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Monitoring Costs, Credit Constraints and Entrepreneurship

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ABSTRACT

Monitoring Costs, Credit Constraints and Entrepreneurship*

The vast majority of firms in developing economies are micro and small enterprises owned by families whose members also provide the labour to the units. Often, they fail to grow in size even with the relaxation of credit constraints. In this paper, we show that frictions in the labour market leading to monitoring costs tend to reduce the growth of the firm via two channels: (1) it forces the entrepreneur to devote more time on monitoring hired labour from outside family which curtails her time on productive activities leading to failures of firm's projects. (2) The need to pay a premium wage over the market rate in order to incentivize workers makes it costlier for the firm to expand in size via hiring outside labour. In this framework, we show that possibility of an inverted U- shaped relationship between the credit supply and the size of the firm, measured by hiring of non family labour, indicating frictions in the labour market may outweigh the effects of the easing of borrowing constraints of the firm. We then use a unique data-set comprising large nationally representative surveys of small and micro-enterprises in Indian manufacturing and find support for the existence of such a non-monotonic relationship attributed to both frictions in the credit and labour markets.

JEL Classification: D22, G10, O16

Keywords: entrepreneurship, monitoring costs, credit constraint, household enterprises, India

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Monitoring Costs, Credit Constraints and Entrepreneurship

I. Introduction

An important stylized fact in low income countries is the presence of a large number of very small household enterprises in the informal sector which mostly employ family labour. Such firms rarely make the transition to the formal sector or grow in size by hiring labour from the outside market (Gollin 2008, Woodruff 2012). The presence of such a large number of micro sized household enterprises along with their lack of growth is often attributed to credit constraints that do not allow these firms to increase in size (Hurst and Lusardi 2004). For example, in the case of Vietnam, Rand (2007) shows that between 14 per cent and 25 per cent of enterprises are credit constrained. Similarly, Banerjee and Duflo (2008) and Paulson and Townsend (2004) also find the presence of credit constraints among small firms in India and Thailand. However, for very small owner-managed enterprises, rates of return to capital can greatly exceed borrowing costs (de Mel *et al.*, 2008; Cotler and Woodruff, 2008), and the relatively small amount of external funds that they require to grow may not be difficult to obtain from friends, family and business partners. Therefore, credit constraints, albeit, plays an important role in determining the size of a firm but cannot be the full explanation of why household enterprises in low income countries do not grow in size, and why owner-entrepreneurs do not become employers of wage labourers.

In this paper, we argue that the frictions in labour market in the form of monitoring costs of employing non-family labour exacerbates the problems of credit constraints and create obstacles for a small firm to grow in size. We show that the frictions stemming from monitoring of labour lead to higher probability of failures of projects and increased wage costs of hired labour, thereby hindering the growth of the family based firms.

The basic tenet of our argument is as follows: much of the entrepreneurial activities involve performing and coordinating multiple tasks. A successful entrepreneur, at least in the in the initial stages of venture, gets involved in the development, design and marketing of the product as well as in the actual process of production[2] (Sonobe et al. 2011). These tasks become relatively easier when the unit itself is in the beginning stage when all stakeholders are family members. However, when the production unit starts expanding its operation beyond a threshold level, an entrepreneur need to hire outside labour and secure finance beyond family ties, and has to resort

[2] Such as the management of product innovation and the development of marketing skills that enhance the probability of success.

to outside labour and credit markets to augment production and finance such activities (King and Levine 1993a, 1993b). Approaching simultaneously to both labour market for recruiting workers and credit markets to secure funds for financing wage bill and related costs could expose an entrepreneur to agency problems from dual sources. The banks or creditors may ration credit to a new firm either due to lack of information about the project or for enforcement problems, mostly due to the absence of past track records of a new entrepreneur. On the other hand, labour recruited from an anonymous labour market may shirk which prompts the entrepreneur to divert time from productive activities to monitoring of workers. In addition, larger incentive payments to outside workers tend to raise costs of recruitments and tighten the credit constraints as well.

Set in the context of such dual constraints originating from credit and labour markets, the paper addresses the following sets of questions: (a) how do financing constraints in the credit market, monitoring costs in the labour market and extra incentive payment of wage (premium over the market rate) affect the allocation of entrepreneur's time between productive activities and monitoring of non-family labour? (b) What is their joint impact on the size of the firm measured by the hiring of magnitude of non-family labour? In particular, to what extent do monitoring costs of outside labour constrain entrepreneurship in low income countries and the growth of household enterprises?

First, we show that both monitoring costs and credit constraint unambiguously reduce the employment via both higher wage rate and fund constraints, compared to the benchmark case where both frictions are absent. The same circumstances also reduce entrepreneurial time devoted to productive activities leading to more frequent failures of the projects. More surprisingly, our model predicts that even with relaxation of credit constraint and greater access to finance, the firm may not hire more outside labour if the relative magnitude of the frictions in the labour market tends to be larger and thus may inhibit the growth of the firm. In fact, the relaxation of credit may lead hiring of outside labour initially but it tends to fall if the magnitude of friction due to monitoring costs (measured by the difference between firm's wage and market wage rate) is too high. Thus, we predict a non monotonic relationship in the form of inverted U-shaped curve between hired labour and the size of credit may emerge in the presence of larger costs due to monitoring of outside labour.

We then use an unique data-set comprising large nationally representative surveys of small and micro-enterprises in Indian manufacturing which provides information on the use of hired and family labour and relevant firm characteristics for 2000-01 and 2005-06 and explore whether our

argument on the importance of monitoring costs in influencing the relationship between the easing of credit constraints and the firm's demand for outside labour usage finds empirical support by pooling the data for these two years. We find clear evidence of a possible non-monotonic relationship between the firm's magnitude of borrowing and the hiring of non-family labour, and show that this relationship depends negatively on the inverse of productivity and on the wage premium of non-family workers (that is, what the firm pays to the worker over and above the reservation wage).

The primary contribution of our paper is thus to identify scenarios where the twin frictions from labour and credit market may constrain the growth of the family firm even in the event of relaxation of the credit constraint and then test the hypothesis empirically with the unique data set. Two other papers which look at small family firms are Kimhi (1997) and Vallejo (2011). Kimhi develops a model of the small family firm and studies the role of intergenerational succession in firm ownership in ensuring the firm's survival and growth, while Vallejo looks at the role of organisational culture in the competitive potential of the family firm. Thus, the foci of these two papers are different from that of our paper, which studies the transition of family firms from using own labour to the use of non-family labour, and the role of credit constraints and monitoring costs in determining this transition.

The remainder of the paper is in four parts. In the next section, we develop our theoretical model. Section 3 proposes the empirical specification, discusses the econometric methodology and describes the data. In Section 4, we provide some descriptive statistics and discuss the econometric results. Section 5 concludes.

II. The Model

Consider an entrepreneur that has a project which generates an uncertain outcome and the probability of success of the project depends on the amount of time devoted by the entrepreneur to tasks specific to prevent its failures. Let λ be the time allocated by an entrepreneur towards marketing, designing or setting quality standards of the product or anything that boosts up directly the probability of success of the project. We denote μ to be the time devoted to monitoring of hired labour from outside market. That is, once the design of the product is completed and is successful to some degree, the actual production, if carried out by the hired worker needs supervision and monitoring, and is captured by μ such that $\mu \equiv 1 - \lambda$.

If $p(\lambda)$ is the probability of success of the project, we assume that $p^{/}(\lambda) > 0$ and $p^{//}(\lambda) \leq 0$. Let $f(n)$ be the firm's production function that depends only on labour (n). If the firm uses

labourers exclusively from the family, then one can regard the number to be fixed in size. We assume that the labour belonging to the family of the entrepreneur is motivated and need not require any monitoring of their activities. However, if the firm hires labour from the outside labour market, then entrepreneur must engage in monitoring.

The cash strapped entrepreneur in household enterprises needs to borrow from the credit market in order to pay the wage bill so that the total costs of borrowing is wage rate (w) times total employment (n).

For the determination of the wage rate, we follow the efficiency wage model of Calvo and Wellisz (1978, 1979) and Shapiro and Stiglitz (1984). A worker obtains a wage rate (w) from the employer if he does not shirk. His net pay-off is the wage rate minus the disutility or costs (c) associated with work and is equal to $-c$. If the worker decides to shirk, then there is a probability q that he may get caught and fired, in which case he obtains a reservation wage rate $\bar{w}$ outside the firm. However, if the worker does not shirk, the probability is $1-q$ that he is not caught and thus earns the wage rate w, without incurring costs of work. The probability of being monitored and caught upon shirking is not exogenous but it depends on the amount of time that an entrepreneur devotes to this activity. Hence, $q = q(\mu)$, $q'(\mu) > 0$. Since $\mu \equiv 1 - \lambda =$ the amount of time spent by the entrepreneur on monitoring activities, it follows that $q'(\lambda) < 0$.

In equilibrium, the worker must be indifferent to the possibility of shirking and being fired and not shirking and being paid the wage rate, w, so that:

$$q(\mu)\bar{w} + \big(1 - q(\mu)\big)w = w - c \qquad (1)$$

By rearranging , we get the standard efficiency wage equation,

$$w = \frac{c}{q(\mu)} + \bar{w} \qquad (2),$$

which simply suggests that wage rate is equal to a premium $\frac{c}{q(\mu)}$, which is paid to prevent workers from shirking, over the reservation (market) wage rate $\bar{w}$. The equation (2) also indicates the trade-off between allocation of time between monitoring of outside labour and productive activities that enhance success of the project. More time devoted to monitoring (μ) increases the probability $\big(q(\mu)\big)$ of apprehending the evasion of work and thus reduces the wage rate (w) but

also it reduces the probability of success $p(\lambda)$ due to lesser available time for making the project successful as $\mu \equiv 1 - \lambda$.

In order to show the role of credit constraints and monitoring costs in influencing the firm's decision to hire outside labour, we first consider the benchmark case where there is no credit rationing and no monitoring costs.

Benchmark case: No credit rationing and no monitoring costs

We assume that the entrepreneur borrows money to pay for his wage costs and since the total amount of borrowing is $L = \bar{w}n$, he need to pay back $\bar{w}n(1+r)$, where $\bar{w} = market\ wage$ in the absence of any monitoring costs, and r is the market interest rate.

The expected profit of the entrepreneur is: $\pi = p(\lambda)[f(n) - \bar{w}n(1+r)] - F$ and he chooses $\lambda\ and\ n$ to maximize the profit. Here, F is the fixed cost of investment.

The first order conditions are:

$$p'(\lambda)[f(n) - \bar{w}n(1+r)] \geq 0 \text{ and } f'(n) - \bar{w}(1+r) = 0 \qquad (3)$$

Since, $p'(\lambda) > 0$, the entrepreneur chooses $\lambda = 1$, and equation (3) determines both the optimal amount of labour and also determines the total borrowing $\bar{w}n(\bar{w}, r)$.

Therefore, the entrepreneur chooses all of his time towards productive activities $(\lambda = 1)$ so that the probability of success in his project is maximum and expected profit, $[f(n) - \bar{w}n(1+r)]$, is also maximum.

Introducing Credit rationing and Monitoring Costs:

Now, suppose that firms are credit rationed and they also need to incur the monitoring costs in the form of paying a wage rate, $w = \frac{c}{q(\mu)} + \bar{w}$. The amount of loan is now fixed for him so that his budget constraint for hiring labour is $L + a = wn$, where a is the personal wealth or assets of the entrepreneur. Since the Left Hand Side $(L + a)$ is fixed due to rationing of funds and limitations of personal wealth, he can hire more labour and increase production only by reducing wage rate. This immediately generates the following trade-off under the presence of monitoring costs and rationing of loan. If he spends more time in monitoring (by increasing μ), the probability of detection of shirking increases (since $q(\mu)$ is an increasing function of μ) and results in a decrease of the wage rate $w = \frac{c}{q(\mu)} + \bar{w}$. Hence, output increases because he can hire more labour with his available fund which also increases his expected profit at the margin.

But it also results in the decrease of time devoted to the project and the probability of success decreases, leading to a fall in the pay-off from engagement in entrepreneurial activities at the margin.

It is also easy to see credit constraints will have an impact on the hiring of outside labour. If the amount of credit received by the firm L $+a < \bar{w}n(\bar{w}, r)$, the amount that firm procures without rationing, given the wage rate, the optimal level of employment in a credit constrained firm is $n < n(\bar{w}, r)$ so that $f'(n) - \bar{w}(1 + r) > 0$. That is, credit constraints prevent the entrepreneur to carry out production to the point where the expected surplus is also at maximum.

To sum up the discussion regarding monitoring costs and credit constraint:

(a) Monitoring cost takes the form of $w - \bar{w} = \frac{c}{q(\mu)} > 0$ and (b) Rationing of credit implies that $f'(n) - \bar{w}(1 + r) > 0$.

We next show the trade-off for the entrepreneur in spending time on entrepreneurial activities and on monitoring outside workers.

The entrepreneur's expected profit in the presence of credit constraints and monitoring cost is given by:

$$\pi = p(\lambda)[f(n) - L(1 + r)] - F, \text{ where } n = \frac{L+a}{w} = \frac{L+a}{\frac{c}{q(\mu)} + \bar{w}} \quad (4)$$

$$\text{Hence, } \pi = p(\lambda)\left[f\left(\frac{L+a}{\frac{c}{q(\mu)} + \bar{w}}\right) - L(1 + r)\right] - F \quad (5)$$

We define $R = wn(1 + r)$ = the total principal and interest that needs to be paid to the bank.

The entrepreneur chooses λ, to maximize the expression and the first order condition is:

$$\frac{\partial \pi}{\partial \lambda} = 0 \Rightarrow p'(\lambda)[f(n) - R] + pf'(n)\frac{\partial n}{\partial \lambda} = 0 \quad (6)$$

By plugging $\frac{\partial n}{\partial \lambda} = \frac{L+a}{\left[\frac{c}{q(\mu)} + \bar{w}\right]^2}\frac{c}{q}\frac{q'}{q} = -n\frac{(w-\bar{w})}{w}\frac{q'}{q}$ into above expression, we get:

$$p'(\lambda)[f(n) - R] = pf'(n)\, n\frac{(w-\bar{w})}{w}\frac{q'}{q} \quad (7)$$

Where $q'(\lambda) < 0$

Equation (7) captures the tension of allocation of time between entrepreneurial activities because the Right Hand Side of the equation, $p'(\lambda)[f(n) - R]$, is the gains at the margin on entrepreneurial activities and the Left Hand Side of the equation is the costs of increased wages

that results from less monitoring efforts at the margin (given by $n\frac{(w-\bar{w}))}{w}\frac{q^{/}}{q}$) and the consequent loss of profit due to reductions in employment captured by the term $pf^{/}(n)$.

Immediately, it follows from the first order condition, we get $\lambda < 1$. That is, entrepreneurial activities suffer due to monitoring costs.

We now capture the effect of a change in the financial variables, L and a, on the time spent on entrepreneurial activities, λ, and the hiring of outside labour, n, by the means of two propositions.

Proposition 1: An increase in loans will increase the time devoted to entrepreneurial activities if the increase in profits resulting from greater time spent on entrepreneurial activities at the margin (measured by $\left[f^{/}(n)-(1+r)\right]$ exceeds marginal monitoring costs ($n\frac{(w-\bar{w})}{w}\frac{q^{/}}{q}$) by a proportion, $\mathrm{p}/\mathrm{p}^{/}$.

Proof: The straightforward differentiation of (7) yields, $\frac{\partial\lambda}{\partial L}=\frac{pf^{/}(n)\,n\frac{(w-\bar{w}))q^{/}}{w\quad q}-p^{/}(\lambda)\left[f^{/}(n)-(1+r)\right]}{\pi_{\lambda\lambda}}\frac{1}{w}>$ < 0 according as $\frac{\left[f^{/}(n)-(1+r)\right]}{f^{/}(n)n\frac{(w-\bar{w}))q^{/}}{w\quad q})}>(<)\frac{p}{p^{/}}$

($\pi_{\lambda\lambda} < 0$ due to the second order condition of the profit maximisation).

Proposition 2: The effect of a relaxed credit constraint on the use of hired labour depends on three components:

(a) The direct effect, that increases the demand for hired labour;

(b) An indirect effect, via the increase in production with greater access to finance, that tends to increases the demand for hired labour (the credit rationing effect).

(c) An indirect effect, via an increase in monitoring costs, which tends to reduce the demand for hired labour (the monitoring costs effect).

Proof: Differentiating $n=\frac{L+a}{\frac{c}{q(\mu)}+\bar{w}}$ with respect to L, we get:

$$\frac{\partial n}{\partial L}=\frac{\left(\frac{c}{q(\mu)}+\bar{w}\right)-(L+a)\frac{c}{q}\frac{q^{/}}{q}\frac{\partial\lambda}{\partial L}}{\left[\frac{c}{q(\mu)}+\bar{w}\right]^{2}}$$

The first term is the direct effect of increasing the size of loan and is positive. The second effect is given by $\frac{\partial \lambda}{\partial L}$, and captures the indirect effect of L or a on n, as shown in Proposition 1. Its sign depends on the strength of two countervailing effects: the first, as given by statement (b) in Proposition 2, is the gains in profits due to the increased time that the entrepreneur can spend on entrepreneurial activities with the relaxation of the credit constraint. This effect is positive – that is, with an increase in L, the entrepreneur is able to increase the employment of outside labour, to increase production. We call it the credit rationing effect. The second, as given by statement (c) of Proposition 2, is the increase in the wage premium that the entrepreneur has to pay outside workers if he spends more time on entrepreneurial activities, leading to a fall in employment, for a given wage bill. We call it the monitoring cost effect.

The proposition 2 makes clear that the effect of an easing of the credit constraint on the firm's decision to employ outside labour usage is not necessarily positive, and could even be negative, if the monitoring cost effect is large enough to swamp the direct effect and the credit rationing effect. We see that whether the relationship between access to finance and the hiring of non-family labour is positive or negative would depend in part on whether gains in profits due to the easing of credit rationing is higher or lower than the increase in monitoring costs with the employment of such labour.

Our model also suggests that monitoring costs would tend to be very large with an increase in the size of the firm, so that the demand for labour may increase with an increase in access to finance, and then decrease beyond a certain point. Thus, it is possible that the relationship between hired labour employment (n) and loan amount (L) may be inverted U shaped, as shown in Figure 1.

Thus the propositions 1 and 2 together lead to the emergence of the following sets of hypothesis that we plan to test with a unique data set in the next section.

Hypothesis 1: The relationship between hired labour usage and the firm's borrowing is non-monotonic and depended positively on firm productivity (that is, negatively on the inverse of productivity) and negatively on the wage premium.

Hypothesis 2: The relationship between hired labour usage and the firm's borrowing is expected to be inverted U shaped, and may decrease beyond a threshold size of the firm, with an increase in access to finance.

INSERT FIGURE 1 HERE

III. Empirical Strategy, Econometric Methodology and Data

Our main prediction is that the relationship between firm's use of hired (non-family) labour and access to finance (as captured by the firm's borrowing) is not necessarily positive and possibly non-monotonic. Whether this relationship is positive or not would depend on the relative strengths of two effects – the increase in the firm's output (and consequently, profitability) with an increase in the time that the firm's owner spends on entrepreneurship related activities and the increase in wage costs due to the less amount of time that the owner can spend on monitoring non-family workers when he spends more time on entrepreneurial activities. If the marginal gain to the firm that results from the increase in output with the hiring of more non-family workers is greater than the marginal cost originating from the higher wage costs, then the firm will increase hired labour usage to the point where marginal costs of wage premium offsets marginal gains from increased production. If the marginal costs of hiring more non-family workers outweigh the marginal benefit of hiring them, the firm may decrease the use of non-family labour, even with greater access to outside finance.

Empirical Strategy

To test for the possible non-monotonicity of the hired labour-access to finance relationship, we examine how this relationship depends on the two counter-vailing effects: the marginal gains of increasing the usage of hired labour, given by the expression: $(f'(n)-(1+r))$ and the marginal costs of increasing the usage of hired labour, given by the expression: $((\frac{w-\overline{w}}{w})q'/q)$. We capture the expression $(f'(n)-(1+r))$ by the average productivity of the firm (since the rate of interest r will not differ across firms for a given year), and we approximate the expression: $((\frac{w-\overline{w}}{w})q'/q)$ by the firm-specific wage premium, where the wage premium = average wage rate of hired workers in the firm – reservation wage. We take the reservation wage to the government-determined minimum wage rate set in the state in which the firm is located. We then test for the possible non-monotonicity of the hired labour-access to finance relationship by running regressions of hired labour usage on total loans and introducing interaction terms of the following type:

Interaction term (1) = LOAN × INVPROD

Interaction term (2) = LOAN × WAGEPREM

Where INVPROD is the inverse of labour productivity of the firm, and WAGEPREM is the difference between the average wage rate of hired workers in the firm minus the state-level minimum wage rate.

Our hypothesis will be that both interaction terms will be negative and significant, if the relationship between hired labour usage and the firm's borrowing is non-monotonic and depended positively on firm productivity (that is, negatively on the inverse of productivity) and negatively on the wage premium.

Therefore, we test for the presence of a possible non-monotonic effect of finance constraints on hired labour usage by running a regression of the following generic form:

$$h_{j,i,t} = \alpha_0 + \alpha_1 LOAN_{jit} + \alpha_2 LOAN_{jit} * PRODINV_{jit} + \alpha_3 LOAN_{jit} * WAGEPREM_{jit} + \alpha_4 X_{jit} + \gamma_i + \delta_t + e_{jit} \quad (8)$$

Where h is the number of hired non-family workers, the subscript j stands for firm, i stands for industry and t for time. We denote the firm's access to finance by *LOAN,* which is the firm's total borrowing. Our unit of analysis is the firm, and we have data on the use of hired and family labour by firms in the Indian informal manufacturing sector from two cross-sectional surveys conducted by the Indian National Sample Survey Organisation (NSSO) for the entire country in 2000-01 and 2005-06.[3] We have over 15,000 firms in this pooled data-set, across 21 industries, 429 districts and 15 Indian states. X_{jit} are possible control variables, γ_i are industry specific fixed effects and δ_t is the year dummy (=1 if the survey is for 2005-06). All variables are transformed to their natural logarithmic values.

We hypothesise that α_1 is positive while α_2 and α_3 are both negative.

Among control variables, we also include firm size (measured by log employment, including non-family workers) in some specifications- larger firms will need to hire outside labour, independent of the finance constraint that the firm may face. Since some industries are more reliant on external finance than others (Rajan and Zingales 1998), we include industry fixed effects as controls to capture industry-specific external finance requirements which may exert an independent influence on hired labour usage over and above that exerted by the finance constraint that the firm faces.[4] Finally, we include a year dummy for 2005-06 as a control variable

[3] We restrict our sample to the fifteen major Indian states, where over 90 per cent of firms in our data-set are located.

[4] We use National Industries Classification (NIC) three digit industry dummies in our regressions.

to capture macro shocks that may have positive productivity effects, leading to an increase in hired labour usage.

Econometric Methodology:

To estimate equation (8), we use Ordinary Least Squares (OLS) and Instrumental Variable (IV) estimation methods, with robust standard errors clustered at the district level, to account for possible non-independence of the error term across districts. The data is pooled, comprising two cross-sections for 2000-01 and 2005-06. Since the NSSO does not provide information on which firms are surveyed, nor are the same firms surveyed in the different quinquennial surveys, we do not have a panel.

While we present OLS estimates of equation (8) in the paper, the use of OLS is problematic in that we are implicitly assuming that the LOAN variable that we include on the Right Hand Side is capturing finance constraints. However it is quite likely that LOAN may be demand determined and not supply determined – that is, as firms increase their hiring of outside labour, they increasingly borrow from external sources to pay for their wages. To address endogeneity concerns with LOAN, we employ instrumental variables (IV) methods, where we use a direct measure of the firm's finance constraint as the instrument for the financial variable in question, as has been used by Rand (2007). The NSSO asks the firms in its surveys if they have faced any constraint on its borrowing in the last year. We denote this variable BORRCN and code this variable equal to 1 if the firm states that it faced constraint and 0 if it answers that it did not face constraint. BORRCN will meet the necessary exclusion criterion as an instrumental variable as it is not expected to influence the firm's decision to hire outside workers except through the borrowing constraint that the firm faced.

Data and Variables

We use unit level data for the informal manufacturing sector for two years, 2000-01 and 2005-06. Data on the informal manufacturing sector is drawn from the Government of India's National Sample Survey Organization (NSSO) surveys on the informal manufacturing sector, which is undertaken quinquennially using a stratified sampling procedure. The surveys contain information on the number of hired/outside labour as well as family labour for each firm. The surveys also provide information on total loans outstanding for the firm, and total fixed assets owned by the firm. All financial variables are deflated by the wholesale price index for capital goods.

IV. Descriptive Statistics and Results

We begin the empirical analysis by presenting the summary statistics, and an exploratory graphical analysis of the possible non-monotonicity of the relationship between access to finance and hired labour usage. We then present the main results of the econometric analysis.

Descriptive Statistics

We present summary statistics of the key variables used in the empirical analysis in Table 1. We see that the average number of hired labour per firm is 3.56 (exponential of 1.27), and 55.1 per cent of the firms state that they face borrowing constraints.

We explore the possibility of a non-monotonic relationship between hired labour usage and firm-level borrowing by plotting the relationship between the proportion of hired labour in total employment and loans outstanding for all firms in Figure 2, then dividing the firms into two sub-samples – the first with higher than mean employment, and the second with lower than mean employment (Figures 3 and 4). We find that the positive relationship between hired labour proportion and loans outstanding is strongly positive for all firms and for smaller sized firms, but this positive relationship is less evident for larger sized firms. This suggests that there may well be a critical threshold for firm size, beyond which firm owners are less likely to increase hired labour usage with an increase in the firm's borrowing.

INSERT TABLE 1 HERE

INSERT FIGURE 2 HERE

INSERT FIGURE 3 HERE

INSERT FIGURE 4 HERE

Results

Table 2 presents the OLS estimates of equation (8). In Cols. (1) and (2), we test for the two interaction effects separately, and in Col (3) we include both the interaction effects. We begin with a basic specification (with no industry or year dummies and firm size as control variables), where we regress the number of hired workers against total loans, and the interaction effects. The coefficient on total loans is significant at the 10 per cent level and of the right sign – greater access to finance (as captured by a higher amount of loans taken by the firm) leads to a higher use of outside workers. In Cols. (1) and (2), the interaction terms LOAN*INVPROD and LOAN*WAGEPREM are negative as hypothesised, but not statistically significant. When we

introduce the interaction terms together in Col. (3), now LOAN*WAGEPREM is negative and statistically significant, but not LOAN*INVPROD. In Cols. (4), (5) and (6), we re-do the same specifications as Cols. (1)-(3), now with firm size as control. The interaction terms are now negative and significant, both on their own and when they are included jointly. Firm size as expected is positively and significant. In Cols. (7), (8) and (9), we now introduce industry fixed effects and a year dummy for 2005-2006. The interaction terms remain negative and significant, both on their own and jointly. Therefore, the OLS estimates provide clear evidence of a non-monotonicity in the relationship between the firm's hiring of non-family labour and firm's total borrowing. For sufficiently low levels of firm productivity and/or sufficiently high levels of the wage premium, the firm may actually use less non-family labour, with greater borrowing.

INSERT TABLE 2 HERE

Next, we address endogeneity concerns with LOAN – the positive relationship between LOAN and hired labour use may be driven by the fact that firms who use more outside labour are more likely to borrow from external sources to pay for their wages. To address these concerns, we use Two Stage Least Squares (2SLS) with BORRCN as an instrument for LOAN. We present the IV results in Table 3. We follow the same order in the specifications that we test as in Table 2. We first estimate equation (8) instrumenting LOAN with BORRCN with a basic specification (no industry dummies, no year dummy, and no control for firm size). We estimate the interaction effects LOAN*INVPROD and LOAN*WAGEPREM in turn and then jointly, in Cols. (1), (2) and (3). We then include firm size as a control variable, with the interaction effects LOAN*INVPROD and LOAN*WAGEPREM included in turn and then jointly in Cols. (4), (5) and (6). Finally, we include industry dummies and the year dummy, again including the interaction effects LOAN*INVPROD and LOAN*WAGEPREM in turn and then jointly in Cols. (7), (8) and (9). We find that while the interaction terms are of the right sign but not statistically significant in Cols. (1) and (2), the interaction term LOAN*WAGEPREM is statistically significant in Col. (4) when firm size is included, but not the interaction term LOAN*INVPROD in Col. (5). However, once we include the two interaction terms together, they are both negative and significant in Col. (6) with firm size included as a control variable. In Cols. (7)-(9), with the industry dummies and the year dummy included, the interaction terms are negative and statistically significant, both when entered on their own and jointly. Thus, the IV results reinforce the main finding of the OLS estimates that there is a non-monotonic relationship between the firm's employment of non-family labour and total borrowing. We also re-run our regressions using ASSET as an alternate measure of the firm's financial constraint

since our model is symmetric in its prediction of a non-monotonic relationship between use of non-family labour and the total assets of the firm (denoted by *a* in our model). We find identical results for both OLS and IV estimates when we use ASSET instead of LOAN.[5]

INSERT TABLE 3 HERE

Finally, we test for one more prediction of our model – that the firm may try and decrease non-family labour once a certain threshold of firm size has been reached with greater access to finance as beyond a certain size of the firm, the monitoring costs of non-family labour may exceed the benefit of greater economies of scale through a larger firm size. We introduce interaction terms FIRM SIZE*LOAN and FIRM SIZE*ASSET, and test for the sign and significance of these two interaction terms. We call these regressions Auxiliary Regressions. We follow the same structure of regression specifications as in Table 3 (basic regression with no firm size/industry dummies/year dummy as control, only firm size as control, and firm size along with industry and year dummies as control) and present the OLS and IV estimates in Table 4. We find clear and unequivocal non-monotonicity in the hired labour-loan and hired labour-asset relationships. That is, beyond a certain size of the firm, an increase in loans or in assets seems to lead to a decline in the use of non-family labour. Overall, our results suggest that monitoring costs of non-family labour play an important role in discouraging owner-managed firms to increase their size and to hire more non-family labour, and that the easing of credit constraints do not automatically lead to the growth of the firm.

INSERT TABLE 4 HERE

[5] Results are not presented but available from authors on request.

V. Conclusions

For an owner-managed small firm, the hiring of a non-family worker is a non trivial decision and involves a trade-off between the greater profits and productivity benefits that the firm can enjoy with a larger size and the opportunity cost of the firm's owner in monitoring the worker's effort and as a consequence, increasing wages of non-family workers to provide greater incentive for them to be productive. In this context, we show that the availability of external finance can have a perverse effect – while the direct effect of the easing of credit constraints will always be positive on the hiring of non-family labour, it is possible that if the increase in the wage premium to be paid to non-family workers is so high, or if the productivity benefits of the increase in size not large enough, the owner-manager may actually decrease the amount of non-family workers to spend more time on entrepreneurship activities. We develop a model that captures this trade-off and which shows that under certain conditions, greater access to external finance may actually lead to a fall in hired labour usage. We then explore the empirical implications of our model using an unique data-set comprising large nationally representative surveys of small and micro-enterprises in Indian manufacturing which provides information on the use of hired and family labour and relevant firm characteristics for 2000-01 and 2005-06.

We find clear evidence of a possible non-monotonic relationship between the firm's borrowing and the hiring of non-family labour, and show that this relationship depends negatively on the inverse of productivity and on the wage premium of non-family workers (that is, what the firm pays to the worker over and above the reservation wage). Our results suggest that the relaxation of credit constraints in themselves may not be enough in contributing to small firm growth in developing countries. Our paper shows both theoretically and empirically the importance of monitoring costs of non-family labour in explaining why few family firms in the informal sector make the transition to the use of non-family labour, limiting the growth of family owned enterprises in the economy.

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Table 1. Summary Statistics

Variable	No of Observations	Mean	Standard Deviation	Min	Max
NUMBER OF NON-FAMILY WORKERS	15302	1.275	0.893	0	5.996
LOAN	15302	10.558	1.832	3.469262	18.330
ASSET	15301	12.265	1.391	4.249051	18.199
FIRM SIZE (INCLUDING FAMILY WORKERS)	15302	1.734	0.674	0	6.006
INVPROD	15297	0.003	0.0122	-0.0795365	0.963
WAGEPREM	15228	4.72629	1.474897	-3.87018	9.489112
BORRCN	15298	0.551	0.497	0	1

Note: all variables are in natural logarithms, except wage premium. All financial variables are in real terms.

Table 2.Regressions Results: OLS Results

Dependent Variable = Log Hired Labour

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LOAN	0.253*	0.256*	0.256*	0.034*	0.032*	0.034*	0.031*	0.029*	0.031*
	(0.007)	(0.008)	(0.008)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
LOAN*INVPROD	-1.000		-1.205		-1.109*	-1.281*		-1.369*	-1.470*
	(0.747)		(0.822)		(0.612)	(0.691)		(0.727)	(0.778)
LOAN*WAGEPREM		-3.73e-06	-4.32e-06*	-2.13e-06*		-2.76e-06*	-2.49e-06*		-2.80e-06*
		(2.70e-06)	(2.69e-06)	(9.45e-07)		(1.05e-06)	(9.77e-07)		(1.02e-06)
FIRM SIZE				1.206*	1.206*	1.206*	1.214*	1.213*	1.214*
				(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Constant	-1.389*	-1.422*	-1.416*	-1.175*	-1.150*	-1.168*	-1.297*	-1.273*	-1.290*
	(0.075)	(0.081)	(0.081)	(0.031)	(0.030)	(0.031)	(0.045)	(0.045)	(0.045)
Industry dummy	N	N	N	N	N	N	Y	Y	Y
Year dummy	N	N	N	N	N	N	Y	Y	Y
N	15297	15278	15273	15278	15297	15273	15276	15297	15273
R squared	0.27	0.27	0.27	0.89	0.89	0.89	0.90	0.90	0.90

Note: *significant at 10 per cent level or more

N=No, Y=Yes.

Robust standard errors clustered at the district level

Table 3.Regression Results: IV Estimates

Dependent Variable = Log Hired Labour

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LOAN	0.305*	0.287*	0.305*	0.106*	0.084*	0.104*	0.123*	0.094*	0.120*
	(0.048)	(0.035)	(0.047)	(0.021)	(0.015)	(0.021)	(0.025)	(0.017)	(0.025)
LOAN*INVPROD		-0.702	-1.246*		-0.711	-1.265*		-0.845*	-1.073*
		(0.688)	(0.769)		(0.450)	(0.620)		(0.500)	(0.551)
LOAN*WAGEPREM	-0.00001		-0.00001	-0.00001*		-0.00001*	-0.00002*		-0.00002*
	(9.49e-06)		(9.46e-06)	(4.28e-06)		(4.37e-06)	(5.57e-06)		(5.53e-06)
FIRM SIZE				1.125*	1.139*	1.127*	1.113*	1.131*	1.116*
				(0.026)	(0.021)	(0.025)	(0.029)	(0.024)	(0.029)
Constant	-1.916*	-1.755*	-1.906*	-1.755*	-1.580*	-1.736*	-2.043*	-1.825*	-2.018*
	(0.487)	(0.379)	(0.481)	(0.170)	(0.121)	(0.168)	(0.200)	(0.145)	(0.200)
Industry dummy	N	N	N	N	N	N	Y	Y	Y
Year dummy	N	N	N	N	N	N	Y	Y	Y
N	15247	15266	15242	15247	15266	15242	15245	15266	15242
R squared	0.26	0.26	0.26	0.88	0.88	0.88	0.88	0.88	0.88

Note: *significant at 10 per cent level or more

N=No, Y=Yes.

Robust standard errors clustered at the district level

Table 4: Auxillary Regressions: OLS and IV estimates

Dependent Variable = Log Hired Labour

Variables	OLS Results				IV Results			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LOAN	0.044* (0.004)	0.050* (0.004)			0.555* (0.193)	0.544* (0.164)		
ASSET			0.062* (0.006)	0.063* (0.006)			0.578* (0.206)	0.671* (0.214)
SIZE	1.285* (0.032)	1.348* (0.028)	1.302* (0.044)	1.350* (0.045)	3.725* (0.919)	3.677* (0.773)	4.161* (1.139)	4.634* (1.155)
LOAN*SIZE	-0.007* (0.003)	-0.012* (0.002)			-0.245* (0.090)	-0.238* (0.075)		
ASSET*SIZE			-0.008* (0.003)	-0.011* (0.003)			-0.246* (0.095)	-0.284* (0.096)
Constant	-1.289* (0.045)	-1.506* (0.057)	-1.575* (0.071)	-1.732* (0.074)	-6.408* (1.938)	-6.441* (1.647)	-7.700* (2.443)	-8.865* (2.509)
Industry dummy	N	Y	N	Y	N	Y	N	Y
Year dummy	N	Y	N	Y	N	Y	N	Y
N	15275	15242	15274	15272	15271	15269	15270	15268
R squared	0.89	0.88	0.89	0.90	0.75	0.77	0.81	0.79

Note: *significant at 10 per cent level or more

N=No, Y=Yes.

Robust standard errors clustered at the district level

Figure 1: The Possible Non-Monotonicity of the Relationship between Demand for Outside Labour (n) and Access to Loans (L)

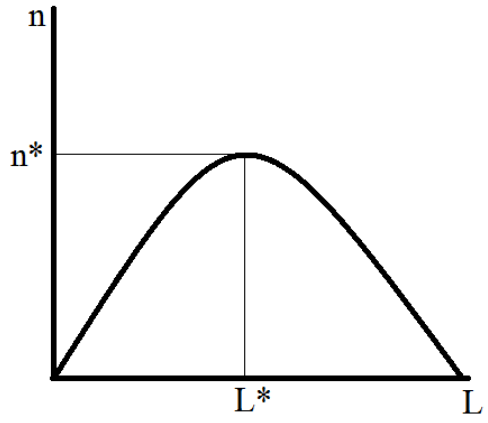

Figure 2: Scatter plot of Hired Labour Proportion and Log Loan: All Firms

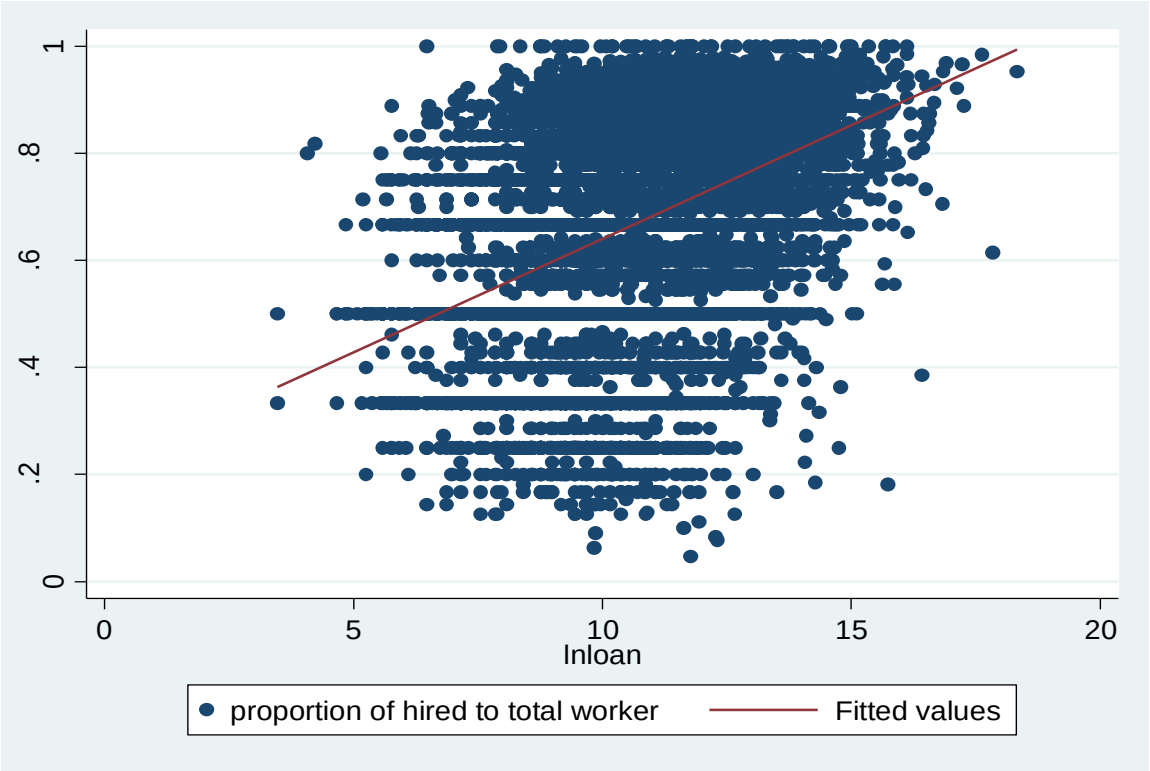

Figure 3: Scatter plot of Hired Labour Proportion and Log Loan: Large Firms

Figure 4: Scatter plot of Hired Labour Proportion and Log Loan: Small Firms