The Gender Productivity Gap: Evidence from the Informal Sector in India

Ira Gang (Rutgers U.), Rajesh Raj (Sikkim U.), Kunal Sen, (UNU-WIDER) and Myeong-su Yun (Inha U.)

UNITED NATIONS UNIVERSITY
UNU-WIDER

Background and Motivation

- A long standing literature has highlighted deep and widespread gender inequalities in labour market outcomes (see World Bank 2012)
- Much of the focus has been on gender wage gaps and gender differences in labour force participation (see Bertrand 2020 and Borrowman and Klasen 2020)
- Less attention has been devoted to understanding the gender differences in firm productivity, especially for micro and small firms in the informal sector
- Yet, as has been documented in the previous literature, female micro proprietors face significant disadvantage as compared to male micro proprietors (Batista et al. 2021).

Our contribution

- We examine the correlates of gender differences in productivity of male and female owned firms in the Indian informal sector.
  - to assess whether a performance gap between male-owned and female-owned enterprises, as observed in the majority of the existing studies, is present in informal sector enterprises too
  - to understand the factors contributing to this gap

Informal sector: Our focus

- Much of economic activity is in this heterogeneous sector
- Typically household units, survivalist in nature, with limited growth prospects
- Characterized by both entrepreneurial activity and serves as an employer of last resort
- Comprises about 75 per cent of manufacturing employment and 17 per cent of manufacturing output in India
- Women are more likely to run small family enterprises and are concentrated more in less productive activities
- If female-run firms disproportionately exhibit lower productivity, then it is likely that the women who operate and work in these firms will be less successful in escaping poverty and improving their living standards than their male counterparts

Methodology

- Oaxaca decomposition and recentered influence function (RIF) decomposition to locate the sources of gender gaps in productivity
- Oaxaca has the following limitations and addressed by the RIF
  - it is prone to specification errors and lacks a counterfactual
  - the choice of the reference group may affect the ratio of the endowment effect to the structural effect of the gap
  - it overstates the contribution of the endowment effect

RIF Decompositions

- RIF
  - constructs a counterfactual (for instance, the distribution of productivity of male proprietary firms if they had the same distribution of characteristics as female proprietary firms)
  - provides decomposition of differences that occur between the distributions at any point
  - allows attributing the differences to both the observable characteristics and their prices
  - it allows estimation of the individual contribution of each explanatory variable considered in the analysis to the gap

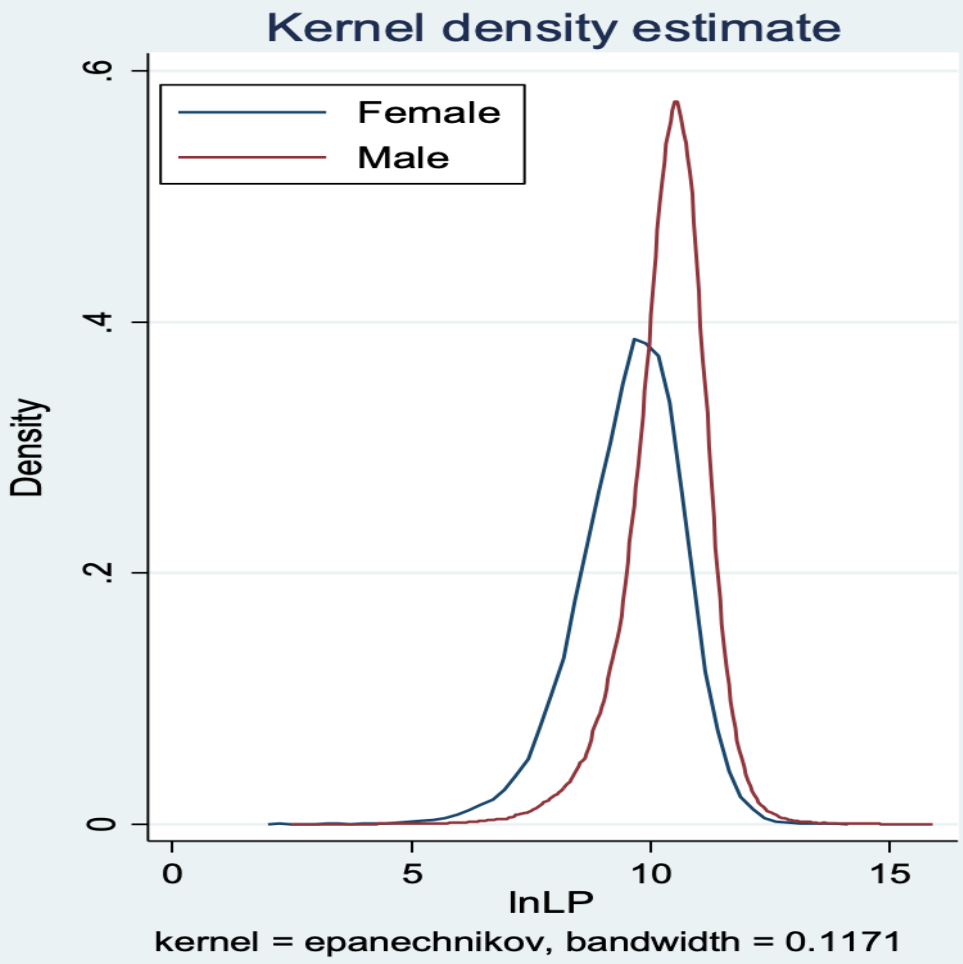
Data

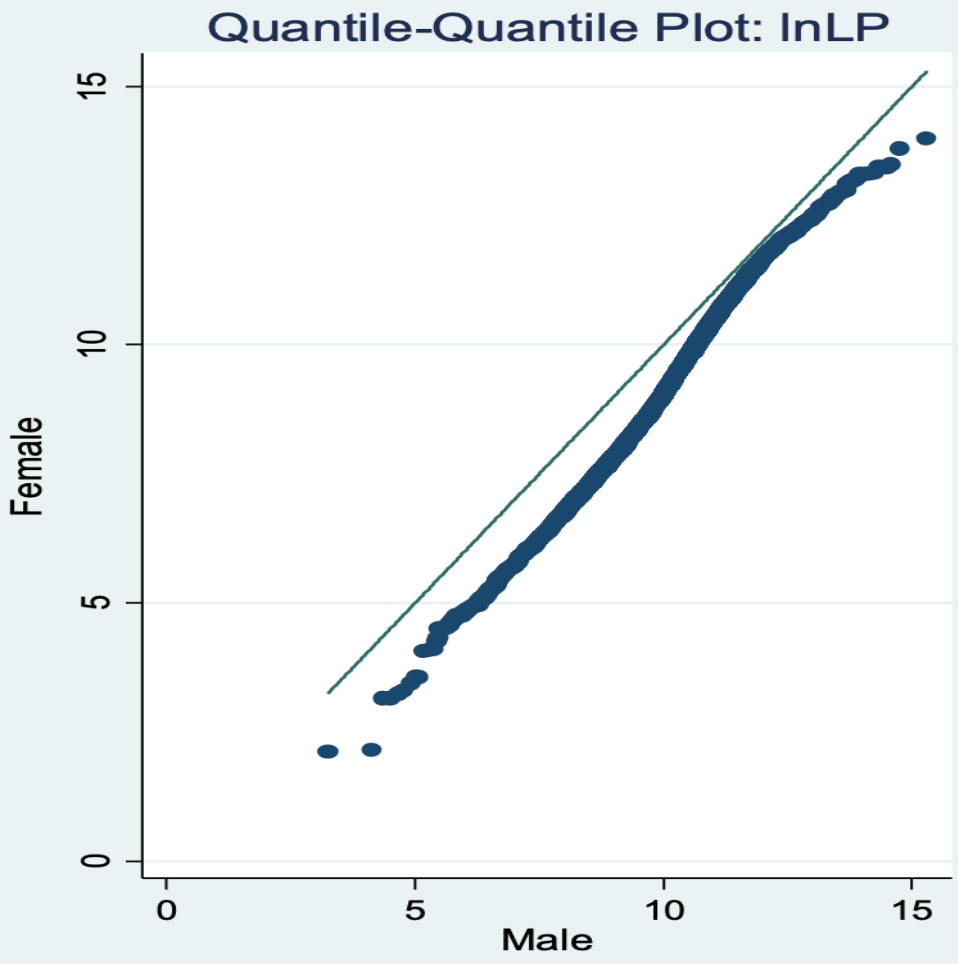
- unit level nationally representative data on unincorporated non-agricultural enterprises (73rd round, 2015-16), covers firms belonging to manufacturing, trade, and service sectors
- This dataset has not been used in the past to analyse firm productivity and the factors contributing to it
- Availability of crucial information on the gender of the owner enables us to address this gap in the literature
- Sample: restricted to sole proprietorship firms; worked with a sample of 270,442 firms (13% are female-run firms)

Variables

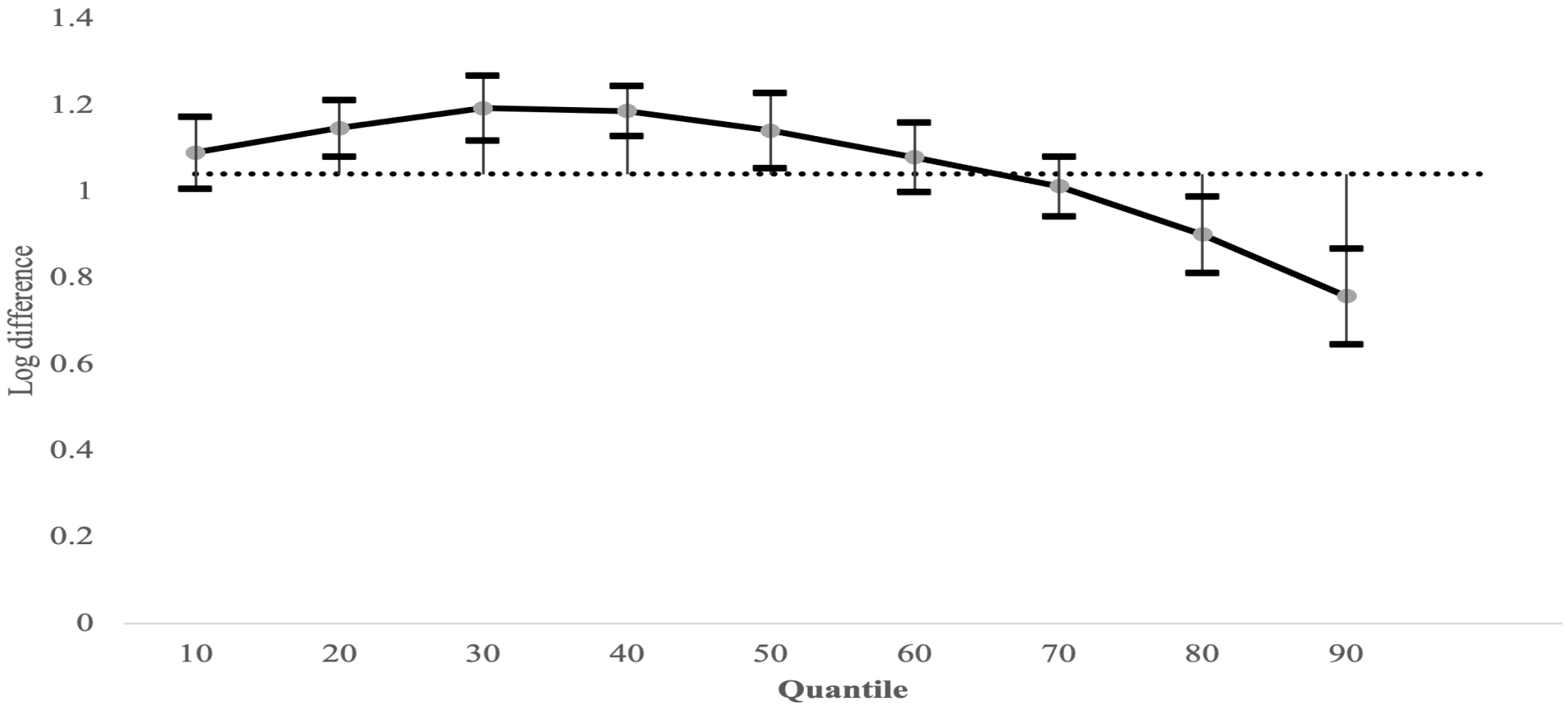
- Female ownership - gender of the entrepreneur who owns and manages the enterprise
- Dependent variable: labour productivity as a proxy for firm performance
- Independent variables: grouped into three sets
  - Firm characteristics: firm size, age, location, assistance, registration, linkage, and account maintenance
  - Firm constraints: finance and electricity
  - Social group: caste of the firm owner (SC, ST, OBC and General)
- Two sets of controls: Regional and sectoral dummies

Gender gap in firm productivity





Gender Productivity Gap at Quantiles



UNITED NATIONS UNIVERSITY
UNU-WIDER

Gender Productivity Gap at Quantiles

- Productivity of male-owned firms is higher than that of female-owned firms at all percentiles
- The mean gender productivity gap is 70 log points
- We find that the gap increases strictly up to the 40th percentile and then falls steadily
- The gender gap in productivity is widest at the bottom percentiles and lowest at the top percentiles
- The variation implies that focusing on the mean productivity gap per se may not be informative

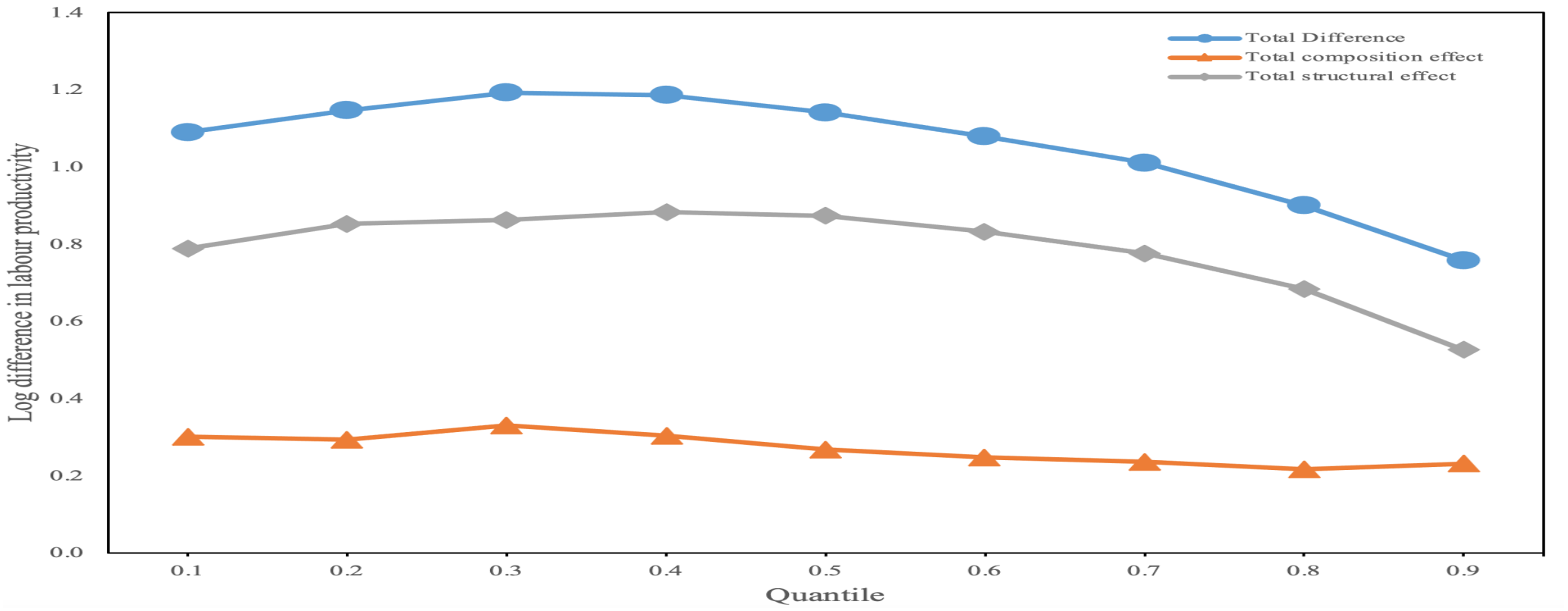
Sources of Productivity Gap: RIF Decomposition

- Employed both traditional Oaxaca and RIF decomposition methods
- Both yield similar results
- RIF decomposition is performed at the mean and different deciles

Sources of Productivity Gap: RIF Decomposition

	(1)	(2)
	Estimate	Share (%)
Overall		
Gender gap in productivity (M-F)	1.0405*** (0.0557)	
Reweighting decomposition		
Counterfactual (C)	9.8973*** (0.0338)	
Total composition effect (M-C)	0.2689*** (0.0287)	25.84
Total structural effect (C-F)	0.7716*** (0.1216)	74.16
Pure composition effect		
Firm Characteristics	0.1380*** (0.0237)	52.21
Firm Constraints	-0.0002 (0.0022)	-0.08
Social group	0.0137** (0.0060)	5.18
Regional effects	0.0197 (0.0220)	7.45
Sectoral effects	0.0931*** (0.0175)	35.23
Pure structural effect		
Firm Characteristics	0.0682 (0.2934)	9.00
Firm Constraints	-0.0248 (0.1825)	-3.27
Social group	0.0586 (0.0944)	7.73
Regional effects	0.1289 (0.1315)	17.00
Sectoral effects	0.1618 (0.2424)	21.34
Intercept	0.3652 (0.4058)	48.17
Observations	270442	

Breakdown of Productivity Gap by Deciles



- The productivity gap between male-owned and female-owned firms is primarily driven by the structural effects
- The explanatory power of structural effects is the highest between the 20th and the 60th percentiles (83 to 85 percentage points), whereas it is the lowest at the 90th percentile (53 percentage points)

UNITED NATIONS UNIVERSITY
UNU-WIDER

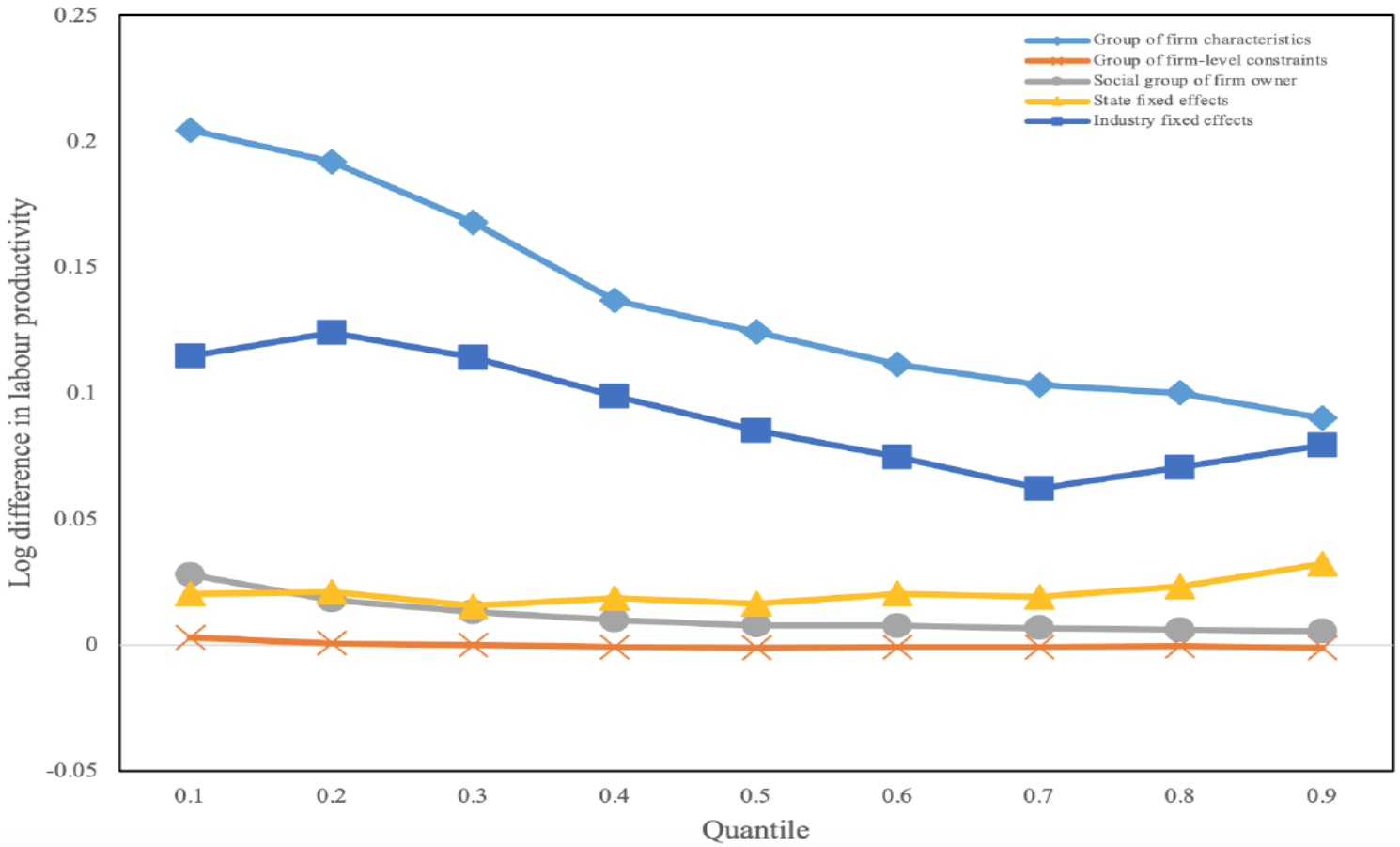
Sources of Productivity Gap: RIF Decomposition

- Structural effect (differences in returns to observables) accounts for around 3/4th of the gender gap in productivity where as composition effect (differences in levels of observables) explains 1/4th of the gender gap
  - Male owners have a clear advantage in terms of returns to observable characteristics
  - If the coefficients of the variables affecting productivity yielded similar returns for male and female owners, then 73% of the gap would be reduced
  - 27% of the gap would be bridged if female-run firms had similar endowments and advantages in characteristics as male-run firms
- The explanatory power of structural effect is the highest in lower percentiles and the lowest in top percentiles (declined from about 85 percent to nearly half)

Sources of Productivity Gap: RIF Decomposition

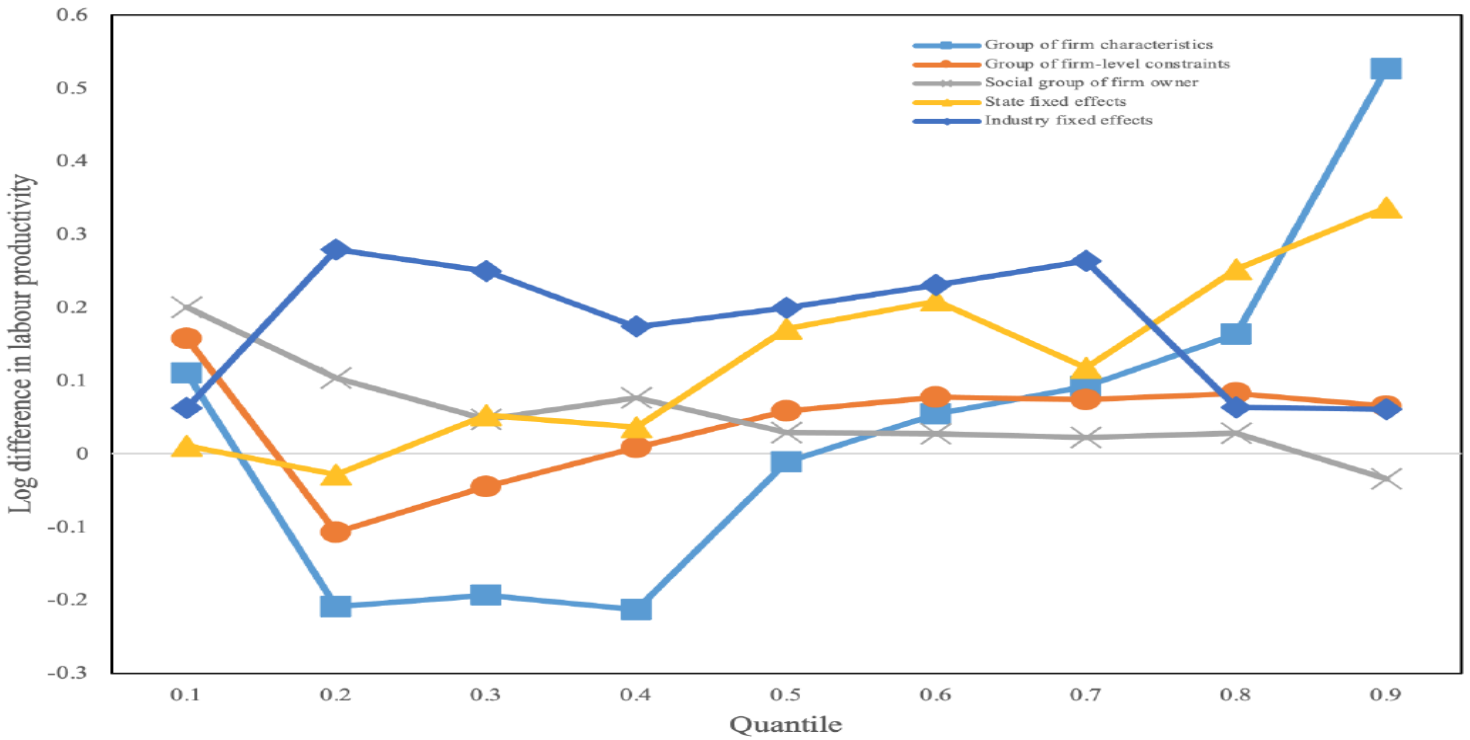
- Firm characteristics, social group of the firm owner and sectoral effects contribute significantly to the size of the composition effect
  - More than half of the explained gap is explained by gender differences in firm characteristics
  - Gender differences in sectoral choice contribute about 36% of the gap explained by composition effect
- These covariates retain their importance at every decile
- However, we see a reduction in their importance as we move from the bottom to the top of the productivity distribution
- Regional and sectoral effects are more relevant in explaining the structural effect
- Firm constraints do not play any role.

Figure 4
Detailed Decomposition of Composition Effects



Note: Log difference is between male- and female-owned firm labour productivity. Entries are based on the reweighted RIF Oaxaca decomposition results presented in Table 5.
Source: Authors' elaboration based on NSSO Survey data on Unincorporated Non-Agricultural Enterprises, 73rd round (2015/2016).

Figure 5
Detailed Decomposition of Structural Effects



Note: Log difference is between male- and female-owned firm labour productivity. Entries are based on the reweighted RIF Oaxaca decomposition results presented in Table 5.
Source: Authors' elaboration based on NSSO Survey data on Unincorporated Non-Agricultural Enterprises, 73rd round (2015/2016).

Conclusions

- In contrast to earlier literature on gender inequality in the labour market, which focus on women's labour force participation, we examine the gender productivity gap in the case of India.
- We find systematic differences in productivity between male owned and female owned firms in the Indian informal sector, with male owned firms more productive than female owned firms.
- However, this gender gap in productivity is particularly observed in bottom and middle parts of the productivity distribution, and less evident for the most productive male and female owned firms.
- We also find that among observable characteristics, the most important contributing set of factors that explain the gender productivity gap are firm characteristics both for the composition and structural effects.
- Our findings have clear implications for policy. Given the role played by firm characteristics in explaining the gender productivity gap, there is a need for training programmes for female proprietors in maintaining accounts as well as facilitating the registration of their enterprises with state authorities.

Summary Statistics

Variables	All firms (1)	Male-run firms (2)	Female-run firms (3)	Difference (2)-(3) (4)
Dependent variable				
Labour Productivity (in Rupees)	40803.51	43304.47	23910.34	19394.13**
	(54245.81)	(56525.49)	(30154.72)	
Log of Labour Productivity	9.9539	10.1662	9.1257	1.0405***
	(1.0731)	(0.9686)	(1.0594)	
Firm characteristics				
Size	0.3437	0.3892	0.1663	0.2229***
	(0.5172)	(0.5395)	(0.3688)	
Location	0.4889	0.5009	0.4417	0.0592***
	(0.4999)	(0.5000)	(0.4966)	
Age of the firm, below two years	0.1219	0.1167	0.1422	-0.0255***
	(0.3272)	(0.3210)	(0.3493)	
Age of the firm, 3 to 9 years	0.4516	0.4419	0.4896	-0.0477***
	(0.4977)	(0.4966)	(0.4999)	
Age of the firm, above 9 years	0.4265	0.4414	0.3682	0.0732***
	(0.4946)	(0.4966)	(0.4823)	
Any assistance from government?	0.0076	0.0080	0.0057	0.0023***
	(0.0867)	(0.0893)	(0.0755)	
Registered under act/authority?	0.2953	0.3499	0.0825	0.2674***
	(0.4562)	(0.4769)	(0.2751)	
Undertake work on contract	0.1032	0.0468	0.3233	-0.2764***
basis?	(0.3042)	(0.2113)	(0.4677)	
Accounts maintained?	0.0971	0.1129	0.0357	0.0771***
	(0.2961)	(0.3164)	(0.1856)	
Firm constraints				
Financial constraint	0.0841	0.0943	0.0441	0.0503***
	(0.2775)	(0.2923)	(0.2053)	
Electricity constraint	0.0320	0.0349	0.0206	0.0143***
	(0.1759)	(0.1835)	(0.1419)	
Social group of firm owner				
General category	0.3290	0.3343	0.3081	0.0262***
	(0.4698)	(0.4717)	(0.4617)	
Scheduled Tribe	0.0413	0.0397	0.0479	-0.0082***
	(0.1991)	(0.1952)	(0.2135)	
Scheduled Caste	0.1260	0.1210	0.1456	-0.0246***
	(0.3319)	(0.3262)	(0.3527)	
Other Backward Class	0.5037	0.5050	0.4984	0.0066**
	(0.5000)	(0.5000)	(0.5000)	
Number of observations	270442	235566	34876	

UNITED NATIONS
UNIVERSITY
UNU-WIDER

www.wider.unu.edu

Helsinki, Finland