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Informal firms in developing countries entrepreneurial stepping stone or consolation prize?

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Research Paper No. 2009/19

Informal Firms in Developing Countries

Entrepreneurial Stepping Stone
or Consolation Prize?

John Bennett*

March 2009

Abstract

We analyse potential dynamic benefits for a firm from having the option of adopting informal status. Informality may be a stepping stone, without which formality might never be achieved. This result obtains for a broad range of realistic parameter values, suggesting a potential dynamic case for government support of informal firms. Informality may alternatively play a converse role as a consolation prize, a firm only entering an industry (formally) because it recognizes that if profitability is disappointing, it can switch to informality. However, this result obtains for a range of parameter values so narrow to be of no practical significance.

Keywords: informality, entrepreneurship

JEL classification: O17, M21, D2

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1 Introduction

In developing economies perhaps 40% of GDP is contributed by producers without formal status (Schneider and Este, 2000; Schneider, 2006) and in many countries this percentage is growing (World Bank, 2007). To try and explain the reasons for and consequences of informality an extensive literature has accumulated. Many of the theoretical contributions to this literature are concerned with the effects of the net costs and benefits of informality relative to formality. They are formulated in a multi-firm context, focusing on issues such as competition between firms, the structure of an industry or on the evolution of an economy. The question of what status will be chosen by a single firm, in partial equilibrium, is a simple and relatively minor part of each model.

However, once uncertainty is introduced, the factors underlying the choice between formality and informality are more complicated, and interesting issues arise bearing on the role of informality. In this paper we analyze a two-period model in which, at the beginning of the first period, an entrepreneur chooses whether his or her (price-taking) firm will enter an industry formally or informally, or whether

to stay out. This choice is made under uncertainty about profitability; but if entry is chosen, either formal or informal, the experience of producing in the first period reveals the firm's profitability. Then, given that entry has occurred, at the beginning of the second period the entrepreneur faces the choice, under certainty, between continuing with the same or switching formality/informality status, or exit. In each period formality and informality have various cost/benefit differences, including with respect to sunk cost. In this framework, we consider two specific questions relating to whether the availability of the option of informal status for a firm may play a dynamic role in its entry and continued production. These 'stepping stone' and 'consolation prize' arguments are suggested in Bennett and Estrin (2009). In the present paper we formulate them in detail to assess their validity.

The literature generally views informality as something that may have to be lived with for a while, but which it would be better to eliminate. For example, Loayza (1996) argues that informality undermines the tax base, with negative effects on investment public infrastructure. De Paula and Scheinkman (2008) note that there is growing evidence that informal firms are less efficient than formal ones, suggesting that this might be because of their 'necessarily' small size and lack of access to credit and legal protection. Furthermore, informal employment is disadvantageous to workers in that it generally comes without social benefits (see,

e.g., World Bank, 2007). These perspectives are built into our model.

An alternative view, associated particularly with Maloney (2004) sees a significant proportion of informal firms, especially the self-employed, in Mexico and some other Latin American countries, as the equivalent of small-scale entrepreneurial firms in developed economies. For these firms, informality is a rational response to the excessive regulation of formality. The analysis in the present paper gives a complementary perspective - informality may have dynamic benefits in an uncertain world because it involves smaller outlays, including on sunk costs, than formal operation does.¹

We assume that a formal firm has a higher unit labour cost than an informal firm, the difference being interpreted either as the requirement that a formal firm must provide social benefits, or that it must pay a statutory minimum wage (a similar assumption is made by Rauch, 1991, Loayza, 1996, and Banerji and Jain, 2007, among others). However, a formal firm obtains a productivity benefit from access to public services (e.g., legal protection and contract enforcement) that may not be available to an informal firm (Straub, 2005; Amaral and Quintin, 2006; de Paula and Scheinkman, 2008).² In practice, informality is strongly associated

¹Similar arguments can be made with respect to choosing between small and large size even without the formality-informality dimension being included in the model. However, the analysis of these arguments in the context of formality and informality is particularly important because it relates to whether government policy should actively discourage informality.

²This advantage may also be interpreted as reflecting the ability of a formal, but not an informal, firm to sell its output to the government, thereby receiving a higher price than for a private sale.

with small size, the expansion of informal firms often being inhibited by the fear of attracting the attention of the authorities (Fortin, Marceau and Savard, 1997; World Bank, 2007), while some regulations only apply to firms above a specified size (see, e.g., Ahsan and Pages, 2007, on benefits for workers in India). To give a stylized representation of this size factor we assume that if the firm were operated formally it would use twice as much capital and labour as it would if it were informal.³

The stepping-stone argument relates to whether entering informally, to test the water before uncertainty is resolved, may be a rational choice for the entrepreneur. We suggest alternative interpretations of the stepping stone in this context. In particular, we consider whether, for some parameter values, having the option of entering informally in the first period will, given the potential to switch to formality in the second period, be the decisive factor in inducing the entrepreneur to enter at all.⁴

The consolation-prize argument concerns the possible impact of being able

³A similar formulation is used by Bennett (2008) to analyze welfare aspects of formality/informality and by Bennett and Estrin (2009) to analyze interactions between formal and informal firms. Other cost/benefits for formal, but not informal, firms that appear in the literature, but which we do not consider, are taxes (Auriol and Warlters, 2005), registration costs (Antunes and Cavalcanti, 2007), and access to formal finance (Straub, 2005) and superior technology (Chong and Gradstein, 2007). Also, endogenous growth models have been developed, in which higher taxes finance more productive public infrastructure but give an incentive to firms to be informal so as not to pay tax (see, for example, Loayza, 1996, Sarte, 2000, and Ihrig and Moe, 2004).

⁴It is noted by the World Bank (2007, p 140) that in Mexico new entrants into self employment are more likely to start their businesses without any employees, testing the waters before they make any significant investment decisions. Self-employment in developing economies is commonly treated as part of the informal sector.

to choose informality in the second period, having entered formally in the first period.⁵ Suppose that formal entry in the first period only yields a positive present value of the profit stream because of the existence of the option of being able to switch to informality in the second period; that is, without this option, the entrepreneur would not enter in the first period. In this case informality offers a consolation prize that plays a critical role in attracting entry.

After analyzing these arguments, we arrive at the general conclusion that ranges of parameter values exist for which the stepping-stone and consolation-prize arguments hold. Indeed, the stepping-stone argument obtains for a wide range of parameter values that appear realistic. However, in our stylized model the consolation-prize argument only applies for a range of parameter values that is so narrow that it appears of little practical significance. Therefore the stepping-stone argument, but not the consolation-prize one, suggests a potential dynamic rationale for adopting lenient government policy towards informality.

Section 2 outlines the model. Sections 3 and 4 examine the stepping-stone and consolation-prize arguments, respectively. Section 5 contains further discussion of our assumptions, and Section 6 concludes. An appendix provides some technical details.

⁵This might occur by transferring the assets for the (formal) firm to set up another (informal) firm under another name.

2 The Model

At time $t = 0$ a risk-neutral entrepreneur considers whether to enter a given industry in a developing economy. The profitability of his or her firm in the industry is unknown at this time; but if entry is chosen, production occurs at time $t = 1$, resolving the uncertainty, i.e., it reveals what profitability is. If the entrepreneur then decides to continue, production at $t = 2$ will take place under certainty. This formulation of uncertainty can be regarded as reflecting one or both of two forms of uncertainty. The first is firm-specific (or equivalently entrepreneur-specific), as modelled by Jovanovic (1982), with the firm learning its own idiosyncratic profitability through experience. The second is industry-specific, as formulated by Hausmann and Rodrik (2003) and Hausmann, Hwang and Rodrik (2007), which relates to an industry that is new to a developing economy. The industry is assumed already to exist in other economies, but it is unknown *ex ante* what its profitability will be when adapted to the specific institutional deficiencies and factor supply constraints of the developing economy concerned. In this case, production by an initial entrant reveals profitability for all future entrants.

At $t = 1$ the entrepreneur may choose informal status or formal status for the firm.⁶ At $t = 2$, if the firm continues in production its formality/informality status from $t = 1$ may be maintained, or its status may be switched. At either

⁶Although it would be interesting to allow for the possibility that the firm may employ some workers formally and some informally, the model is not suited to examining this issue.

time, if the firm is informal it employs one unit of labour, while if it is formal it employs two. Factor proportions are assumed fixed, an informal firm using k units of capital, and a formal firm $2k$. Thus, to operate informally at $t = 1$ a firm must purchase k units of capital, and if it switches to formality at $t = 2$ it must purchase an additional k units. To operate formally at $t = 1$ it must purchase $2k$ units of capital, and if it switches to informality at $t = 2$ it is assumed to dispose freely of its excess capital. We assume that the firm is a price taker in all markets.⁷

If the firm is informal it pays the market wage rate w , whereas if it is formal it pays $w + s \equiv \bar{w}$, with either s being interpreted as the cost of providing social benefits or \bar{w} being interpreted as the statutory minimum wage. We assume that, per unit of labour (and the associated k units of capital), if the firm is formal it produces β times as much as it would if it were informal. Profitability depends on the value taken by a stochastic variable whose realization θ is defined to be the revenue from operating informally, and is assumed uniform over $[0, 2\Theta]$.⁸

⁷By specifying a larger size for a formal firm than an informal firm we are implicitly assuming that the risk of discovery and associated penalties are so great if the firm is informal *and* large, that the entrepreneur never pursues this option. Reformulation of the model explicitly to incorporate this factor would make it more complicated without affecting the basic insights that are obtained.

⁸ θ may be understood as output with either the Jovanovic firm-specific interpretation or the Hausmann-Rodrick industry-specific interpretation of uncertainty; but with the latter interpretation θ may alternatively be understood either as unit price.

Thus, at $t = 1$ profits from informality and from formality are, respectively,⁹

$$\pi_{1i} = \theta - w - k; \quad (1)$$

$$\pi_{1f} = 2(\beta\theta - \bar{w} - k). \quad (2)$$

If the firm entered informally (formally) at $t = 1$, it begins $t = 2$ with k ($2k$) units of capital. Assuming free disposal, if it is informal for $t = 2$ its profit is then

$$\pi_{2i} = \theta - w, \quad (3)$$

while if it is formal at $t = 2$ its profit is

$$\pi_{2f} = 2(\beta\theta - \bar{w}) - k \text{ if informal at } t = 1; \quad (4)$$

$$= 2(\beta\theta - \bar{w}) \text{ if formal at } t = 1. \quad (5)$$

The entrepreneur's choice problem is solved by backward induction. We start by examining the choice made at $t = 2$, first assuming that formal entry occurred at $t = 1$, and then instead assuming informal entry at $t = 1$. In each of these cases

⁹We could interpret the informal firm as involving self-employment, with w being the opportunity cost for the entrepreneur - that is, the market wage that he or she could earn if employed by another firm. But then we need also to allow for the entrepreneur's opportunity cost if his or her firm is formal, so presumably we should also subtract w from the expression for formal profit. Appropriate amendments would then be required throughout our algebra, but the general thrust of the arguments would be unaffected.

we determine how the entrepreneur's chosen action at $t = 2$ (exit, informality or formality), depends on the realization of θ (and also on the values of parameters w , \bar{w} , k and β). Thus we calculate the expected profit at $t = 2$, contingent on the action taken at $t = 2$ (the details are left to an appendix). We then consider the choice facing the entrepreneur at $t = 1$. For simplicity, we do not allow for discounting. We assume that the entrepreneur maximizes total (two-period) expected profits (which we call the 'payoff'). We denote the firm's expected profit at $t = 2$ by $E\pi_2(f)$ and $E\pi_2(i)$, respectively, depending on whether it entered formally or informally at $t = 1$.

Suppose the firm was formal at $t = 1$. We then find that if

$$w \geq \bar{w}/\beta,$$

that is, if the variable cost per unit of output at $t = 2$ is at least as great for informality as for formality, informality is never chosen at $t = 2$ (regardless of how large θ is). Expected profit at $t = 2$ is then

$$E\pi_2(f) = \frac{1}{2\Theta} \int_{\bar{w}/\beta}^{2\Theta} 2(\beta\theta - \bar{w})d\theta = \frac{1}{2\Theta\beta} (2\Theta\beta - \bar{w})^2, \quad (6)$$

which is valid if

$$2\Theta > \bar{w}/\beta. \quad (7)$$

If, alternatively,

$$w < \bar{w}/\beta, \quad (8)$$

informality may be chosen at $t = 2$, and we obtain

$$\begin{aligned} E\pi_2(f) &= \frac{1}{2\Theta} \int_w^{(\bar{w}+s)/(2\beta-1)} (\theta - w) d\theta + \frac{1}{2\Theta} \int_{(\bar{w}+s)/(2\beta-1)}^{2\Theta} 2(\beta\theta - \bar{w}) d\theta \\ &= 2(\beta\Theta - \bar{w}) + \frac{1}{4\Theta} w^2 + \frac{1}{4\Theta} \frac{(\bar{w} + s)^2}{2\beta - 1}, \end{aligned} \quad (9)$$

which is valid if

$$2\Theta > (\bar{w} + s)/(2\beta - 1). \quad (10)$$

If, alternatively, the firm was informal at $t = 1$, profit at $t = 2$ is the same as if the firm was formal at $t = 1$, except that if formality is chosen at $t = 2$, k must be spent on capital. The condition that the variable cost per unit of output at $t = 2$ is at least as great for informality as for formality is then

$$w \geq \frac{1}{\beta} \left(\bar{w} + \frac{k}{2} \right).$$

If this is satisfied, informality is never chosen at $t = 2$ for any realization of θ , and

expected profit is

$$\begin{aligned}
E\pi_2(i) &= \frac{1}{2\Theta} \int_{(\bar{w}+k/2)/\beta}^{2\Theta} [2(\beta\theta - \bar{w}) - k] d\theta \\
&= 2\Theta\beta - 2\bar{w} - k + \\
&\quad \frac{(k + 2s + 2\bar{w})}{8\Theta(2\beta - 1)^2} [(3\beta - 2)(k + 2w) + 4(\beta - 1)s], \tag{11}
\end{aligned}$$

which is valid if

$$2\Theta > (\bar{w} + k/2)/\beta. \tag{12}$$

If, alternatively,

$$\frac{1}{\beta} \left(\bar{w} + \frac{k}{2} \right) > w, \tag{13}$$

informality may be chosen at $t = 2$, and we obtain

$$\begin{aligned}
E\pi_2(i) &= \frac{1}{2\Theta} \int_w^{(\bar{w}+s+k)/(2\beta-1)} (\theta - w) d\theta + \frac{1}{2\Theta} \int_{(\bar{w}+s+k)/(2\beta-1)}^{2\Theta} [2(\beta\theta - \bar{w}) - k] d\theta \\
&= 2\Theta\beta - 2\bar{w} - k + \frac{2w^2\beta + 4ks + 2kw + 4sw + k^2 + 4s^2}{4\Theta(2\beta - 1)}, \tag{14}
\end{aligned}$$

which is valid if

$$2\Theta > (\bar{w} + s + k)/(2\beta - 1). \tag{15}$$

We assume that (12) and (15) hold, which implies that (7) and (10) hold.

Now let $EV(f)$ and $EV(i)$ denote the respective payoffs from entering formally

and informally at $t = 1$. Then

$$EV(f) = 2(\beta\Theta - \bar{w} - k) + E\pi_2(f); \quad (16)$$

$$EV(i) = \Theta - w - k + E\pi_2(i), \quad (17)$$

where $E\pi_2(f)$ is given by (6) or (9) and $E\pi_2(i)$ by (11) or (14), as appropriate.

Let Δ_t denote the net gain in expected profit at time t from choosing formality rather than informality at $t = 1$. Then

$$\begin{aligned} \Delta_1 &= (2\beta - 1)\Theta - \bar{w} - s - k; \\ \Delta_2 &= E\pi_2(f) - E\pi_2(i) \geq 0. \end{aligned} \quad (18)$$

Δ_2 , the net gain in expected profit at $t = 2$ from choosing formality rather than informality at $t = 1$, is positive because formal entry at $t = 1$ leaves the firm with more capital at $t = 2$ than informal entry at $t = 1$ does. Provided the firm enters, formality (informality) at $t = 1$ is preferred if

$$EV(f) - EV(i) = \Delta_1 + \Delta_2 > (<) 0. \quad (19)$$

Since $\Delta_2 \geq 0$, a sufficient condition for formality to be preferred at $t = 1$ is that $\Delta_1 > 0$.

Using (6)-(15) we obtain the effect of variation of parameter values on the choice at $t = 1$ between formality and informality.

Lemma 1 *$EV(f) - EV(i)$ is increasing in Θ and β , and decreasing in w , \bar{w} and k .*

Proof: see Appendix.

Higher expected output demand, as represented by Θ , favours formality because a formal firm is larger and so can take greater advantage than an informal firm can of a greater profit opportunity. The higher input costs k and w that affect a firm under either status, favour informality because informality involves smaller size. A higher productivity parameter β only impacts on the firm if it is formal and so favours formality. A higher minimum wage rate \bar{w} , for constant w (which is equivalent to a higher cost s of social benefit provision) favours informality.

3 Informality as a Stepping Stone

We consider three ways, denoted by (S1)-(S3), in which the idea of informality as a stepping stone might be formalized. (S1) simply interprets the stepping stone as the possibility that the entrepreneur will enter informally and then change to formal status. (S2) and (S3), which build on (S1), are more interesting analytically since they distinguish the role of first adopting informal status when this has a

critical effect on the decision to invest. (S2) introduces the additional condition that if informality were somehow ruled out altogether, then (formal) entry at $t = 1$ would yield a negative payoff. However, as we argue below, (S2) does not fully disentangle the stepping-stone argument from the consolation-prize one, and so with (S3) we introduce a modification to (S2) that achieves this separation.

(S1) If parameter values, including the realization θ turn out such that informality is chosen at $t = 1$, and then formality is chosen at $t = 2$, then informality has indeed been a transitional phase for the firm. This happens if both

$$EV(i) \geq \max[EV(f), 0], \quad (20)$$

so that informality is chosen at $t = 1$, and

$$\theta \geq \frac{1}{\beta} \left(\bar{w} + \frac{k}{2} \right) \text{ if } \frac{1}{\beta} \left(\bar{w} + \frac{k}{2} \right) \leq w; \quad (21)$$

$$\theta \geq (\bar{w} + s + k)/(2\beta - 1) \text{ if } \frac{1}{\beta} \left(\bar{w} + \frac{k}{2} \right) > w, \quad (22)$$

so that formality is then chosen at $t = 2$. With (S1), the prospects for the firm appear reasonably good at $t = 1$, though not so good as to justify immediate formal status; but then a good ‘draw’ of θ obtains and so a switch is made to formality at $t = 2$.

(S2) The role of informality as a stepping stone is more significant if, in addition

to the conditions specified for (S1), parameter values are such that, if informal entry at $t = 1$ were ruled out altogether, the firm would not enter. Thus, by allowing experimentation at relatively low input costs, informality at $t = 1$ is the critical factor enabling a firm to develop into formality at $t = 2$. Without the stepping stone, formal status could not be achieved.

If informality at $t = 1$ is effectively ruled out by law there seems no reason to suppose that it would then be possible at $t = 2$, and so we also assume that informality is ruled out at $t = 2$. Formal entry at $t = 1$ would yield profit $\pi_1 = 2(\beta\theta - \bar{w} - k)$ and then at $t = 2$ profit would be $\pi_2 = 2(\beta\theta - \bar{w})$ from continued formality, or it would be zero from exit. Thus, at $t = 2$ the firm would remain formal if $\theta \geq \bar{w}/\beta$, but otherwise it would exit. Denoting by $E\pi_2(F)$ its expected profit at $t = 2$ when formality is the only productive status available, we see that $E\pi_2(F) = E\pi_2(f)$, where the latter is given by (6); i.e., expected profit at $t = 2$ is the same as when informality is possible, but parameter values result in informality not being chosen for any realization θ . The condition that formality in both periods would yield a negative expected profit stream is therefore

$$EV(F) = E\pi_1(F) + E\pi_2(F) = 2(\beta\Theta - \bar{w} - k) + \frac{1}{2\Theta\beta} (2\Theta\beta - \bar{w})^2 < 0. \quad (23)$$

For the underlying integral to hold, we have already noted that (7) must be satisfied.

(S3) This interpretation is a development of (S2) and allows sharper differentiation of the stepping-stone argument from the consolation-prize one, which relates to the role of the option of informality at $t = 2$ and its impact on behaviour at $t = 1$. With (S2) we have not ruled out the possibility that formal entry at $t = 1$ followed by informality at $t = 2$ may yield a positive payoff. To separate out this consolation-prize sequence, assume that moving in status from formality to informality is not feasible. Then, (21)-(23) still apply, but the term $EV(f)$ on the right-hand side of (20) must be replaced by $EV(F)$. However, we already require, in (23), that $EV(F) < 0$, and so the term $EV(F)$ in the amended version of (20), becomes superfluous. (S3) is a less demanding interpretation than (S2), the difference being that, instead of (20), we have simply

$$EV(i) \geq 0. \tag{24}$$

In considering these three interpretations we must take into account the complications arising from whether (8) or (13) hold. Since, however, our concern is to explore whether informality can have a positive role in the entry and growth of a firm, we simplify by focusing on cases in which (8) holds (implying (13)). Thus, labour costs per unit of output are greater under formality than informality.

To summarize, for the stepping-stone interpretation (S1) to apply, (20) and (22) must hold so that informality is preferred at $t = 1$, then formality at $t = 2$.

For (S2) to apply (20) and (22), plus (7) and (23) must hold so that, additionally, if informality were ruled out, the firm would not enter. For (S3), the same conditions as for (S2) must hold, except that (24) replaces (20), this amendment ruling out the option of entering formally and then moving down to informal status.

One more distinction can be made. We have specified for each interpretation that at $t = 2$ the realization θ is such that formality is then chosen; that is, the entrepreneur actually makes the step to formality. However, we could still interpret (S2) and (S3) as representing a stepping-stone if the step is not actually taken, that is, if the *possibility* of taking the step to formality is the critical factor. Thus, (S2) and (S3) may be interpreted as obtaining without the condition (22) necessarily holding, but instead assuming that such a realization θ is feasible.

Proposition 1 *For each of the three interpretations (S1)-(S3), there exist non-empty sets of parameter values for which the stepping-stone argument applies.*

The proposition can be proved by example. Consider (S3). We take illustrative values of w and k , and then calculate a lower bound on s , above which (S3) may hold. Given this value of s , the range of 2Θ for which (S3) holds is then calculated.

In Table 1, $k = w = 1$, so that, for $t = 1$, the capital costs of an informal firm are 50% of total costs (other numerical examples give a similar flavour). For each value of β , if w/\bar{w} and 2Θ are each in the range shown in the relevant row of the table, (S3) holds. For example, if $\beta = 1.5$, there being a 50% productivity

gain associated with formality, then (S3) holds if both $w/\bar{w} \leq 0.67$ (the informal wage being no more than about 67% of the formal wage) and 2Θ (which may be interpreted as representing demand prospects) lies between 1.50 and 2.44. The lower bound of the range for 2Θ is the minimum value of the realization θ at which the entrepreneur would switch from informality to formality at $t = 2$. With 2Θ above this value it is feasible to take this step. The upper bound of the range for 2Θ is the minimum value at which informality would be entirely eschewed, formality being chosen in both periods. (Thus, for (S3) to hold, demand prospects must be neither too favourable nor too unfavourable.)

β	w/\bar{w}	2Θ
1.1	≤ 0.91	1.83 – 2.66
1.3	≤ 0.77	1.63 – 2.54
1.5	≤ 0.67	1.50 – 2.44
1.7	≤ 0.59	1.42 – 2.35
1.9	≤ 0.53	1.36 – 2.27

Table 1 (S3) conditions for $k = w = 1$

The table shows that when β is larger, if (S3) is to hold, w/\bar{w} must be more tightly constrained from above, and 2Θ must occupy a lower range. Intuitively, when the productivity gain from formality is larger, the informal wage must undercut the formal wage by more, and the demand prospects of the industry must

be in a lower range.

Data from World Bank (2007, page 87) suggest that, on average, for the same job, the informal wage is 56.9% of the formal wage in Argentina, and corresponding figures are 33.0% for Bolivia, and 54.1% for the Dominican Republic. These figures are broadly consistent with those in Table 1, suggesting that the stepping stone may well obtain in practice. For lower values of the productivity parameter β , a broader range of w/\bar{w} values is consistent with the stepping stone: for example, for $\beta = 1.1$, w/\bar{w} may be up to about 91%. Even for $\beta = 1.9$, the necessary condition is that $w/\bar{w} \leq 0.53$, still broadly in line with the World Bank data.

For the parameter values assumed in Table 1 ($w = k = 1$ and $1.1 \leq \beta \leq 1.9$) it turns out that the conditions for (S2) are the same as those for (S3) - though in other numerical examples (S2) involves tighter conditions. In addition to the conditions specified in the table, for (S1) (and also for (S2) and (S3) if we include this in our definition of these interpretations) it is required that the realization θ actually falls within the range specified in (22), which, as already noted, is the lower bound of the range that is specified for 2Θ .

4 Informality as a Consolation Prize

Given the parallel with the stepping-stone, we can be brief in discussing informality as a consolation prize. Following formal entry at $t = 1$, (8) is a necessary condition

for informal status to be chosen at $t = 2$, and so we assume it holds. We have the following alternative interpretations.

(C1) Suppose parameter values, including the realization θ , turn out such that formality is chosen at $t = 1$ and then informality at $t = 2$. This happens if both

$$EV(f) \geq \max[EV(i), 0], \quad (25)$$

so that formality is chosen at $t = 1$, and

$$w \leq \theta < (\bar{w} + s)/(2\beta - 1), \quad (26)$$

so that informality is chosen at $t = 2$.¹⁰

(C2) The consolation prize argument is of more significance if the firm would not enter if informality were ruled out for the two periods, that is, if, in addition to (25), (23) is satisfied, in which case (7) must hold for the integral to be valid. For this interpretation, it is not necessary that (26) hold - we may regard the potential compensation prize, rather than its receipt, as what matters.

(C3) However, the term $EV(i)$ in (25) relates to informal entry at $t = 1$ followed by either formal or informal status at $t = 2$. To differentiate the consolation prize fully from the stepping stone we rule out the sequence of informality followed

¹⁰Here, $EV(f) = 2(\beta\Theta - \bar{w} - k) + E\pi_2(f)$, where $E\pi_2(f)$ is given by (9); $EV(i) = \Theta - w - k + E\pi_2(i)$, where $E\pi_2(i)$ is given by (14). These equations also apply for (C2) and (C3).

by formality; that is, instead of $EV(f) \geq \max[EV(i), 0]$, we now need $EV(f) \geq \max[EV(i^*), 0]$, where $EV(i^*)$ denotes the payoff from entering informally at $t = 1$ if, for $t = 2$, formality is ruled out. Since this amendment involves a reduction in the number of situations in which the consolation prize sequence is required to yield the greater payoff, a wider range of parameter values will satisfy (C3) than (C2).

Proposition 2 *For each of the three interpretations (C1)-(C3), there exist non-empty sets of parameter values for which the consolation-prize argument applies.*

For (C1) we focus on the satisfaction of (25), for if this holds (26) will also be satisfied for some realizations θ . In Table 2 it is assumed, as in Table 1, that $w = k = 1$, and values of β are specified between 1.1 and 1.9. Unlike in Table 1, however, we find that the required range for 2Θ , if it exists, varies with the specific value of w/\bar{w} . To illustrate, if $\beta = 1.5$ then (C1) cannot hold for $w/\bar{w} = 0.91$ or $w/\bar{w} = 0.77$; but for $w/\bar{w} = 0.67$, (C1) holds if $2\Theta > 2.50$, while for $w/\bar{w} = 0.59$ it holds for $2\Theta > 2.90$, and for $w/\bar{w} = 0.53$ it holds for $2\Theta > 3.30$. These ranges for 2Θ are higher than for the $\beta = 1.5$ row in Table 1 because formal entry at $t = 1$ (as in the consolation-prize sequence) involves a higher sunk cost than informal entry (as in the stepping-stone sequence) does.

	2Θ				
β	$w/\bar{w} = 0.91$	$w/\bar{w} = 0.77$	$w/\bar{w} = 0.67$	$w/\bar{w} = 0.59$	$w/\bar{w} = 0.53$
1.1	> 2.83	> 3.50	> 4.17	> 4.83	> 5.83
1.3	—	> 2.63	> 3.13	> 3.63	> 4.13
1.5	—	—	> 2.50	> 2.90	> 3.30
1.7	—	—	—	> 2.42	> 2.75
1.9	—	—	—	—	> 2.36

Table 2 (C1) conditions for $k = w = 1$

As w/\bar{w} is reduced (i.e., s is raised) in Table 2, the lower bound on the 2Θ range increases: this happens because as w/\bar{w} falls 2Θ must be in a higher range to ensure that $EV(f) \geq EV(i)$. As β is increased, formality being more profitable, there is a reduction in the lower bound on the 2Θ -range that is required for $EV(f) \geq EV(i)$ to hold. But, in order for (8) to be satisfied, higher values of w/\bar{w} (lower values of s) are ruled out.

For (C2) the picture is qualitatively different. For example, if $k = w = 1$ there are no values of 2Θ for which, with $w/\bar{w} \in [0.5, 1]$ and $\beta \in (1, 2]$ (C2) is satisfied. There exist other ranges of parameter values that do satisfy (C2) - but these are narrow. Suppose $w = 1$ again, but that $k = 2$. If, for example, $\beta = 1.5$, then (C2) can hold for $w/\bar{w} \in (0.58, 0.67)$, but only for ranges of 2Θ for which the upper lower bounds differ from the fourth decimal place onwards. For example,

if $w/\bar{w} = 0.625$ we require $2\Theta \in [3.29360, 3.29396]$. When we search across other ranges of parameter values, similar results are obtained. Thus, Proposition 2 is corroborated for (C2), but it appears that there is no practical significance.

However, (C2) is a hybrid formulation of the consolation prize argument, whereas (C3) is a purer formulation and it involves a weaker set of conditions. It may therefore be conjectured that (C3) will be satisfied for a wider range of parameter values. Consider again, for $k = w = 1$, the values of w/\bar{w} and β used in Table 2. For 15 of the 25 combinations of w/\bar{w} and β shown there, there are no ranges of 2Θ for which (C3) obtains.¹¹ For example, for $w/\bar{w} = 0.67$ and $\beta = 1.1$ (C3) obtains if $2\Theta \in [3.341, 3.359]$, while if w/\bar{w} is reduced to 0.53, the required range is $2\Theta \in [3.928, 3.990]$; and for $w/\bar{w} = 0.53$ and $\beta = 1.5$ (C3) obtains if $2\Theta \in [2.919, 2.925]$.¹² The conjecture that (C3) will hold for a wider range of parameter values than (C2) is correct; but the required ranges of parameter values are still narrow compared to the ranges found for the stepping stone, and they do not appear wide enough for the consolation prize, as represented by (C3) to play a significant role in practice.

¹¹The ones that do obtain are those for the four furthest right-hand cells of Table 2 for $\beta = 1.1$; the three furthest right-hand for $\beta = 1.3$; the two furthest right-hand for $\beta = 1.5$ and the far right-hand for $\beta = 1.7$.

¹²For the particular example described for (C2) above, that is, with $\beta = 1.5$ and $w/\bar{w} = 0.625$, it is found that the required range for 2Θ is the same for (C3) as for (C2).

5 Further Comments

Our analysis has been based on a highly stylized model, but this is adequate for establishing, by example, the *possibility* that the stepping-stone and consolation-prize arguments will hold. It would be interesting to explore these arguments in alternative models, and in particular to examine whether our negative conclusion about the likelihood of the consolation-prize argument holding can be reversed. Among other things, we might consider the effects of better access to capital for formal firms, greater capital intensity of formal firms, and of the existence of a market for used capital goods. To examine these issues in detail would require a reworking of our algebra and examples, but, to illustrate the factors that come into consideration, here we discuss the first of them briefly.

Suppose that only formal firms can access the formal credit market and that they therefore pay a lower unit price for their capital than informal firms do. Thus, taking a time period in isolation, the expected profitability of formality is raised relative to that of informality, and this factor might be decisive in causing an entrepreneur to choose formality rather than informality. However, we cannot jump to the same conclusion in a dynamic context. We focus on the stepping stone here, but a similar conjecture applies for the consolation prize.¹³ The critical point

¹³Another possibility is that an informal firm faces a binding constraint on its availability of credit, whereas a formal firm is unconstrained. This would work against both the stepping-stone and consolation-prize arguments.

is that an increase in the expected profitability of formality at $t = 2$ not only raises the payoff¹⁴ from entering formally at $t = 1$, but also raises the payoff from entering *informally* at $t = 1$ because the firm then has the *option* of formal status at $t = 2$.

Assume first that there is a single price for capital. Suppose that (i) if informality were ruled out the entrepreneur would not enter, i.e., the payoff from entering formally and then either remaining formal or exiting, as appropriate, would be negative; and (ii) if informality were possible, informality at $t = 1$, followed by whatever behaviour turns out to maximize profit at $t = 2$, also yields a negative payoff, though suppose this payoff is close to zero. Now amend the model such that the price of capital for an informal firm, but not that for a formal one, is reduced. This raises the payoffs for both scenarios, (i) and (ii); but even if it raises the payoff for (i) by much more than that for (ii), we conjecture that the payoff for (i) may still be negative, while that for (ii) may become positive. If, at $t = 2$, the realization of θ turns out to be high, formality will then be chosen. Thus, we suggest that a lower price for formal capital may, for some parameter ranges, widen the applicability of the stepping-stone argument. Further analysis is required to test this conjecture.

¹⁴Recall that, for brevity, we are using the term ‘payoff’ to represent the present value, as of the beginning of $t = 1$, of the expected profit stream over the two periods in the model.

6 Concluding Comments

Analysis of the role of informal firms in developing economies has not previously focused on the dynamic role of informality. In this paper it is shown that informality may be a stepping stone toward formality for a firm and that without the stepping stone formality might never be achieved. Although the analysis is based on a simple stylized model, it appears that the stepping stone may be inducement to entry and growth for a broad range of realistic parameter values.

It has also been established that informality may be a consolation prize for a firm, and, in particular, that the existence of the potential fallback of informality, should profitability turn out to be disappointing, can be the decisive factor inducing a firm to enter. However, this result only obtains for a very narrow range of parameter values, and so does not appear to be of practical significance, though we cannot rule out the possibility that the consolation prize would play a greater role in a less stylized model.

The greater significance of the stepping stone, compared to the consolation prize, may not be found surprising when we consider the difference in sunk costs between the two. Each involves entry under uncertainty, but with the stepping stone a small amount of capital is sunk before further commitment is made, whereas with the consolation prize a larger amount of capital is sunk initially. Thus, it is harder to find parameter values that make entry justifiable in terms of the consolation-

prize argument. We conclude that on stepping-stone (but not consolation-prize) grounds there can be a dynamic case for government being lenient in its policy towards the informal sector.

Appendix

Derivation of Expected Profit at $t = 2$

We write X to denote exit, I informal status, F formal status and SO staying out of the industry. Consider behaviour at $t = 2$. If F at $t = 1$, from (3) and (5) profits at $t = 2$ are $\theta - w$ if I is chosen, but $2(\beta\theta - \bar{w})$ if F chosen. Thus, if $w \geq \bar{w}/\beta$, I is not chosen at $t = 2$ for any θ : X is chosen if $\theta < \bar{w}/\beta$, but F if $\theta \geq \bar{w}/\beta$. (6) follows. But if (8) holds, at $t = 2$ X is chosen if $\theta < w$; I if $w \leq \theta < (\bar{w} + s)/(2\beta - 1)$; F if $(\bar{w} + s)/(2\beta - 1) \leq \theta \leq 2\Theta$. (9) follows.

If I at $t = 1$, then if $\frac{1}{\beta}(\bar{w} + \frac{k}{2}) \leq w$, at $t = 2$ X (F) is chosen if $\theta < (\geq)(\bar{w} + \frac{k}{2})/\beta$. (11) follows. But if (13) holds, at $t = 2$ X is chosen if $\theta < w$; I if $w \leq \theta < (\bar{w} + s + k)/(2\beta - 1)$; F if $(\bar{w} + s + k)/(2\beta - 1) \leq \theta$. (14) follows.

Lemma 1

From (19), $EV(f) - EV(i) = \Delta_1 + \Delta_2$. From (18), Δ_1 is increasing in Θ , and β , and decreasing in s , k and w , as in the lemma. We now focus on Δ_2 . Since (8) and (13) each may or may not hold, and $k > 0$, three cases can be distinguished.

First, if $(\bar{w} + \frac{k}{2}) \leq w$ then, using (6) and (11),

$$\Delta_2 = k + \frac{1}{2\Theta} \left\{ \frac{1}{\beta} \bar{w}^2 - \frac{(k + 4s + 2w)}{4(2\beta - 1)^2} [(3\beta - 2)(k + 2w) + 4(\beta - 1)s] \right\}.$$

Using (12), the lemma follows for this case. Second, if $\frac{1}{\beta} \bar{w} \leq w < \frac{1}{\beta} (\bar{w} + \frac{k}{2})$ then, using (6) and (14),

$$\Delta_2 = k + \frac{1}{2\Theta} \left[\frac{1}{\beta} \bar{w}^2 - \frac{1}{2(2\beta - 1)} (2w^2\beta + 4ks + 2kw + 4sw + k^2 + 4s^2) \right].$$

Using (15), the lemma follows for this case. Third, if $w < \frac{1}{\beta} \bar{w}$, then using (9) and (14),

$$\Delta_2 = k - \frac{1}{4(2\beta - 1)\Theta} [2(\bar{w} + s) + k]k.$$

Using (10) and (15), the lemma follows for this case.

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