal supplier is registered for GST. 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, similar to the intensive margin discussed earlier. 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.

Our analysis shows that we need to account for industry level differences, specific features of the product, the composition of customers 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 price of the more recognised brands from the formal sector. Yes, these are likely to be less durable, less safe to use and may not have other modern features but many low income households would not hesitate to own them. This demand helps sustain the informal sector firms. 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 authority. As we have mentioned, the biggest concern is the labour force employed by them. Without threatening their closure, these firms have to be co-opted to provide security and benefits to their workers.

Notes

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 firm may not turn formal, over time the proportion of informal activity falls. See Kanbur (2017), and Danquah, Schotte, and Sen (2019) also.
2. However, we have to be careful in interpreting this since the productivity gain of formalization is not guaranteed, it depends on several factors, as has been observed by Berkel and Tarp (2022) in the case of Myanmar. Second, individuals with certain characteristics, will choose to be in informal employment because of other attractions, confirmed by Duval (2022) in this issue.
3. The evidence on this is quite mixed. While Bruhn (2010) finds that such reforms had negligible impact in Mexico, Fajnzylber, Maloney, and Montes-Rojas (2011) note a significant rise in registration under the SIMPLES program in Brazil. See de Mel, McKenzie and Woodruff (2013) for a similar field experiment in Sri Lanka. See also the survey by Ulyssea (2020) for a summary of the impacts of different interventions.
4. There are some studies who do study these interactions. Maloney (1999) and Ulyssea (2018) are examples where these sectors are not segmented. We discuss this in the next section.
5. Since data on the GST is available, one can define tax formality as firms having registered under the GST. It reports that, 87 percent of firms, representing 21 percent of total turnover, are purely informal, outside both the tax and social security nets. On the other hand, less than 1 percent of firms are purely formal with both social security and GST. Clearly, the extent of informality is huge
6. The scale K matters when we are talking about credit market imperfections and borrowing cost of firms. In the present analysis, it does not play any role.
7. It can be shown that $\frac{\partial A^*}{\partial t} > 0$, and $\frac{\partial A^*}{\partial \theta} < 0$.
9. See Almeida, Paz and Poole (2022), Conover, Khamis and Pearlman (2022) and Duval (2022) in this issue.
10. Various other papers have looked at this relationship in different contexts. See Dobson and Ramlogan-Dobson (2012), Mishra and Ray (2010), Rosser, Rosser, and Ahmed (2000) and Dell'Anno (2016).
11. We can introduce a third group of consumer, low income consumer l with income $Y_l < Y_m$. A similar model with continuous income version but with given informal-formal choice appears in Mishra and Ray (2010).
13. We do not provide formal details of equilibrium analysis here, these would be made available upon request. Also, the analysis can be extended to multiple firms.
14. This is likely to change in the Post-Covid-19 scenario, as the e-commerce segment has expanded considerably.
15. See Mahfuz, Singh, and Ferrantino (2019). According to Sharma (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.
16. The Automotive Component Manufacturers Association of India (ACMA) is the apex body representing the interest of the Indian Auto Component Industry.
17. This is lower than the payoff in (10) as middle income consumers cannot be pushed to their reservation price for the basic good.

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