Modes of Exports by Sub-Saharan African Firms: Intensive Margins and Interdependencies

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- The Middle East and the North Africa region has the largest proportion of indirect exporters (46%) and the Sub-Saharan Africa has 35%.

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- In the past studies, these firms have not been treated as a separate group.
- And almost never, policy makers made these distinctions when formulating policies that affect exporters.

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- Bernard et al. (2010a) conduct an empirical investigation on the role of intermediaries and examine how they differ from manufacturing firms, using cross-border transactions data for Italy.

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- A third category of firms chooses to export indirectly through intermediaries.

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- We formulate a theoretical framework and support its predictions with data from Sub-Saharan countries.
- We try to answer questions such as how does change in efficiency level by one mode exporter affects the production decision of the other mode exporter in the same industry?

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- We find that the socially optimal policy is to tax direct exporters.
- Competition among direct exporters has a negative effect on export production for both direct and indirect exporters.

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- X is the total demand in the export market, i.e., $X = nx^d + x^{id} + g$, with x^d: output of each direct exporter, x^{id}: the output the indirect-exporting firms, and g: exogenous output from other suppliers in other countries than the country in consideration here.

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- Profits of the representative indirect-exporting firm (producer) and the intermediary firm (seller) are given, respectively, by
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- The total cost of the indirect-exporting firm is $\gamma(x^{id})^2$

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- Assuming Cournot competition, the profit-maximizing condition for each direct exporting firms is $\partial \pi_i^d / \partial x_i^d = (\alpha - \beta X) - \beta x_i^d - 2\delta x_i^d + s = 0,$

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- The intermediary firm maximizesprofits by taking the indirect-exporting firm's reaction function into consideration. The first-order condition is $\partial \pi_m / \partial x^{id} = (\alpha - \beta X) - \beta x^{id} - 4\gamma x^{id} = 0$.

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- The welfare of the country is defined as $W = n\pi^d + \pi^{id} + \pi^m - nsx^d$. consumer surplus being absent as all outputs are exported.

Comparative statics

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- We find:

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- The results are as one would expect an increase in inefficiency of one type of firm decreases its own output and increases the output of the other type.

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- An increase in the number of direct-exporting firms, increases the level of competition in the industry and reduces the output of each and every firm in the industry: direct-exporting firms and indirect-exporting firms.

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- the price-taking behavior of the indirect-exporting firm makes the distortion caused by the indirect exporter less harmful that that caused by the direct exporter.

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- If $x^{id}/(nx^d + x^{id}) \geq A$, we have $dx^d/d\gamma \geq 0$ and $dx^{id}/d\gamma \leq 0$.
- That is, for both the direct-exporting and the indirect exporting firms, the indirect effect can sometime dominate; however, under the stated sufficient condition the direct effects dominate.

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- The first set is when subsidy is exogenous and the second set is when it is endogenous.
- Following the first set of results for the case of exogenous subsidy, we test the hypothesis that a positive relationship exists between exporter's own efficiency and subsidy levels and its level of exports and negative cross effects.
- The theory also predicts that the effects of competition on export levels of both direct and indirect mode exporters are negative.

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- The estimated equations for d (direct) and id (indirect):

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where $\mu_{i,j,k}$ and $\omega_{i,j,k}$ are random error terms for firm i in sector j from country k. The efficiency level is $Efficiency_{i,j,k}$

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- Two pairs of equations are estimated using the recursive method.

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- We pick total sales figure from two years ($Sales_{i,j,k}$) and book value of machinery and equipment 1 year ago ($Machinery_{i,j,k}$) to serve as level variables in the regressions.

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- Table 1 gives the definitions of all the variables used.

Table 1: Definition of Variables

Variable Notation	Definition
$\log(Export^d)$	Log of export sales for direct exporter
$\log(Export^{id})$	Log of export sales for indirect exporter
Efficiency	Firm's own efficiency level
Cefficiency	Average cross efficiency levels
Competition	Median number of competitors of direct exporters
mtax	Median tax on direct exporters
Sales	Total sales 2 years ago
Owner	Percentage of firm owned by foreign private sector
Machinery	Machinery & equipment 1 year ago
Website	=1 if the firm uses website for business with clients and/or suppliers, and = 0 otherwise
GDP	Gross Domestic Product (in 2000 constant dollar)
Age.	Age of the firm
Credit	=1 if the firm has access to line of credit and overdraft
AvEfficiency	Average efficiency level of direct exporter
Interaction	Interaction between efficiency and competition
AvSales	Average total sales 2 years ago
Mdskill	Median business constraint: skills of available workers
Avregulation	Av time dealing with government regulations
Mdlabor	Median business constraint:Business constraint: labor regulations
LGDP	Log of GDP

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- In the sample, about 65% of all the observations are fully owned by locals.
- The proportion of firm's with any foreign ownership tend to be larger for direct exporters (37%) than for indirect exporters(26%).

Table 3. Distribution of firms by industry for direct and indirect exporter

Industry	Indirect Exporters(%)	Direct Exporters (%)	Total (%)
Textiles	1.69	8.65	10.34
Leather	0.26	1.9	2.16
Garments	4.28	8.52	12.81
Agro-industry	1.17	6.14	7.31
Food	3.63	10	13.63
Beverages	0.04	0.26	0.3
Metals and machinery	2.16	9.52	11.68
Electronics	0.22	1.04	1.25
Chemicals and pharmac.	1.73	8.05	9.78
Wood and furniture	0.78	4.24	5.02
Non-metal. and plastic	1.13	5.45	6.58
Paper	0.04	1.34	1.38
Other manufacturing	4.63	13.11	17.74
Total	21.77	78.23	100

Table 4. Distribution of direct and indirect exporters by emp. size

	Employment Size		
In percent	small(< 20)	medium(20-99)	large(100+)
Indirect Exporters	38.02	41.15	20.83
Direct Exporters	17.19	35.29	47.52

Table 5. Level of foreign ownership distribution

Nature of Ownership	Indirect Exporters (%)	Direct Exporters (%)
Non foreign ownership	73.45	62.47
Minority foreign ownership	4.99	5.72
Half foreign ownership	1	1.72
Majority foreign ownership	5.39	8.33
Full foreign ownership	15.17	21.77
Total	100	100

Table 6: Descriptive statistics

Indirect Exporters					
Variable	N	Mean	Std. Dev	Min.	Max.
$\log(Export^{id}_{i,j,k})$	469	6.67e+10	4.02e+11	150 6.	49e+12
$Efficiency_{i,j,k}$	469	0.28	0.35	1.05e-06	1
$Xefficiency^{id}_{j,k}$.	461	0.33	0.23	0.05	1
$Competition_{j,k}$	368	3.9904891	2.8489286	1	21
$mtax_{j,k}$	465	1.4086022	1.1539527	0	4
$Sales_{i,j,k}$	431	1.834E+09	9.807E+09	0	1E+11
$Owner_{i,j,k}$	505	20.777558	38.056674	0	100
$Website_{i,j,k}$	497	0.2796781	0.4492932	0	1
GDP_k	497	2.784E+10	5.38E+10	212034806	1.8E+11
$Age_{i,j,k}$.	501	18.914172	17.30834	0	95
$Credit_{i,j,k}$	499	0.3707415	0.483488	0	1

Table 6 (contd.): Descriptive statistics

Direct Exporters					
Variable	N	Mean	Std. Dev	Min.	Max.
$\log(Export^d_{i,j,k})$	1649	1.13e+11	7.01e+11	434	1.68e+13
$Efficiency_{i,j,k}$	1626	0.32	0.35	2.62e-07	1
$Xefficiency^d_{j,k}$.	1349	0.32	0.22	0.045	1
$Competition_{j,k}$	1340	5.18694	4.05382	0	21
$mtax_{j,k}$	1813	1.52951	1.11189	0	4
$Sales_{i,j,k}$	1560	2.1E+09	1.1E+10	0	1.38E+11
$Owner_{i,j,k}$	1807	30.4212	42.6116	0	100
$Website_{i,j,k}$	1790	0.51397	0.49994	0	1
GDP_k	1797	4.1E+10	6.3E+10	212034806	1.78E+11
$Age_{i,j,k}$.	1784	21.2321	18.1658	0	100
$Credit_{i,j,k}$	1704	0.60035	0.48997	0	1

Table 7: Estimation results for direct exporter

	(i)	(ii)	(iii)	(iv)	(v)
$Eff._{i,j,k}$	0.766***	0.806***	0.815***	0.677***	0.667***
	(0.0496)	(0.0527)	(0.0492)	(0.0512)	(0.0592)
$Ceffi^{id}_{j,k}$.	-0.585***	-0.612***	-0.578***	-0.532***	-0.456***
	(0.0495)	(0.0518)	(0.0567)	(0.0508)	(0.0594)
$Compt._{j,k}$		-0.0600***		-0.0611***	-0.0654***
		(0.0201)		(0.0230)	(0.0273)
$mtax_{j,k}$		-0.613**	-0.583***	-0.475**	-0.490*
		(0.249)	(0.223)	(0.224)	(0.260)
$Sales_{i,j,k}$				2.83e-11***	
				(8.78e-12)	
$Owner_{i,j,k}$				0.00934***	0.0107***
				(0.00151)	(0.00158)
$Website_{i,j,k}$				0.496***	0.651***
				(0.143)	(0.150)
$Age_{i,j,k}$.				0.0118***	0.0136***
				(0.00392)	(0.00404)
$Credit_{i,j,k}$				0.356**	0.544***
				(0.151)	(0.158)
$LGDP_k$				−0.347	
				(0.409)	
$Mach._{i,j,k}$					3.89e-11***
					(9.26e-12)

Table 8. Estimation results for indirect exporters

	(vi)	(vii)	(viii)	(ix)	(x)
$Eff._{i,j,k}$	0.741***	0.574***	0.628***	0.533***	0.568***
	(0.114)	(0.1000)	(0.0969)	(0.0980)	(0.107)
$Ceff._{j,k}^{id}$.	-0.956***	-0.649***	-0.640***	-0.325*	-0.392*
	(0.189)	(0.182)	(0.213)	(0.174)	(0.205)
$Compt._{j,k}$		-0.701***	-0.772***	−0.402***	−0.403***
		(0.0832)	(0.0984)	(0.0611)	(0.0771)
$mtax_{j,k}$		0.380***	0.486***	0.525***	0.584***
		(0.145)	(0.138)	(0.143)	(0.147)
$Sales_{i,j,k}$				1.1e-10***	
				(2.03e-11)	
$Owner_{i,j,k}$				0.00983**	0.011**
				(0.00484)	(0.0051)
$Website_{i,j,k}$				0.0723	-0.0389
				(0.411)	(0.432)
$Credit_{i,j,k}$				-1.036***	−0.94**
				(0.351)	(0.376)
$LGDP_k$		-0.459***	−0.409***	−0.43***	−0.43***
		(0.0992)	(0.110)	(0.111)	(0.115)
$Mach._{i,j,k}$					1.9e-10***
					(6.1e-11)

Table 9. Estimation results for median tax burden on direct exp.

	(1) OLS	(2) OLS	(3) Order Logit	(4) Order Logit
$AvEff.^{d}_{j,k}$	-0.266***	-0.312***	-0.359**	-0.495***
	(0.0784)	(0.0804)	(0.120)	(0.142)
$Interact._{j,k}$	0.0268**	0.0325***	0.0344**	0.0491***
	(0.0105)	(0.0112)	(0.0148)	(0.0184)
$Compt._{j,k}$	0.0727***	0.0630**	0.116***	0.107***
	(0.0235)	(0.0249)	(0.0355)	(0.0412)
$AvSales_{j,k}$	-3.66e-13	-1.47e-12	-3.14e-12	-4.52e-12
	(4.23e-12)	(4.22e-12)	(5.87e-12)	(6.37e-12)
$Mdlabor_{j,k}$		0.332***		0.619***
		(0.0745)		(0.140)
$Mdskill_{j,k}$		-0.0424		-0.0989
		(0.0602)		(0.106)
$Avreg.$		0.0167**		0.0308**
		(0.00591)		(0.0119)
$Lpercapita$	-0.586***	-0.585***	-0.917***	-1.017***
	(0.0544)	(0.0561)	(0.106)	(0.127)
Constant	5.139***	4.688***		
	(0.379)	(0.405)		
Adj. R^2	0.24	0.32		