Returns on Informal and Formal finance for Indian Informal firms: A Pseudo panel data analysis

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ABSTRACT

The study investigates the differential impact of various sources of finance on informal firm performance. In the informal sector, where access to finance is limited, we investigate how productivity varies with different sources of finance. Given the data limitations, a pseudo-panel data design was used by combining the three only available, independent cross-sectional surveys conducted by the National Sample Survey Office between 1999-2000 and 2015-16. Using formal and informal credit as two different sources of finance and total factor productivity (TFP) as the primary measure of firm performance, we find a positive relationship among them across all major industries; however, the impact of formal finance was higher than informal credit. Our results stand robust against alternative performance measures. Additionally, to address endogeneity concerns, dynamic panel data analysis was adopted. Obtained findings convey essential policy implications for intensification of financial inclusion and financial literacy.

JEL Classification: D24, L25, M21, O17

Keywords: Informal Sector, Finance, Credit, Total Factor Productivity, Pseudo Panel, India

I. INTRODUCTION

According to Lewis' "dual economy" theory, the surplus labour force shifts as the economy grows from the traditional labour surplus (subsistence) sector to the capital surplus modern (capitalistic) sector (Lewis, 1954). Similar trends have also been present throughout India's history. As per the ILO estimates[1], non-farm employment has grown over time while the overall share of the agricultural labour has decreased, leading to an overall increase in the share of informal employment in India. Hence informal firms are known as the employers of last resort, where the ever-increasing workforce gets absorbed in the presence of the evident lack of formal employment opportunities. Thus, the study realises the importance of informal firms and analyses one of the essential factors of firm productivity in the literature – *Finance* or *access to finance*.

Informal businesses are primarily presumed to be inefficient. The literature is generally limited to comparative analyses of formal vs informal enterprises rather than examining the various factors that may influence productivity and performance heterogeneity among informal firms. It is widely assumed that formalisation is the natural progression for informal firms as they grow, leading to increased productivity. However, formalisation is a difficult process to follow (Andrade et al., 2014). The existence of the informal sector presents policymakers with a conundrum because they must choose between reducing the size of the informal sector by relocating as many workers as possible from the informal to the formal sector or supporting the inherent dynamism of informal firms, thus enhancing their vitality. During the 1990s, India liberalised its trade and licencing policies, which led to easy entry and exit of the firms, thus increasing competition. Informal firms coexist with formal firms in the same socioeconomic environment and have a symbiotic relationship with them (Maiti, 2008).

The development of a self-reliant indigenous industry is based upon the growth of informal firms that also helps develop indigenous entrepreneurship (Turkson, 2010; Yankson, 1983). For a fast developing country like India, meeting its near mid-term goal of employment-led economic growth will require addressing the concerns impeding growth. Literature finds various factors that impede growth in SMEs (small and medium enterprises), such as excessive regulative tax, high transaction costs, logistics, infrastructure, technology, volatile business environment, lack of finance, inadequately skilled labour, etc. (Turkson, 2010; Baah-Nuakoh et al., 2002; Tybout, 2000; Nugent,

[1] https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-new_delhi/documents/publication/wcms_568701.pdf

1996; Fafchamps, 1994). However, emerging literature highlights financial constraint as the most significant and direct determinant of firm growth (Quartey et al., 2017; Beck & Cull, 2013; Collier, 2009; Ayyagari et al., 2008; Beck et al., 2006). The existence of a gap in financing for SMEs is due to the reluctance of the formal financial institutions to offer credit because of the informal character of the majority of the SMEs, the inability to provide collateral and high transaction costs (Bigsten et al., 2003).

By nature, there is a significant difference between formal and informal finance, implying that it may have varying impacts on firm performance or firm growth. Considering this, debates in recent literature argue about the relative importance of formal vs informal finance (Ayyagari et al., 2010). Informal sources of finance are ideal for informal firms due to their easier accessibility and flexible repayment options. In addition, lesser information asymmetry between the borrower and financer leads to better enforcement of oral contracts through reputation and coercion, hence lowering the transaction costs (better monitoring and screening) than formal finance. However, the smaller quantum of credit offered limits long-term firm growth. On the other hand, formal finance offered by institutional lenders is the most efficient source of credit since it has the potential to offer a higher quantum of the loan amount at the lowest interest rates. Moreover, formal finance comes with other benefits such as - access to a wider network of other institutional bodies, credit insurance schemes at reasonable rates to cater for exigencies, etc.

Thus, the present study is motivated to analyse the differential impact of formal and informal finance on informal firms in a developing country like India, where the informal sector significantly contributes to output and employment. We find the extent to which finance can hinder or drive firm performance. Adopting a pseudo-panel data design to cater for the data limitations, we examine the dynamic relationship between access to finance and firm performance by combining three nationally representative, cross-sectional surveys conducted in India between 1999 and 2016. We use total factor productivity (TFP) as our primary measure of firm performance because, unlike single productivity measures, it is unaffected by the intensity with which other omitted factors are used. As a measure of finance, we use access to both formal and informal credit sources.

We discover a positive relationship between credit and productivity, implying that access to credit boosts firm productivity. However, the impact of formal finance clearly outperforms informal finance. Our findings are consistent across all major industrial sectors and alternative performance measures. We add to the body of knowledge by capturing the dynamic process of informal firm performance in the presence of formal and informal finance sources.

Theoretical Underpinnings

Despite remarkable economic growth since liberalisation, the size of India's informal sector has not decreased, as growth economists predicted. In contrast, the informal sector has made significant contributions to the economy in terms of gross output and as a buffer against periodic economic shocks by serving as the employer of last resort. Furthermore, its products are more affordable, serving lower-income people and facilitating employment growth because small businesses integrate vertically, increasing the employment-to-sales ratio (Williamson, 1975). Such findings indicate that informal firms have the potential to create jobs, especially when the formal system has limited capacity to reap the benefits of the demographic dividend.

Because of the prevalence of weak institutional systems such as underdeveloped credit markets, corrupt bureaucracy, and inefficient legal systems, the business environment in low- and middle-income countries (L&MICs)[2] is challenging. Emerging economies frequently have a sizable informal sector, often caused by the lack of jobs in the formal sector. As a result, the informal sector in L&MICs plays a vital role in addressing unemployment, poverty, and inequality (Papola, 1980).

India stands out among the Asian economies for its approach to industrial development through MSMEs (Micro, Small and Medium Enterprises), which was adopted to establish a core infrastructure industry that requires significant capital investment as well as a few labour-intensive consumer goods manufacturers that could be dispersed throughout the nation in both rural and urban areas, thereby promoting industrialisation and addressing the issue of unemployment. According to the Central Statistics Office, the percentage of MSME Gross Value Added (GVA) in GDP for the years 2018–19 and 2019–20, respectively, was 30.5% and 30%. (2011-12). The majority of these MSMEs are informal, employing about 110 million workers[3].

[2] Lower-income countries, e.g. Afghanistan, are those with GNI per capita of less than $1036; lower-middle-income countries, e.g. India, are those with GNI per capita between $1036 and $4045; and upper-middle-income countries, e.g. China, are those with GNI per capita between $4,046 and $12,535. (https://www.worldbank.org/en/country/mic/overview).

[3] https://www.pib.gov.in/PressReleasePage.aspx?PRID=1744032

Conceptualising Informality

L&MICs are distinguished by the higher proportion of informal than formal enterprises. Regarding informality, two opposing theories are mutually exclusive. The conservative, Marxist, and dualist schools blame the small size of the informal or unregistered enterprises for their poor productivity levels in the informal sector and the inefficient use of resources (La Porta & Shleifer, 2014). Because of the socioeconomic environment, where the cohabitation of the formal and informal sectors is crucial for economic development, the emerging view of the structuralist, legalist, and institutionalist schools of thought view the informal sector as an essential medium of production. Recent studies demonstrate that many businesses and employees willingly choose informality (Perry et al., 2007). Many business owners and entrepreneurs use the informal sector as a stepping stone to develop their abilities before entering the formal sector because there is less regulatory pressure. Workers from the formal sector frequently use their experience to launch informal businesses (Hoyman, 1987). As a result, the opportunity-driven informal sector can be a tool for building wealth.

Finance as a factor for firm performance

Initial literature like Modigliani and Milllers (1958), using the '*no transaction cost model*', find that financing structure (debt and equity financing) has no impact on firm value. This model was unrealistic since it assumed perfect information symmetry. Using *the 'agency model*', Jenson and Meckling (1976) find that information asymmetry impacts the debt and equity holdings of a firm since the managers and firm owners have differential incentives. However, the *agency model* was found to be static and did not differentiate between the sources of financing. This shortcoming was handled by Myers (1984) by introducing the '*pecking order theory*', which showed that SMEs initially explore internal sources of finance before moving to external and formal sources of finance due to inadequacy of funds. Using the *'financial hierarchy model*', Carpenter and Peterson (2002) find that the choice of finance from different sources depends on the cost of financing. Small firms initially opt for informal finance since it comes at a relatively cheaper cost. Berger and Undell (1998), through their theoretical model, argue that financing of firms occurs in a continuum based on firm size, firm age and availability of information, i.e. smaller and younger firms have less information to ascertain their credibility, thus restricting them to internal and informal sources of financing.

At the macro level, most of the cross-country studies find a positive association between economic growth and finance (Levine, 2005). However, such studies fail to capture the heterogeneity among the individual countries. Individual country-level studies, especially for developing countries, suffer from the unavailability of long time-series data required for producing consistent estimates (Christopoulos & Tsionas, 2004). In such a scenario, the emerging literature has diverted the focus on firm-level studies that provide a better understanding of finance and growth while accounting for firm and country-level heterogeneity. Khan (2015) finds that, unlike informal finance, banks positively influence SME growth in Pakistan. Whereas Beck et al. (2015) find that informal finance from friends and relatives positively impacts sales growth in microenterprises but has no impact on self-employed enterprises. They also found no significant relationship between firm growth and formal finance. Degryse et al. (2016) find a positive and higher impact of informal finance on sales growth of small firms than on larger firms. They also explored the complementariness between formal and informal finance. They argued for optimal financing by simultaneously utilising the informational advantage of informal finance and the scale advantage of formal finance for increasing sales. Allen et al. (2019) segregate informal finance into *constructive* and *underground*. *Constructive informal finance*, such as family borrowing and trade credits, positively impacts firm performance since it depends on the altruistic relationships and information advantages between the borrowers and creditors. Whereas, *Underground informal finance*, such as from money lenders, does not lead to good firm performance due to its exploitative nature.

In this section, we gave a brief literature review along with the introduction outlining some theoretical arguments for why finance is considered an essential determinant of firm performance. In the following section, we outline the methodology and data. Section III discusses the results and the last section concludes the paper.

II. EMPIRICAL SETTING

Data

Data for this study come from three rounds of surveys conducted by India's National Sample Survey Office (NSSO): (i) NSS 55th Round *(Informal Non-Agricultural Enterprises Survey)*: July'1999 – June'2000, (ii) NSS 67th Round *(Unincorporated Non-agricultural Enterprises - excluding construction)*: July'2010 – June'2011, and (iii) NSS 73rd Round *(Unincorporated Non-agricultural Enterprises - excluding construction)*: July'2015 – June'2016. Unlike the other NSSO surveys, which are restricted only to the manufacturing sector, these three surveys cover all the significant sectors of the Indian economy, thus providing a richer data source for the unincorporated non-agricultural enterprises in India. Additionally, they cover a significant period from 1999-2000 to 2015-2016.

Starting with NSSO 55th round[4], we choose only the variables which are common in all three rounds (Table 1.1). All the relevant variables, such as *Total receipts, Hired Capital, Owned Capital, investment* and *TFP*, are inflation-adjusted using the wholesale price index (WPI) for manufacturing sector firms and consumer price index (CPI) for services sector firms, with 2010 as the base year[5].

Pseudo-Panel Data Analysis

For our investigation, pure panel data would have been preferable because the link between finance and firm performance is dynamic. Panel statistics on informal enterprises are, however, hardly available for L&MICs. Therefore, we adopt Deaton's (1985) method of constructing a synthetic or pseudo-panel from a set of cohorts, each cohort consisting of a collection of observations with a comparable set of attributes. However, as we are dealing with independent repeated cross-sectional surveys, the cohort observations (n) are not necessarily the same across all the surveys. The total number of observations (N) also varies across surveys. Hence, we get an unbalanced pseudo-panel dataset. Cohort (c) is the unit of observation in a pseudo-panel. A cohort in our study is a collection of homogenous firms grouped according to specific selection criteria. Hence, we are analysing cohorts (groups of similar firms) over

[4] Since the 55th survey is the oldest among the three, it had a relatively lesser variety of variables, which is a limitation we have to deal with.
[5]Source WPI: https://data.worldbank.org/indicator/FP.WPI.TOTL?locations=IN&most_recent_value_desc=false
CPI: https://data.worldbank.org/indicator/FP.CPI.TOTL?locations=IN

time instead of studying individual firms over time. However, this aggregation of similar firms into cohorts comes at the cost of some information loss (as we now deal with average values rather than individual values). There is also a trade-off between the size of each cohort and the number of cohorts.

We specify our cohorts precisely such that membership can be as exclusive as feasible while retaining a sufficient number of observations in each cohort (Antman & Mckenzie, 2007). The firms in the dataset are categorised on the following seven criteria – Name of the state in which the firm operates (Goa, Assam, Delhi, etc.), Industry type (manufacturing, etc.), nature of operations (perennial, casual and seasonal), location of the firm (Urban or Rural), three quantiles (25^{th}, 50^{th} and 75^{th}) based on employment size, three quantiles (25^{th}, 50^{th} and 75^{th}) based on capital size and finally, the type of ownership (male proprietor, female proprietor, partnership, etc.).

Based on these seven broad classifications, firms falling under identical categorisations were considered similar and kept in one cohort. In other words, firms operating in the same state and industry, same location, belonging to the same employment and capital size quantile, and having the same ownership type, would fall under one cohort.

Moreover, following this procedure of constructing the cohorts effectively added these characteristics as controls in the model. With the initial count of 820,485 observations among the three independent cross-sectional surveys, 47,683 cohorts we constructed.

Using pseudo-panel data does not always imply inferior results compared to panel data because the former is subject to only minor measurement errors. It could be argued that pseudo-panels built with cohort means are average values for some homogeneous firms and thus an approximation of the population mean with measurement errors. Nevertheless, if the cohort size is high enough, most writers in empirical applications ignore such inaccuracies (Blundell et al., 1994; Moffit, 1993; Browning et al., 1985). Additionally, compared to panel data, the attrition problem in pseudo-panel data is less severe because individual enterprises are not required to remain constant throughout all periods in the pseudo-panel.

1.1: Summary Statistics for the cohorts of the pseudo panel

Variable	Description	Mean	SD	N
Log (TFP)	Log of Total Factor Productivity	2.52	.77	47683
Total Workers	Total workers in a firm	3.43	3.68	47683
Log (Total receipts)	Log of total receipts from sale	10.01	1.56	47658
Log (Capital_hired)	Log of total capital hired	6.31	5.90	47683
Log (Capital_owned)	Log of total capital owned	10.76	2.66	47683
Log (Investment)	Log of total investment	3.43	4.75	47683
Market concentration	Measured via Herfindahl-Hirschman Index	.001	.012	47658
Formal Loan	Dummy(Yes=1)	0.247	0.431	47683
Informal Loan	Dummy(Yes=1)	0.248	0.432	47683

Econometric Methodology

Our main measure of finance is *access to finance*, which is segregated based on sources of finance. We use binary variables for *access to formal* and *access to an informal* loan where the value of 1 signifies the availability and value of 0 signifies the unavailability of finance. TFP serves as our main metric for assessing firm performance. TFP, often referred to as multifactor productivity, refers to a firm's potential to generate goods and services without increasing input costs over time. In other words, TFP merely represents the measured difference between the inputs and outputs caused by two important variables. First, technical efficiency, or effective use of the input resources already at hand. Second, utilising advanced technologies. We can fairly assume that technical efficiency is the main driver of TFP in informal enterprises since they lack the capital to obtain expensive, advanced technologies. We measure TFP using a Cobb-Douglas production function with constant returns to scale:

$$Q = A\,L^{\theta}\,K^{(1-\theta)} - - - (1.1)$$

Where Q = output or revenue

K = capital stock

L = Labour force

$\boldsymbol{\theta}$ *= output elasticity of the factor*

A = factor-neutral shifter

TFP is measured by calculating *A*; TFP = $A = Q/\,L^{\theta}\,K^{1-\theta}$ (Syverson, 2011). We use the log-transformed production function equation (1.2) to estimate TFP. The lowercase letters denote the logarithmic values. *A* is TFP, representing the firm's efficiency in transforming inputs into output.

$$q = A + \beta_l l\ + \beta_k k - - - (1.2)$$

The following variables were used to estimate the production function – *total receipts* and *total workers* for output and labour force, respectively. The capital was divided into *hired capital* and *owned capital*. We use the semi-parametric TFP estimation method primarily to address simultaneity bias concerns that may arise with the traditional OLS method if the productivity shock is positively related to firm input use. In other words, when a firm observes a positive productivity shock that the econometrician does not observe, the firm increases its use of inputs. As a result, the residual is a skewed estimate of productivity. Considering this issue, we adopt *Wooldridge modified Olley-Pakes* method[6], where proxy variable (*investment*) is used for controlling the correlation between unobservable productivity shock and inputs usage, implemented through the generalised method of moments (GMM) approach[7] (Olley and Pakes,1996; Wooldridge, 2009).

[6] This estimation was done using the Stata package '*Prodest*' (Rovigatti & Mollisi, 2018)
[7] Production function estimates are available in the appendix Table 5

Equation (2.1) is estimated using Random Effects (RE) estimation technique to observe the effect of access of finance on productivity.

$$log(TFP)_{ct} = \beta_0 + \beta_1 Formal\_Loan_{ct} + \beta_2 Informal\_Loan_{ct} + \gamma Z_{ct} + \delta_c + \epsilon_{ct} \text{ ---------- (2.1)}$$

$$log(TFP)_{c\,t} = \beta_0 + \theta\, log(TFP)_{c\,t-1} + \beta_1 Formal\_Loan_{ct} + \beta_2 Informal\_Loan_{ct} + \gamma Z_{c\,t} + \delta_c + \epsilon_{c\,t} \text{ ---------- (2.2)}$$

Where, $TFP_{c\,t}$ = Total factor productivity (TFP) of c^{th} cohort in t^{th} year

$TFP_{c\,t-1}$ = Total factor productivity (TFP) of c^{th} cohort in t-1 year

Formal_Loan = measured as a binary variable

Informal_Loan = measured as a binary variable

Z_{ct} = vector of control variables chosen to reduce the possibility of omitted variable bias, including Firm size and Market Concentration.

Our main explanatory variable of interest is *Formal_Loan* and *Informal_Loan*; both are binary variables. Access to credit and sources of finance have an impact on firm performance (Beck et al., 2005; Maffioli, 2017; Allen et al., 2019), encourage entrepreneurship in the informal sector (Gang et al., 2022), and can help reduce the overall size of the informal economy (Gharleghi & Jahanshahi, 2020). Underdeveloped financial markets and information asymmetry inhibit L&MICs. Firm performance may benefit from timely financing through optimal investment in machinery, raw material procurement, and other firm operations.

Z_{ct}, a vector of control variables chosen to reduce the possibility of omitted variable bias, includes various *Frim sizes and Market Concentration*. We use *employment size* as the measure of firm size as one of the controls, since informal firms are highly labour-intensive and capital deficient. Similar to De and Nagaraj (2014) we have defined firm size as a categorical variable by dividing our data into three size categories according to 25th and 75th quantiles: *small firms* with up to two workers, *big firms* with five or more workers, and the rest as *Mid-sized firms*. A similar exercise was adopted to measure firm size based on asset size category as an alternative measure of firm size.

Firms respond to competition by implementing organisational changes that have an impact on efficiency (Dasgupta et al., 2018). We use cohort dummies for δ_c to account for the heterogeneity among the cohorts, possibly due to various features like management style, location, industry, and nature of the operation, assumed to be time-invariant. Fixed Effects (FE) could not be used due to perfect collinearity, as the firm size categories were one of the criteria used to create the pseudo panels. In Random Effects (RE), we assume that unobserved error terms are uncorrelated with the main explanatory variable.

As a measure of robustness check, we transformed equation (2.1) as a dynamic panel data model by including the first lag of the dependent variable as an explanatory variable (Udin et al., 2017) and estimated equation (2.2). Dynamic estimator provides essential checks for potential endogeneity issues that might arise due to the time dependency of TFP (Syverson, 2011).

Market competition in the domestic market is proxied by industry concentration, calculated as Herfindahl-Hirschman Index (HHI)[8] measured at the two-digit industry level[9] with data on total receipts/output/revenue:

$$Mkt\_conc_{js} = \sum_{c} ms_{cjs}^2 , and\ ms_{cjs} = {receipts_{cjs}}\Big/{\sum_c receipts_{cjs}} \quad --------(3)$$

Where Mkt_conc = Market concentration,

ms = Market share

receipts = Total revenue receipts or total output

c = cohort, j = industry, s = state

Not accounting for the competition from the formal firms is one of the potential concerns regarding using market competition (proxied via market concentration) as a control variable. We provide two primary arguments for this

[8] Since we are dealing with informal firms, most of these firms' products are for local markets. Therefore, the competition is within the local (state) markets. Thus, the HHI is calculated at the industry-state level instead of at the industry-national level. A higher value of the HHI indicates a lesser level of competition in the industry.

[9] As per National Industrial Classification 2008 (NIC-2008)

genuine concern. Firstly, our data set does not consist of formal firms. Any other dataset that comes close to the sampling procedure followed by NSSO is the Annual Survey of Industries (ASI), which is restricted to manufacturing firms only. Secondly, due to the significant productivity differentials between the formal and informal firms (Kumari, 2022) and the separate category of customers and markets to which the informal sector caters, we can safely assume that informal firms are characteristically different from formal firms. Thus non-accounting of competition from formal firms would not statistically alter our estimates. A similar additional concern may arise due to the non-accounting of agglomeration economies. Ramachandran and Sasidharan (2021), in their study on formal and informal Indian manufacturing firms, find that there are advantages of localisation for both types of firms, with co-location advantages for formal firms only. The insignificant impact of co-location was observed for Informal firms.

III. RESULTS AND DISCUSSION

Table 2 (regression 1) shows that access to formal and informal credit positively impacts productivity as timely credit helps in purchasing necessary resources. We find that access to formal credit relatively increases TFP by 31.6% and access to informal credit relatively increases TFP by 23.8%, at one percent statistical level of significance. Exposure to formal credit increases the ability of an informal firm to engage with banks or other financial institutions. It makes it easier for informal firms to come in contact of formal firms and can support formal firms with non-core operations or supply them with intermediate inputs. Formal credit often comes with mandatory insurance cover at subsidised rates, which may hedge the firm's operational risk in case of credit default (Mund, 2020). Informal credit, especially from moneylenders, is exploitative. However, credit from family and friends or close suppliers may provide timely credit during sudden cash crunch or demand shocks. A similar positive effect of informal financing was also found by Wahab et al. (2022) on small cottage firms in Pakistan. Unfortunately, our dataset does not provide informal credit sources for further investigation of this dimension. We also observe that increasing market concentration (decreasing market competition) increases firm performance. Similar results were observed with changing the control variable firm size based on asset size category (regression 2, Table 2).

Table 2: Main Results

Dep Var: Ln(TFP)	(1)	(2)	(3)	(4)
			Dynamic Panel Model	
Formal Loan(No=0) **Base Category**				
Formal Loan(Yes=1)	0.316*** (0.00479)	0.283*** (0.00565)	0.253*** (0.00634)	0.214*** (0.00798)
Informal Loan (No=0) **Base Category**				
Informal Loan (Yes=1)	0.238*** (0.00424)	0.205*** (0.00487)	0.178*** (0.00573)	0.125*** (0.00704)
L.Ln(TFP)			0.314*** (0.00896)	0.679*** (0.00652)
Controls				
Firm_Employment_Size =0 (Small firm) **Base Category**				
Firm_Employment_Size =0 (Mid-size firm)	0.693*** (0.00473)		0.500*** (0.00825)	
Firm_Employment_Size =0 (Big firm)	1.503*** (0.00759)		1.107*** (0.0166)	
Firm_Asst_Size=0 (Small firm) **Base Category**				
Firm_Asst_Size=0 (Mid size firm)		0.362*** (0.00933)		0.106*** (0.00662)
Firm_Asst_Size=0 (Big firm)		0.641*** (0.0105)		0.209*** (0.00883)
Market Concentration	2.240*** (0.458)	2.793*** (0.669)	4.147* (1.642)	5.904** (2.198)
Constant	1.876*** (0.00332)	2.064*** (0.00679)	1.348*** (0.0178)	0.685*** (0.0141)
Observations	47658	47658	19667	19667
Adjusted R^2	0.72	.218	.838	.816
Chi2	59472.9	8924.7	51221.6	29966.4

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As a measure of robustness check, we estimated equation (2.1) as a dynamic panel data model by including the first lag of the dependent variable as an explanatory variable (Udin et al., 2017) and found similar results. We find that access to formal credit relatively increases TFP by 25.3%, and access to informal credit relatively increases TFP by 17.8%, at one percent statistical level of significance (regression 3, Table 2). Similar results were observed with changing the control variable firm size based on asset size category (regression 4, Table 2).

Additionally, we also used alternative measures of firm performance like Gross Value Added (*GVA*)[10] and *Revenue* (total sale receipts or total output revenue) using dynamic panel specification, and found similar results (Table 3).

Firms with access to formal credit were able to generate 19.5%, and firms with access to informal credit were able to generate 10.4%, more revenue, respectively (regression 1, Table 3). Similarly, Firms with access to formal credit were able to generate 31.6% and firms with access to informal credit were able to generate 21.8%, more revenue, respectively (regression 2, Table 3). Moreover, similar results were also obtained at various industry-specific levels (Table 4).

Table 3: Dynamic panel RE results with alternative measures of performance

	(1) Ln(GVA)	(2) Ln(Revenue)
Formal Loan (No=0) **Base Category**		
Formal Loan (Yes=1)	0.195***	0.316***
	(0.0120)	(0.0159)
Informal Loan (No=0) **Base Category**		
Informal Loan (Yes=1)	0.104***	0.218***
	(0.0110)	(0.0142)
Controls		
Firm_Employment_Size =0 (Small firm) **Base Category**		
Firm_Employment_Size=1 (Mid-size firm)	0.681***	0.747***
	(0.0188)	(0.0247)
Firm_Employment_Size=2 (Big firm)	1.315***	1.365***
	(0.0355)	(0.0453)
L.Ln(TFP)	0.449***	0.420***
	(0.0156)	(0.0191)
Market Concentration	13.80**	19.58**
	(5.124)	(7.435)
Constant	7.598***	8.502***
	(0.0329)	(0.0408)
Observations	19630	19667
Adjusted R^2	0.565	0.452
chi2	14948.9	8573.4

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[10] Since GVA is calculated as the difference between Total Revenue and Total Cost, we can consider it as gross profit.

Table 4: Dynamic panel RE industry-specific results

Dep Var:Ln(TFP)	**(1) Manufacturing**	**(2) Hotel & Restaurants**	**(3) Trade & Repair**	**(4) Transport, Storage & Communication**
Formal Loan (No=0) **Base Category**				
Formal Loan (Yes=1)	0.269***	0.260***	0.225***	0.297***
	(0.0132)	(0.0156)	(0.0112)	(0.0184)
Informal Loan (No=0) **Base Category**				
Informal Loan (Yes=1)	0.218***	0.196***	0.168***	0.136***
	(0.0119)	(0.0129)	(0.0105)	(0.0168)
Controls				
Firm_Employment_Size =0 (Small firm) **Base Category**				
Firm_Employment_Size =0 (Mid-size firm)	0.493***	0.480***	0.478***	0.568***
	(0.0159)	(0.0178)	(0.0160)	(0.0247)
Firm_Employment_Size =0 (Big firm)	1.094***	1.070***	1.008***	1.097***
	(0.0327)	(0.0366)	(0.0297)	(0.0497)
L.Ln(TFP)	0.277***	0.232***	0.369***	0.269***
	(0.0180)	(0.0218)	(0.0162)	(0.0254)
Market Concentration	8.544***	7.043	2.676*	5.680***
	(1.610)	(5.001)	(1.150)	(1.125)
Constant	1.413***	1.594***	1.225***	1.380***
	(0.0350)	(0.0451)	(0.0317)	(0.0517)
Observations	4882	3253	4871	2150
Adjusted R^2	0.839	0.814	0.850	0.818
chi2	13284.1	7701.3	14429.5	4963.9

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

IV. CONCLUSION

Inequality is a key problem in development economics. The income distribution in emerging economies has remained unequal even after years of rapid expansion. Productivity growth at the firm level is one option to raise people's living standards because L&MICs have limited resources. A rapidly expanding economy like India also needs to address the unemployment issue in addition to many institutional flaws. Inequality in society is made worse by unemployment. The informal sector can be used for this because the formal sector's capacity to meet the demands of the expanding workforce is restricted. Therefore, there is an urgent need to understand informal firm dynamics and elements that may substantially impact its capacity for productivity.

A crucial component of overall economic development is firm performance. Access to finance is one of the most logical elements identified in the literature among the several tangible and intangible aspects that can influence it. However, the literature is still limited in its coverage of the informal sector, and the empirical findings on the impact of various sources of finance on firm performance require further analyses. Using pseudo panel data from 1999-2000 to 2015-16, we find a positive association between access to finance and performance. The findings also show that, in addition to formal credit, even credit from informal sources positively influences firm performance, which was previously thought to be inconsistent. The study's findings highlight the severe lack of capital and limited access to timely funds that these firms experience.

Possible Policy Implications

The results reveal the importance of finance for informal firms which are labour intensive and capital starved. The underdeveloped credit markets require significant policy impetus and strong political will. The underground nature of informal firms is the main hindrance in their path to recognition, which is one of the primary requisites for formal credit. Reducing the formalisation costs can prove a welcome step in inducing firms towards formalisation hence providing them official recognition. Governments should incentivise financial institutions to encourage lending in the informal sector. Simultaneously, public education and training should be provided to the informal firms to manage their business in a more professional manner that may help attract formal lending.

The results observe the statistically significant positive impact of informal credit, thus encouraging regulations that can further streamline the development of small financial institutions like payment banks, etc., enhancing financial penetration even in rural areas. The results encourage the continued focus on financial inclusion which is the first step towards financial literacy.

Limitations and Future Scope

Despite the benefits of pseudo-panel data analysis, it is not impervious to problems like estimation error and information leakage. By grouping companies with similar features into one cohort and using the cohort average as an observation, leads to information loss; this also affects estimation accuracy because we are working with approximate cohort averages rather than the real values of the observations. Hopefully, we can produce reliable estimates once pure panel data becomes available.

Additionally, we had to cope with the challenge of just analysing the common factors shared by the three separate cross-sectional surveys. For instance, the NSSO 55th round survey, the oldest of the three polls, included fewer variables than the NSSO 67th and 73rd round surveys, which were substantially richer datasets. Hence, the 55th survey was used as the base survey to bring coherence while constructing pseudo panels. As a result, numerous additional factors found in the latter two surveys were not used. Thus, our results may not be immune to the problem of omitted variable bias.

Despite observing significant results for informal finance, data limitations restricted us from observing the various sources of informal finance like credit from money lenders, friends, family or suppliers. Hence we could not segregate the various *constructive* and *underground* sources of informal finance (Allen et al., 2019). Future research is welcome in analysing the various sources of informal finance that can provide richer and more detailed results, enriching the current literature.

DECLARATION OF INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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DATA AVAILABILITY STATEMENT

The datasets were derived from sources in the public domain: [http://microdata.gov.in/nada43/index.php/catalog/ENT].

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