

The Elasticity of Formal Work in African Countries

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Outline

Introduction

Estimation methods

Data and some descriptives

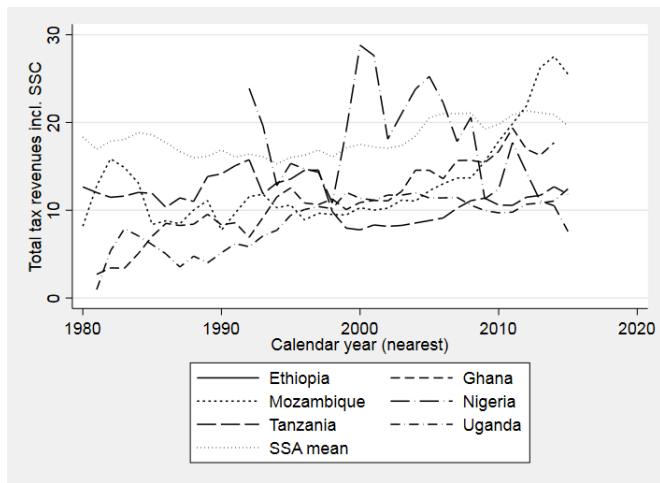
Results

Conclusion

Motivation

- ▶ The informal sector in developing countries is large, and it is not getting smaller
 - ▶ was on average 58% in Latin America in 2005-10, whereas it was much larger in Sub-Saharan Africa (approx. 66%)
 - ▶ Charmes (2012): the informal sector size in Africa the same than it was in the 1980s
- ▶ Informal sector outside of the tax network
- ▶ Developing countries have been able to increase their tax take, but revenues still not sufficient to finance necessary developmental spending
- ▶ A dilemma: A further increase in (income) tax rates can limit the growth of private sector jobs
- ▶ Decisions about the trade off should be based on reliable research findings

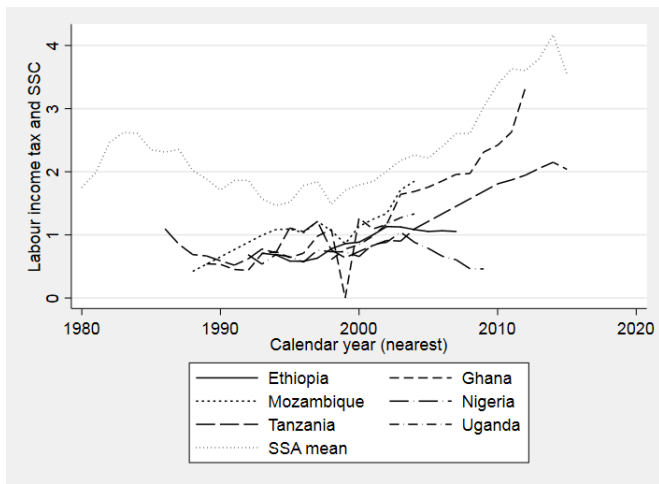
Total tax revenue in some African countries



Source: Authors' own calculations based on UNU-WIDER-ICTD Government Revenue Dataset.

Figure: Tax revenues including social security contributions (SSC) as a percentage of GDP in selected African countries.

Income tax revenues



Source: Authors' own calculations based on UNU-WIDER-ICTD Government Revenue Dataset.

Figure: Labour income tax and social security contributions (SSC) receipts as a percentage of GDP in selected African countries.

Earlier work

- ▶ There is some earlier quasi-experimental evidence on the impacts of expanding social security financed by payroll taxes on formal work in the Latin American context, including Kugler and Kugler (2009), Bergolo and Cruces (2014) and Garganta and Gasparini (2015)
- ▶ Studies utilizing South African minimum wage and pension reforms: Borat et al. (2014) and Tondini et al. (2017)
- ▶ CGE model for 38 African countries to calculate MCPFs for various tax instruments (Auriol and Warlters, 2012)

This paper

- ▶ Notwithstanding some studies on South Africa, similar evidence is not available, to our knowledge, for African countries
- ▶ Our paper: offers evidence on the elasticity of the formal sector share with respect to the tax burden on formal-sector labour for the first time for African countries using a transparent and credible identification strategy
 - ▶ The current version: four countries (Ghana, Uganda, Rwanda, Tanzania)
 - ▶ Work ongoing using data from Ethiopia and Nigeria
- ▶ Another objective of the study is to provide new descriptive information about the workers in formal vs informal sector in Africa
- ▶ Method used builds on applying the repeated cross-section estimator by Blundell et al. (1998)

Outline

Introduction

Estimation methods

Data and some descriptives

Results

Conclusion

Outline

Introduction

Estimation methods

Data and some descriptives

Results

Conclusion

Conceptual framework

- ▶ Net income in the state of formal work is given by $x_f = y_f - T(y_f) + B(y_f)$, and in the state of informal work $x_s = y_s + B(y_s)$

- ▶ Individual works in the formal sector if

$$x_f - x_s \geq \psi$$

- ▶ Note that with perfect labour market, nominal tax incidence should not matter: an income tax reduction for formal sector workers \Rightarrow lower wage demand \Rightarrow higher employment
- ▶ In case of involuntary informal work (due to e.g. a biting formal sector minimum wage), this mechanism does not necessarily work
 - ▶ preferred specification: Formal sector wage restricted to lie strictly above the minimum wage

Estimation

$$P(y_f > 0)_{it} = \alpha + \beta \times [x_f - x_s]_{it} + \epsilon_{it},$$

- ▶ from which β can be used to calculate the formality elasticity: proportional change of the share of formal work with respect to the proportional change in the difference in the net pay between formal and informal sector
- ▶ Challenges in the estimation
 - ▶ individual only observed in one state
 - ▶ the RHS endogenous: net pay depends on taxes, which depend on whether the person works for the formal sector or not

Estimation ctd

- ▶ The solution: partition the data into groups based on personal characteristics => pseudo panel based on age, gender, education; compare development between groups over time

$$P(y_f > 0)_{it} = \alpha + \beta \times [x_f - x_s]_{it} + \alpha_g + \mu_t + \eta_{it},$$

- ▶ Estimate using two-stage least squares (2SLS) while using group*time interactions as excluded instruments for $(x_f - x_s)$.
- ▶ Identifying assumption: Once group permanent effects and common time effects are controlled for, group*time effects affect formality only via changes in net pay
- ▶ Angrist and Pischke (2009) show that this can also be estimated by GLS, using group size as weights:

$$\overline{P(y_f > 0)}_{gt} = \alpha + \beta \times \overline{(x_f - x_s)}_{gt} + \alpha_g + \mu_t + \eta_{it}$$

Outline

Introduction

Estimation methods

Data and some descriptives

Results

Conclusion

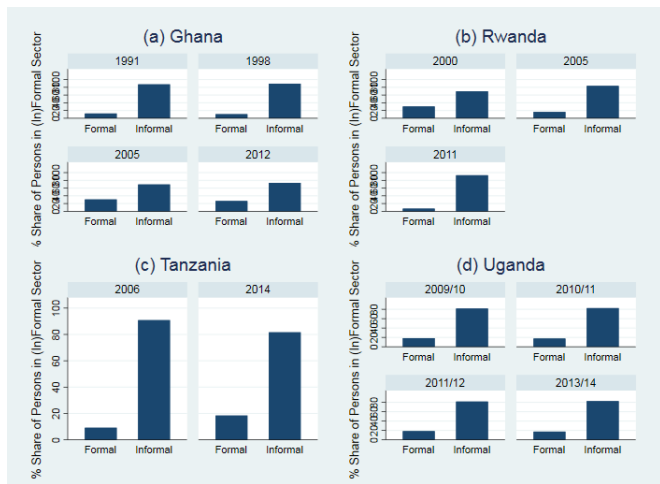
Data

- ▶ Labour force survey data or labour force modules of living standard household surveys from four sub-Saharan countries over a time period from 1991-2014:
 - ▶ Ghana: Ghana Living Standards Survey (GLSS) 3 (1991), GLSS 4 (1998) , GLSS 5 (2006) and GLSS 6 (2012)
 - ▶ Rwanda: Enquête Intégrale sur les Conditions de Vie des ménages (EICV, in English: Integrated Household Living Conditions Survey) 1 (2000/2001), EICV 2 (2005/2006), EICV 3 (2010/2011)
 - ▶ Tanzania: Integrated Labour Force Survey (ILFS) (2005/2006), ILFS (2014)
 - ▶ Uganda: Uganda National Panel Survey (NPL) (2009/2010), NPL (2010/2011), NPL (2011/2012), NPL(2013/2014)
- ▶ Countries chosen on the basis of whether reliable information exists about the sector (formal vs informal)

Some choices

- ▶ Formality mainly determined on the basis of having access to social security (entitled to pension, unemployment or health insurance)
 - ▶ complemented with self-reported status
- ▶ Age 15-60 (five groups)
- ▶ Education: less than primary education or primary education, junior secondary education, senior secondary, and tertiary
- ▶ Public sector workers and agricultural self-employed excluded
- ▶ Net income calculated using the tax code in a country for formal sector workers if only gross income reported

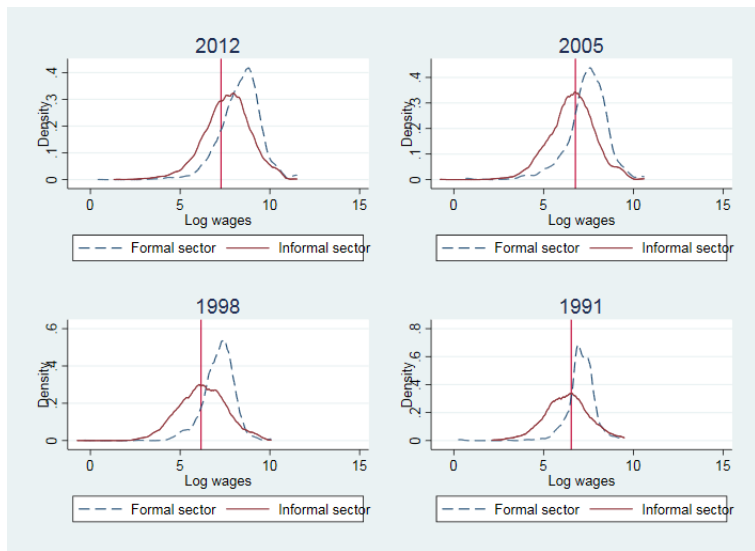
Formal sector share



Source: Authors' own estimations based on survey data from GLSS 3-6, EICV 1-3, IFLS 2006-2014 and NPL 2009/2010 – 2013/2014.

Figure: Share of Formal Workers by Country.

Wage distributions: Ghana



Summary on sum stats

- ▶ For all countries, men, household heads and middle aged individuals (25-44 years) more likely to be formal workers
- ▶ The share of individuals working in the formal sector rises with education.
- ▶ Professionals and technicians and associate professionals are occupations most likely to be formal whereas clerks and sales and shop workers are most likely informal
- ▶ Formal workers typically earn more, but there are cases where the opposite is true
 - ▶ similar situations observed in other countries (Bargain and Kwenda, 2011; Matos and Portela Souza, 2016)

Is there tax rate variation?

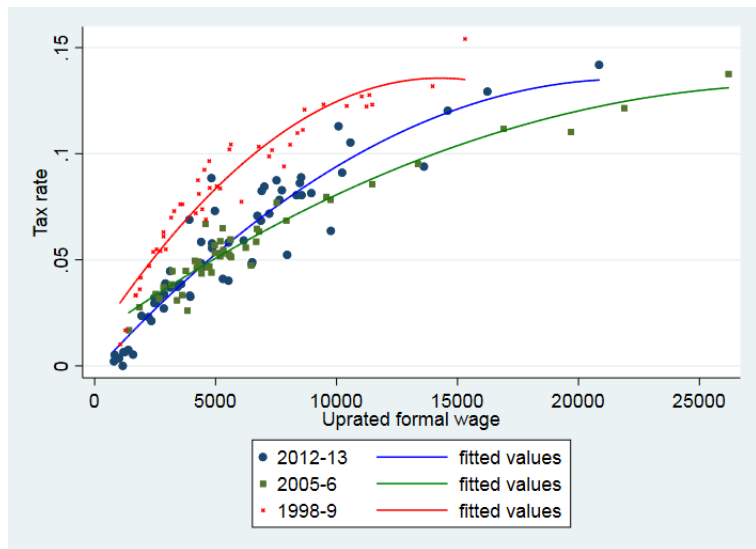


Figure: Average tax rates in cell-level data in Ghana, GLSS4-6

Cross-sectional correlation

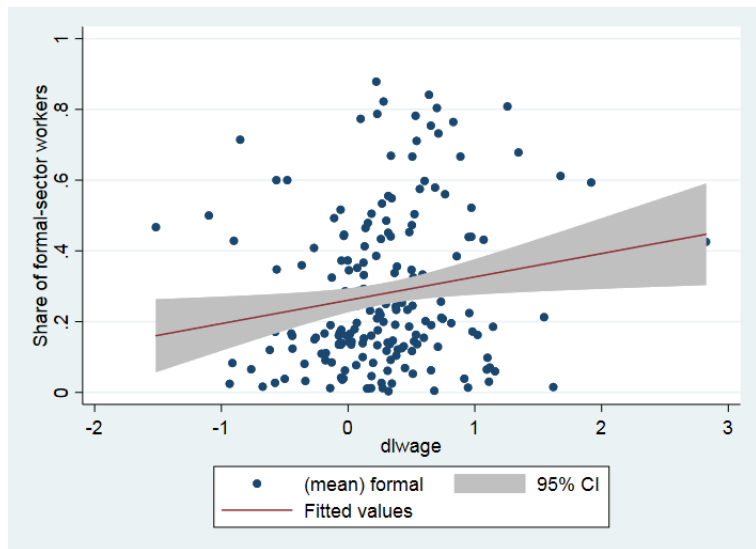


Figure: Average tax rates in cell-level data in Ghana, GLSS4-6

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Introduction

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Conclusion

Basic results by country

		No controls	All controls
a) Ghana	Elasticity	0.311	-0.029
	Std. Dev.	-0.225	-0.106
	Group N	110	110
b) Rwanda	Elasticity	-0.415	0.467*
	Std. Dev.	-0.265	-0.282
	Group N	67	67
c) Tanzania	Elasticity	0.488***	-0.089
	Std. Dev.	-0.177	-0.368
	Group N	53	53
d) Uganda	Elasticity	0.3	-0.103
	Std. Dev.	-0.218	-0.096
	Group N	78	78

Additional results

		>min wage	Men	Women
a) Ghana	Elasticity	-0.042	-0.214	0.151
	Std. Dev.	-0.121	-0.148	-0.151
	Group N	105	57	48
b) Rwanda	Elasticity	0.467*	-0.087	0.777**
	Std. Dev.	-0.282	-0.384	-0.334
	Group N	67	37	30
c) Tanzania	Elasticity	-0.089	-0.798**	-0.212
	Std. Dev.	-0.368	-0.322	-0.457
	Group N	53	29	24
d) Uganda	Elasticity	-0.103	-0.104	-0.07
	Std. Dev.	-0.096	-0.105	-0.187
	Group N	78	46	32

Testing the first stage

	Ghana	Rwanda
F-statistic	$F(109, 18338) = 2.59$	$F(68, 22221) = 5.17$
P-value	Prob > F = 0.0000	Prob > F = 0.0000
F-statistic	Tanzania	Uganda
P-value	$F(35, 19184) = 11.63$	$F(153, 2794) = 21.04$
	Prob > F = 0.0000	Prob > F = 0.0000

Table: First-stage F tests from individual-level regressions

Observations based on the results

- ▶ Unfortunately, the results are not very precisely estimated
- ▶ Cell size probably too small in the analysis by gender
- ▶ However, instruments seem to work
- ▶ Results are not compatible with the idea there being a strong trade-off between taxing formal sector and formal sector share
- ▶ Reasons why the responses may be rigid
 - ▶ individuals do not have the skills required by formal-sector jobs
 - ▶ they may prefer the formal sector for other reasons (security, future pension entitlement)

Outline

Introduction

Estimation methods

Data and some descriptives

Results

Conclusion

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- ▶ In our understanding the first paper to explore whether formal sector taxes lead to a lower formal sector size in Sub-Saharan African countries
- ▶ We did our best to utilise the data available (repeated cross sections)
- ▶ The approach lead to non-significant results, suggesting that there may not be a strong tax impact on formality
- ▶ There is a need to intepret the results carefully
 - ▶ income self reported, can lead to measurement error and an attenuation bias
 - ▶ limited tax rate variation, tax treatment variation mainly arises from bracket creep (are individuals aware of the changes?)
 - ▶ only two surveys in the case of TAZ

References I

- Angrist, J. and J.-S. Pischke (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press.
- Auriol, E. and M. Warlters (2012). The marginal cost of public funds and tax reform in Africa. *Journal of Development Economics* 97(1), 58 – 72.
- Bargain, O. and P. Kwenda (2011). Earnings structures, informal employment, and self-employment: New evidence from Brazil, Mexico, and South Africa. *Review of Income and Wealth* 57, S100–S122.
- Bergolo, M. and G. Cruces (2014). The anatomy of behavioral responses to social assistance when informal employment is high. Discussion Paper 8198, IZA.
- Bhorat, H., R. Kanbur, and B. Stanwix (2014). Estimating the impact of minimum wages on employment, wages, and non-wage benefits: The case of agriculture in south africa. *American Journal of Agricultural Economics* 96(5), 1402–1419.
- Blundell, R., A. Duncan, and C. Meghir (1998). Estimating labor supply responses using tax reforms. *Econometrica* 66(4), 827–861.

References II

- Charmes, J. (2012). The informal economy worldwide: Trends and characteristics. *Margin: The Journal of Applied Economic Research* 6(2), 103–132.
- Garganta, S. and L. Gasparini (2015). The impact of a social program on labor informality: The case of AUH in Argentina. *Journal of Development Economics* 115, 99 – 110.
- Kugler, A. and M. Kugler (2009). Labor market effects of payroll taxes in developing countries: Evidence from Colombia. *Economic Development and Cultural Change* 57(2), 335–358.
- Matos, V. and A. Portela Souza (2016). Mudanças dos diferenciais de salários formal e informal: redução da segmentação ou do salário hedônico? In d. F. Holanda Barbosa Filo, G. Ulyseia, and F. Veloso (Eds.), *Causas e Consequências da Informalidade No Brasil*, Chapter 2. Elsevier.
- Tondini, A., C. Ardington, and I. Woolard (2017). Public pensions and elderly informal employment: Evidence from a change in retirement age in South Africa. Working Paper 05, SALDRU.