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Firm-level Determinants of Earnings in the Formal Sector of the South African Labour Market

Haroon Bhorat, Morne Oosthuizen, Kezia Lilenstein & Francois Steenkamp

Growth and Development Policy:
New Data, New Approaches, and New Evidence
Economic Policy, National Treasury
UNU-WIDER

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Outline

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- Decomposition – The Relative Importance of Demand- and Supply-side Characteristics in Wage Formulation
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1. Research Objectives

1. Examine the role of firm characteristics in explaining wage formulation in the formal private sector of the South African labour market.
2. Measure the relative importance of firm (demand-side) and individual (supply-side) characteristics in explaining wage formulation.
3. Examine the firm size-wage relationship

Warning!

More questions than answers, which is exciting.

II. Methodology

Estimate pooled regression, fixed effects regressions (spell fixed effects and FEiLSDVj/felsdvreg) and quantile regressions. Our preferred estimates are from the FEiLSDVj method, which is informed by Abowd, Kramarz & Margolis (1999), and Cornelissen (2008).

$$y_{it} = x_{it}\beta + w_{j(i,t)t}\gamma + \theta_i + \psi_{j(i,t)} + \epsilon_{it}$$

- y_{it} = Log of real (2012=100) monthly wages for worker (job) i in period t.
- $x_{it}\beta$ = Time varying firm characteristics (e.g. firm size, firm age, industry, product market power, profitability, labour productivity, capital-intensity, and trade status).
- $w_{j(i,t)t}\gamma$ = Time varying individual-level characteristics (e.g. age, age-squared, tenure)
- θ_i = Time invariant individual (job) effects
- $\psi_{j(i,t)}$ = Time invariant firm effect
- ϵ_{it} = Error term

Advantage:

- Firm and worker (job) effects identified by 'movers'
- Able to decompose wage variation across workers into components due to 1) observable worker and firm characteristics, 2) firm heterogeneity and 3) worker heterogeneity.

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III. Data

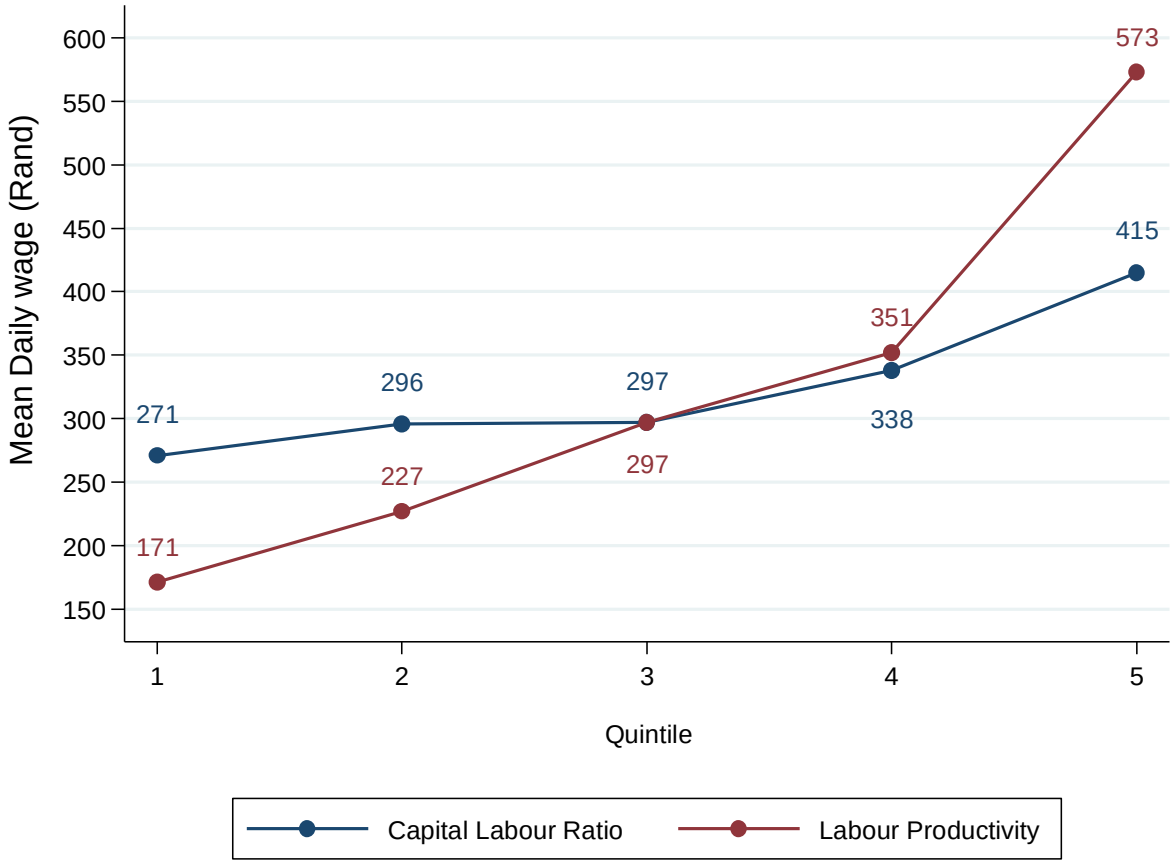
- Construct a matched employer-employee panel (unbalanced) dataset using anonymous administrative data (IT14, ITR14, IRP5, customs) made available by SARS in partnership with National Treasury and UNU-WIDER.

	2010	2011	2012	2013
Individuals	4 488 493	4 757 426	4 757 168	4 820 370
Firms	99 247	100 619	97 364	95 077

Source: Authors calculations using SARS IRP5 and CIT data

- Panel covers the period 2010 to 2013 (include lagged firm-level data from 2008 and 2009)
- Panel encompasses full population of formal private sector firms and their employees (jobs) (approximately 19 million observations)
- Focus on the individual (i.e. don't aggregate individual measures by firm)
- Earnings measured as log of real monthly earnings
- Firm size constructed using method similar to that applied by Pieterse, Kreuser & Gavin (2016)
- Wages defined as real gross remuneration (gross taxable income + gross retirement funding income + gross non-retirement funding income)

IV. Firm-level Determinants of Wages
Capital-intensity, Labour Productivity and Wages, 2013



Initial evidence points to a positive relationship between wages and, firstly, firm labour productivity, and secondly, firm capital-intensity.

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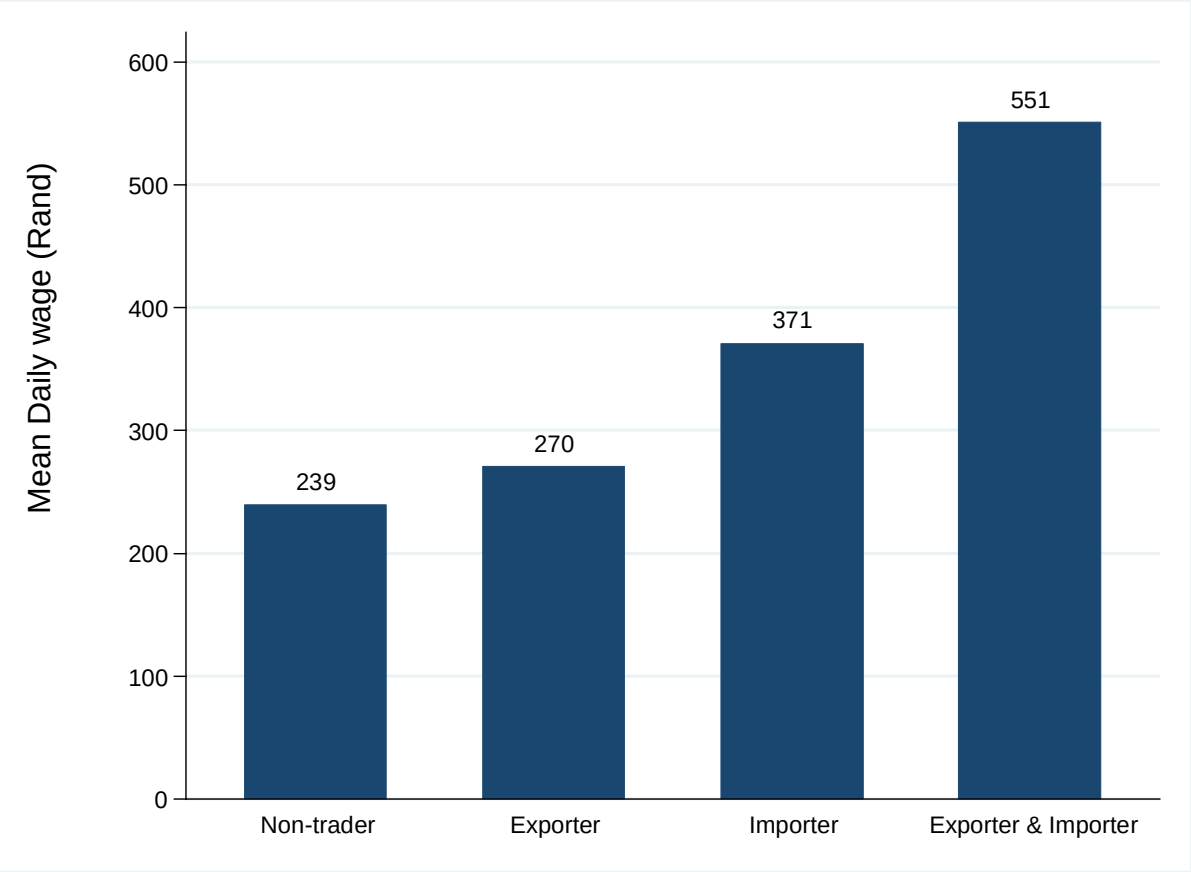
IV. Firm-level Determinants of Wages
Trade Status and Wages, 2013



Non-trading firms pay the lowest average wages.

Average wages increase with trade status – order consistent with Edwards, Sanfilippo & Sundaram (2016)

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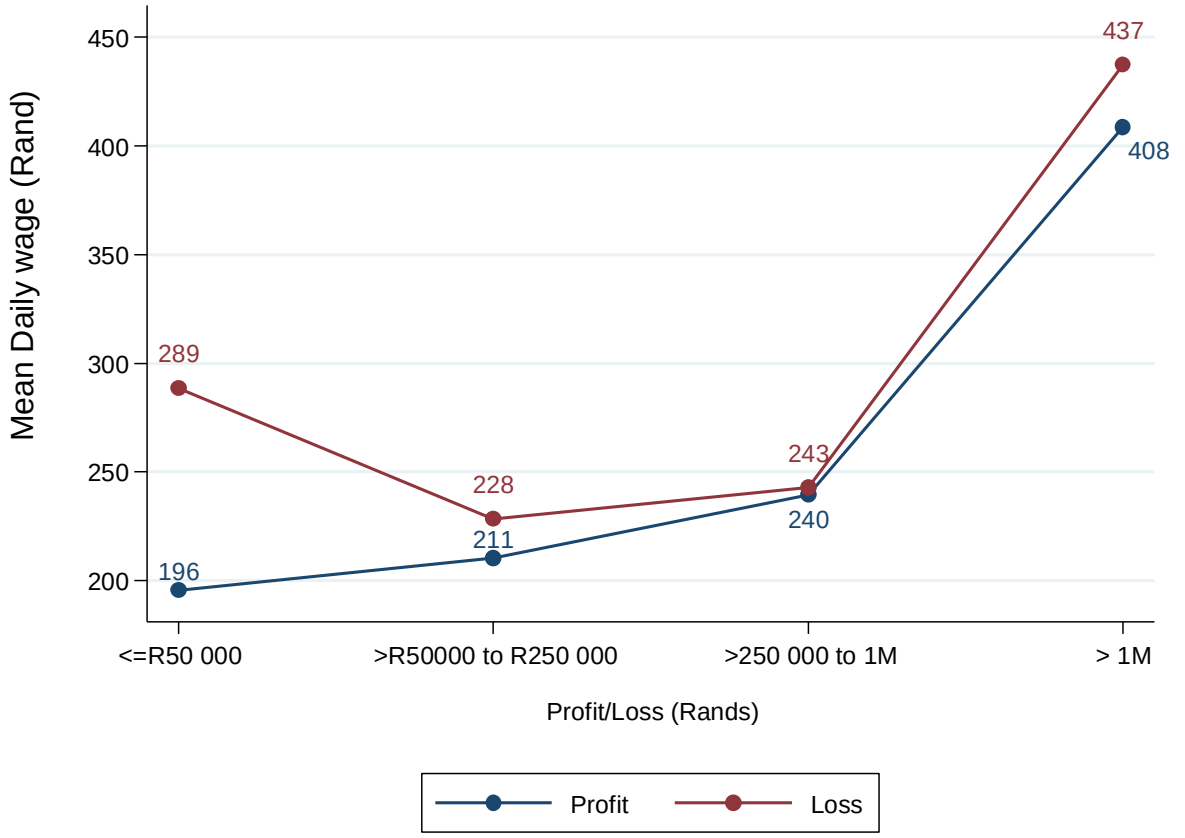
IV. Firm-level Determinants of Wages
Profitability and Wages



In general, average wages rise with net profit/loss (except in 1st category – explanation for high exit rate?)

Avg. wage for loss making firms consistently higher than avg. wage for profit making firms.

Avg. wage significantly higher in largest category (scale effect?)

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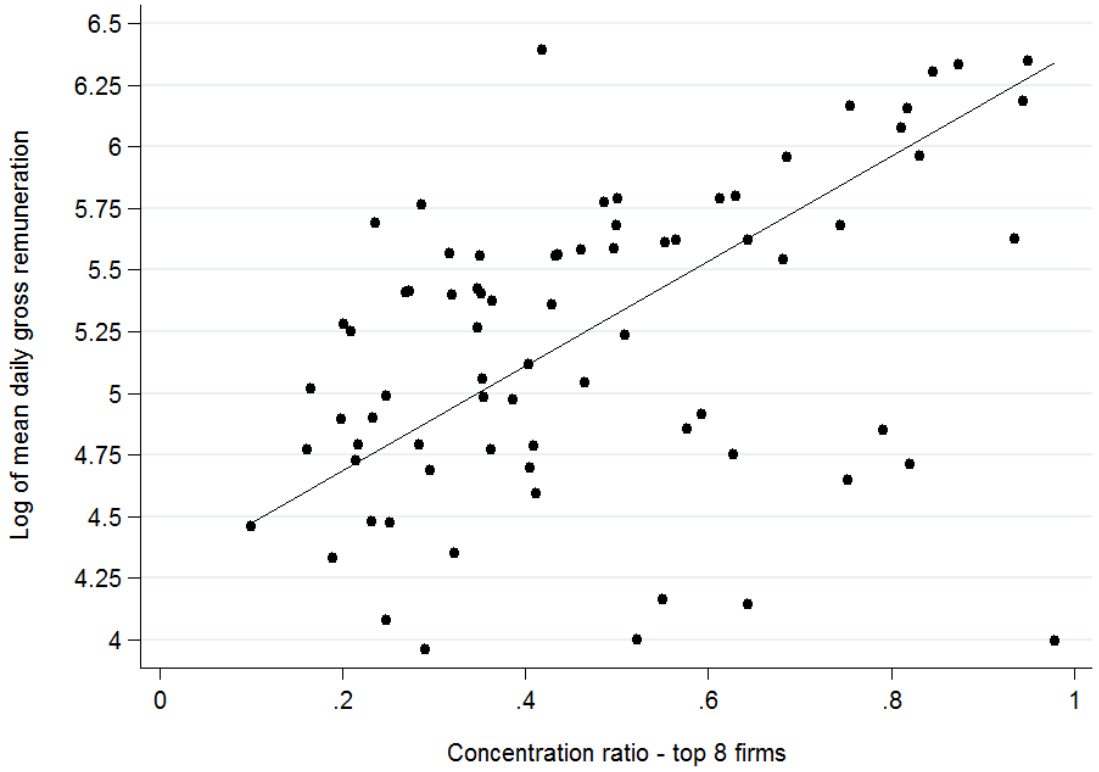
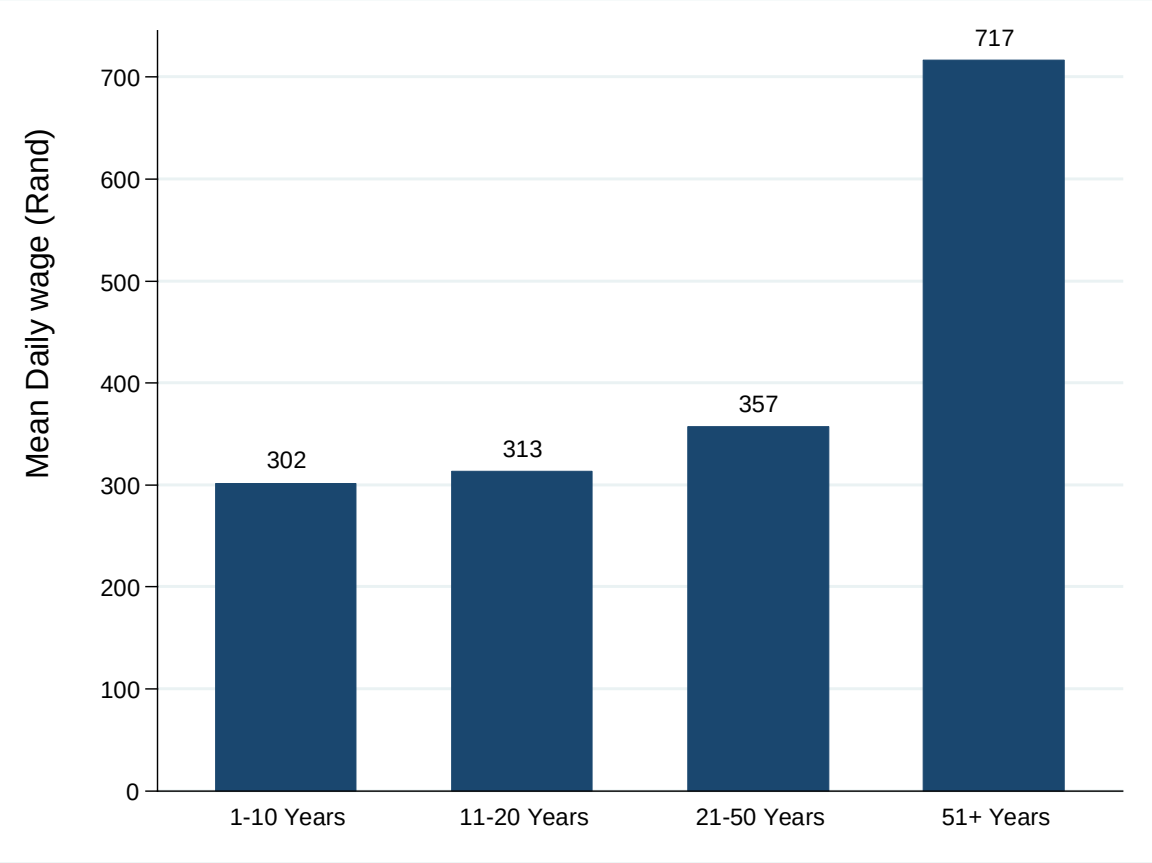
IV. Firm-level Determinants of Wages
Product Market Power and Wages



Initial evidence points to a positive relationship between product market power and wages.

IV. Firm-level Determinants of Wages
Firm Age and Wages



Older firms pay higher wages – effect strongest for oldest firms (related to firm size?)

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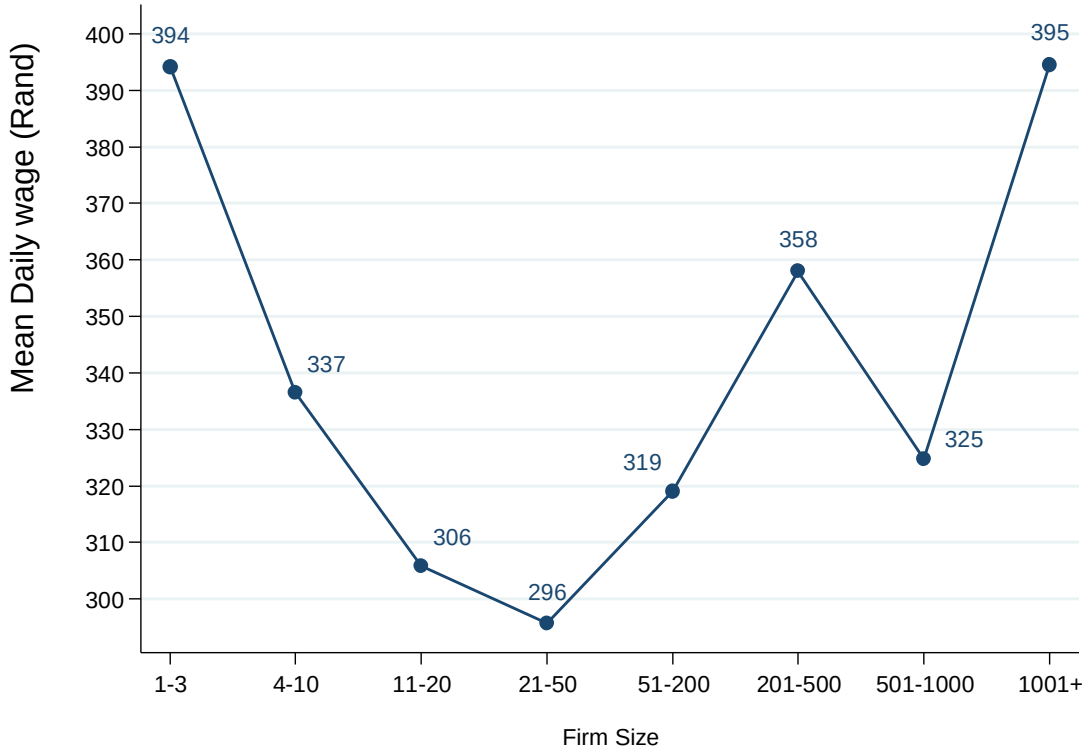
IV. Firm-level Determinants of Wages
Firm Size and Wages



U-shaped relationship between firm size and wages runs contrary to literature.

U-shaped relationship evident in manufacturing, agriculture, construction and wholesale & retail trade.

Small-firm wage premium evident in finance.

Large firm wage premium evident in mining and utilities.

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Summary of Descriptive Analysis

- Initial evidence indicates that higher average wage levels are are associated with firms that are more capital-intensive, more productive, involved in international trade, and older.
- The data reveal a U-shaped pattern between wages and firm size, which we investigate further…
- Fixed effects regression analysis allows us to explore these relationships further while controlling for observables and unobserved firm and individual heterogeneity.

IV. Firm-level Determinants of Wages
Earnings Function Estimates using the FEiLSDVj Method

Firm Characteristic	Statistical significance	Coefficient estimates Min	Max
Firm Size and Age:			
Firm Size: 4-10	(3 of 7)	0.017	0.022
Firm Size: 11-20	(3 of 7)	0.015	0.028
Firm Size: 21-50	(4 of 7)	0.010	0.028
Firm Size: 51-200	(2 of 7)	-0.015	0.012
Firm Size: 201-500	(7 of 7)	-0.047	-0.017
Firm Size: 501-1000	(7 of 7)	-0.079	-0.051
Firm Size: >1000	(7 of 7)	-0.104	-0.080
Firm Age: 11-20	(7 of 7)	-0.020	-0.009
Firm Age: 21-50	(7 of 7)	0.015	0.028
Firm Age: >50	(7 of 7)	0.066	0.094
Technology and Productivity:			
Ln Capital: Labour	(7 of 7)	0.018	0.020
Ln Labour Productivity	(7 of 7)	0.106	0.109
Exporter	(7 of 7)	0.008	0.016
Importer	(7 of 7)	-0.027	-0.009
Exporter & Importer	(7 of 7)	0.024	0.036
Profitability:			
Lagged Net Profit/Loss	(7 of 7)	0.008	0.009
Concentration Ratio	(5 of 7)	-1.447	-1.191

Source: Authors calculations using SARS IRP5 and CIT data

Notes: 1. Reference dummies refer to an individual working in a firm that employs between 1 and 3 employees in the agricultural industry, does not trade, and it no older than 10 years old. 2. Dependent variable is measured as real gross monthly remuneration per job. 3. Time and industry dummies as well as individual time-varying controls not reported.

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IV. Firm-level Determinants of Wages
Earnings Function Estimates for Quantile Regressions

	10th		50th		90th	
Firm Characteristic	**Sign**	**Statistical significance**	**Sign**	**Statistical significance**	**Sign**	**Statistical significance**
Firm Size: 4-10	+VE (9 of 9)	(8 of 9)	-VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)
Firm Size: 11-20	+VE (9 of 9)	(9 of 9)	-VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)
Firm Size: 21-50	+VE (9 of 9)	(9 of 9)	-VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)
Firm Size: 51-200	+VE (9 of 9)	(5 of 9)	-VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)
Firm Size: 201-500	+VE (8 of 9)	(5 of 9)	-VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)
Firm Size: 501-1000	-VE (7 of 9)	(2 of 9)	-VE (4 of 9)	(4 of 9)	+VE (9 of 9)	(9 of 9)
Firm Size: >1000	-VE (9 of 9)	(9 of 9)	-VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)
Lagged Net Profit/Loss	+VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)
Concentration Ratio	-VE (9 of 9)	(9 of 9)	-VE (9 of 9)	(9 of 9)	+VE (9 of 9)	(9 of 9)

IV. Decomposition – The Relative Importance of Demand- and Supply-side Characteristics in Wage Formulation

	South Africa	Austria
Observed time varying characteristics	0.13	0.09
Person effects	0.61	0.60
Firm effects	0.13	0.27
Residual	0.13	0.05

Source: Authors calculations using SARS IRP5 and CIT data

Notes: 1. Columns 1reports mean values of the variance decomposition across the seven samples in which the FEiLSDVj method was estimated. 2. The estimates for Austria are taken from Gruetter & Lallive (2009).

- Individual (supply-side) characteristics account for the major share of wage variation across formal private sector workers in SA
- At least 13% of wage variation is due to differences in firm (demand-side) characteristics
- Comparable with Austria (Gruetter & Lallive, 2009) and France (Abowd, Kramarz & Margolis, 1999).

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IV. Firm-Size Wage Relationship – Possible Explanations

- Specification error: Is the 1-3 employees category problematic? Should we have specified a larger range for the smallest firm size category?
- Relationship between the inherent structure of an industry and the non-random distribution of firms by firm size. For example, due their scale of operations, mining firms are inherently large. Is the mean wage in these firms lower due to a large contingent of low paid workers? In contrast, what about a small skill-intensive asset management firm? This may suggests that future analysis needs to be industry specific.
- Dynamics – is it something to do with the shifting of firms across firm size categories?

IV. Firm-Size Wage Relationship – Possible Explanations

Transition Matrix of % Change in Avg. Wages by Change in Firm Size, 2010-2013

Firm Size 2010	Firm Size 2013: 1-3	4-10	11-20	21-50	51-200	201-500	501-1000	1001+	Contracted	Expanded
1-3	30.0	10.9	-19.3	-22.0	42.3	-	-	-	-	9.0
4-10	65.6	17.3	4.6	-14.2	13.7	-62.3	-	-	65.6	0.9
11-20	144.9	24.3	12.7	10.1	-23.0	-29.1	-	-	38.6	6.2
21-50	673.9	174.6	25.0	12.9	1.5	-47.6	-	-	90.0	0.0
51-200	242.4	344.0	178.4	39.8	12.0	-0.4	7.6	-46.0	92.1	-1.3
201-500	1273.3	358.6	553.2	190.2	36.1	23.6	-2.4	2.9	110.8	-1.6
501-1000	159.7	-	-	509.5	160.1	20.9	14.3	1.7	61.1	1.7
1000+	6.2	-	0.0	-	47.1	163.8	42.4	27.5	61.3	-

- This pattern may be driving the firm size results in the fixed effects regressions
- What's driving this pattern?
  - Are firms that are contracting becoming more capital-intensive and/or skill intensive?
  - Is it something to do with the post-Great recession macro environment? Who is first to lose their job – unskilled low-wage or skilled high-wage worker?

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V. Conclusion

- Individual characteristics relatively more important than firm characteristics in wage formulation. This result is consistent with international literature.
- Jobs in firms involved in international trade, especially two-way traders, tend to be ‘good jobs’. Does this provide motivation for policy aimed at trade facilitation?
- Firms that are more productive, capital-intensive and older, (u-shaped) pay higher wages, on average.
- Firms that are profitable pay higher wages, and thus workers are able to share in the total revenue pool. Quantile regressions suggest that this is consistent across earnings distribution.

V. Conclusion

Two puzzling results that warrant future research:

- Puzzlingly, the fixed effects estimations show a negative relationship between product market power and wages. However, quantile regressions indicate a positive relationship at the top of the earnings distribution. Are firms in concentrated markets price setters that pay a premium for labour that is in shortage (skilled) and bargain down wages for labour that is in surplus (unskilled)? These results must be considered with **caution** since 1) the industry measures are problematic, and 2) the quantile regressions may be biased since they do not control for firm and individual heterogeneity. Warrants future research.
- Puzzlingly, the fixed effects estimations show a negative firm size-wage relation. Is it a specification issue? Are industry specific effects confounding the results? Is there a unique dynamic present in the South African labour market relating to the expansion/contraction of firms and the subsequent impact on wages?

Thank you

Wages and Firm Size