Small Bus Econ (2010) 34:53–63
DOI 10.1007/s11187-009-9194-6

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

John Bennett

Accepted: 15 March 2009 / Published online: 5 May 2009

Abstract The potential dynamic benefits of a firm having the option to adopt informal status are analysed. Informality may be a stepping stone, without which formality may never be achieved. This result is obtained 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, with a firm only entering an industry (formally) because it recognizes that if profitability is disappointing, it can switch to informality. However, this result is obtained for a range of parameter values so narrow as to be of no practical significance.

Keywords Entrepreneurship · Informality

JEL Classifications O17 · M21 · D2 · L26

1 Introduction

In developing economies, perhaps 40% of the gross domestic product (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). An extensive literature has accumulated that attempts to explain the reasons for and consequences of informality. Many of the theoretical contributions to this literature focus on the effects of the net costs and benefits of informality relative to formality. These are formulated in a multi-firm context, focusing on such issues as competition between firms, the structure of an industry or the evolution of an economy. The question of which 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, I analyse 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 conditions of 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 conditions of certainty, between continuing with the same status or switching formality/informality status, or exit. In each period, formality and informality have various cost/benefit differences, including those of sunk cost. In this framework, I consider two specific

J. Bennett (✉)
Department of Economics and Finance and Centre for Economic Development and Institutions (CEDI), Brunel University, London, UK
e-mail: john.bennett@brunel.ac.uk

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 I 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 in 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 may 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, for example, World Bank 2007). These perspectives are built into my 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 those of sunk costs, than formal operation does.[1]

I assume that a formal firm has a higher unit labour cost than an informal firm, with 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 with small size, with the expansion of informal firms often being inhibited by the fear of attracting the attention of the authorities (Fortin et al. 1997; World Bank 2007), while some regulations only apply to firms above a specified size (see, for example, Ahsan and Pages 2007, on the need to provide benefits for workers in India). To give a stylized representation of this size factor, I assume that if the firm were to be 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. I suggest alternative interpretations of the stepping stone in this context. In particular, I 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 to choose informality in the second period, after having entered formally in the

[1] Similar 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.

[2] This 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.

[3] A similar formulation is used by Bennett (2008) to analyse welfare aspects of formality/informality and by Bennett and Estrin (2009) to analyse interactions between formal and informal firms. Other cost/benefits for formal—but not informal—firms that appear in the literature, but which I 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).

[4] It 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.

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 analysing these arguments, I 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 holds for a wide range of parameter values that appear to be realistic. However, in my stylized model, the consolation-prize argument only applies for a range of parameter values that is so narrow that it appears to be 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 a further discussion of my assumptions, and Section 6 concludes the article. An Appendix provides some technical details.

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 et al. (2007), and 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 time, if the firm is informal, it employs one unit of labour, while if it is formal, it employs two. Factor proportions are assumed to be 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. The firm is assumed to be 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. I 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]

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

[6] Although 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.

[7] By specifying a larger size for a formal firm than an informal firm, I am 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; with the latter interpretation, however, θ may alternatively be understood as unit price.

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

$$\pi_{1i} = \theta - w - k; \tag{1}$$

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

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

$$\pi_{2i} = \theta - w, \tag{3}$$

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

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

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

The entrepreneur's choice problem is solved by backward induction. I start by examining the choice made at $t = 2$, first assuming that formal entry occurred at $t = 1$, and then, alternatively, assuming informal entry at $t = 1$. In each of these cases, I 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, the expected profit is calculated at $t = 2$, contingent on the action taken at $t = 1$ (the details are left to the Appendix). The choice facing the entrepreneur at $t = 1$ can then be considered. For simplicity, discounting is not allowed, and the entrepreneur is assumed to maximize total (two-period) expected profits (which is called the 'pay-off'). The firm's expected profit at $t = 2$ is denoted 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 $t = 1$. It is then found 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

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

which is valid if

$$2\Theta > \bar{w}/\beta. \tag{7}$$

If, alternatively,

$$w < \bar{w}/\beta, \tag{8}$$

informality may be chosen at $t = 2$, so that

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

which is valid if

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

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

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

which is valid if

[9] The informal firm could be interpreted 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 it would also be necessary to allow for the entrepreneur's opportunity cost if his or her firm is formal, so presumably w should also be subtracted 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.

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

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

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

which is valid if

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

(Eq. 12) and (Eq. 15) are assumed to hold, which implies that (Eq. 7) and (Eq. 10) hold.

Now let $EV(f)$ and $EV(i)$ denote the respective payoffs from entering formally and informally at $t = 1$. Then

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

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

where $E\pi_2(f)$ is given by (Eq. 6) or (Eq. 9) and $E\pi_2(i)$ by (Eq. 11) or (Eq. 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

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

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 $t = 1$. Provided the firm enters, formality (informality) at $t = 1$ is preferred if

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

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

Using (Eqs. 6–15), I 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 of a greater profit opportunity than an informal firm. The higher input costs k and w that affect a firm under either status favour informality because informality involves a 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

Three approaches are considered, 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 an 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 I argue below, (S2) does not fully disentangle the stepping-stone argument from the consolation-prize one, and so with (S3) a modification is introduced 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

$$EV(i) \geq \max[EV(f), 0], \tag{20}$$

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

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

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

so that formality is then chosen at $t = 2$. With (S1), the prospects for the firm appear reasonably good at $t = 1$, although not so good as to justify immediate formal status; however, then a good 'draw' of θ is obtained, 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 to be no reason to suppose that it would then be possible at $t = 2$, and so it is also assumed 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. Denoted 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 (Eq. 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

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

For the underlying integral to hold, it has already been noted that (Eq. 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), it has not been ruled out 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 changing status from formality to informality is not feasible. Then, (Eq. 21)–(Eq. 23) still apply, but the term $EV(f)$ on the right-hand side of (Eq. 20) must be replaced by $EV(F)$. However, we already require, in (Eq. 23), that $EV(F) < 0$, and so the term $EV(F)$ in the amended version of (Eq. 20), becomes superfluous. (S3) is a less demanding interpretation than (S2), with the difference being that, instead of (Eq. 20), we have simply

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

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

To summarize, for the stepping-stone interpretation (S1) to apply, (Eq. 20) and (Eq. 22) must hold so that informality is preferred at $t = 1$, then formality at $t = 2$. For (S2) to apply, (Eq. 20) and (Eq. 22), plus (Eq. 7) and (Eq. 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 (Eq. 24) replaces (Eq. 20), with this amendment ruling out the option of entering formally and then moving down to informal status.

One more distinction can be made. I 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, (S2) and (S3) can still be interpreted as representing a stepping-stone even 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 (Eq. 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 proven by example. Consider (S3). I 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 $t = 1$, with the capital costs of an informal firm being 50% of the total costs (other numerical examples give a similar result). 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) is 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, with formality being chosen in both periods. [Thus, for (S3) to hold, demand prospects must be neither too favourable nor too unfavourable.]

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, p. 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 be obtained 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 $w/\bar{w} \leq 0.53$, is still broadly in line with the World Bank data.

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

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

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)—although in other numerical examples, (S2) involves tighter conditions. In addition to the conditions specified in Table 1, for (S1) [and also for (S2) and (S3) if this is included in the definition of these interpretations], it is required that the realization θ actually falls within the range specified in (Eq. 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, I can be brief in discussing informality as a consolation prize. Following formal entry at $t = 1$, (Eq. 8) is a necessary condition for informal status to be chosen at $t = 2$, and so I assume it holds. Three alternative interpretations can be made.

(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

$$EV(f) \geq \max[EV(i), 0], \tag{25}$$

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

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

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

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

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

	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

addition to (Eq. 25), (Eq. 23) is satisfied, in which case (Eq. 7) must hold for the integral to be valid. For this interpretation, it is not necessary that (Eq. 26) hold—the potential compensation prize, rather than its receipt, may be regarded as what matters.

(C3). However, the term $EV(i)$ in (Eq. 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, the sequence of informality followed by formality is ruled out; 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), non-empty sets of parameter values exist for which the consolation-prize argument applies.*

For (C1), I focus on the satisfaction of (Eq. 25), for if this holds (Eq. 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, the required range for 2Θ, if it exists, is found to vary with the specific value of $w/\bar{w}$. To illustrate, if β = 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 those 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 does informal entry (as in the stepping-stone sequence).

As $w/\bar{w}$ is reduced (i.e., s is increased) 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. However, in order for (Eq. 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. Other ranges of parameter values exist 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) is obtained 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 $w/\bar{w} = 0.53$

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

and $\beta = 1.5$, (C3) is obtained 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.

5 Further discussion

The analysis reported here 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 the negative conclusion about the likelihood of the consolation-prize argument holding can be reversed. Among other things, consideration can be given to 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 the algebra and examples given here, but to illustrate the factors that come into consideration, here I 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 do informal firms. Thus, taking a time period in isolation, the expected profitability of formality is raised relative to that of informality, and this factor may 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 is that an increase in the expected profitability of formality at $t = 2$ not only raises the payoff[14] 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 (1) 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 (2) 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, although suppose this payoff is close to zero. Now amend the model such that the price of capital for a formal firm, but not that for an informal one, is reduced. This raises the payoffs for both scenarios (1) and (2), but even if it raises the payoff for (1) by much more than that for (2), it can be conjectured that the payoff for (1) may still be negative, while that for (2) 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.

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 an 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 is only obtained for a very narrow range of parameter values and so does not

[12] For 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).

[13] Another 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.

[14] Recall 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.

appear to be of practical significance, although 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 surprising when the difference in sunk costs between the two is considered. 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. I conclude that on stepping-stone (but not consolation-prize) grounds, there can be a dynamic case for the government being lenient in its policy towards the informal sector.

Acknowledgements I am grateful for discussions with Saul Estrin and for excellent research assistance by Dilly Karim. I also thank three anonymous referees for helpful comments.

Appendix

Derivation of expected profit at $t = 2$

X denotes exit, I denotes informal status, F denotes formal status and SO denotes staying out of the industry. Consider behaviour at $t = 2$. If F at $t = 1$, from (Eq. 3) and (Eq. 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 $\theta \geq \bar{w}/\beta$. (Eq. 6) follows. But if (Eq. 8) holds, at $t = 2$, X is chosen if $\theta < w$; I if $w \leq \theta < (\bar{w} + s)/(2\beta - 1)$; F if $(\bar{w} + s)/(2\beta - 1) \leq \theta \leq 2\Theta$. (Eq. 9) follows.

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

Lemma 1 From (Eq. 19), $\mathrm{EV}(f) - EV(i) = \Delta_1 + \Delta_2$. From (Eq. 18), Δ_1 is increasing in Θ, and β, and decreasing in s, k and w, as in the lemma. Let us now focus on Δ_2. Since (Eq. 8) and (Eq. 13) each may or may not hold, and $k > 0$, three cases can be distinguished. First, if $\left(\bar{w} + \frac{k}{2}\right) \leq w$ then, using (Eq. 6) and (Eq. 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 (Eq. 12), the lemma follows for this case. Second, if $\frac{1}{\beta}\bar{w} \leq w < \frac{1}{\beta}\left(\bar{w} + \frac{k}{2}\right)$ then, using (Eq. 6) and (Eq. 14),

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

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

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

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

References

Ahsan, A., & Pages, C. (2007). *Are all labour regulations equal? Assessing the effects of job security, labour dispute, and contract labour laws in India*. World Bank policy research working paper 4259. Washington D.C.: World Bank

Amaral, P. S., & Quintin, E. (2006). A competitive model of the informal sector. *Journal of Monetary Economics, 53*, 1541–1553.

Antunes, A. R., & Cavalcanti, T. V. de V. (2007). Start up costs, limited enforcement, and the hidden economy. *European Economic Review, 51*, 203–224.

Auriol, E., & Warlters, M. (2005). Taxation base in developing economies. *Journal of Public Economics, 89*, 625–646.

Banerji, A., & Jain, S. (2007). Quality dualism. *Journal of Development Economics, 84*, 234–250.

Bennett, J. (2008). *Formality, informality, and social welfare*. IZA discussion paper 3550. Bonn: IZA (Institute for the Study of Labour).

Bennett, J., & Estrin, S. (2009). Entrepreneurial entry in developing economies. In R. Kanbur & J. Svejnar (Eds.), *Labour markets and economic development*. Abingdon, UK: Routledge.

Chong, A., & Gradstein, M. (2007). Inequality and informality. *Journal of Public Economics, 91*, 159–179.

de Paula, A., & Scheinkman, J. (2008). *The informal sector*. PIER working paper 08-018. Philadelphia: University of Pennsylvania.

Fortin, B., Marceau, N., & Savard, L. (1997). Taxation, wage controls and the informal sector. *Journal of Public Economics, 66*, 293–312.

Hausmann, R., Hwang, J., & Rodrick, D. (2007). What you export matters. *Journal of Economic Growth, 12*, 1–25.

Hausmann, R., & Rodrick, D. (2003). Economic development as self discovery. *Journal of Development Economics, 72*, 603–633.

Ihrig, J., & Moe, K. S. (2004). Lurking in the shadows: The informal sector and government policy. *Journal of Development Economics, 73*, 541–557.

Jovanovic, B. (1982). Selection and the evolution of industry. *Econometrica, 50*, 649–670.

Loayza, N. V. (1996). The economics of the informal sector: A simple model and some evidence from Latin America. *Carnegie-Rochester Conference Series on Public Policy, 45*, 129–162.

Maloney, W. (2004). Informality revisited. *World Development, 32*, 1159–1178.

Rauch, J. E. (1991). Modelling the informal sector informally. *Journal of Development Economics, 35*, 33–47.

Sarte P.-D. G. (2000) Informality and rent-seeking bureaucracies in a model of long-run growth. *Journal of Monetary Economics, 46*(1), 173–197

Schneider, F. (2006). *Shadow economies of 145 countries all over the world: what do we really know*? Working paper, Johannes Kepler University of Linz.

Schneider, F., & Enste, D. (2000). Shadow economies: Size, causes, and consequences. *Journal of Economic Literature, 38*, 77–114.

Straub, S. (2005). Informal sector: The credit market channel. *Journal of Development Economics, 78*, 299–321.

World Bank. (2007). *Informality: Exit and exclusion*. Washington, DC: World Bank.