APPLICATION FORMAT

1. Application for the position of: (please tick √)

☐Assistant Professor ☐Professor(Grade-I) ☐√ Non Resident Fellow

2. Area applying for (*select multiple areas, if applicable*):

☐ Decision Sciences
☐ Entrepreneurship
☐ Information Systems
☐ Health Policy
☐ √ Economics
☐ **Finance & Accounting**
☐ √ **Climate & Sustainability**
☐ Strategy

[Only one Area, which may be the most applicable to the candidate, should be selected. If multiple Areas are selected, the application is liable to be rejected].

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3. Please use the format given below only and provide complete data. Use additional sheets as needed and reference them suitably. All information furnished MUST be based on supporting documentation.

4. <u>All</u> pages of the application and additional sheets/annexure (forming part of the application) must be duly signed, before submission of hardcopy by post/courier.
5. At this stage of application, please DO NOT attach/submit copies of any certificates / supporting documentation. Such proof would be sought ONLY from short-listed applicants.

1. PERSONAL DETAILS
Full Name (in capital letters, with surname in the end): DINABANDHU BAG
Date of Birth (dd/mm/yyyy): 01/07/1971
Contact Address with PIN/Zip Code: FR 57, NIT, ROURKELA, 769008 Contact Number: 9437490180 E-mail(SKYPE):dinabandhu.bag@gmail.com
Gender: M Nationality: INDIAN Marital Status: M

2. EDUCATIONAL QUALIFICATIONS (in reverse chronological order):							
S.No.	Examination	University/ Institution	Main Subjects	Year of Passing	% of Marks or CGPA	Class / Division	Distinctions (if any)
1.	PhD.	University Of Mysore	Financial Economics	2009	-	FIRST	

2.	Post- Graduation (Master's Degree)	IGIDR Mumbai	Economics	1997	3.55/4.0	FIRST	FIRST
3.	Professional Qualification (MBF)	IIBF, MUMBAI, MBF	BANKING	1999	3.5/5.0	FIRST	
4.	Graduation (Bachelor's Degree)	NIT Rourkela	Mining Engg.	1994	70.71%	FIRST	
5.	Higher-Secondary Class XII	CHSE	SCIENCE	1988	65.46%	FIRST	
6.	Matriculation/ Secondary School/Class X	BSE	SCIENCE	1986	70.76%	FIRST	

3. TOPIC OF PhD/ EQUIVALENT

ECONOMIC CAPITAL FOR RETAIL BANK PORTFOLIOS USING CREDIT RISK FRAMEWORK: MODEL & EMPIRICAL EVIDENCE

4. FULL TIME WORK EXPERIENCE (in reverse chronological order):

Sl. No.	Name of the Employer	Period of Service		Designation	Key Result Areas
		From	To		
1	NIT ROURKELA	30.3.2010	CONTINUE	ASSOCIATE PROFESSOR	teaching & research
2	ORACLE FINANCIAL SERVICE SOFTWARE LTD	15.5.2006	29.3.2010	CONSULTANT	PRODUCT MANAGEMENT FOR REVELEUS FINANCIAL ANALYTICS
3	CITIBANK N.A.	09.4.2004	12.4.2006	MANAGER	GLOBAL DECISION MANAGEMENT FOR CONSUMER FINANCE
4	GE CAPITAL	06.2.2001	07.04.2004	ASST. MANAGER	COMMERCIAL EQUIPMENT FINANCE ANALYTICS
5	RESERVE BANK OF INDIA MUMBAI	02.02.1998	06.02.2001	GRADE B OFFICER	BANKING OPERATIONS
6	IGIDR MUMBAI	01.08.1996	31.1.1998	ADHOC R.A	ECONOMIC MODELING

7	ENVIROCARE LTD	01.08.1994	02.02.1995	PROJECT ENGINEER	ENVIRONMENT QUALITY AUDIT

Notes:

i. Only full-time experience should be mentioned. Experience should not overlap.
ii. Duration of PhD shall not be counted as experience.
iii. Self-employment shall not be counted as experience.

a. Academic Experience:
   i. As Assistant Professor (Grade-II): _____ years; _____ months
   ii. As Assistant Professor (Grade-I): _____ years; _____ months
   iii. As Associate Professor: __13__ years; __6____ months
   iv. As Professor: __0_____ years; __0___ months
   v. Teaching at bachelor's degree level: __12_____ years; _____ months
   vi. Teaching at master's or doctoral degree level: ___12____ years; _____ months

   Total Academic Experience: ___13____ years; _____ months

b. Total Industry experience: _13_____ years; _6_____ months
c. Total other experience (e.g., NGO) ____0__ years; __0____ months
d. Total work experience [(a)+(b)+(c)]: __25_____ years; ___0___ months.

5. COURSES TAUGHT (IN THE PAST FIVE YEARS)						
No.	Institution	Course Title	Level (Bachelor's/ Master's/Doctoral)	Year	Batch Size	Students' Feedback / Rating (0-3)
1	NIT ROURKELA	MANAGERIAL ECONOMICS	pg	2010-2023		
2	NIT ROURKELA	BUSINESS ENVIRONMENT	PG	2010-2023	45	(>2.80)
3	NIT ROURKELA	PORTFOLIO MANAGEMENT,	PG	2010-2013	44	(>2.8.0)
4	NIT ROURKELA	MERGERS AND ACQUISITIONS,	PG	2010-2018	48	(>2.80)
5	XIMB BHUBANESWAR (PGBFS)	FINANCIAL MANAGEMENT	Phd	2010-2019	11	(>2.80)
7	NIT ROURKELA	STATISTICAL ANALYSIS & EXPERIMENTAL DESIGN		2010-2015	160	(>2.8)
8	XIMB	RISK MANAGEMENT IN BANKING	PG	2011	160	N.A.
9	NIT ROURKELA	QUANTITATIVE METHODS IN	PG	2012-2015	48	(>2.8)

		MANAGEMENT				
10	NIT ROURKELA	BUSINESS RESEARCH METHODLOGY	PG	2010-2016	47	(>2.8)

6. INNOVATIONS IMPLEMENTED IN TEACHING

1. use of video content and analysts commentary cases display in classrooms.
2. digital and smart classroom.
3. Online assignment distribution and evaluation using NITRIS portal
4. Use of MS TEAM, ZOOM, GOOGLEPOINT & YOUTUBE
5. Evaluation using moodle and MSTEAM

7.RESEARCH PAPERS PUBLISHED

S. No.	Journal	ISSN No.	Journal Rank / Category	List / Source for the Rank / Category	Title of the Paper	No. of Month & Year of Publicatio		Vol. No.	Issue No.
1	Interdisciplinary Environment Review INDERSCIENCE	1521-0227	C	ABDC	Rural Farm Land Value: Compensation For Displaced Villages and Environmental Factors	1	2021	21	3/4 Pg 301-313
2	Copernican Journal of Finance and Economics. Vol. 9 No. 4, 2020	2300-1240	C	ABDC	A Simple Linear Test Of The Integration In Corporate Bond Markets	2	2020	9	4
3	Copernican Journal of Finance & Accounting	2300-1240	C	ABDC	Information Content of stocks in Call auction of shorter duration: an Introspection	1	December 2019	8	4

4	Wealth International Journal of Money, Banking and Finance	2277-9388	C	ABDC	Risk Premium Of Corporate Bonds, Residual Errors Estimation In Presence Of Idiosyncratic Factors	1	June 2020	9	1
5	EPW	0012-9976	B	ABDC	Pesticides and Health Risks	1	September, 2000	37	9
6	The Journal of Private Equity	1096-5572	C	ABDC	Venture Capital Investment Choice: Multi-criteria Decision Matrix.	2	2017	20	2
7	Journal of Entrepreneurship and Innovation in Emerging Economies	2393-9575	C	ABDC	Syndication in Venture Capital Investment in India: An Empirical Study	2	2017	3	2
8	Journal of Service Research IMT	0972-4702	C	ABDC	Transaction Costs and Efficiency in Intermediation	1	2013	13	1
9	Journal of Risk & Compliance, FINISGHT MEDIA	XX	C	ABDC	Model Validation Under Basel II	1	2010	6	8
10	Journal of Small Business and Enterprise Development	1462-6004	C	ABDC	Why do informal service enterprises remain informal? A RIDIT approach,	2	2018	26	3
11	International Journal of Sociology and Social Policy	0144-333X	C	ABDC	The service sector: migration, technology and productivity	2	2017	39	1/2

12	Asian Journal of Business and Accounting	**1985-4064**	C	ABDC	Does Ownership Structure Affect Firm Performance in an Emerging Market? The Case of India, 2019,	2	2019	12	1.7
13	VILAKSHAN, XIMB JOURNAL	0973-1954	C	ABDC	Retail Assets Management in Indian Banking: Credit Marketing Model using Data Mining Approach, 2009	2	2009	6	2
14	IJEI, SERIALS PUBLICATIONS,	0974-603X	C	ABDC	Bank Regulation And Credit Quality In Indian Banking : A Quantitative Evaluation, 2009	2	2009	2	1
15	IJRDMS, SERIALS PUBLICATIONS	0975-0614	C	ABDC	Management Of Retail Assets In Banking: Comparison Of Internal Model Over Basel, 2008	2	2008	2	2
16	PRAJNAN, NIBM JOURNAL, pune	0970-8448.	C	ABDC	Management of Retail Assets in Banking: Credit Migrations and Default Correlations,	2	2009	38	3
17	ASIAN PROFILE, ASIAN RESEARCH SERVICE, CANADA	0304-8675	C	ABDC	Managing Retail Credit Risk: An Application of the Information Model, 2012	1	2012	40	4

18	CRO RISK AND COMPLIANCE, MUMBAI 2010		C	ABDC	MODEL VALIDATION UNDER BASEL II	1	2010	4	8
19	PRAJNAN, NIBM JOURNAL, pune	0970-8448.	C	ABDC	Stress Testing of the Banking Sector in Credit Risk Framework, 2012	1	2012	41	1
20	World Journal of Entrepreneurship, Management and Sustainable Development April 2020. 10.1108/WJEMSD-03-2018-0031/full/html	2042-5961	C	ABDC	Deriving successful venture capital deal profile through decision tree analysis in Indian context	2	2020	16	2
21	CAPITAL MARKETS REVIEW MALAYSIA	1823-4445	C	ABDC	Weak Form Of Call Auction Prices: Simulation Using Monte Carlo Variants	1	2022	39	4
22	INDIAN JOURNAL OF FINANCE, ASSOCIATED MANAGEMENT CONSULTANTS PRIVATE LIMITED, NEW DELHI	0973-8711	C	ABDC	Compensation Provisions in a Venture Capital-Limited Partner (VC-LP) Contract : A Theoretical Framework.	2	2016	10	5
23	ECONOMIC AND POLIITICAL WEEKLY	0012-9976	B	ABDC	Transition From Informal Firms To Formal	1	2021	56	50
24	The Journal of Impact and ESG	2693-1974	C	ABDC	Impact of Environmental, Social &	2	2021	2	4

	Investing Fall 2021,				Governance (ESG) Factors on Stock Returns of Emerging Markets				
25	INDIAN JOURNAL OF ECONOMICS AND DEVELOPMENT, ISEE, CHENNAI	2320-9828	C	ABDC	Role of Financial Inclusion and Poverty Alleviation in Odisha	2	2020	8	3
26	INDIAN JOURNAL OF ECONOMICS AND DEVELOPMENT, ISEE, CHENNAI	2320-9828	C	ABDC	Effect Of Rural Development And Targetted Expenditure Towards Poverty Alleviation In Odisha	2	2020	8	3
27	International Journal		C	ABDC	Pursuing The Rural Employment Goal: Re-Thinking Rural Development Schemes	2	2023		
28	.SOUTHE ASIAN JOURNAL OF ECONOMICS SAGE PUBLICAT		C	ABDC	Consumer Disutility From Assorted Referrals In Diagnostics Services	1	2022	23	3
29	International Journal of Education Economics and Development	1759-5681	C	ABDC	Inequality In Financial Attainment: An Exclusion Indicator To Social	1	2022	13	2

	Inderscience				Development.				
30	International Journal of Electronic Banking	1753-5247	C	A B D C	Customer Engagement Of Digital Money: A Case Of Mobile Banking In Rural India	1	2021	5	2
31	International Journal of Computing and Corporate Research,	2249-054X	C	ABDC	Growth of Retail Credit and Its Composition in Indian Banking: A Macro Evaluation	1	2012	2	3
32	Economic and political weekly	0012-9976	B	ABDC	Multidimensional scale of exclusion and inequality in financial attainment	1	2023	56	51

8. INNOVATIONS IMPLEMENTED IN RESEARCH

1. Access to Leading Data Sources provided in Research labs.
2. Enhanced computing facility in labs
3. Enhanced the use of standard statistical packages in labs.
4. Greater Use of Anti-plagiarism Tools.
5. Introduced new courses for PhD students.
6. Enlarged the scope of PEER review network for validation of empirical results.

9. CASE STUDIES AUTHORED IN THE PAST FIVE YEARS

S.No.	Publisher	Title of the Paper	Whether first/sole author? (Yes/No)	No. of authors	Month & Year of Publication
1	Ivey Business School	Financial Impact of	yes	1	submitted

	Canada, 2023 (Submitted)	Climate Change			2023
2	The Case Centre, Cranfield University, Wharley End Beds MK43 0JR, UK	LENDING RATE CUT TO CUSTOMERS: RETAIL GIANT HDFC BANK. CASE -No. 119-0085-1, 2019	yes	1	November 2019
3	Emerald Emerging Markets Case Studies, 2023 (Submitted)	Stress Testing of the Banking sector in India using credit risk Framework,	yes	1	submitted 2023

10. BOOKS / BOOK CHAPTERS ETC.								
S. No.	Title of the Book / Chapter	ISBN No.	Authored (or) Edited	Whether first/ sole author? (Yes/No)	No. of authors	Publisher	Year of Publication	Year of Latest Reprint
1	BUSINESS ANALYTICS	9781138916128	Authored	YEs	1	Routledge	2017	2017
2	VALUATION AND VOLATILITY : STAKEHOLDER'S PERSPECTIVE	9789811611346	Authored	YES	1	Springer	2022	2022
3	Latitude, and altitude of poverty		Authored	YES	1	International	2023	2023

11. PAPERS PRESENTED IN CONFERENCES / SEMINARS / COLLOQUIA (IN THE PAST FIVE YEARS)							
S.No.	Title of the Event	Title of the Paper	Whether first/sole author? (Yes/No)	No. of authors	Month & Year	Organizer	Place
1	4th ICADABAI, AHMEDABAD	Corporate Bond Yield Approximation Using Piecewise Cubic Spline And Residuals Estimation With Liquidity Factors	yes	1	2015	IIMA	AHMEDABAD
2	IFC 2012 IIM	Asset pricing	yes	1	2012	IIM	Kolkat

	Kolkata on 20th Dec 2012.	and volatility in financial markets" at International Finance Conference (IFC 2012),				kolkata	a
3	International Conference on Infrastructure Finance, VGSOM, IIT Kharagpur, 28-30th December 2011	"Capital Structure of Real Estate Firms In Emerging Market: An Analysis Of The Indian Capital Market",	Yes	1	2011	VGSOM, IITKGP	KHARAGPUR
4	2nd International Conference on Advanced Data Mining and Business Intelligence,"IIM Ahmadabad,January 7th, 2011.	Product Testing in Financial Services: An Application",	yes	1	2011	IIMA	AHMEDABAD
5	ICOCMS, International Conference on Coal Management, NCL, IT-BHU, Singrauli, 2020	OPTIMAL CAPITAL COST and carbon foot print in open cast mining	YES	1	2020	Ncl coal india singrauli	Ncl coal india singrauli
6	ICOCMS, International Conference on Coal Management, NCL, IT-BHU, Singrauli, 2023	Rehabilitating Coal Workers: Field Level Challenges and Transition Alternatives	yes	1	2022	Ncl coal india singrauli	Ncl coal india singrauli

12. RESEARCH PROJECTS/CONSULTANCIES TAKEN UP IN THE PAST FIVE YEARS							
S.No.	Project Title	Whether Principal Investigator / Project Leader? (Yes / No)	Sponsoring / Funding Agency & Value (in INR Million)	Client (*If different from Sponsor*)	Month / Year of Award	Month / Year of Completion	Project Outcome
1	IMPACT OF PRE	yes	SEBI 350000/-		2014	2016	Report

	OPENING CALL AUCTION ON NORMAL MARKETS						
2	MARKET PENETRATION HEALTH INSURANCE IN INDIA	yes	IRDA HYDERABAD 500000/-		2016	2017	Report
3	EXPORT OF HANDICRAFTS AND TEXTILES IN ORISSA AND WEST BENGAL	yes	MINISTRY OF TEXTILES 678000/-		2016	2018	Report
4	EVALUATION OF BC MODEL OF FINANCIAL INCLUSION	no	NABARD MUMBAI 698000/-		2013	2014	Report
5	LIMITING THE GAP IN GENDER PAY DISPARITY IN THE INFORMAL SECTOR	yes	NATIONAL COMMISSION FOR WOMEN NEW DELHI 5,01,600/-		2021	2022	Report

13. DOCTORAL GUIDANCE / SUPERVISION IN THE PAST FIVE YEARS						
S.No.	Institution	Name of the Scholar	Year of Registration	Research Topic	Your Role	Whether PhD Awarded
1	NIT Rourkela,	Shruti Mazumdar	2012	Cash Flow for Indian Industry: An Analysis Using an Advanced Frame Work,	Sole Supervisor	2018
2	NIT Rourkela	D Selva Kumar	2012	Market Value And Practices of Capital Structure: Empirical Study Of Indian Firms,	Sole Supervisor	2019
3	NIT Rourkela,	Sarita Mishra,	2013	Performance, Structure and Compensation Contract of Indian Venture Capital Deal,	Sole Supervisor	2018
4	NIT Rourkela	Sunanda Jha,	2013	Productivity Measurement in Service Sector,	Sole Supervisor	2019
5	Sambalpur University	Narayan Rout,	2013	Financial Inclusion and Analysis Of Its Role In Poverty Alleviation In Odisha, Sambalpur University,	Sole Supervisor	2023
6	NIT Rourkela	Ruchira Panda,	2014	“Financial Market and Sectoral Integration: Empirical Evidence from Domestic and Emerging	Sole Supervisor	2020

				Markets",		
7	NIT Rourkela,	Brahmadev Panda,	2014	"Ownership Structure, Firm Performance and Liquidity: Empirical Evidence from Indian Listed Firms",	Sole Supervisor	2020

14. EXECUTIVE EDUCATION PROGRAMS /WORKSHOPS/SEMINARS/CONFERENCES CONDUCTED (IN THE PAST FIVE YEARS)								
S.No.	Type of Program / Event Conducted	Sponsor / Client (if any)	Theme / Title	Place	From (Date)	To (Date)	No. of Participants / Delegates	Your Role
1	MMI 2011	NIT ROURKELA	MANAGING MARKET INTELLIGENCE	ROURKELA	NOVEMBER 2011	NOVEMBER 2011	36	CONVENOR
2	FDP 2016	ICSSR	FACULTY DEVELOPMENT PROGRAM	ROURKELA	february 2016	february 2016	32	resource person
3	Research Methodology Workshop 2014	ICSSR	FACULTY DEVELOPMENT PROGRAM	ROURKELA	february 2014	february 2014	42	resource person
4	Annual e-conference on management, Development & Economics	NIT Rourkela	conference	ROURKELA	December 2020	December 2020	32	convenor
5	CASH MANAGEMENT IN TURBULENT TIMES	NIT Rourkela	mdP	ROURKELA	March 2021	March 2021	23	convenor

15. ADMINISTRATIVE EXPERIENCE IN ACADEMIC INSTITUTIONS					
Institution	Administrative Position Held	From (MM/YY)	To (MM/YY)	Major responsibilities	Notable Achievements / Significant Outcomes
NIT ROURKELA	CHAIR	07/16	06/19	HEAD OF THE DEPT.	OVERALL ADMINISTRATION OF MANAGEMENT DEPT.
NIT ROURKELA	PIC-LIBRARY-SM DEPT.	07/16	06/19	PIC-LIBRARY-SM DEPT.	LIBRARY CONTACT OF MANAGEMENT DEPT.
NIT ROURKELA	PIC-PURCHASE-SM DEPT.	07/19	-	Chairman-PURCHASE committee--SM DEPT.	PURCHASE OF MANAGEMENT DEPT.

16. AWARDS/ REWARDS / RECOGNITIONS / PROFESSIONAL AFFILIATIONS			
S.No.	Appointing / Nominating / Recognizing Body	Month & Year	Brief details of Award / Reward / Recognition etc.
1	GE Capital	April 2002	Six Sigma Green Belt Certification.
2	Oracle Finance Service Software Ltd	2008	Customer Excellence Award
3	GE Capital	2002	Customer Appreciation Award
4	GE Capital	2003	Presentation techniques Certificate
5	CITI BANK N.A.	2005	Mentorship Certificate

17. Have you faced, in your educational and/or work career –

(i) Any disciplinary/penal action by the employer? ~~YES~~ / NO
(including, but not limited to extension of probation, postponement of increment, demotion etc.)

(ii) Any action by any law-enforcement agency in India/abroad? ~~YES~~ / NO

If the answer to any of the above is "YES", full details must be furnished.

18. Professional References (Three)

a. Name: Prof. Sanjay patro,

Designation: Professor
Organization: XLRI, Civil Lines, Jamshedpur, 831002.
Official E-mail: _sanjaypatro@xlri.ac.in,
Mobile: 0657 665 3333___
b. Name: Prof. S.Mazumdar

Designation: Professor,
Organization: IIM Trichy ,
P. Road, Trichy , 6200245011
Official E-mail: saumenmazumdar@iimtrichy.ac.in

Mobile: -431-2505000_____
c. Name: Prof. ASIT MOHANTY

Designation: PROFESSOR
Organization: XIMB, BHUBANESWAR
Official E-mail: ASITMOHANTY@XIMB.AC.IN,
Mobile: 067466663333_____
19. Statement of Purpose (About 500 words):

enclosed

20. Any other information you wish to highlight:

1. Provided Assistance in the compilation of "India Development Report: 1997" IGIDR. Mumbai
2. Provided Assistance in "Capacity 21 Environmental Economics, UNDP Project", IGIDR Mumbai, December 1997.
3. Mentor Indo-U.S. Science & Technology Forum, 2016.
4. Mentor Expert iSixsigma.com, 2006.

21. Declaration:

I hereby declare that all the statements/particulars made/furnished in this application are true, complete and correct to the best of my knowledge and belief. I also fully understand that in the event of any information furnished being found false, incomplete or incorrect at any stage, my application/candidature is liable to be summarily rejected and if I am already appointed, my services are liable to be terminated from the post, without any notice and without prejudice to any other legal/penal action that the Institute may initiate, as deemed fit.



Signature of the applicant
(Name of the applicant)

Date:
Place: Rourkela

Transition from Informal Firms to Formal

Evidence from Service Sector Microunits

D BAG

What prevents informal firms from converting to formal? This study develops a self-choice model where the owners are driven by their professionalism, asset holding, landownership, and tax rates. It is found that the owner's self-drive and efficiency parameter to convert to formality is explained by their professional skills and ownership status.

D Bag (*dinabandhu.bag@gmail.com*) is a faculty at the National Institute of Technology, Rourkela.

The transition of informal enterprises to the formal sector and the disproportionately large size of the informal sector has been a matter of interest for a long time. But the reasons for this still remains elusive. Informal and petty firm owners may not intend to be registered with jurisdictional tax authorities or comply with regulations. They provide goods or services of commercial nature and pay for expenses by cash with or without having a bank account. They do not pay taxes or duties to local or provincial authorities. Banerjee and Duflo (2011) suggest that informal units are set up by owners who may be surviving at near subsistence levels. Informal firms are inefficient, small, and operated by poorly endowed entrepreneurs. They suffer from livelihood risks relying on what could be limited social capital and renege on payments to workers and suppliers and escape from regulators shifting their location or time of operations over and over again during the year. These owners could be subjected to surprise or disaster raids by authorities.

De Soto (2000) suggests that informal firms are formidable employers and could become successful future entrepreneurs. The works of authors Levy (2008), Lewis (1954), and Rauch (1991) highlight that informal firms possess a skewed distribution of assets. Formal entrepreneurs participate to pay taxes and incur the compliance costs to run their business, employ labour, raise funds, and utilise the public infrastructure. Informal entrepreneurs lack the professionalism (quality) to deploy productive resources. They run smaller businesses producing low-quality products using little capital and generate very little value addition. What prevents firms from going formal? When the entrepreneur chooses to deploy capital, it requires skilled labour in conjunction with higher productivity to attain enhanced output. The question of penalty costs borne by informal owners may increase with factors specific to their business. The theories of demand-based dualism imply that growth in a nations' population may lower the rate of decline in the informal sector. Natarajan et al (2020) shows evidence of about a 10% lower share of self-employed workers. The International Labour Organization (ILO 2014) report suggests that the 10-worker threshold is especially important because labour laws on wages and benefits are applied to units above this size. Firms can avoid being part of the organised sector in two ways: operating "under the radar" by simply not registering or by not growing.

The authors D Bag, Nickell and Wadhwani (1990), Christofides and Oswald (1992), Sanfey (1993), and Oswald (1995) have identified the labour demand function as a cost of capital and

firm characteristics, respectively. La Porta and Shleifer (2008) document the possibility of lower employment growth in informal firms than formal firms. Other works of Loayza (1996), Johnson et al (1997), and Friedman et al (2000) provided evidence of the correlation between the average firm size of the informal economy with higher tax rates, restrictions in the labour market, poorer institutions, and rent-seekers, respectively. Few of the other works of Monteiro and Assunção (2012) explored the Brazilian SIMPLES—a federal initiative that simplified and reduced tax rates for greater compliance by smaller firms in Brazil. The authors noted that SIMPLES could not successfully convert firms to formality. Also, Fajnzylber et al (2006) showed that formalisation was associated with larger use of labour and capital, and firms could not obtain the full benefits.

There are other works that investigate what prevents informal firms from becoming formal. A few authors (De Soto 1989) state that informal firms are prevented by rent-seekers and government regulation, which appear as non-prohibitive disaster costs. The probability of disaster is the chance of being intercepted and detected by authorities. The threat could vary with location, size, number of employees, asset holding, etc. There is the temptation or fear of converting into formal firms, paying taxes, and complying with the regulation. A larger proportion of such firms occupies their location facility (premises) illegally and fear raids and eviction by authorities. The informal firms have more information when it comes to choosing a makeshift site location or off-hours operating timings to escape detection. Informal owners attempt to minimise the incidence of disaster costs by shifting their site or time of operations. Detection is more idiosyncratic and seen as a local phenomenon such as increased frequency of raids, more employed labour, degree of predominance of informal owners, respectively, rather than of a national wide policy effort on an anti-informal drive in the economy. The benefits of evading taxes are larger than the smaller benefits of converting to formal. From the regulator's view, these are parasitic elements that rely on free rides on readily available public infrastructure for which they do not pay a premium and realise arbitrage advantages.

A much smaller share of only 2% of informal firms sells their products to large firms and the rest 98% of their output is sold through informal channels or brokers. The informal owners' goods market does not reach the direct consumers since they do not deal with formal players as enlisted suppliers. Higher compliance costs desist informal firms from declaring their status or registering themselves. Informal firms do not trade as much with the formal sector. Rauch (1991) suggests three options for household owners. The ones with low efficiency become workers and those with higher professionalism become formal owners. The last group of owners are the semi-efficient owners and the runners of informal firms. The National Sample Survey Office (NSSO 2014) household informal sector survey (2014) reported that informal workers numbering about 370 million workers constitute 92% of the total workforce. The survey (2014) reported that the value added in the organised sector grew at 8% against 4.1% in the informal sector. Similarly, employment growth in the formal sector was 2.95% against 2.8% in the informal sector. Table 1 also shows the distribution of firms by the location of the unit. Over 43.6% of the owners had their units located within their house premises, with only 28% having permanent structures. Almost 67% had their units located outside their house, over 10% were street vendors and 3.5% operating under the open sky, and 2% were under temporary structures, respectively. At least in urban areas, the units owning and operating with fixed structures (about 47.5%) could be expected to turn formal.

Table 1: Distribution of Enterprises by Type of Location (%)

Location and Facility of the Enterprise	Rural	Urban	All
(i) Within the house premise	51.7	34.2	43.6
(ii) Outside house premises			
1 Permanent structure	27.8	47.5	37
2 Temporary structure	2.8	2.5	2.6
3 Without any structure	2.2	2.1	2.1
4 Mobile operator	4.8	2.9	3.9
5 Street vendors	10.8	10.5	10.3
Total	100	100	100

Over 65% of households operate without any fixed facility in urban, while > 10% are street vendors.
Source: Author's compilation using the NSSO 67th Round (2011).

This study aims to derive the factors of formality from the available microunits database and explain the transition to formality. We develop a self-choice model for an ideal entrepreneur given their socio-economic characteristics and the environment of operations at the site. This paper develops a self-choice model where the owners are driven by their professionalism, landownership, local tax rates, and expected penal costs. Owners with a large holding of assets would be capable of setting big units, deploy capital, and participate in the mainstream formal sector. As owners, they avail access to capital at low borrowing rates. The reduced cost of capital will lead such owners to hire full-time paid labour. Unlike larger units, the marginal firm will trade on bearing taxes and escape from disaster versus the higher borrowing rates of capital.

Informal firms lack access to affordable finance. Banks lend only to skilled entrepreneurs who follow financial reporting discipline and accounting standards, which informal entrepreneurs lack. Informal units could be mixing up their personal expenditure with the monetary expenditure of their units. De Soto (1989) had detected that informal firms in Peru availed a nominal interest rate of 22% as against formal firms availing an interest rate of 4.9%. In India, it is 15.5% per annum for formal and 31% per annum for informal firms (NABARD 2009). In a model developed by Straub (2005), in a dual credit framework, the informal firms managed low labour costs and avoided paying formal wages to labour and taxes that induced larger differences in capital to labour ratios against the formal. Original theories of dualism refer to declining consumer demand that prevents the transition of firms to modern production firms. Modern firms need to generate higher sales to cover the commitment (fixed) costs of their investment. The dual economy model of Lewis (1954) emphasised the presence of both formal and informal firms producing separate sets of products to serve different segments of customers. Johnson et al's (1997) and La Porta and Shleifer's (2008) works have focused on tax avoidance by informal firms that can reduce the government's kitty and the government's ability to support infrastructure. Levy (2008) suggested that if taxes are imposed for all firms, it will lead to

higher costs of being identified formal relative to the realised benefits of being formal.

The rest of the paper is arranged as follows. It begins by providing a simple conceptual framework that explains the plausible hypotheses that follow from the review above. Then it describes the methodology, data, results, and conclusion, respectively.

Hypotheses

As mentioned, the findings from previous studies discussed the importance of landownership in influencing formality. Similarly, the larger family size seemed to have favoured the transition to formality. A few other results have confirmed the crucial role of location, infrastructure, and human capital in characterising the informal sector (Kamete 2018). The likelihood of being a formal firm is higher among firms located in urban areas or in geographic proximity to the state capital cities. The transition is faster among firms that have access to better infrastructure, power, etc. The crucial role of human capital is manifested in entrepreneurial ability. There could have been past attempts of qualitative studies highlighting the degree of enforcement of regulations by civic authorities against street vendors, during festival seasons, in select cities of India. Since the sample data allows us to test for the significance of one or more similar attributes, we proceed with the following hypotheses.

The first hypothesis would be the socio-demographic characteristics of the owners or the operating characteristics of the microunits.

Hypothesis 1: Owners' characteristics or their professionalism enhance the transition to formalisation.

Hypothesis 2: The findings from previous studies did mention the importance of landownership to influence formality.

Owners' characteristics or their landholding lead to formalisation.

Hypothesis 3: The findings from previous studies did mention the importance of healthy functioning of microunits to drive formality. Fixed costs in the nature of commitment costs have not been examined.

Hypothesis 3.1: Healthy functioning of the unit leads to formalisation.

Hypothesis 3.2: Continued fixed costs of the nature of commitments in the unit discourage formalisation.

There may not be a causal or direct relationship between the tax rates and the transition rate of firms.

Hypothesis 4: Expected costs of doing formal business to escape raids or penalties tend to discourage formality.

Methodology

The relationship between asset holding and firm size does exist. Owners' asset holding (for example, owned premises of operations) is the total value of all physical assets inherited or owned by them. Household assets could also include agricultural farmland, livestock, agricultural tools, equipment, residence, etc. Similarly, vehicles, jewellery, mobile phone, accessories, furniture, etc, could also be included as assets.

The owner's efficiency could be translated into a scalar ή that signifies their quality as an entrepreneur. Each owner has the choice of choosing between (i) becoming a formal worker, (ii) owning a formal unit, and (iii) owning an informal unit, respectively.

We assume that the firm employs l workers and k units of capital, with output (y) equates

$$y = \acute{\eta}\, k^{\alpha}\, l^{\beta}; \text{ where } \alpha + \beta < 1 \qquad \ldots (1)$$

A formal entrepreneur pays tax τ and raises capital at the cost of r_f, while the informal owner pays no taxes and raises capital at the higher cost of r_i. Formal workers command higher wages than informal ($w_f > w_i$).

Where professionalism is denoted as

$$\acute{\eta} = X \exp(\varepsilon) \qquad \ldots (2)$$

where ε is an unobserved driver of quality, independent of X. X is an observed proxy variable that may signal the possession of items (for example, asset holding, education, site location, asset holding pattern, school education, size of the property, number of labour employed, the ownership of the home, or years in business, etc).

There are penalty risks or costs equivalent to a peril or fire or tsunami hazard from raids by tax collectors and authorities. The penal costs exist in the form of expected loss and damage to saleable goods, loss of accessories, confiscated furniture, utensils in the event of being detected by the authorities. The hidden costs of informal units are the disaster costs, the probability of which increases with more employees, and a few other factors. A few informal entrepreneurs decide to shut down their operations and choose to work as formal salaried professionals who would pay income tax. The probability of disaster risk ρ (y_i, δ_i), is a natural function of the size of the microunit (y_i) or the number of employees in the informal firm operating at a given location (δ_i).

The periodic tax deficit at the county or municipality level would possibly induce the frequency of raids by authorities on the informal owner's location δ_i.

The probability of penalty risks (ρ) is a direct function of the probability of detection P_D, where the probability of detection P_D is a probability that the site of the vendors' location δ_i is covered.

As mentioned earlier, the authority could increase the probability of detecting a vendor p_D by increasing the frequency of raids, choosing multiple timing of raids and improving coverage of raid spaces within the municipality. In the literature, the general abundance assumption using the Horvitz–Thompson (1952) estimator has been suggested to arrive at the detection probability p_D. The detection probability P_D is proportional to the abundance.

Assuming the disaster probability (ρ) is equal to the probability of being detected, P_D is denoted as

$$\rho(l_i, k_i, \delta_i) = P_D = \alpha + \beta_1 y + \beta_2\, \delta_i + \beta_3 YIB + \varepsilon \qquad \ldots (3)$$

where *YIB* is the age of the firm as measured in years.

We assume the self-choice from equation (3) above could be demonstrated using the multinomial logit as below

$$\text{Log}\ (p_j/1 + p_j) = \alpha + \gamma_i X_i + \beta_1 y + \beta_2 \delta_i + \beta_3\ \text{YIB} + \varepsilon \qquad \ldots (4)$$

where p_j is the probability of choice $= j$, X_i is the characteristics of the firm and the owner, *YIB* and δ_i are explained above.

Data

The data is mainly from the Investment Climate Surveys (ICS) conducted by the World Bank that focused on enterprises in the manufacturing, retail, and micro (unorganised) sectors. The *Micro Investment Climate Survey* (2006) targeted 1,549 microunits with 10 or fewer full-time paid employees for Delhi, Ludhiana, Mumbai–Thane, Howrah, and Hyderabad. The *Micro Investment Climate Survey* (2006) in India covered over five major cities. The sampling methodology followed in the survey includes stratified random sampling. The information collected included the access to land, use of labour, ownership, number of years of operations, revenues, costs, etc. For each of the manufacturing subsectors, seven states with the maximum number of manufacturing units were identified. Delhi, a city–state, was considered for the selection despite having a relatively low proportion of units compared with other bigger states in the country.

For the selection of cities, in each identified state, districts having a large number of manufacturing units in each subsector were identified. For selecting the cities, for each manufacturing subsector, the maximum availability of each specific manufacturing subsector in the districts, and the coverage of each region in the country were applied. The following six cities across four regions were selected: North (Delhi and Ludhiana), West (Mumbai and Thane), East (Howrah), and South (Hyderabad). To cover the manufacturing subsectors underrepresented in the selected cities (for example, chemicals and leather), two additional cities were identified where these subsectors were easily available—Bangalore and Kanpur. These two additional cities also served as reserve cities in case some manufacturing subsectors were not available in a sufficient number in the main cities. Each city was split into clusters that were designated as "industrial clusters" or where these types of enterprises were most likely to operate. This was done through discussions with the municipal, government, trade organisations, and chambers of commerce. Once these clusters were selected, snowballing techniques were applied to identify enterprises in various industry sectors. Table 2 gives the distribution of category-wise units across five cities in urban India for the set of 1,548 firms. It shows the dominance of the manufacturing sector, which employs a larger share of labour.

Table 2 shows that about 33% (953) are registered microunits, where Ludhiana had the highest proportion of 42% of registered units and Delhi had the lowest registration rate of only 34%. Except for Hyderabad, the sample covered auto component units in all other cities. Table 3 gives the descriptive statistics of the sample dataset of 1,548 firms.

Table 3 shows the socio-demographic profile of the owners (for example, gender, family size, education, and training) alongside the operating characteristics of the firms (for example, years in business, rent paid, number of employees, annual sales, landownership status, etc). The socio-demographic profile of the responders does not vary much by city in India. The average number of female owners was only 1.1%. The education level of responders varied from illiterates to postgraduates, their family size ranged from one to five, and training experience varied from 0 to 60 months, respectively.

For information on the degree of enforcement, we collected the trade licence fees rates data for all the five cities covered in World Bank survey and shown in Appendix Table A1 (p 58, 59). Each of these municipalities varies widely in the degree of enforcement against unregistered entities. Further, these municipalities also display wide variations in the actual trade licence fee rates and the method of calculating the entry fees or renewal fees for the intending units. The method of arriving at the total fees (including licence, processing/scrutiny, renewal fees) is non-uniform across all five cities. For example, the Greater Hyderabad Municipal Corporation (GHMC) (Hyderabad) and Kolkata Municipal Corporation (KMC) (Kolkata) levy the fee rate per square feet and trade category. The New Delhi Municipal Council (NDMC) (New Delhi) has the highest licence fees compared to four other cities in the sample. It is interesting to observe that certain trades are predominant in those locations due to historical and cultural reasons. This is evident from the

Table 3: Descriptive Statistics

Indicator	Minimum	Maximum	Mean	Std Deviation
Registered indicator	0	1	0.62	0.487
Family size	1	5	3.16	.714
Gender	1	2	1.01	.098
Rent paid annual (₹)	0	500	24.28	43.679
Sales annual (₹)	30	30,000	1,226.31	1,966.797
Number of employees	1	10	4.46	2.762
Education level	1	8	5.2	1.328
Vocational training (months)	1	60	15.59	10.052
Years in business	1	157	13.22	13.092
Landowned	0	100	.39	6.214

Table 2: Sample Distribution of Category-wise Units (1,549 Units)

City / Category	Auto	Chemicals	Electrical	Electronics	Food	Garment	Leather	Metal and Tools	Textiles	Total	Registered	Unregistered
1 Delhi	31	12	57	34	81	84	25	61	19	404	137	267
2 Ludhiana	38	9	13	11	31	113	31	39	25	319	239	71
3 Mumbai–Thane	11	19	29	22	86	53	34	65	84	403	289	114
4 Howrah	9	14	12	8	47	33	12	61	38	234	213	20
5 Hyderabad	0	14	6	11	49	37	19	20	42	198	75	123
Total	89	88	117	86	294	320	121	246	208	1,548	816	595

(1) About 62% (953) are registered microunits in the sample. (2) Food, garment, and metal units are predominant in the sample. (3) There are no auto component units in the sample of Hyderabad. (4) Delhi had a registration rate of only 34% reported.
Source: World Bank Investment Climate Survey (2006).

classification of trade licence rate charts of these municipalities. Example, Delhi city has food joints and stitching units, Mumbai has textile and food units, Howrah also has fish sellers and metal makers, Hyderabad has bakeries, Ludhiana has auto parts, etc.

Similarly, for all cities, the trade fee rates are the highest for the number of employees exceeding 10 across all cities. The fee rates are also highest for a few specific trades, for example, for food and pastry in NDMC (New Delhi). The square feet rates in GHMC (Hyderabad) are much higher than in KMC (Howrah). Overall, as shown in Appendix Table A1, the gross licence fees vary from a minimum of ₹130 in Howrah (KMC) to a maximum of ₹7,500 in Delhi. It may not be easy to causally relate the registration rates with the licence fees directly. We do find that Howrah had the highest registration rate of 91% (213/233) in the sample. Further, New Delhi, which is the capital city, had the lowest registration rate of 34% (137/404) in the sample.

Results

The results of estimating equation (4) are shown in Table 4, which is reported in two parts, where the first part produces the parameters of the entire (full) sample of five cities (1,548) and the second shows the same for the sample of four cities, excluding Hyderabad (1,351). Moreover, the second part is used as a check for robustness since, in the full sample, there were no auto component units among the responders in Hyderabad.

The full sample Business Process Master List (BPML) test shows that the null hypothesis of the presence of heteroscedasticity is rejected. We find the variables, namely family size, education, annual sales, the number of employees, rent paid, and the number of years in business are significant in the model. Among these, however, interestingly, rent paid is negative. This confirms the second hypothesis. The ranking of values of the coefficients of each parameter is necessary to comment on the performance of the variable in order of their declining effect, namely the variables of family size, education, number of employees, years in business (YIB), and annual sales, respectively. The family size would have a greater effect than the number of employees when the survey covered firms below 10 employees—a limit under labour laws in India (ILO 2019). In the second part, in the subset sample the same set of parameters remain significant in the model. Further, the signs and values of the coefficients of the parameters in the second model remain within the standard errors of the coefficients of the parameters of the full sample estimates. Between the two sets, the minor deviation in parameter values is due to a shift in the observed distribution of the dependent variable (15.2% from the full sample 38.5%). An odd's ratio equal to 1.0 is considered stable. As shown in Table 4, for the full sample, an increase in the family size by one increased the odds ratio by 1.6. Similarly, for a level of increase in the owner's education, the odds ratio increased by 1.36.

Table 4: Logistic Regression Estimates

Dependent Variable: Registered Indicator

	Full Sample			Sample Excluding Hyderabad			
Variable	β	Wald $\chi2$	Prob	β	Wald $\chi2$	Prob	VIF
Family size*	.472	15.53	< .001	.369	10.83	.001	1.886
Gender	-.765	1.44	.230	-.874	3.17	.075	1.008
Education level*	.314	34.69	< .001	.329	45.37	< .001	1.097
Vocational training (months)	-.003	.14	.704	-.003	.12	.730	1.992
Years in business*	.020	10.20	< .001	.023	13.70	< .001	1.045
Land owned	-.001	.94	.330	-.002	2.41	< .001	1.345
Number of employees*	.107	10.06	.002	.112	13.00	< .001	1.968
Sales annual*	.005*	23.12	< .001	.004	24.51	< .001	1.215
Rent paid annual*	-.008*	19.52	< .001	-.006	16.64	< .001	1.270
Constant	-2.056	7.48	.006	-1.942	10.37	.001	-
Number of observations (N)	1,548			1,351			

Model summary -2 Log likelihood	Nagelkerke R^2	BP-LM test for heteroscedasticity	-2 Log likelihood	Nagelkerke R^2
1,479.460	.250	$\chi2_{(1)} = 0.12$ ($p = 0.72$)	1,760.020	.242

* Significant at 99% level of confidence.
Source: Compiled by author.

Further, for an increase in years in business by one year, the odds ratio increased by 1.02. Similarly, for an increase in the annual sales by ₹1,000, the odds ratio increases by 1.005. Conversely, for an increase in rent paid by ₹1,000, the odds ratio decreases by 0.99. Therefore, the rent paid has an incidental impact of less than 1.0, as against all other variables, which have the odd's ratio of more than 1.0. Education level is a crucial factor in aiding the transition from informal to formal employment (ILO 2014; Benjamin and Mbaye 2012). The rising number of employees would naturally draw the attention of the civic squad and the need for compliance. Lastly, experience in businesses, such as years in business and annual sales cause an equivalent incidental impact on the odd's ratio. Rising sales are positively related since the setup can look for larger facilities and turn formal. The rent paid is negatively related, which implies a higher probability of detection by authorities when the informal owner operates from a regular fixed location. However, in contrast to the many other findings, the variables of landownership, gender, and training in months are not found significant at all.

Similarly, in contradiction to the some earlier findings (Johnson et al 1997), the variables of landownership gender, and training in months are not found significant at all; these results do not confirm the proposed hypotheses in our framework. This is important because landownership and distribution are highly skewed in urban India, where the government or institutions own the roadside lands. It may sound reasonable for older businesses in the fray to attempt to purchase land and become permanent operators. The gender ratio is too low in the sample to cause an influence on the decision-making towards formality. The vocation training for the owners could have been related and explained by their education status. The larger family size does favour conversion to formality.

As mentioned in ILO (2014), the informal sector has the potential not only to create wealth, reduce costs, and democratise politics but also to push out and replace the first economy. There may seem to be criticisms against the poorer ability of informal firms. However, De Soto (2000) mentions that the informal sector has a much larger potential. Several policy implications follow from our results. First, policymakers can provide greater incentives for firms to register by eliminating entry costs as seen from Appendix Table A1 for Howrah (KMC). Second, the government can encourage skill upgradation to the owners as serious rehabilitative measures. In contrast, Gollin (2008) notes that small enterprises do not play a major role in advanced market economies. Overall, unlike the limitation in earlier studies, we

can provide a causal analysis of factors that can explain how or why firms can move to formal.

Conclusions

In this paper, we developed a framework that examined the transition of informal owners in a self-choice model. The transition of firms to formality lies at the root of the survival of informal units. Unprofessional owners in informal sectors would continue to run small and inefficient firms. The regulator can deregulate and reduce the impact of disaster costs for all firms in the economy. Similarly, as suggested by Narang and Goyal (2017), street vendors can be supported by ensuring that municipal authorities earmark dedicated vending zones within the city as suggested in the Street Vendors Act, 2014. Low wage bills continue to benefit the informal sector. Workers would find it attractive to become informal owners due to low wages also mentioned in ILO (2019). The asset holding distribution has been important in the findings of authors Romanello and Oliveira (2014). However, there are a few limitations. The results are unique to the micro-survey sample data of the World Bank. A robust study would require intergenerational or life cycle cohort studies of informal owners combining survey data from rural India. Similarly, future research must highlight other aspects of informal firms, such as stricter entry norms, entry costs, degree of implementation of wage rules, the rate of high skilled labourers, etc.

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Appendix

Table A1: Summary of Annual Trade Licence Fees (₹) across Cities in India

City	Trade	Number of Employees	Number of Lanes	Area in Square Feet	Annual Fees	Square Ft Rate (₹)	Processing Scrutiny Fees	Renewal Fees	Total
Greater Howrah	Betel pan shop	1		0–1,000	50+25	1.0 to 1.5	50		125
	Dyer/laundry	1 to 5		0–1,000	100+30	1.0 to 1.5	50		180
	Eatery	6 to 20		0–1,000	100+30	1.0 to 1.5	50	200	180
	Kiosk	1 to 5		0–1,000	50+30	1.0 to 1.5	50	100	130
	Garment shop	1 to 5		0–1,000	50+30	1.0 to 1.5	50	100	130
	Vegetable	1 to 5		0–1,000	50+30	1.0 to 1.5	50		130
	Sweet shop	1 to 5		0–1,000	100+30	1.0 to 1.5	50	200	180
	Tailor	1 to 5		0–1,000	50+30	1.0 to 1.5	50	100	130
	Watch repair	1 to 5		0–1,000	50+30	1.0 to 1.5	50	100	130
	Fish/meat/egg	1 to 5		0–1,000	50+30	1.0 to 1.5	50	100	130
	Jatra/signboard/ sharpener/all others	1 to 5		0–1,000	50+30-100+30	1.0 to 1.5	50		130

(Continued)

Table A1: Summary of Annual Trade Licence Fees (₹) across Cities in India *(Continued)*

City	Trade	Number of Employees	Number of Lanes	Area in Square Feet	Annual Fees	Square Ft Rate (₹)	Processing Scrutiny Fees	Renewal Fees	Total
Greater Howrah	Jatra/signboard/ sharpener/all others	6 to 20		0–1,000	50+30-100+40	1.0 to 1.5	50		130
	Cable TV	6 to 20		0–1,000	200+40	1.0 to 1.5	50		290
	Caterer	1		0–1,000	100+25	1.0 to 1.5	50		125
	Caterer	1 to 5		0–1,000	100+30	1.0 to 1.5	50		130
	Caterer	6 to 20		0–1,000	100+40	1.0 to 1.5	50		140
	Cycle/cycle	1 to 5		0–1,000	100+30	1.0 to 1.5	50		130
	Decorator/flower	1 to 5		0–1,000	100+30	1.0 to 1.5	50		130
	Gamla/pot	1 to 5		0–1,000	100+30	1.0 to 1.5	50		130
Thane		1			100			100	100
		1 to 5			300			300	300
	Mela stall	6 to 10			600			600	600
		11 to 20			1,000			1,000	1,000
Hyderabad		1	Single lane (20 ft)	100	100	3.0		100	100
		1 to 5			500	3.0		500	500
		6 to 10			1,000	3		1,000	1,000
		11 to 20			2,000	3.0		2,000	2,000
		1	Double lane (30 ft)		100	4.0		100	100
		1 to 5			500	4.0		500	500
		6 to 10			1,000	4.0		1,000	100
		11 to 20			2,000	4.0		2,000	2,000
		1	Multiple lane (> 30 ft)		100	6.0		100	100
		1 to 5			500	6.0		500	500
		6 to 10			1,000	6.0		100	100
		11 to 20			2,000			2,000	2,000
New Delhi	Vegetable on cycle						250	100	250
	Uncut fruits on cycle						250	100	250
	Sale of meat and poultry products				500		250	100	750
	Ice cream on the pushcart						250	100	250
New Delhi	Stall/kiosk				500		250	100	750
	DMS/mother dairy booth				250		250	100	500
	Meat shop				1,000		500	100	1,500
	General store/provisional store/mechandise				500		250	100	750
	Trade for food				5,000		500	100	5,500
	Flour mill						1,000	100	1,000
	Fruits/vegetables/packed food				500		500	100	1,000
	Laundry				500		500	100	1,000
	Boilers				500		500	100	1,000
	Beauty parlour				500		500	100	1,000
	Dry cleaner				500		500	100	1,000
	Saloon				500		500	100	1,000
	Shop				500		500	100	1,000
	Canteen				1,200		500	100	1,700
	Pastry and confectionery items				5,500		1,000	100	6,500
Ludhiana	General merchant	< 5			150			150	150
	General merchant	> 5			500			500	500
	All kinds of sale/storage/ trading/processing unit				150			150	150
	Photography				200			200	200
	Hotel/restaurant				500			500	500
	Videography				300			300	300
	Dhaba				300			300	300
	Hardware				150			150	150
	Stationery				150			150	150
	Bookseller				150			150	150
	Beauty parlour				200			200	200
	Cosmetic shop				150			150	150
	Confectionery/bakery				150			150	150
	Readymade garments	< 5			150			150	150
	Barber				100			100	100
	Cloth merchant	< 5			150			150	150
	All others	> 5			500			500	500

The method of fixing rates are non-uniform across India.

Source: Government of Maharashtra (2008), Government of New Delhi (2008), Government of Punjab (2008), Government of Telangana (2007), and Government of West Bengal (2007).

Pesticides and Health Risks

The promotion of high yielding varieties (HYV) that marked the green revolution has led to the large-scale use of chemicals as pesticides. Increase in the use of chemicals as pesticides can result in various health and environmental problems like pesticide poisoning of farmers and farm workers, cardiopulmonary, neurological and skin disorders, foetal deformities, miscarriages, lowering the sperm count of applicators, etc.

DINABANDHU BAG

On December 3, 1984, an accidental release of methyl isocyanide at Union Carbide's pesticide manufacturing plant at Bhopal, India, killed approximately 3,000 people and injured hundreds of thousands. Around the same time several similar incidents occurred in the US (West Virginia). Together with the Bhopal spill, these events raised public awareness about the risks associated with pesticides use and underscored the need for the public's right to know about the chemicals used in agriculture and public health.

Pesticide is defined as any substance or mixture of substances, intended for preventing, destroying or controlling any pest including vectors of human or animal diseases, unwanted species of plants and animals. It includes substances intended for use as a plant growth regulator, defoliant, desiccant or fruit-thinning agent, for preventing the premature fall of fruit and substances applied to crops to protect the commodity from deterioration.

Unabated use of pesticides can result in various health and environmental problems. The misuse and unsafe handling of hazardous pesticides can lead to pesticide poisoning of farmers and farm workers who spray pesticides. Prolonged exposure can produce chronic ailments such as cardiopulmonary, neurological and skin disorders, adverse reproductive effects such as foetal deformities, miscarriages, lowering the sperm count of applicators, etc. In Philippines, of the 4,031 acute pesticide poisonings reported between 1980 and 1987, 608 proved fatal [Pingali 1995]. Besides risk to human health, pesticides can also cause serious ecological damage such as toxic effect to fish stock, birds and wildlife, contamination of fragile environment of the wetlands, leaching through the soil, and contamination of groundwater, etc.

Policy action for reducing the damage should involve banning deadlier chemicals or restricting their use. What is the extent of the use of chemicals in agriculture and public health in India? What is the degree of health risks of pesticides' use? How do we justify their banning or restricting their use? Here we make an overview of the uses of chemicals and evaluate their potential health risks in agriculture. Further, we question the ad hoc banning of chemicals as undesired policy action to reducing their health risks.

Pesticide was used for the first time on a small scale for malaria control by importing DDT in India. This was followed by use of BHC for locust control in 1948. DDT is used in most tropical countries for control of vector borne diseases such as malaria, while BHC is used as a cheap insecticide in agricultural production. We first examine the use of pesticides in Indian agriculture. Later, we examine public health uses of pesticides in India focusing particularly on malaria control.

Pesticide Uses

Pesticides are applied to various crops in Indian agriculture. These include rice, wheat, maize, millets, pulses, oilseeds, vegetables, tobacco, cotton and plantation crops. Gross cropped area increased from about 16 million hectares in 1970-71 to over 20 million hectares in 1994-95, whereas pesticides application has increased threefold from about 24.3 thousand tonnes in 1970-71 to about 90 thousand tonnes in 1994-95. Their intensity (per hectare) of application grew by over two times from 147 gms/ha in 1970-71 to about 404 gms/ha in 1990-91. India was ranked ninth in the list of top pesticide consuming countries in the world in 1985 [UNIDO 1988]. Pesticide application has also grown in other countries. For example, in the US the use has increased from 342 gms/ha in 1971 to about 424 gms/ha in 1992 [USDA 1997]. The world average rate of application has also increased from 1,450 gms/ha in 1975 to 1,650 gms/ha in 1985 [UNIDO 1988].

Statewise consumption of pesticides in India is not uniform and varies with planted acreage and agroclimatic conditions. Andhra Pradesh, Uttar Pradesh, Tamil Nadu, Punjab and Maharashtra are the top five major pesticide consuming states, in that order. However, the intensity of application in the above states varies a lot and it is comparable to some of the developed countries in the world. In 1993, the (per hectare), application of pesticides was 1,467 gms/ha in Tamil Nadu, 1,162 gms/ha in Andhra Pradesh, 826 gms/ha in Punjab, 430 gms/ha in Uttar Pradesh and 313 gms/ha in Maharashtra, whereas the same for India was 429.1 gms/ha only. Cropwise consumption of pesticides in India is also not uniform and also varies with their planted acreage, agroclimatic conditions and the other market related factors. Rice and cotton alone account for over 50 per cent of the value of pesticides consumed.

Pesticides are classified according to their use and kinds of applications as, insecticides, fungicides, herbicides and, other pesticides [Ministry of Agriculture 1976]. Insecticides account for the major share of pesticides consumption in India that includes both preventive treatments, which are applied before infestation levels are known, and intervention treatments, which are based on monitored infestation levels and expected crop damages. Insecticides include chloro hydrocarbons, organophosphorous and carbamates, chlorohydrocarbons like DDT, BHC, chlorodane, etc. Recently, some of these chemicals like DDT, BHC and Heptachlor were banned or phased out. Fungicides account for a smaller share of use than insecticides.

Table 1: Consumption of Pesticides in India
(Per cent)

Year	1993-94	1994-95	1995-96	1996-97
Insecticides	67.21	66.29	66.48	64.99
Fungicides	22.29	20.41	21.43	22.76
Herbicides	8.16	11.76	10.61	10.80
Others	2.34	1.55	1.47	1.46
Total (tonnes of active ingredient)	82076	84842	91313	92726

Source: Pesticides Association of India 1997.

Fungicides are mostly used on fruits and vegetables to control diseases that affect the health of the plant or quality and appearance of fruit. They comprise metallic chemicals like copper oxychlorides, non-metallic agents like sulphur and limesulphur and thio and dithio carbamates. Sulphur and copper compounds constitute the largest share of treatment in this group. Many farmers tend to use high levels of fungicides to try and achieve full protection of high value crops, such as fruits and vegetables where the appearance to the consumer or processors greatly affects their price. Herbicides belong to the group of pesticides that kill weeds competing with crops for water, nutrients, and sunlight, and causing reduced yields. Herbicides are the smallest pesticide class. They include 2,4-D, 2,4,5,T urea derivatives and triazines. Triazine and 2,4-D have been in use for more than 30 years and account for the largest share in this group.

Other types of pesticides such as soil fumigants, growth regulators, desiccants and harvest aids, have witnessed the largest increase in use amongst all the pesticide classes in recent years. The function of these pesticides is to act as growth regulators, desiccants and harvest aids. They are normally applied at low rates to affect the branching structure of plants, to control the time of maturity or ripening, to aid mechanical harvesting, to defoliate plants before harvest, and to alter other plant functions to improve quality or yield. Fumigants, normally used at very high application rates, are used mostly on vegetable root crops susceptible to damage from soil nematodes and other soil organisms. Fumigants and some desiccants account for most of the pesticides in this class.

Pesticides are also used in public health services to control the spread of certain diseases that are communicated by insects, parasites, larvae, etc. Community spraying on water bodies, garbage dumps, sewers, marshy lands, etc, is the most common method of public health use of pesticides. Besides, households, commercial establishments particularly hotels and restaurants also use pesticides in large quantities for the same purpose. In 1994-95, about 5 per cent of the total pesticides used in India were for public health purposes.

Malaria control is one of the major public health uses of pesticides in India. The National Malaria Eradication Programme (NMEP) of India, started in 1958, is the world's largest health programme against a single communicable disease and continues to be the country's most comprehensive and multifaceted public health activity. Pesticide rotation programmes to control malaria vectors use various chemicals including DDT, BHC, dieldrin, malathion, pirimiphos methyl, bendiocarb and a variety of pyrethiods. The objective of the malaria eradication programmes has been to contain the spread of malaria through the enhanced use of insecticides and larvicides of longer half life (pertains to the period in which the chemical degrades in the environment). Thus, DDT, BHC and malathion are the main pesticides used under the NMEP. In recent years the use of BHC in the NMEP has been discontinued following the ban on its use in agriculture and for vector control. Following the implementation of NMEP, the annual incidence of malaria has drastically reduced from 75 million in 1958 to about 0.1 million in 1965. However, the number of positive cases of malaria has remained around this level in the subsequent years even with continued spraying. One of the reasons cited for the above stagnation in malaria eradication is the gradual build up of parasite resistance to these chemicals over the years in parasite dens and therefore insignificant achievement in malaria control.

The heavy use of pesticides in agriculture and for public health services exposes the human population to these toxic chemicals. Besides, many of these toxic chemicals are known to have a long life after their application which increases the chances of non-target species coming into contact with these chemicals.

III-Effects of Pesticides

Health hazards associated with the use of pesticides manifest in chronic or acute toxicity in living beings. Chronic toxicity of pesticides arising due to long-term/ continuous exposure to pesticides probably affects the entire population while acute toxicity, arising out of short-term/ immediate exposure to pesticides probably affects only those who are involved in the formulation, manufacture, trade and application of pesticides. Health risks due to pesticides arise out of exposure of human beings to these harmful chemicals. Exposure can be direct as when spraying the chemical on the farmland, or indirect, through intake of food which contain toxic residues. The problem of health risks of pesticides use has become quite significant during the last few decades due to increase in the quantity of pesticides used, increase in the number of chemicals employed as pesticides, and growing re-

Table 2: Excess Pesticides Residues in Human Milk

Country	Year	tBHC	tDDT	tPCB
Japan	1977	2500	1900	1100
China	1982	6600	6200	NA
Thailand	1988	NA	NA	60
Vietnam	1988	NA	NA	100
India	1988-89	750	3740	NA

Note: The above figures are the amount of excess pesticide residue over acceptable daily intake determined by WHO.
Source: *Down to Earth* ,1997.

Table 3: Policy Action against Use of Pesticides in India

Name of the Pesticides	Policy Action as on December 31, 1992	Author's Recommendations
Chlorinated hydrocarbons		
Aldrin	Banned	Ban
BHC	No agricultural use	Public health
DDT	Public health	Public health
Other chlorohydrocarbons		
Captan/captafol	Under review	
Chlorodane	Banned	Use
Chlorobensilate	Under review	Use
Dieldrin	Only for locust control	Use
Endrin	Banned	Use
Heptachlor	Banned	Use
Pentachloronitrophenyl	Banned	Ban
Toxaphene	Banned	Use
Organophosphorous		
Methyl Parathion	No action	Ban
Other organophosphorous		
Metasystox	No action	Ban
Fenitrothion	No action	Ban
Dimetheaote	No action	Ban
Phophamadion	No action	Ban
DDVP	No action	Ban
Monocrotophos	No action	Ban
Phorate	No action	Ban
Ethyl Parathion	Banned	Ban
Carbamate Insecticides		
Carbofuran	No action	Restricted use
Carbaryl	No action	Restricted use
Weedicides		
2,4,5,T	Not approved for use	Ban
2,4-D	Under review	Ban
Nitrofen	Banned	Ban
Paraquat	Banned	Ban
Rodenticides		
Sodium Cyanide	Under review	Ban
Dibromochloropropane	Banned	Use
Other Pesticides		
EDB	Restricted use	
Tetradifon	Banned	

Source: For policy action is Ministry of Agriculture, 1996.

sistance developed in pests that call for higher doses and more toxic chemicals.

Residues of organochlorides and organophosphate pesticides have been monitored in a wide variety of foods. The Global Environment Monitoring System (GEMS) food programme has been collecting data on residues of pesticides in foods, including human milk, across the world since 1976. Table 2 shows the values of tDDT, tBHC and tPCB, a measure of the units of chemicals found inside mother's milk, evaluated for some countries by the World Health Organisation (WHO).

In addition to the above, chemicals have also been detected in various other food items like, paddy, wheat, maize and in fruits and vegetables like banana, cauliflower, sugarcane, etc. Residues of pesticides in food items refer to the dietary risks of pesticides application, which can result in acute risk or chronic risk, depending on the frequency of intake of such contaminated food. The toxicity evaluation studies of the FAO/WHO monitors and recommends statutory maximum levels of chemicals inside various food items from period to period for various countries.

Apart from such health risks, as already mentioned, pesticides can also cause damage to the environment. One such environmental effect of pesticides is the contamination of soil in agricultural farmlands. Organochloric pesticides are more persistent in soil due to their lower biodegradability than organophosphates. The absorptive capacity of soil to chemicals is highest in organo rich soil and is least in sandy soils. Leaching to groundwater in permeable soil is about 1 per cent of the chemical application depending upon the type of soil and the characteristics of the groundwater aquifer. Thus, contaminated groundwater by the chemical residues in soil can kill valuable microorganisms, which contribute to crop growth and can form a potential hazard to the source of safe drinking water.

Public Action

The extremely sensitive nature of the damage to human health and environment because of the large-scale application of pesticides has called for public action against the use of chemicals and has received considerable attention under the Indian Insecticides Act 1968. It is not only the government, but also the courts that have favoured strong action against the use of certain chemicals. Farmers, however, have tended to overuse pesticides according to their perception of the worst possible losses. For example, farmers tend to overuse chemicals to achieve full protection of high value crops such as fruits and vegetables because the physical appearance to the consumer or processors greatly affects the price of these crops. Many pesticides have been banned from agricultural use in recent history. Some chemicals have also been phased out of use. Subsequently protests against the harmful effects of some chemicals also initiated reviewing the use of chemicals. DDT was banned from use in agriculture followed by BHC, Aldrin and others.

Over 20 chemicals have been restricted or withdrawn from agricultural use and licences of the production of a few chemicals have also been done away with. Table 3 shows the status with regard to the uses of certain chemicals in agriculture in India. It also reports the recommendations of the author against some chemicals based on his analysis. Authors' analysis is based on the computed health risk indices of individual chemicals within the period of 1971-93. From our observations, it is evident that most of the chemicals which have been banned or restricted are low or medium risk chemicals. Such low risk chemicals do not have any significant impact on the health risks. This would suggest that some chemicals should be high on the priority list of banning/restricting use and hence the author recommends immediate action against such chemicals.

The rapid intensification of agriculture through expansion of irrigation, greater mechanisation and the introduction of new high yield varieties are largely instrumental in promoting the use of chemicals. The apparent benefits of pesticides application relative to their costs of application are higher where there are subsidies on pesticide use or in the form of crop support prices. Such subsidies encourage farmers to ignore safety thresholds altogether and engage in preventive spraying, which may result in heavy pesticides use even on relatively pest resistant crops. Similarly, growing population and urban conglomerates with inadequate drainage and sewerage infrastructure leading to growing menace of communicable vectors (malaria) has called for greater use of chemicals in public health.

The need for a good agricultural practice (GAP) calls for minimising the use of pesticides so as to minimise environmental and health damage. Our analysis of identifying chemicals that require immediate attention calls for banning/restricting the use of some more chemicals. However, efforts to reduce the production and use of agro-chemicals that threaten the quality of the ecosystems require a judicious policy analysis of the costs of banning certain chemicals and benefits of continuing their use. Banning the use of certain chemicals should result in losses to the producers of those pesticides, and also to the farmers in the form of possibly costly substitutes and/or losses due to pest attacks. A comprehensive policy action could involve biological methods of pest control like integrated pest management (IPM) as an alternative to pesticide use, as well as relying on other non-chemical substitutes to pesticides, suitable conservation tillage practices to reduce application of weedicides in farm lands, etc. EPW

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TRANSACTION COSTS AND EFFICIENCY IN INTERMEDIATION

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TRANSACTION COSTS AND EFFICIENCY IN INTERMEDIATION

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The transaction cost of intermediation between the lenders and borrowers is a crucial challenge for the lender and borrower. With the expansion in consumer lending and competition among banks, the necessity of reducing transaction costs to improve the quality of lending is critical for Banks. Further, transaction costs due to information asymmetry between bankers and borrowers can impact lending decisions of the bank and so also the quality of lending. Transaction costs play an important role in reducing information asymmetry and improving the efficiency in monetary transmission and credit access for the borrowers. In this paper, we model the use of borrower transaction information to test its impact on the portfolio delinquency and the lending relationship. This concludes that transaction information can help reduce transaction costs and increase the sphere of lending since banks can assign higher loan limits. This study is an extension of previous empirical studies for other countries of the Indian credit market. It also reviews the empirical studies on transaction costs and attempts to demonstrate the benefits of transaction costs usage on the reduced delinquency rates of a banks' retail portfolio.

INTRODUCTION

The business of lending depends upon the trust in the relationship between the borrowers and lenders and the size of the relationship depends upon the expected outcome (returns) of the transaction. Transaction costs of intermediation between the lenders and borrowers are a crucial challenge for both the lender and borrower. Hence, the presence of transaction costs lending decisions would not be taken with complete information about the credit-worthiness of potential borrowers. This situation of inadequate information regarding borrowers is also known as information asymmetry. In an increasingly competitive atmosphere, banks may not share information among themselves and this could worsen the problem of adverse selection, of moral hazard[1] and the transaction costs in borrowing. The lack of trust associated with rising delinquency and credit losses impact the quality of lending. With the expansion in consumer lending and increased competition among banks, the necessity for sharing of information to reduce transactions costs is critical. Transaction costs have been amply discussed and demonstrated in the literature. Financial intermediaries incur numerous transaction costs that may include search costs, screening costs, training and counseling, credit education costs, monitor-

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ing and enforcement costs, to control possible opportunistic behavior of clients (moral hazard) and adverse selection (Gray, 1993). One can denote these types of transaction costs as information costs. Hence, information costs are defined as the cost incurred to ensure that borrowers adhere to terms of the loan. Therefore, information costs impact the operating costs in lending and determine the successful completion of a financial transaction (Cole, 1998). Monitoring activities are desired to enable lenders to obtain complete knowledge of the borrower. This study attempts to review previous work on transaction costs and also attempts to demonstrate the benefits of transaction theory usage on the borrower delinquency using test data on retail revolving assets for an Indian bank. The next section describes the literature on transaction costs.

TRANSACTION COSTS

The theory of transaction costs has been a very important driver in explaining the growth of the financial sector in the past few decades. Empirical research on financial intermediation has placed information costs at the center of total transaction costs incurred in conducting financial exchanges. Transactions costs make the presence of credit granting decisions costlier which means risk-averse lenders could deny sanctioning credit. Theoretical framework of transaction costs have been suitably discussed in the literature. There have been a number of previous researches on transaction costs and information sharing among lenders to improve the performance of credit markets (Campion, 2001, DeJanvry, 2003, Luoto *et al*, 2007, Miller, 2003, Vercamen, 1995, Cowan *et al*, 2003, McIntosh, 2009 and 2005, Japelli, 1993, etc). Transaction costs theory involves the design of efficient mechanisms for conducting economic transactions. The basic assumption is that economic transactions have potential costs associated with them where a transaction is the basic unit of analysis and is important in economizing transaction costs (Romano, 1992). Williamson (1985) states that transaction costs is the resultant friction that arises in undertaking transactions among exchange parties. The friction associated with transactions is mainly caused by opportunistic behavior that usually arises when two parties in an exchange fail to fulfill their obligations. The presence of collaterals can reduce transaction costs in such an exchange. Few theorists (Bardhan and Udry, 1999) placed emphasis on the acquisition of

cost minimizing requirement such as lower reliance on collateral to reduce the incidence of opportunism. Other theorists have proposed the design of incentive mechanisms to discourage behavior that lead to diverging interests among exchange parties (Coase, 1991).Williamson (1985) points out that complex formal contracting and vertical linkages are only effective if they exist in a complementary relationship with relational governance. Lending relationships are viewed as one of the mechanisms by which frictions in the economic exchange of goods and services among agents can be reduced. There exist two types of transaction costs, *ex post* and *ex ante* costs in financial exchange. *Ex ante* transaction costs are incurred to build and establish credit relationships contracts such as costs of collecting information to make agreements. *Ex post* costs are incurred to minimize the chances of default such as the costs of recovery and the bonding costs of effecting secure commitments (Williamson, 1985). Both types of costs are critical in operation of financial intermediation services and this study focuses on ex ante transaction costs which can also help in reducing ex post costs (Stiglitz and Weiss, 1981). The most critical factors influencing transaction costs are, kind and type of lending product, the degree of uncertainty associated with the transaction and the ease with the measurement of performance can be done (Klein, *et al.*, 1978; Williamson, 1985). In a study of manufacturing industries (Klein, *et al*. (1978) demonstrated that if the switching costs between suppliers were low then both parties were protected by the availability of alternative partners so that they incur minimal transactional risks. However, if an asset is designed for a particular borrower, then the lender would cause serious transaction costs which refers to the substitutability of contracts since it may not be easy to substitute. Williamson (1985) and Coase (1991) proposed that the decision to have a transaction in the market place is determined by the magnitude of transaction costs. Given a choice, individuals will choose the set of institutions, contracts and transactions that is the minimum costs of creating or sustaining relationships.

The requirement of collateral is ensured before loans are issued in order to enhance the likelihood that a financial firm will be able to recover its loan through liquidation of collateral (Cole, 1998). Hence, the aim of the collateral requirement is that in case a borrower fails to repay the loan willingly, a lender can get paid by taking repossession of the collateral and

recover the debt (Mann, 1997). Collateral not only serves as a secondary source of repayment in case of loan default, but is also useful in classifying risky groups of borrowers (Cole, 1998). In case a loan is defaulted, a financial institution takes direct control over the assets until a loan is completely paid off (Mann, 1997). Banks incur costs to verify and attach value to collateral before loans are issued to borrowers which may increase when collateral assets are located in remote areas or possess lower marketability value (Tomer, 1998). Further, banks may face liquidity risks when collateral assets are liquidated at a price lower than contracted value. When a borrower repeatedly and successfully transacts with a Bank (or other Banks) for a long time, it creates reputation (with information on his/her relationships) and thus provides evidence that he is not liable to default. In such lending relationships, the bank may reduce its demands for collateral from such a borrower (Cole, 1998). In line with the above argument, it is anticipated in this study that if the bank-borrower lending relationship holds longer, the collateral requirements may be reduced or waived and the bank does not necessarily have to incur costs associated with the collateral requirement.

Uncertainty in financial exchange also occurs because firms lack appropriate information necessary to predict opportunistic behavior of customers. Uncertainty also arises due to unexpected changes in technology, competition, interest rates, and factors affecting the demand for credit (McNaughton, 1997). Consequently, lenders will likely desire different and most likely more stringent repayment terms in form of interest rates, loan maturities, and loan installments, from the borrowers. In addition, the presence of uncertainty requires managers of financial intermediaries to design performance aimed at protecting their businesses (Coase, 1991) by mitigating the agency problem.

Formal loan contracts may specify loan terms, monitoring activities, and enforcement mechanisms in case of nonperformance. Therefore a bank will avoid the grant of credit to many new borrower applicants to avoid the large costs of monitoring and credit losses when such loans are defaulted, which is known as credit rationing (Stigliz, 1981).

The use of information costs can create a screening effect that can improve the risk assessment of loan applicants, thereby raising portfolio quality (since it prevents uncreditworthy borrowers from penetrating into

the Bank), which in turn reduces the loss rates on portfolio. It also creates an incentive effect since it may deter the borrowers from failing to repay on past loans. Stiglitz and Weiss (1981) revealed that when borrowers undertake riskier investments with higher expected payoffs, it reduces the expected payoff to the lender since it increases their probability of default. Vercamenon (1995), De Janveres *et al* (2003) and Herera (2003) also demonstrated the capitalization of reputation collateral by providing their credit worthiness for later loans and greater access to financial services. In presence of relational information, certain costs such as screening and monitoring are likely to decrease (Luoto, Williamson). The existence of a relationship provides information about the performance of businesses necessary for future loans. Promotion of greater relationship lending practices in financial exchange would imply that the information advantage available to the bank would control the opportunistic behavior of borrowers and require less monitoring and enforcement. Therefore, information costs may be considered equivalent of what Williamson (1985) suggests in his definition of transaction costs; as the costs of safeguarding contracts, and the bargaining and haggling costs of moving contracts from one point to another.

Consistent with the above research, this study examines the influence of relationship based transaction variables on the behavior of coordination costs incurred. Ultimately, it is assumed that a significant reduction of transaction costs is expected in the presence of borrower information. The literature on credit markets of India with the scenario of Indian banks is limited to its application for credit rating for corporate borrowers. Credit Rating agencies (CRAs) such as CRISIL, CARE, ICRA and recently Dun &Brad Street have used firm's credit history data to obtain their credit rating. Credit Information Bureau (India) Ltd. (CIBL) was established only in year 2000, hence application of its products to retail borrowers is very recent. Khatwani, *et al* (2006) investigated Indian corporate bank loan defaults using CIBIL data on 90 manufacturing firms and using discriminant analysis technique, highlighting few financial ratios which were critical to corporate defaults. Bandopadhya (2008) developed a credit scoring model for agricultural loan portfolio for Indian banks and using logistic regression on a sample of 448 Indian agricultural borrowers identified a mix of qualitative (Socio-demographic) and quantitative (financial, loan

parameters, etc), which were significant in determining defaults. In the next section we present a simple model that exemplifies the treatment of transaction costs.

Model of Delinquency

Ideally three sets of variables have significant influence on a borrower's default behavior. The operational variables include two categories of variables; loan characteristics and borrower characteristics. The loan characteristic information is available with the bank where as the borrower transaction characteristics need to be collected. The traditional variables include MOB (Account Age on Books), Limit (Credit Limit of the borrower), Pmt (Last Payment Amount), PDelinq (Previous Delinquent Amount), Charges (Total Fees & Charges), Age (Borrower's Age), Size (Size of the Borrower's Family), etc. The transaction costs variable includes information such as *Home (*Current Home Ownership Type of the borrower), *Profession (*Current Major Source of Income of the borrower), *Total Loan Amt* (Total existing Loan Amount of the borrower), etc.

The proposed model attempts to consider both the screening effect of identifying and eliminating delinquent borrowers (William, 1991) and also the credit expansion effect of the lender increasing the loan limit for a given borrower. The probability of delinquency, which is a delinquency score, can help in screening borrowers. This delinquency score estimation approach is easy to understand and to implement by the bank. We use a simple probit model where the delinquent is first timer and assuming a logit distribution for delinquency, the null hypotheses are given below;

H0: *A model of borrower delinquency that includes both the traditional and transaction variables will have higher explanatory power than a model based only on traditional variables.*

HA: *A model of borrower delinquency that includes both the traditional and transaction variables will have equal explanatory power than a model based only on traditional variables.*

DATA & RESULTS

The sample data includes randomly drawn 86,799 accounts (3,467 delinquent accounts and 83,332 non delinquent accounts) of both delinquent and non delinquent borrowers observed between the periods from April 2006 to March 2007. This data includes loan performance data on the ac-

counts on both delinquent and non delinquent borrows for a period of 14 months. It includes (as mentioned earlier) traditional information on the borrowers such as gender, education, marital status, and borrower's age, family size, etc. The bank has their performance information such as age on books, last payment amount, credit limit, fees and charges, delinquency status (Di = 1 or 0), etc. We use the home ownership type and profession (major source of income) as transaction information which pertains to the information from an external source. The external source can provide recently authenticated profession or (primary source of income) information with respect to the borrower such as in case of small businesses, industry category (Manufacturing, Trading, Service Industry, etc), self employed (Hospitality, Medical, Consulting, Interior Design & Contractors, etc). For employed borrowers, it includes whether they are salaried in IT, MNC, Non-MNC, Government Service, Teaching, Education or Home Makers, etc. In today's economy, borrowers change their profession type (major source of income) and hence an external source would authenticate them. Similarly, borrowers move from their paternal family home to stay in an employer housing or to a self owned home or may be in rented accommodation. In fact, the market value of a self owned home or the rent paid provides a better indicator of credit worthiness than just the home ownership type, which has not been considered in our analysis.

Table 1: Sample Summary Statistics

Variable	Mean (Rs.)	Standard Deviation(Rs.)	Minimum(Rs.)	Maximum(Rs.)
Credit Limit (Rs.)	1,57,110	64,940	0	20,00,000
Payment Amount (Rs.)	9,257	20,116	0	901,720
Total Fees & Charges (Rs.)	92	344	0	25,925
Age of Borrower (Years)	41	11	9	85
Age on Books (Months)	31	21	0	75
Delinquency (%)	4.50%	20%	0%	100%
Total (=86,799)	Delinquents	= 3,467	Non Delinquents	= 83,332

Source: Test data on Revolving Assets for Indian Bank (2006-2007)

We apply ordinal indicator transformation to the joint information of home

ownership and profession while estimating for the delinquency in the test data. Table 1 gives the profile of the test sample population. This average delinquency rate of 4.5% against an average credit limit of Rs. 1,50,388 and month on book (MOB) of 37 months. The average payment rate in the sample is 8% over the credit limit. We observe a good distribution of the population characteristics in our sample. For example, Borrower Age varies from 9 to 85, Credit Limit from 0 to Rs. 20, 00,000 and age on book (MOB) 0 to 75 months, and Total Fees and Charges from 0 to Rs. 25,925, etc. These variations represent the characteristics of a larger true population (asymptotic) in the random test sample data. The variables, Age on Book (MOB), Credit Limit (CL), Total Fee Charges (Charges), Payment Amount (PmtAmt) and Age of the Borrower, etc. are the information available within the bank. Total existing loan amount (*Total Loan Amt)* is an important attribute that represents the aggregate transaction relationship of the borrowers across all lenders which could not be used in our analysis because of non availability of data. Banks do not use home ownership type as a criteria to grant revolving credit and we observe a distribution of all categories of home ownership types in the data. As mentioned earlier, banks do use income of the borrower to grant credit and there may be some degree of association between home ownership type and income. However, it is possible that the reported income may be relatively lower for a borrower residing in own home. This reflects the presence of high transaction costs between the lender and borrower. The Base Model is fitted with the internal attributes alone and Transaction model is fitted with all the nine attributes. Table 2 provides the results of the model fitting. No multi-co linearity was detected within the model attributes, as shown in the Annexure. The Base (traditional) model, having two attributes is compared with a Transaction model with three attributes. The attribute in the second model called, Home Ownership_Profesion is a joint indicator of two attributes, Home Ownership and Profession. As shown here, incorporation of the transaction information (Home Ownership Profession) gives higher predictive power (K-S) to the delinquency model here. The AIC (Akaike Information), SC (Schwartz) and LL (Log Likelihood) information criterion does improve after the incorporation of external attribute.

Table 2: Model Estimates and Comparison

Criterion	Base Model	Transaction Model
AIC (Akaike Information)	28,169	28,105
SC (Schwartz)	28,197	28,143
-2 Log L (Log Likelihood)	28,163	28,097
Concordant (%)	63	65
Discordant (%)	37	35
Somers' D	0.341	0.353
Gamma	0.365	0.372
Tau-a	0.026	0.027
c	0.671	0.677
Parameters*		
Model Variable	**Base Model**	**Transaction Model**
Intercept	-2.55E+00	-2.81E+00
Credit Limit	-5.10E-06	-5.26E-06
Total Fee Charges	9.08E-04	9.04E-04
Home Ownership_Profession		6.17E-02
*Chi-square Values are significant at 99.99%		

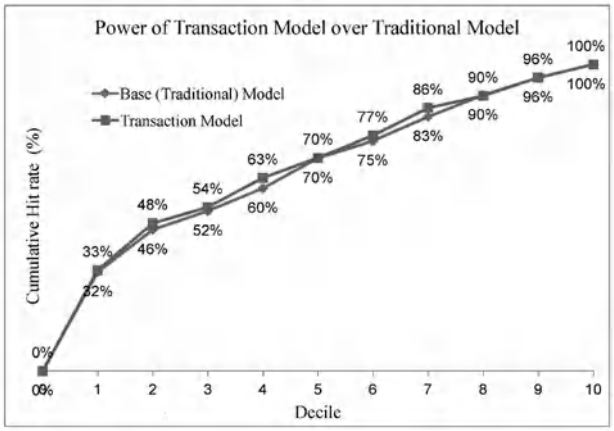


Chart 1: Power of Transaction Model over Base Model

Chart 1 compares the power curve of both the models. As shown in the Chart 1 here, the power (predictive power) of a 'Transaction model' with transaction information is higher than a 'Base Model'. This means that (during a sorted draw of the sample from a population) a transaction costs model is more likely to identify more number of delinquent borrowers than compared to a Base Model, accurately. The model performance of both the models is compared in 10 deciles. The transaction model provides a Maximum KS of 29.39 (against a Maximum KS of 27.25 for the Base Model), but also accurately captures higher percentage of the delinquent accounts from the second deciles onwards. Kolmogorov-Sminrov (KS) measures the distance between the cumulative bad (delinquent) rate (%) and cumulative good (non delinquent) rate (%) and hence is a predictive measure. Table 2 provides the model parameter estimates for both the models including comparison against the global model parameters. As shown in Table 2, we compare the AIC, SC and -2 LogL (information criterion) values for both the models and in line with theory we find rise in model information due to the positive attribute. It is worth mentioning the fact that banks do not use profession as a filter to grant credit to new borrowers and therefore we observe a distribution across all categories of profession. Banks use income of the borrower to grant him credit as well as credit limit. There may be some degree of association between profession and income for a given geography. However, the random sample drawn from the entire portfolio of the bank may not confirm this fact of association between profession and income. Similarly, the transaction model depicts a higher concordance value (65%) and 'c' value (0.677) over the Base Model. The model parameter estimates are significant at 99.99 % confidence. The parameter against Credit Limit reduces from (-5.1) to (-5.26) which means that the weights against the credit limit are lower by 3.25%. The reduction in the weights against Credit Limit means the borrower is eligible for higher limit now since the likelihood of delinquency has gone down. The parameter against total fees and charges reduces from (9.08) to (9.04), which means that the weights against the total Fees & charges are lower by 5%. The total fees and charges are higher for higher month on books than recent accounts. Accounts that are of higher age on books, the expected delinquency is lower now which means

the transaction costs have fallen. To understand the significance of the overlap (intersection) between the home ownership and profession, we conduct a cross tabulation analysis presented in Table 4. Since a good proportion of delinquent borrowers (40%) are non salaried and residing in rented homes their expected delinquency is lower than that of self owned and salaried borrowers. Similarly, as compared to a situation where the borrower's home ownership-profession has not been used, the likelihood of delinquency increases. It is true that the bank has taken into consideration the income of the borrower but information regarding his wealth such as ownership or profession can provide the bank useful information to maintain its portfolio delinquency rate. This obviously implies that banks need not deny credit to applicants based on their ownership or profession, but they can fix the line amount to new borrowers so as to maintain their portfolio delinquency rates at a given level. This shows the sensitivity to delinquency is lower meaning that better screening makes delinquency less sensitive to loan size than it was before.

CONCLUSIONS AND POLICY IMPLICATIONS

The purpose of this study was to explore the possibility of reducing transaction costs in lending in an empirical study on the usage of transaction information. We established their efficacy and confirmed that transaction costs could be reduced using tools of information as a practical example for a bank. We proposed a simple model of information costs to analyze the impact of positive borrower information on his/her eligibility to obtain greater credit limit (loan limit) and also its benefits on the overall portfolio of the bank due to reduced delinquency rates. Our empirical results, also confirmed in earlier studies, suggest that a strong screening effect of less credit unworthy borrowers is achieved by giving weights to home profession element. Further, a credit expansion effect i.e., higher loan eligibility of the borrowers; due to lower risk weights given to credit line amount is crated in the presence of home ownership and profession element. These results are in line with previous empirical findings (Pagano, 2003, Luoto, Bag, 2012). In presence of relational information, certain costs such as screening and monitoring are likely to decrease (Luoto, Williamson). The existence of relationship information about the borrower performance is also necessary for future loans.

There exist two policy implications of these findings here. The first policy implication is the immediate need for setting up an active, dynamic, vibrant and far reaching, accessible credit information system in the Indian economy. The second policy implication is the need for facilitating a necessary mechanism for information sharing, transmission and popularization, in terms of the responsibilities of the various stake holders such as banks, lenders, borrowers and the government or other regulators. The pricing of the credit data from a credit information system (CIS) should be cheaper for each lender to make complete and timely use of it. An effective credit information system can be integral to the operation of modern financial systems. Credit information systems can include a number of functions, including collecting, analyzing, and distributing information about how consumers and businesses, large and small, handle their credit obligations. A sound environment for managing credit requires reasonable access to accurate, reliable and current credit information on borrowers that affords adequate protection and safeguards for the privacy of borrowers and which is governed by general rules of due process. Thus, the goals of financial inclusion and efficient monetary transmission can be achieved by expanding the credit eligibility of a large population of our country with the help of such foot prints and also expanding credit which is a financial goal of banks. Growing competition among banks in the Indian market will make it tough for this to happen. However, it is high time that India becomes a developed financial market with the existence of a credit bureau, CIBIL. It provides limited data on borrowers such as outstanding loan amount and delinquencies, payment history, etc. CIBIL has already demonstrated the power of credit information with few US Bureaus (e.g. Trans Union Inc.). It is a good beginning but has a long way to go to fulfill the desires of bank's risk managers. A true test of the positive welfare enhancing effects of CIBIL can only happen when banks in India conduct their portfolio delinquency rates comparison between pre-CIBIL and post-CIBIL usage scenario.

END NOTE

1. Moral hazard arises because of the lack of transparency in the behavior of individual borrower leaving the Bank to face the consequences of the borrowers' actions.

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Annexure

	Collinearity Diagnostics				
	Proportion of Variation				
		Condition			
Number	Eigen value	Index	Intercept	Credit Limit	Tot_Fee_Chg
1	2.05365	1	0.03155	0.03154	0.04951
2	0.87053	1.53593	0.00936	0.00893	0.95033
3	0.07582	5.20427	0.95909	0.95953	0.0001627
	Parameter				
Variable	Estimate	t Value	Variance Inflation Factor	Probability	
Intercept	0.05175	19.77	<.0001	0	
home	-0.00451	-5.28	<.0001	1.0451	
Profession	0.00711	11.62	<.0001	1.00775	
Credit_Limit	-1.20E-07	-11.55	<.0001	1.05369	
Tot_Fee_Chg	0.00007276	37.86	<.0001	1.00776	

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The service sector: migration, technology and productivity

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Abstract

Purpose – The purpose of this paper is to study the characteristics of the workers in the informal economy and explore the reasons for workers migrating from rural to urban area. The authors also explore and enumerate various reasons why the migrants choose to work informally and study whether internal migrants treat this sector as temporary or transitory before moving to the formal sector. The authors reconnoitre the issues in coverage of factors in unregistered service, this research is carried out at a smaller scale of operations of the service enterprises having a minimum of three (or more) employees, which poses significant issues in the enumeration. This work further emphasises on the reasons why people migrate and choose the informal sector (IS) and to estimate the contribution of technology towards productivity of this sector.

Design/methodology/approach – Building on empirical data collected through interviews with the migrants, who are now part of the informal service enterprises of Delhi and peripheral areas, this paper presents the results of a survey conducted in 2017. This research is based on appropriate scale driven by the instrument of choice by the sampling of units. Data were collected by conducting field survey using structured questionnaire. By performing the estimation at the unit rather than the industry level, the authors reduce difficulties of mis-measured output and inputs, thus, potentially obtaining a more accurate estimate of technologies contributions towards the firm productivity.

Findings – The small service enterprises are making poorer value addition towards measured productivity due to the factors such as lack of equipment or technical know-how. The authors find that marginalisation thesis holds true only partially and the rest are in this sector by choice, considering it as an opportunity. Maximum number of entrants had been attracted by opportunities in this sector itself; actual and potential mobility from the informality towards formalisation is quite low; education is one of the important determinants for entrepreneurs shifting from informality towards formalisation.

Research limitations/implications – The research is limited only to informal service enterprises located in Delhi, the national capital of India and the peripheral areas.

Practical implications – By identifying the factors, proper policy measures can be designed which will be in a focused direction to reduce the size of the IS and to improve the working condition of the migrants who are part of this sector. The estimation is at the unit level using primary data.

Originality/value – The estimation is at the unit level using primary data, the research contributes to the literature on informal service sector, and this sector needs more intensive large-scale studies in order to design policies which can result in betterment of the society as a whole, benefiting the segment that needs immediate attention from government and society as well.

Keywords Employment, Technology, Migration, Service sector, Productivity, Informality

Paper type Research paper

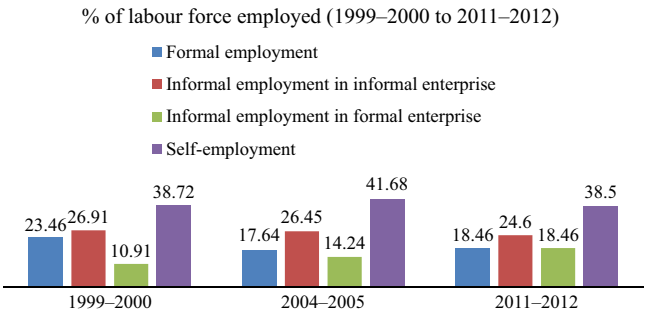
1. Introduction

The major objective of this study is to investigate the relationship between migration and the growth of informal service sector (SS), technology adoption and informal sector (IS) and access the impact of technology on productivity, using primary data. The IS is a term ambiguously defined and difficult to measure. This expression immediately makes some people think of the mechanic who repairs radio or television at a cheaper rate than the authorised service provider. Others remember the fast food stalls at the corner of the roads offering mouth-watering dishes at affordable prices. It can even be recalled as weekly markets (haat), where one can bargain for anything from a bunch of coriander to a T-shirt,

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all of these unregulated and untaxed transactions make the informal economy (IE). In developing economies since the 1970s, an upsurge of discussion and various controversies have been revolving around the concept of the IS. The concept of the informality assumes the existence of dualism in the IS (Samal, 2008). The cause of large-scale migration to the urban areas is pull factor, the perceived opportunity which acts as attraction or the motivation for the residents of rural areas to migrate to the urban areas. Traditionally, the structuralist school of thought (Moser, 1979; Castells and Portes, 1989) has dominated the IS, according to which this sector absorbs those who are marginalised from the primary/formal economy (Gurtoo and Williams, 2009). From this perspective, the workers of IS engage in this sector, which is low paid and prone to exploitation, out of economic necessity in the dearth of alternative means of employment (Kapoor, 2007). The IS is a constant and intensifying attribute of the existing global economy, this sector provides income-earning opportunities for the poor and is characterised as low-quality waged work (Chaudhuri and Banerjee, 2007). The work in the IS is highly casual and unstable; workers are exploited through long working hours in poor conditions with little, or no, legal protection (Kapoor, 2007). The key reason for the existence of the IS is believed to be the scarcity of job in the formal economy. This is because the availability of job in the formal sector is not at par with the available manpower. Large-scale migrations from rural to urban areas every year in search of livelihood increase the proportion of unemployed, also termed as urban employed. But, why do people migrate? There are various reasons, mainly the perception of opportunities, namely, better income opportunities and presumably higher standards of living, the perception of better lifestyle, facilities and amenities draw the unemployed, underemployed and other disadvantaged groups to the urban areas. These migrants create two types of problems for the urban areas related to the job and shelter. The migrants who are marginalised from the formal economy due to various factors like lack of education, formal training, technical know-how, experience, skill, etc., are absorbed in the IE. It is easy for them to enter the IS, and start earning. Migration is nothing but a by-product of urbanisation which is resulting in parallel growth of the IS. The informal employment is not limited to informal enterprises; many registered firms too contribute to the informal employment by hiring outsourced workers, who are not salaried at par with the regular employees; they are deprived of the basic facilities entitled. Outsourcing is done as a cost-cutting measure, to reduce the operation cost; this is practiced widely in all sectors of the economy and more prominently in the SS. This is due to the seasonality of demand, as SS is labour intensive in nature, it needs greater workforce in peak season, and this is when they hire outsourced employees. This is a widely practised trend even in banking and other formal public and private sectors enterprises. In fact, when the trend of last few years (Figure 1) is analysed, it is seen that the share of informal employment in formal employment has increased significantly. As a result of which the size of IS is increasing, it can be that that the laws (Indian) have indirectly assisted in in-formalization of the workforce (Chakraborty, 2015), e.g. Bhimanand[1] is an outsourced employee, working in a reputed company as surveyor since last 18 years (same organisation), and receives a salary of Rs. 7,000 per month (present wage) with no other additional benefits, whereas the regular employee on the same profile gets a basic pay of Rs. 19,035 plus other benefits like housing, travel allowance, daily allowance, provident fund (PF), medical, etc. This practice is prevalent in all sectors of the economy.

The main challenge (obstacle) for researchers, statisticians, economists and others working on the IS is data deficiency, the difficulty further increases in informal SS. The data, if available, are relatively noisy and it is not an easy task to use them, as its input and output are both tangible and intangible. Furthermore, due to the nature of services, outputs, as well as input, are difficult to capture. The data can answer various questions about the contribution of the informal SS towards real GDP, employment and wages, its impact on the



Notes: The informal enterprise includes private unincorporated proprietary or partnership enterprises and the formal enterprise includes public sector institutions and private limited companies. Self-employed comprises own-account workers (enterprises with no hired workers), unpaid workers and employers as per NSSO Employment–Unemployment Survey. Includes three rounds of surveys conducted in 1999, 2004 and 2011, respectively

Source: Various rounds of NSSO Employment–Unemployment Survey

Figure 1.
Employment trend in urban India

marginalised economy and various other questions on inequality and poverty and much more. Due to the data issues, this study uses primary data collected using structured questionnaire having 110 questions.

2. Literature review

The India's SS is the fastest growing sector having highest labour productivity and is expanding at a fast pace (Mukherjee, 2013). The existing literature demonstrates that economic liberalisation and reforms contribute to the growth of this sector (Bhagat, 2015; Chanda, 2002; Gordon and Gupta, 2005; Jain and Ninan, 2010). With the economic growth and the rise in per capita income, demand changed from necessity-driven to discretionary consumption. With discretionary income, the elasticity of demand for services increased which contributed to the growth of the sector (Mukherjee, 2013; Bhattacharya and Mitra, 1990; Gordon and Gupta, 2005). With technological advancement and availability of skilled workforce, the information and communication technology (ICT) industry expanded along with ICT-enabled services (Chanda, 2002). But there are several barriers to growth of this sector as well, which include lack of decent employment (Basu and Maertens, 2007), poor business environment (Joshi, 2008), absence of integrated SS policy (Banga, 2005) and a robust emphasis on skill-intensive services, nevertheless a majority of the population remains unskilled and poorly educated (Mukherjee, 2013; Kochhar *et al.*, 2006).

Productivity of any enterprise or sector is vital for sustainability, but one of the various issues faced by the SS in India is computing productivity, as data on a yearly basis are not calculated and a significant share of employment in services is informal. On looking at the productivity estimates released by statisticians, it can be derived that after 1980 the services sector had the highest labour productivity (Mukherjee, 2013). Bosworth and Maertens (2010), using output data of National Account Statistics and from other secondary sources (Table I), found that the services sector had the highest total factor productivity (TFP) growth.

IS is an indispensable part of both developed and developing economy. The concept of informality originated various fields of social sciences like anthropology, economics, sociology, political science and many more (Figure 2).

2.1 Taxonomy of the IS

The services sector in an amalgamation industry which includes various sets of services to provide the final service to the customer. This sector is vast and ranges from banking services to barbering, domestic household workers to the hotel managers, medical services, tourism services, postal services to delivery service by grocery stores, etc. There is an unending list of basic services that it constitutes. Due to its vast size, it was classified by various researchers into sub-categories, like Browning and Singelmann (1975) proposed a six sector scheme in which the SS was divided into four sub-categories, i.e. distributive services, producer services, social services and personal services. Rau and Roncek (1987) re-analysed Singelmann data and supported his classification. Auxiliary, with the advancement of technology, new systems of classification emerged, and it was categorised as technology-based services and human-based services. Similarly researchers like Thomas (1978), Baumol *et al.* (1985), Marshall *et al.* (1988), Melvin (1990) and Bhagwati *et al.* (2004) and many others proposed classification schemes based on different dimensions. As most of the enterprises in informal SS provide human-based services, this survey followed Browning and Singelmann (1975) classification. This classification was adopted and applied by Pais (2014) on Indian economy. He found that in India the distributive service has the highest contribution towards total employment in the SS and also towards the percentage share of the total GDP.

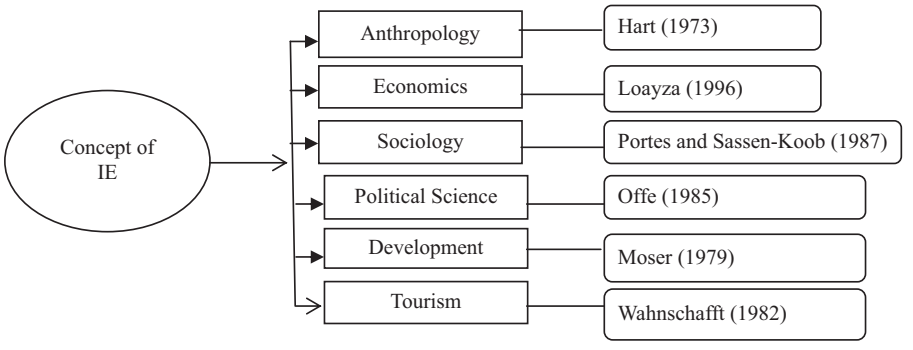
2.2 Migration and service sector

Migration is unavoidable in the process of economic development (Afsar, 2003; Ballard, 2005). People migrate from less developed areas to developed urban centres in search of better opportunities (Bhattacharya, 1993; Haan, 1997). Migration of labour is not only rural to urban but it is also inter-sectoral in nature, which means informal to formal and manufacturing to services or agriculture to services. There are strong reasons to believe that

Sector	1980–1990	1990–2000	2000–2006
Total economy	2.2	1.8	2.1
Agriculture	1.9	0.7	0.9
Industry	1.5	0.6	1.6
Services	2.1	3.1	1.9

Source: Extracted from Bosworth and Maertens (2010), Table 2.3, p. 119

Table I.
Total factor productivity for major sectors in India, 1980–2006 (per cent)



Source: Authors' elaboration based on literature survey

Figure 2.
Concept of informal economy

a relationship exists between migration and the IE (see Xaba *et al.*, 2002; Fapohunda, 1981; Sethuraman, 1981; Perberdy, 1998; Verick, 2006; Abdulloev *et al.*, 2011). Migrants can bring about both positive and negative effects on an economy's employment, production and growth (Ivakhnyuk, 2005). In the early debates, the IE and migration were seen as complements (see Fields, 1979; Sethuraman, 1981; Okojie, 1984; Gang and Gangopadhyay, 1987). By this rational, the IE represents the starting point for migrants. In particular these migrants, upon arrival in the host region or destination, engage in activities in the IE before they are able to secure formal sector employment (Table II).

One of the basic hypothesis of probabilistic migration model is that temporary people remain in this sector only till they find an opportunity in the formal sector (Banerjee, 1983). In many countries including India migration from less developed part of the country to the developed part or from rural to the urban area is not considered positive. Policies are framed to reduce migration (Bhagat, 2015). The two-sector classical model developed by Lewis (1954) argued that the movement from rural to urban areas helps to relocate the surplus labour and enhance economic development (Dubey *et al.*, 2006) and due to this some authors and practitioners believe that migration is beneficial (Lucas, 1997). According to a report by World Bank (2009), in an elongated time frame, the right type of policy migration could play a decisive role and could benefit both the origin and destination. The migrants who are skilled and educated are absorbed in the formal economy (as a formal employee in a formal firm or as an informal employee in informal firm), but the ones who are unskilled or low educated become part of the IS (marginalisation thesis) and are excluded from various social security programmes such as public distribution of food, access to education and healthcare and, most importantly, entitlement to housing at the place of destination owing to the absence of identity and residential proof (Bhagat, 2015). The social security of the migrants should be rooted in urban development policy, and as 90 per cent of the workforce belongs to the IS workforce, social security becomes an important aspect (Bhagat, 2015).

2.3 IT and firm productivity

"The technological revolution is rapid and sustained, the costs are falling, applications broadening and diffusion is deepening" (Atkinson, 1998). There is a large volume of literature on the IS, but there are very few which document the impact of IT spending on firm (small informal unit) productivity. In a study conducted by Roach (1991) on IT workers using data for 16 years (1970–1986), he established that computers had limited influence on

Factors	Author
Expected income gap	Harris and Todaro (1970), Teilhet-Waldorf and Waldorf (1983), Koo and Smith (1983), Banerjee and Bucci (1995), Yamada (1996), Marcouiller *et al.* (1997)
Urbanisation	Goldstein and Mayer (1965); Cherunilam (1981)
Facilities at the migration destination	Harvey (1968)
Ethnic factors	Ahmad (1992)
Cost of migration	Sjaastad (1962)
Availability of jobs	Fields (1975)
Lack of employment in the source destination	Rao (2005)
Literacy rate	Nagraj (2000)
Poverty	Afsar (2003), Kundu (2006)

Table II. Determinants of migration

Notes: The determinants are extracted from prominent literature on migration. This is part of authors doctoral research work
Source: Authors' exploratory analysis based on literature review

the labour productivity. Some studies established a negative impact of IT on the productivity of enterprises (Franke, 1987), whereas some emphasise that IT spending has a significant positive effect on intermediary measures of enterprise productivity and the return on investment (Hitt and Brynjolfsson, 1994; Brynjolfsson and Hitt, 1996). These results are from the research in the manufacturing sector. With increasing research contributions we are developing a more transparent image of the correlation between technology and productivity (Brynjolfsson, 1996). In the 1980s and early 1990s, disappointment in IT was reported in numerous articles relating wide-ranging negative correlations with productivity. Low IT capital productivity was indicated in several econometric estimates. More recently, researchers began to find positive relationships between IT investment and various measures of economic performance at the level of individual firms. The findings of multiple researchers are contradictory (Brynjolfsson and Yang, 1996). Table III gives a brief review of the contradictory findings by various authors.

The IE by its structure works through the creation of labour-intensive activities and backward and forward linkages with the formal economy, subsequently, it acts as a bolster against poverty and income inequality, especially during external jolts. Thus, it can be said that in the emerging economies the IS is expanding in both the absolute and relative terms.

3. Methodology

A unit-to-unit survey was conducted in July 2017 in Delhi, the national capital of India and peripheral areas. To critically evaluate the factors, we used a scheduled questionnaire which is one of the frequently used measurement instrument in social science. This survey composed of face-to-face depth interviews, we used this method only because of the subject matter being investigated which was sensitive and also as literacy of the respondents was low, and this was the only practical and possible way of collecting data.

Depth interview was used as it was not possible to get the reliable data from them without covering all the aspects, besides the suspicion about the information being asked to them would have been a barrier, with the help of repeated visits we suppose that the data shared by them are reliable. Furthermore, as these units hardly had records of financial transactions on book, we had to rely on what they said and on our observation. The units surveyed engaged in various activities ranging from beauticians, tailors, kirana stores, fruit juice centres, book sellers, repairing shops, carpenters, vendors providing door-to-door service and many more were covered. The primary intention was to include those units which were not covered in the surveys conducted by the government; as there is a remarkable gap between the studies. Many new firms start operation informally and remain informal, some operate seasonally so stay un-captured and some keep moving their shop shifting, and some do not have a visible

Author and year	Finding
Strassmann (1985, 1990)	No correlation between IT ratios and performance measures
Bender (1986)	Weak relationship between IT and performance ratios
Loveman (1994)	IT investment added nothing to output
Berndt and Morrison (1995)	Found negative correlation between TFP and the share of high tech capital
Kwon and Stoneman (1995)	The adoption of new technology, primarily use of computer has a positive impact on the output of the firm and its productivity
Jorgenson and Stiroh (1995)	Found that technology regarding computer capital contributes more than ordinary capital
Mitra and Chaya (1996), Alpar and Kim (1990), Harris and Katz (1991)	Established that the cost-effectiveness of the firm is negatively affected by the investment on IT

Source: Authors' exploratory analysis based on literature review

Table III. Relation between technology and productivity/ performance

operation space, and so they remain unrecorded. The survey was conducted in various parts of Delhi, namely, Daryaganj market, Janpath market, Sarojini Nagar market and Palika bazaar, Faridabad (in and around park plaza) and Vaishali (sector 4 market). The choice of clusters was done using stratified random sampling, where the population was divided into smaller groups as strata, these strata were formed based on the activity the area is popularly known for, and part of this stratification was based on the availability of information with Department of Industries. All the responders belonged to the informal units in and around Delhi having an employee size of three or more (minimum three workers having at least one salaried employee). For example, Ram (see Footnote 1), a cold drink seller works out of a mobile pushcart (trolley) with an iced box as refrigeration support and sells mango drink for Rs. 10 per piece near Palika bazaar roadside from 8.30 a.m. to 10.00 p.m. to earn gross revenue of Rs. 1,000 per day employing two temporary delivery boys including himself, who also caters to delivering to nearby shop owners (customers) who takes orders from shopkeepers on the phone and assures timely delivery.

A total of 350 service enterprises were visited for the survey out of which 180 enterprises owner/leader agreed to participate, the respondents were hesitant and they agreed to participate only after repeated visits. Out of 180, 30 questionnaires were rejected as they were incomplete, so a total of 150 valid questionnaires were responded (Table IV), giving a response rate of 42.86 per cent. To the data collected from 150 firms, we apply standard productivity and growth accounting techniques. By performing the estimation at the unit rather than the industry level, we reduce difficulties of mis-measured outputs and inputs, thus, potentially obtaining a more accurate estimate of technologies contributions towards the firm productivity.

4. Data analysis and interpretation

4.1 Profile of the sampled enterprise

The survey covered various informal units spread across the survey area. The types of ownership of these units varied, 40 per cent of the units surveyed had proprietary ownership, 30.7 per cent of the units had a partnership with the same household/family whereas 5.3 per cent had vice versa, i.e. partnership with members not from the same household, 9.3 per cent were a limited company, and remaining 14.7 per cent were categorised as others (refer Table V).

It is established in this study that more than half of the informal service enterprises are perennial followed by casual firms. Seasonal firms are found to be 12 per cent which is less than

Locations	Total contacted 1	Actual number of respondents 2	After eliminating incomplete questionnaires 3	Response rate location wise $4 = 3/1 \times 100$ (%)	Overall location-wise participation rate $5 = 3/150 \times 100$ (%)
Daryaganj market (Delhi)	65	30	26	40	17.3
Janpath market (CP, Delhi)	60	32	25	41.7	16.7
Palika bazaar (Delhi)	55	25	18	32.7	12.0
Sarojini Nagar market (Delhi)	45	23	19	42.2	12.7
Faridabad (UP)	75	40	34	45.3	22.6
Vaishali (UP)	50	30	28	56.0	18.7
Total	350	180	150	42.86	100

Notes: CP is Connaught Place. Four locations out of six are from Delhi (17.3+16.7+12+12.7 = 58.7 per cent of the participants). Faridabad location means the bazaar in and around park plaza and Vaishali location consists of sector 4 market and market located near metro station

Source: Authors' own elaboration based on primary survey

Table IV.
Location-wise participation rate

	%
Type of ownership	
Others	14.70
Partnership with members not from the same household	5.30
Limited company	9.30
Partnership with the members of the same household	30.70
Proprietary	40
Type of operation of the firm	
Perennial	57.30
Seasonal	12
Casual	29.30
Others	1.30
Age of informal units	
Greater than 10 years	30.70
5–10 years	36
3–5 years	13.30
Less than 3 years	10.70
Others	9.30

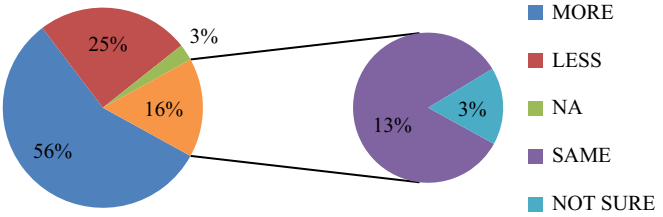
Source: Authors' compilation based on primary survey data

Table V.
Demographic profile of the participants

estimated (refer Table V). The most surprising finding is that the firms which started informally remained informal for years and are still operating informally. This shows that the transition rate of units from informal to formal is quite low. On enquiring the age of the firms, it was found that 30.7 per cent of the firms have been operating for more than 10 years, 36 per cent of the firms aged between 5 and 10 years and only 10.7 per cent of the firms aged less than 3 years. A mere 9.3 per cent of the firms surveyed were new and operated since few months (refer Table V).

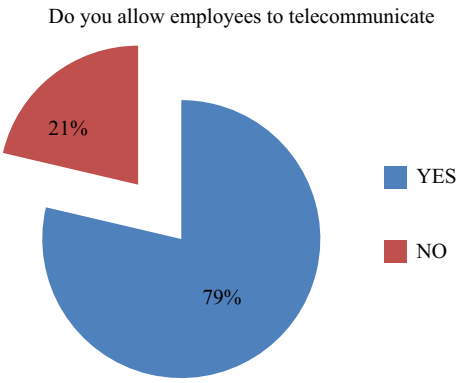
4.2 Technology and informal enterprises

The informal units are widely spread and are used by customers on a daily basis, to fulfil daily or regular requirements. These service providers make our life convenient by providing service at the doorsteps. Most of these service providers are less educated and lack technical skill. Due to increasing competition and technology, these enterprises are lagging behind, and their profits have been hit and also their productivity is close to negligible. The main reasons found in the survey are the perception of informal SS participants towards technology adoption, though their dependency on technology has increased in last few years (Figure 3). As mentioned by 56.7 per cent of the respondents (Figure 4), 56.4 per cent of the respondents believe that keeping up with technology is not essential for them (Figure 5) and this believe is nothing but the shield of perception created by them. The telecommunication is the technology widely used by these service enterprises,



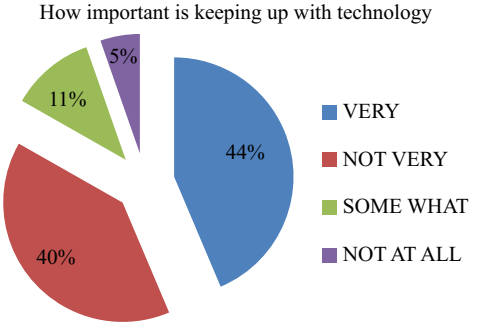
Source: Authors' compilation based on primary survey data

Figure 3.
Dependence on technology



Source: Authors' compilation based on primary survey data

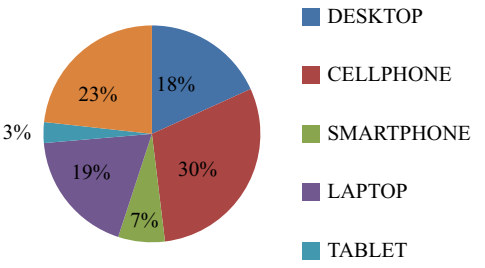
Figure 4.
Telecommunication by employees



Source: Authors' compilation based on primary survey data

Figure 5.
The importance of keeping up with technology

78.7 per cent of the service providers use it to connect to the customers (Figure 4). Even in today's scenario when everything is online, for these entrepreneurs, technology utilization is mostly limited to cellular phones, land line and for few desktop (Figure 6). Various challenges are associated with the use of technology as mentioned by the informal



Source: Authors' compilation based on primary survey data

Figure 6.
Items utilised for business

service units. A total of 26.3 per cent of the informal service entrepreneurs believe that upgrades are the biggest challenge, as they are technically inefficient and do not have educated or technologically efficient staff so they fail to do the upgrades on their own also the time for updates acts as biggest challenge with the use of website (refer Tables VI and VII). So, it can be derived from the above outlook that the prime reason for not using technology, as a result of which they suffer in terms of productivity and visibility, is the lack of technical knowledge and efficiency, i.e. they lack awareness. Their perception towards the difficulty and cost involved with the use of technology is nothing but a myth.

4.3 Location of the enterprise

In the survey conducted it was discovered that 62.7 per cent of the units operated at a fixed location whereas remaining 37.3 per cent of the units had to shift location due to various factors like increase in rent, legal issues, competition and better opportunities at the new identified location. It was also established that these enterprises do have a share of permanent customers, in addition to the new customers. For retaining their customers even by shifting their location they use telephones, they provide service on call so for them the damage caused due to shifting is covered to a certain extent. One of the benefits according to the responders is that when they come to a new location, they have a new set of customers to serve; from the customers served they again add some loyal customers who prefer them over others. So, this movement also has some positive aspect. The firms surveyed were dependent on labour hours for generating output (44 per cent) and machine equipment was used by 25.3 per cent. A negligible share (6.7 per cent) of participants had both skilled and hi-tech telecom as their input (refer Table VIII).

The working conditions in the IS are characterised by irregular/unsocial working hours, low pay scale, little or no job stability, there is hardly any career prospect and the retention rate of

	%
Time for updates	25.6
Cost of maintaining the site	11.3
Finding a reliable website professional	22.1
Keeping up with and protecting name/brand from growing list of domains	6.2
Security issues	14.4
Response time from external web maintenance	10.3
Others	10.3
Total	100.0

Source: Author's compilation based on primary survey data

Table VI. Challenges with the use of the website

	%
Cost of upgrade	26.3
Security	16.8
Time to fix problems	8.9
Cost of maintaining technology breaks	5.6
Lack of expertise	8.9
Response time	8.9
Location	11.2
Others	13.4
Total	100.0

Source: Author's compilation based on primary survey data

Table VII. Challenges with the use of technology

these enterprises is quite low, as the employees keep on moving from one enterprise to another in search of better pay band and working condition. On the other hand, the entrepreneurs of the IS have the advantage of the flexibility of working hours and the most significant motivation for them is that they are their boss. They work in the adverse conditions to establish their business and create employment opportunity for workers with little or no formal training. People migrating from less developed regions find jobs in the sector.

There are various survival challenges faced by these enterprises in order to survive. The major challenge faced by these enterprises is competition, which is increasing day by day. Moreover, the uncertainty and decline in spending power by these firms are hitting these enterprises tremendously. The recent demonetization was one of the biggest hit for these informal units. In demonetization, declared on 8 November 2016 the currency notes of Rs. 500 and 1,000 were no more considered to be legal tenders. These notes were in circulation in a high proportion (over 86 per cent), and employment and daily business were severely hit as the informal service units deal in cash on a regular basis. The other major issue faced by this sector was that most of them did not even have a bank account according to the Report on Fifth Annual Employment and Unemployment Survey (2015–2016), amongst all, very few households (20 per cent) having monthly income less than or equal to Rs. 10,000 have a bank account, and due to demonetization they had to open bank accounts under Jan-Dhan Yojana (a financial inclusion programme), to deposit their money and get new currency notes.

There are various challenges faced by the IS enterprises, the most prominent challenge is competition and uncertainty, with increase in competition the profit margins decrease for them, and lack of available capital is another significant challenge faced by these units. As these are informal units they cannot avail any formal credit, the option they are left with is private lenders who lend money at a much higher interest rate than the bank. Table IX lists some of the significant challenges mentioned by the entrepreneurs. In 2016, government

	%
Labour hours	44.0
Labour and machine equipment	25.3
Labour and mobile equipment	6.7
Skilled labour and hi-tech telecom	6.7
Others	17.3
Total	100.0

Source: Authors' compilation based on primary data

Table VIII.
Inputs to produce the realisable output

	%
Uncertainty	17.7
Taxes	11.5
Regulatory burdens	3.1
Cost of technology	9.2
Decline in spending	8.1
Competition	26.5
Lack of available capital	7.7
Training cost	3.5
Employee salary	6.2
No major challenge	6.5
Total	100.0

Source: Authors' calculations based on primary data

Table IX.
Challenges of survival

launched Mudra loan scheme in collaboration with various banks to help small entrepreneurs financially. There are various other challenges that these enterprises face because they are informal. They can minimise these issues by moving towards formalisation. With new policies and schemes being introduced by the government recently these enterprises can be captured.

4.4 Informal sector and migration

In pursuit of good life and to earn people from rural area migrate to urban areas. There are various factors like unemployment/underemployment, lack of satisfaction, discrimination, less paid jobs, lack of better opportunities, lack of options, etc., that act as push factors due to which there is dissatisfaction, and they perceive that there are better opportunities in the urban area and here the pull factors play a big role. The perception is their well-paid jobs, better lifestyle and more options to explore. When they migrate, very often due to lack of formal education, training and experience, they are unable to enter into the formal sector and then they are absorbed in the IS. The informal SS has huge employment capacity, and it has the ability to employ more people in less investment as it is intensive in nature. These workers are part of the IS and are denied basic benefits which they should be given. They are exploited and lack any security, but the reality is that it gives them a livelihood.

During survey it was also found that the entrepreneurs of the IS are not always the ones who are marginalised from the formal economy. Many entrepreneurs were seen to be part of this sector by choice, as they spotted it as an opportunity. For example, Janta tailors, Faridabad, is a business that was started by Fatima Begum in 1995 at a corner of her residence, she worked along with her mother and had one sewing machine. By 1998, she had seven sewing machines, and seven ladies were employed by her who were paid on a daily basis. She supplies designer garments to boutiques. In 2012, Tabassum, Fatima's daughter, who is a dress designer by profession left her well-paid job and joined her mother's business on a full-time basis. Her business has leapt, and it has been shifted from a room to a workshop where custom designer dresses are designed and supplied. They are planning to have an own boutique. Tabassum wants to get registered as she wants to expand her business and own the boutique. The pull factors for her were money, freedom, flexibility, ownership and growth (Figure 7).

4.5 Reasons people participate in the IE

There are various reasons why people choose IS over formal. For some, this is the last resort, they need to be in this sector out of necessity, due to lack of alternative in the formal sector and they also choose this over low-paid formal employment, and others are in this sector by choice – for flexible working hours, scope to grow and earn more and social connection. One of the common responses of the entrepreneurs engaged in the business of providing services informally, as they were not aware of the process by which they can get the licence, or they can register, they believed that as they operate at very low level with very less investment, they do not need to register. For example, Prabhas (see Footnote 1) who runs a repairing service shop with two hired mechanics and three helpers (also provides car washing and cleaning services at the doorstep) told that they operate off the record because they are not aware of the registration process and when he tried to inquire about the process he was told that the registration process is cumbersome and at every stage you need to give bribe, and as he operated at a minimal scale for which registration was not required for him. For many respondents, the most common response to the question of why they run their businesses informally was "I need to make money", "I can make more money than a regular job can give" and "as I am new in business I am not registered, ones I start earning profits I will register myself". The most interesting and the most surprising response was from the vendors selling food items on stalls or vans, they said, in fact, why do we register? Do we need to register?

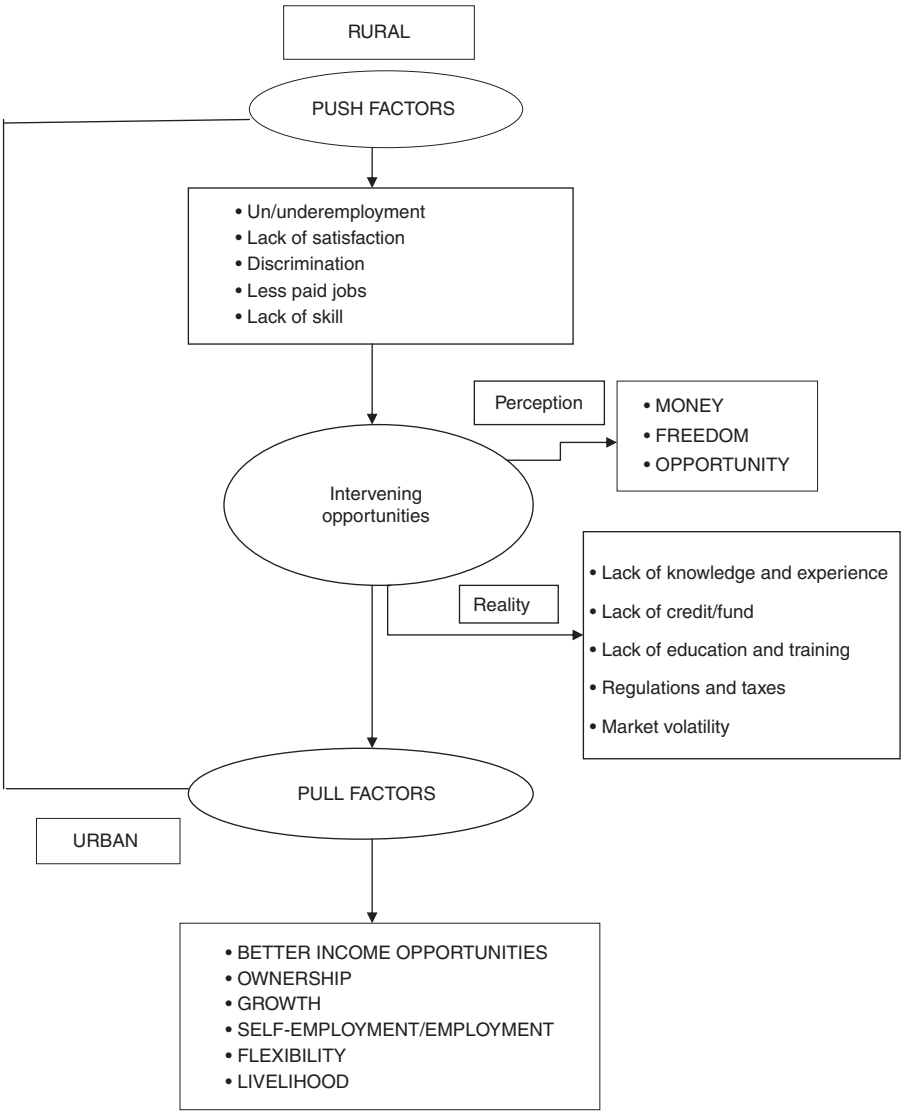


Figure 7.
Push and pull factors

Source: Authors' compilation

Such type of responses is common among the entrepreneurs who are uneducated or less educated, who lack any exposure; however, such responses indicated the lack of awareness among them. On digging deep into the reasons why do entrepreneurs operate informally, it was found that the reasons are numerous, some take this decision analytically as well. Some of the reasons mentioned are:

- The longing to earn more: some hide their income from the government to avoid taxes and make more profits. If they register, they will have to abide by all the rules set by the government for employee benefits, which involves a further higher cost of operation.

- Incapability to get formal employment: some respondents operated in the IS when they failed to get formal wage employment. This is because of low education, lack of experience, lack of skill, lack of training, etc.
- Dissatisfaction with formal employment: some respondents are in this sector due to bad experiences in the formal sector over-bossism, difficulties with co-workers, adverse working conditions and lack of satisfaction. Others have been in regular jobs for long term and decided to quit and start business informally, with a motive to register ones established.
- For independence: the allure of freedom and control is compelling for some; they want to be their boss, their work calendar (flexibility), earn as much as they are willing to dedicate in work hours and be free from any superior or outside forces.

5. Discussion

The informal makeshift shops keep shifting their mobile business unit due to various factors like municipal challans, hike in rent or increasing density of competitions around them, etc. It is also found that it is not necessary that the unit owners are the real owners of the units visited and contacted. The actual owner could be a different person who has similar business interest elsewhere or is a holder (broker/bichholia) who manages many such enterprises around a location. He supplies credit for the purchases made by these units and also owns all the assets operated by the unit. Since the real owner works as a broker (margin owner), he/she has little knowledge of the revenue function and tries to run the enterprise only on cost control basis. This problem of classic principal–agent relationship makes the realisation of optimal outcome impossible. For the rest of the units owned by real owners, lack of credit, lack of certainty in assured revenue, lack of trained workforce and funds for investments make them perennially achieving suboptimal outcomes.

The enterprises surveyed operate at a very low level with very less investment. Many of the entrepreneurs have a perception that the adoption of technology would increase their cost of operation and they would be dependent on skilled staff, they are not even aware of the benefits that they can avail with the use of technology. On the contrary, some service providers believed in adopting technology and were utilising it effectively, but they were not trained, so they failed to utilise technology to its fullest.

The informal enterprises do not maintain their accounts and are hesitant to provide any information of their activities due to various insecurities. The question if they are reluctant in giving information indicates that they are very well aware that the business they are involved in is illegal, then why do these informal firms choose to remain informal? In the research conducted, two prominent factors for being informal were spotted, for some, it was the lack of awareness, and for some, it was useless or is of no benefit, they just wanted to make more money by avoiding taxes and employee benefits. Our research established that a self-selection theory (Taymaz, 2009) is true for the Indian informal entrepreneurs, where educated entrepreneurs were more likely to move towards formalisation. We found that the most prominent reason why most of these very small entrepreneurs are not aware of the benefits they can avail if they get registered is the existence of bichholias (mediators)/agents. By adoption of technology these enterprises can eliminate them and can increase their profit as well as the revenue of the state. The study reveals that these enterprises have suffered in recent years due to change in demand and preferences of the customers. The customers have become more dependent on technology. These informal enterprises are failing as they are unable to adopt the changing technological requirements to promote themselves and survive. There exist

various barriers due to which these enterprises are unable to adopt the technology. Some of the reasons are:

- lack of awareness;
- low or no R&D;
- lack of management skill;
- poor financial situation;
- lack of trained workforce; and
- isolation from technology.

By adoption of technology, these enterprises can increase their profitability and also increase its customers. Various training camps and awareness programs need to be conducted on a large scale. There are NGOs like National Association of Street Vendors of India, which is an association operational since 1998 and registered in 2003 under Societies Registration Act 1860, that work for the protection of the livelihood rights of thousands of street vendors across the country. Women in Informal Employment: Globalization and Organization is a global network focused on the working poor, especially women in the IS. There are many more organisations that are working for the welfare of the IS workers and IS as a whole, but it can only be beneficial if measures are taken at the block level to try to get informal firms go formal by organising awareness campaigns at training programs. This type of programs can benefit both the workers of the informal unit and the owner.

6. Conclusion

The concept of informality assumes the concept of dualism. The main findings of the research can be summarised as follows. The marginalisation thesis does not hold true for the entire IE; the scenario has changed. With growing competition and the urge to grow fast, many are in this segment by choice. The main reasons found behind this was the perception of better-earning opportunity, ownership, growth, flexibility and self-employment. The workers of this sector are mainly the migrants who migrate to the urban areas due to various push and pull factors. The main reason spotted behind the informal service enterprises making poorer value addition towards measured productivity is the lack of equipment or technical know-how. It is also established that few other intangible factors such as the lack of credit, lack of certainty in assured revenue and lack of trained workforce make them incapable of perennially achieving optimal outcomes. The informal SS needs instruments geared towards the issues being faced like working time (overtime regulations, rest periods), social protection (job security, exploitation) and regular remuneration (pay scale, pension schemes, PF), and it is also desired to promote training schemes in cooperation with employers and workers organisation. Advisory services like a free consultation with the help of NGOs can also be held to strengthen appropriate modalities to increase awareness and also to improve productivity. To tackle the hypothesis of mismanagement, there is a need to develop better theoretical models. There is numerous evidence for under-utilisation of available technology (due to lack of awareness and training) by the informal enterprises and also on misuses of technology as spotted in some enterprises. More careful explanations are needed to show how these entrepreneurs and workers can be trained, and why technology might be subject to under-investment or mistakes in implementation.

As a step towards development, more awareness and training campaigns on the use of technology and benefits are needed to be organised; a better theoretical foundation needs to be established which will help identify the explanations that are likely to be empirically significant and will facilitate identifying and testing appropriate variables and their relationships.

The IS creates problems that the IS poses, at the household level, the workers suffered from the income uncertainty risk and denied any protection, there is also no secure legal protection in the IS if anything goes wrong. Registered firms often suffer from over-taxation as the government needs to cover the revenue lost from the informal firms. Moreover, the registered firms face unfair competition from the informal enterprises. At the firm level, the informal units do not have access to credit from banks and other legal, financial institutions and also no legal protection. The overall economy is affected by the IS. Better measures and steps need to be taken to capture these units. Finally, it can be concluded that primary role of technology depends on the nature of the firm and different proportions of change have divergent effects on the productivity. So, a proper level of investment in technology can contribute to the higher productivity of the firm.

Note

1. Name of the respondents is changed in order to conceal their identity.

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Rural farmland value: compensation for displaced villages and environmental factors

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Abstract: This paper is motivated by the natural and institutional characteristics of land valuation for the lawful acquisition for executing public projects. A model to arrive at the valuation of rural farmland is desirable when there does not exist crop insurance for the displaced farmers and villagers. The factors of the natural environment could be the impact of relief or soil fertility on the associated farm or non-farm income from land. However, the environmental implications of converting arable land to mining factories are innumerable and irreversible. Using rural land commission data of claims over 631 cases of rural households for over 52 displaced villages in Sundargarh District of India, we compare the loss of value accrued to farmers against suitable expected market prices. We conclude that the villagers were compensated to the tune of INR 2,67,870 (USD 5,745) per case against their expected lifetime earnings of INR 7,99,319 (USD 17,144) per case. The cumulative compensation received for total area of 2,112.5 acres (855 ha) amounted to only INR 169,026,176 (USD 3,625,413) as against the expected NPV of earnings of INR 504,370,184(USD 10,818,148).

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1 Introduction

Natural assets are private endowments of a household that are often subjected to imperfections in valuation. Natural assets are precious for their owners when they prevail within the ecosystem to represent the rich bio-diversity and realms of uninhibited

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physiography. For example, the relationship between land environment, relief and soil fertility is discussed in texts of geography. Similarly, the non-coincidental relationship between the factor of soil fertility and associated gains in cash crops observed more so in food crop production are also known to researchers (Hoag, 1957). Private use of rights to village land and a market for exchanging such environmental rights never entitled to owners. The increase in demand for commercial use of land assets from agricultural use to non-agriculture use and the need for industrial development has posed challenges in environmental valuation. Land valuation is of interest to the author because of the wide variation in their environmental characteristics, socio-economic characteristics and also to elaborate upon institutional reforms seeking to endow farmers and cultivators with secured and transferable rights to natural property. The surplus land is allocated on long-term leases to private users by a state registry. Such acquisition could provide major advantages to owners with the ability to participate in the secondary land market, such as surrendering the land as collateral mortgage to seek bank credit for industrial and commercial gains. Could the value at which the transfers were orchestrated be justified to the community? Similarly, it is not possible to restore natural wetlands which were lost after the project was initiated.

Recent legal reforms seek to reduce the scope for unilateral land acquisition from landholders one way and aim to disburse proper compensation to individual sellers. Rapid economic growth, higher population density and urbanisation cause high demand for non-agricultural land which is associated with the appreciation of land price. Given the dichotomy between non-agricultural and agricultural land, this has led to a wider price difference between the two, where the compensation payment is not pegged to secondarymarket value, but the fertility value of the plot under farming, as multiples of average annual crop yield. The manner of arriving at the resale amount of payment is not driven by environmental objectivity or transparency. There exists no secondary market for immovable property in rural hinterlands. In this paper, we highlight the factors of the natural environment that could the relief or soil fertility that impacts both farm and non-farm income from land. Further the basic question of the presence of property rights and consequences of loss of resource endowment to make good the social costs are important issues of livelihood in Rural Odisha. For example, a village land is only capable of unirrigated *Kharif* crops of fully sown paddy and could be *Rabi* summer crop or partially sown moong (green gram). Endowments of matured and grown-up trees of non-timber variety are continued sources of biomass and firewood. Fruit or mango trees could provide small earnings occasionally. House or buildings (Gharbari) of pucca (concrete) or earthen kaccha (raw) nature is used for living with the entire family and with little possibility of can also be used for commercial purpose. The commercial rent from a GOOMTY (shed) to store supplies, condiments or essential rations such as salt, sugar edible oil, a bicycle repair shop, blacksmith or carpentry shed, etc. The endowment of land, trees and building not only serves the purpose of periodic entitlement but also guarantees relief during downfalls. When a villager loses his land to expropriation for a public cause at revenue guidance value it could never be compared with a secondary market price. Property rights which are granted to individuals by the registry are although transferable with the first preference to the public cause. This paper figures out the financial or economic loss that accrued to individuals or families in rural Odisha on account of their natural land resources being expropriated by public coal companies. This study contributes to previous research on the topic by providing empirical estimates based on the environmental factors associated with spatial location. It also tests the significance of

bargaining power of villagers. Given that land is the basic factor of production, households try to maximise the return by clinging to their existing piece of land. The land is a source of livelihood for the majority of the population and there is no alternative and reliable source of employment. The land is an environmental factor of production, which is differentiated in terms of topography, location, size and other agro-climatic characteristics.

The objectives are to find out specific environmental and socio-economic factors that influence the average resale price of agricultural land. These factors are, linked to the nature of the site, relative location and accessible distance of each plot from urban towns, and time of resale, respectively.

2 Literature

Literature on the price of land has mentioned factors that influence the geographic and temporal variability of prices. The re-sale of resource endowments owned by a household could enable it to recover the loss due to natural or unnatural disasters, calamities of death of a family member, chronic and severe illness, etc. Vulnerability to disaster (assuming there is no panic selling) can be prevented by possessing assets that could be partially disposed of. The literature on compensation to land offers little guidance for researchers. Further works have explored the empirical importance of similar factors impacting land prices such as net returns from agriculture. Wu (2001) finds that environmental factors may affect not only the geographic location of economic activities but also their market consequences. There exist works of Hoff and Stiglitz (2004) thatdo mention that land acquisition re a deterrent to property rights due to rapid urbanization and the development of national infrastructure. One may suggest using rational approaches to compute the compensation value of land, by identifying attributes that affect agricultural land price, and sale prices. The application of neoclassical microeconomics to environmental factors gives a framework of environmental expenditure accounts to arrive at the loss of fertile soil and the cost of its reclamation (see Lumby, 2006). However, beyond the trait of soil fertility, natural and unnatural characteristics of land-holdings, have not been highlighted adequately. Plantinga et al. (2002) suggest an asset-pricing model in which the price of agricultural land is a function of the expected returns from its current agricultural use and its potential future use. In this paper, we use the case of rural property rights in India, where rising pressure on land has resulted in conflicts between farmers and project authorities. The quality of land in terms of its capacity to produce agricultural products is regarded as the most important driver of land values. Private rights cause optimum use within the limits of a given plot of land, whereas, alternate uses such as public road networks or public buildings exhibit wider and different needs. Miceli and Segerson (2007) have mentioned that in the USA, large projects are widely publicised and made known to the public before they are initiated such that the public sector cannot acquire land quietly. This causes a holdout problem whereby individual owners refuse to part with land, except at prevailing market prices. The primary market of land does not move in conjunction with the secondary market for land. Private investors may influence the price to seek advantage, as mentioned in the literature (Kelly, 2006). The public expropriation of land parcels should be limited to specific, reasonable and sustainable projects only. The state needs to fully compensate for land and prevents others from garnering land banks beyond the optimal

level. The public sector garners more land than necessary to create employment for society. Kaiser and Roumasset (2000) find that full income valuation implies that the value of land or its resources (e.g., water) should incorporate the value of maintaining contributory degradable ecological capital. Ervin and López-Carr (2015) have highlighted the demographic, political and economic factors contributing to local production and demand for agricultural inputs in Latin America. There is a trade-off between the benefits of land acquisition that could increment the value-added for the region and the social or economic costs. Social costs could be in the form of loss of green biodiversity cover, loss of water bodies or the loss of an existing food chain, loss of the joint family system, etc. Economic costs are lost earnings and we evaluate the loss of economic earnings in the farmland. Fair compensation will prevent the project owners or the state from land acquisition exceeding the socially optimal level for unplanned public gain (see, Giammarino and Nosal, 2005). Simpson (2013) mentioned that in Mexico indigenous communities had built on alternative by collectively-managed territories against gold mining. In this paper, we use the case of compensation granted to villagers based on the official guidance value of 2010 (15 December 2018) and compare the loss of future earnings to loss of land, agricultural land price determinants.

3 Methodology

Economic tools to evaluate the projected stream of cash flows or determining the abrupt loss of income and livelihood have constituted the loss of endowments or a stream of losses during the life of the individual and the family. The 'market value' for land is not a simple one-way formula and may be based on the guidance value (which may not be fair value by itself). The literature on the long term value of agricultural and natural assets has dwelt upon primarily arriving at the net present value (NPV) or cost-benefit analysis (CBA). The challenge of estimating entire benefits and comprehensively enumerated costs against a new proposed project will require comparing the with or without project scenarios. However, a simpler NPV method that gives the loss in livelihood and the stream of lost cash inflows during the life of the household is favourable. For example, loss of un-irrigated land of say 0.2 acres in 2009, a landholder (0.2 acres) could lose an amount of gross Kharif paddy income of INR 5,100/- (= INR 850/- × 6) and net income of INR 2,400/- {=(INR 850 – INR 450 = INR 400) × 6} per season, where INR 450/– goes towards NPK (fertiliser) purchase and input costs. One can use the discounted cash flow method (discount rate[1] = 3%) to arrive at the net earnings per season by taking into account the official minimum support price (MSP) of paddy crops, declared NPK price of fertilisers, available from the Ministry of Agriculture (2010a, 2010b). We ignore the potential non-farm income or supplementary income which may arise due to tenancy sharecropping, investments in the post office, lending to relatives or friends or occasional weekly income from the sale of vegetables produced in Gharbari at the village local Haat (market). We do include the wage income of at least one person per case at the rural wage rate (non-farm) reported by the Ministry of Labor (MOL) and also take into account the variations in CPI-Agricultural Laborers reported by the Ministry of Statistics (MOSPI) for those years. Therefore the gross income of a household is the total of expected farm income from land and non-farm wage income for at least one member during the lifetime of 50 years from 2010. We calculate the expected NPV for each year for a land holders' living life of 50 years after 2010 and report.

With inputs from previous work embodied in the literature, we propose a regression-based approach as follows:

Let C_{ij} denotes the amount of one-period compensation paid for land claim i in village j; then the land compensation to be estimated can be written as:

$$C_{ij} = \alpha + \mu Z_{ij} + \upsilon X_{ij} + \omega Y_{ij} + \eta E_j + \varepsilon_{ij} \quad (1)$$

For claimant i in village j, where Z_{ij} is a vector of benchmark indicators (e.g., the distance of headquarter, minimum support price, benchmark value, average yield), X_{ij} is a vector ofbargaining characteristics (e.g., number of claimants, number of households, number of people in the village), Y_{ij} denotes socio-environmental characters of the site (e.g., Number of members in the household, land fertility type *Bahal* or *Mal*, property with trees and/or building, relief), E_j denotes expected NPV of foregone earnings of the claimant and ε_{ij} isan error term. The bargaining power of the villagers to demand higher compensation could depend upon the size of the village, number of households, number of filed claimcases, the promulgation of an ordinance, etc.

4 Data and results

The sample data refers to the list of 52 villages of Rural Odisha given in Table 6. The sample data includes claim commission compensation data on land valuations in Hemgir Tehsil of Odisha during the period 2006 to 2010 for the coal acquisition project. The sample villagers site is close to 3.5 miles from the Garjanpahar (Sundergarh) reserve Forest which is a bio-reserve ecosystem. The information includes individuals, households and families who were resettled in full or part after losing their agricultural land and or homestead land. It includes the natural assets they possessed in the form of land, trees or forestry patches and house. We ignore the presence of variation due to caste, education, occupation or similar socio-demographic heterogeneity existing across villages in our sample. The socio-demographic heterogeneity could influence the bargaining power of claimants in the deal. Few of the settlers were offered and provided rehabilitative employment in the project (about 18%) by the project promoters.

Table 1 gives the descriptive summary of the compensation amount for Gharbari (combined for building and trees) and lands separately, where the amounts paid towards building and trees are not available separately. Table 1 reports acreage, compensation and cases of compensation. Minimum compensation of INR 1,171/- equals the value of one standalone tree of non-timber (NTFR) variety.

The NPV is an asset-pricing model in which the current value of a parcel of land is the sum of expected future income flows discounted. The distribution of the endowment of land and houses for the entire sample of 631 cases are given in Figures 1 and 2. Figure 1 gives the landholding pattern during 2008 and Figure 2 gives the realised compensation value for the sample village during the sale.

Table 1 Value of compensation for 631 claimants

Type	*No. of cases*	*Minimum (INR)*	*Maximum (INR)*	*Std. deviation (INR)*	*Mean (INR)*
			Gharbari (homestead) only		
Value of compensation (INR)	171	1,171	1,453,258	227,232	158,178 (USD 3,393)
			Land only		
Acreage (acres)	631	0	1,012	3.3	40.4
Gross value of compensation (INR)	631	1,178	22,443,812	2,67,870	129,5135
NPV estimate per case (INR)	631	4,775	241,622,466	7,99,319	9,644,925 (USD 206,872)
NPV estimate per acre (INR)	2,112.5		-		2,38,757 (USD 5,121)

Notes: Average land compensation was equal to 153 bags of low moisture paddy at current prices. It translates to INR 80,013 ($1,716) per acre.
Present value is calculated by arriving at landholders gross earnings due to revision in MSP from 850/- in 2009 to 1,080/- in 2011 using a discount rate of 3%, and annual growth in earnings = 6.45%, for 50 years, @25 bags per acre output. Introducing a rise in input costs of NPK costs (@81.38 kg/ha) andNPK prices per MT from INR 9,350/- in 2010 to 12,500/- in 2011, per acre of land.

Source: Authors calculation using Claim Commission MCL, Bhubaneswar Govt. of Odisha (2011), Ministry of Fertilizer, Ministry of Agriculture, Government of India

Table 2 Official grant compensation value and benchmark value

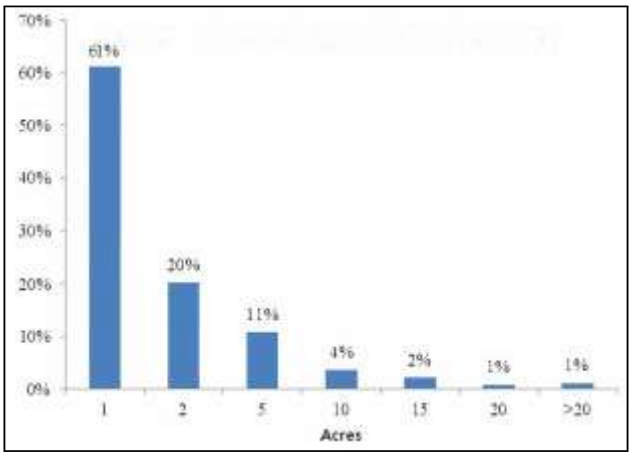
Category	*Grant (INR per acre) (2010)*	*BMV (2018)*
Family losing all land including Gharbari (homestead)	5,52,000	
Family losing Gharbari only	1,10,000	
House rebuilding	1,87,000	
Agricultural land (Bahal and Berna)	1.25.000	1,21,000
Agricultural land (Mal and Goda)	63,000	97,000
Temporary shed	12,500	
Relocation to an alternate site for rehabilitation per family	63,000	

Source: Ministry of Revenue and Disaster Management (2010) (dated 15 December 2010) and Guidance Value as per District Board of Revenue S.R.O. (Hemgir) (15 December 2010)

Table 3 Prices of factor inputs and output

Year	*Minimum support price INR/100 kg*	*Urea (fertiliser) (INR/MT)*	*Real wage (INR)*
2008–2009	850	9,350	62.19
2009–2010	1,000	9,350	59.44
2010–2011	1,000	10,750	66.37
2011–2012	1,080	12,500	67.67

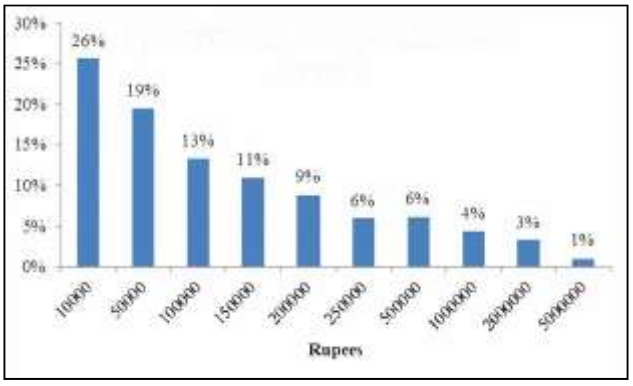
Figure 1 Inequality in landholding (see online version for colours)



Note: Bottom most 46% of the owners own less than 5% of the topmost 2%.

Source: Author's compilation from claim data (2010)

Figure 2 Inequality in realised income from resale of land after the sale (2010) – all sample(see online version for colours)



Source: Author's compilation from claim data (2010)

Figure 1 describes the inequality in the Land holding pattern during the sale (2008). Wecompare the distribution of landholding in sample villages to the land distribution in the overall district.

Figure 3 Revenue map of Gopalpur Hemgir in Sundergarh District of Odisha (see online version for colours)



The marginal farmers constitute about 45% of the landholders in Sundergarh[2]. The total number of households in Hemgir block in 2011 includes 20,953 comprising 153 villages. The Hemgir block comprised 18,483 marginal workers, 2,701 cultivators and 751 agricultural labourers in the 2011 census. The ratio between cultivators to landless labourers is 2.4 for the Sundergarh[3] district. We find that bottom-most 26% of the landowners realised less than 0.2% of the sale value of topmost 2%. Bottom most 46% of the owners own less than 5% of the topmost 2%. Figure 2 gives the inequality in realised income from resale of Land after the sale (2010). Table 2 provides the comparison of official compensation guidance and benchmark values (BMV) for the villages blocks in 2010 and 2018, which is notified by the government. As shown in Table 2, of late, as recent as 2018, the Ministry of Revenue and Disaster Management Odisha reports the benchmark market value of fresh land transactions for the balance of adjacent remaining village landparcels which are guided at about 33% higher than the converted transactions in 2010. Further Ministry of Revenue and Disaster Management Odisha proposes at least a 10% rise in a benchmark for future transactions for Hemgir Tehsil for the same set of the remaining balance of village land parcels. The declared minimum support price (MSP) has grown from INR 850 in 2009 to INR 1,750 in 2018. There is a visible rise over 33% in benchmark value INR 1,33,100/- per acre declared for 2018–2019. Further, when the settler shifts to a new location (maybe away from the village) he is paid a one time amount ofINR 63,000/- (USD 1,351) to start on his own, and an amount of INR 12,500/- (USD 268) for losing his temporary shed, which is a meagre figure. The secondvalidation includes comparing the reported rural household farm income with the projected crop incomes. Table 3 gives the factor input and output prices for paddy crops. Table 4 gives the comparative estimates of annual Rural Farm income and CPI rural forOdisha during the same period, reported by the NSSO (National Sample Survey) for rural Odisha during 2010. Ministry of Statistics, Planning and Programme Implementation (2010) reports the annual income of rural farmers in Sundargarh, Odisha to be

approximately INR 24,000/- per household. Alongside the NSSO we report the calculated present value of earning (NPV) from farm and non-farm together. The compensation amount does not seem to depend upon their holdings of land, location and also alternate use of their properties, etc.

Table 4 Estimates of expenditure and income in Rural Sundargarh District (INR)

Year	*Source of estimates and period*	*MPCE (per month per household)*	*Annual net earnings expected (per claim case)*	*Consumer price index (CPI)*
2008–2009	NSSO 67th Round Rural (2009) 2008	818.00	70,658.7 (USD 1,516)	451
2009–2010	NSSO 70th Round Rural (2011) 2009	876.61	77,422.0 (USD 1,661)	513
2010–2011	Dept. of Economics and Statistics, Household Income (2013)	6,959.8	80,270.2 (USD 1,722)	564
2011–2012	Dept. of Economics and Statistics, Income from Cultivation (2013)	1,674.3	84,945.3 (USD 1,822)	611

Note: Inputs – urea dose 81.38 kg/ha; rural employment 240 full days a year.

Source: Revenue and Disaster Management, Govt. of Odisha (dated 15 December 2010), BMV for Hemgir Tehsil (2018), Agricultural Statistics of Orissa – At a Glance (2010), NSSO 68th Round (2009) and NSSO 70th Round 2012, Dept. of Economics and Statistics Govt. of Odisha

The loss of future farm income due to disposal of their landholding amounts to INR 504.37 million for all the 631 cases. On average individuals expect to earn INR 7,99,319/- per case in the deal. The analysis of land transactions in the sample confirms that the resale value of land is lower, which is also argued by Basu (1986) andothers.

Table 5 Regression model estimates

Dependent variable	*Log (land compensation amount)*			
Variable	*Coefficients*			
	β	*t Value*	*P-value*	*Correlation*
Intercept	0.776	1.98	0.05	-
Eligibility for employment	0.014	0.52	0.60	0.0797
Existing claim for building or tree	0.083	0.37	0.71	0.0790
Number of cases	0.0003	4.091	0.000	0.1178
Log NPV EXPECTED	0.836	50.762	0.000	0.0470
Population of the village	0.0003	4.091	0.000	0.0831
Distance from Sundergarh HQ	–0.00002	–1.234	0.218	-0.0045
R2	0.90	MSE = 0.10	F statistic = 666.0	
R2 Adjusted	0.81			

Note: P-values above 0.05 are not significant.

Source: Author's calculation Commission MCL, Bhubaneswar Govt. of Odisha (2011)

Table 6 Village wise distribution in the valuation of settlement in 2010

Village	*Mean acres*	*Mean compensation (INR)*	*Village*	*Mean acres*	*Mean compensation (INR)*
Badaballochua	0.1	7,629	Kunda	0.2	16,299
Badagaon	0.2	12,658	Kunwarbaga	0.2	10,750
Badgoan	0.1	9,017	Kurga	0.1	12,448
Ballijori	0.1	6,936	Kutra	0.1	11,479
Baraigada	0.2	13,872	Lefripada	0.1	6,936
Barpur	0.1	9,017	Lokdega	0.1	11,933
BhuguraKachhara	0.3	91,003	Maheshdihi	0.1	9,017
Bilangadihi	0.8	86,882	Mahulapalli	0.2	10,404
Billemunda	0.2	14,357	Mamuntari	0.1	6,936
Burabaga	0.02	1,387	Manpalli	0.5	38,226
Darlipalli	0.1	7,629	Nakatideuda	0.8	93,097
Dulinga	1.1	1,04,313	Niallipalli	0.5	3,468
Gambharidihi	0.2	18,726	Oger	4.1	8,48,520
Garjanjoro	1.9	131,086	Panchpada	1.0	69,358
Gopalpur	1.8	280,783	Parlipalli	0.3	22,542
Gulota	0.1	1,178	Rajgangpur	0.3	38,233
Hemgiri	8.5	13,83,795	Ratansara*	2.3	2,44,732
Jharsuguda	0.3	20,807	Salepalli	0.1	9,017
Jhupurunga*	1.2	120,952	Sarabahal	1.9	131,780
Jhurimal	0.1	9,017	Sardiga*	104.5	3,92,231
Jogimal	0.1	10,699	Sargipalli	0.2	22,236
Kalabahal	1.7	155,226	Suguda	0.6	81,565
Kallobahal	0.1	6,936	Sundargarh	0.2	11,532
Kendudiha	0.1	5,549	Tallogoroda	0.4	26,721
Kulaba	2.5	49,969	Tikilipada*	1.3	179,137
Kulabira	0.1	25,662	Tumulia*	0.3	20,807
All Villages (52)				0.2	18,033 (USD 387)

Notes: Average compensation per village INR 18,033/- (USD 387) at an average rate of INR 90,165/- (USD 1,934) per acre. * denotes the five villages who re-appealed to Supreme Court against lower compensation.

Source: Claim Commission MCL, Bhubaneswar Govt. of Odisha(2011)

Table 6 reports the regression estimates for the dependent variable log (land compensation amount) against independent variables of the presence of eligibility for employment, the existence of building and tree, number of claim cases, log (NPV EXPECTED), etc. We apply a cross-sectional claimant's level regression model. The

research units are claimants and the dependent variable is the log value of compensation (INR) received against the loss of agricultural land to coal project.

The correlation between compensation amount and the present value of the lifelong earnings are significant. Bargaining power is related to the size of households or number of individuals or the population of the village. Further, compensation received is unrelated to the number of buildings or trees in the village. However, for the sample villages, the compensation was uncorrelated with the distance from the nearest town (viz. HQ, railway station, project office). Our results could also indicate that agricultural land prices are generally more responsive to market-based returns than to government guidance value. The price of land does not only vary with its fertility but also with its location, suggesting that proximity to markets fetches greater value than land equally fertile in a distant part of the village. We do not find the presence of forestry patches influencing the value of compensation.

There exists no link between the present value of lost earnings and the value of compensation received. There is no secondary market for environmental resources and the primary market is subjected to ordinances of restrictions on the transfer of titles and subject to heuristically fixed guidance value.

The amount of compensation received by over 631 individuals in the 52 villages shows that they have received a value that is not equal to the fair value of their land. These results demonstrate that the institutional characteristics are ineffective in case of expropriation. The large scale low-value acquisition of land leads to socially inefficient outcomes.

5 Conclusions

This review emphasized to focus on various factors consisting of agro-ecological dimensions, socio-economic or institutional dimensions of the problem. We examined the relationship between characteristics of rural property towards the valuation of natural assets. We found that the average land compensation was equal to 153 bags of low moisture paddy at current prices. Although urban influences and site characteristics and their influence on land prices have been the subject of prior studies, the novel results of this paper concern regional heterogeneity of the impacts of differences in land prices. This research helps understand the nature of the relations between agricultural and non-agricultural factors on land prices and the various causal effects between pure land productivity factors and socio-economic factors. These findings may serve as a reference for future policy-making. However, land markets are not as transparent and it inherently involves significant transaction costs, stamp duty and legal costs of transfer from one owner to another. Feitshans (2007) mentions future policy direction must involve measures to enhance income from agriculture and forestry.

There are few other non-market interventions identified in the available official valuation framework and published guidelines (No. 51633 Revenue and Disaster Management dated 15.12.2010 and RECTLARR Act, 2013) (Ministry of Law, 2013). For example, the cost incurred by villagers towards the displacement of Livestock or panic sale of livestock is not mentioned to be covered. Similarly, the coal Company does not directly pay for the trees, water bodies, number of buildings, or the changes to aquatic and birds or plant species around the villages. An institutional system that can facilitate the ability to bargain for their private property is insignificant.

The environmental implications include the eco-logical losses that happen in the long run in the form of soil degradation, loss of biodiversity, the density of dominant tropical trees of *Mahua indica*, water bodies, streams, bird species of *white owl* and or *grey cranes* (Saras) from around the bushes. Future policy insights are derived by focusing on the gross total earnings by relating the physio-graphic maps and accurately comparing with associated survey data from native growers and combining longitudinal samples. Further research must incorporate subjective assessments and efforts towards publishing cost of cultivation studies data, soil health card data and secondary land price data to arrive at definitive inferences.

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Notes

1 The discount rate in Rural Odisha is higher than in the urban metropolis.

2 UNDP (2008) Status Report on Land Rights Ownership in Orissa.

3 A Profile on Agriculture in Orissa (2006) Directorate of Agriculture & Food Production, Orissa.