Explaining firm-level gender productivity differential in Africa

Amira El-Shal, PhD
Cairo University
African Development Bank

Hanan Morsy, PhD
African Development Bank

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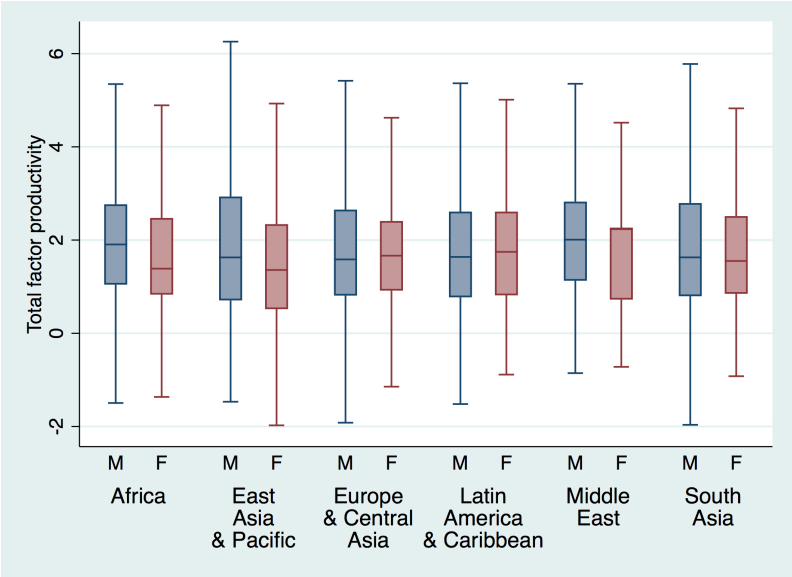
Motivation: Some worrying figures!

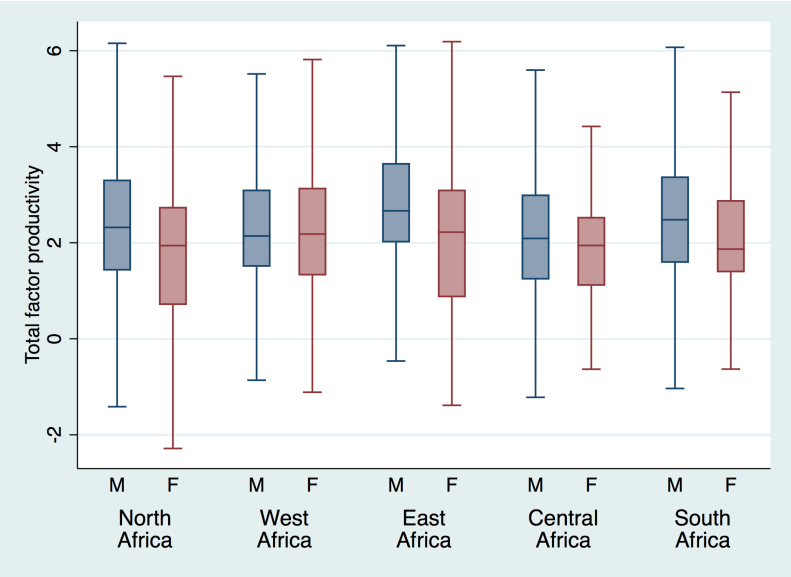
Total factor productivity by gender of manager by WORLD region



Source: Authors' computations based on World Bank Enterprise Surveys

- Gender gaps in total factor productivity (TFP) are the widest in Africa.

Total factor productivity by gender of manager by AFRICAN region

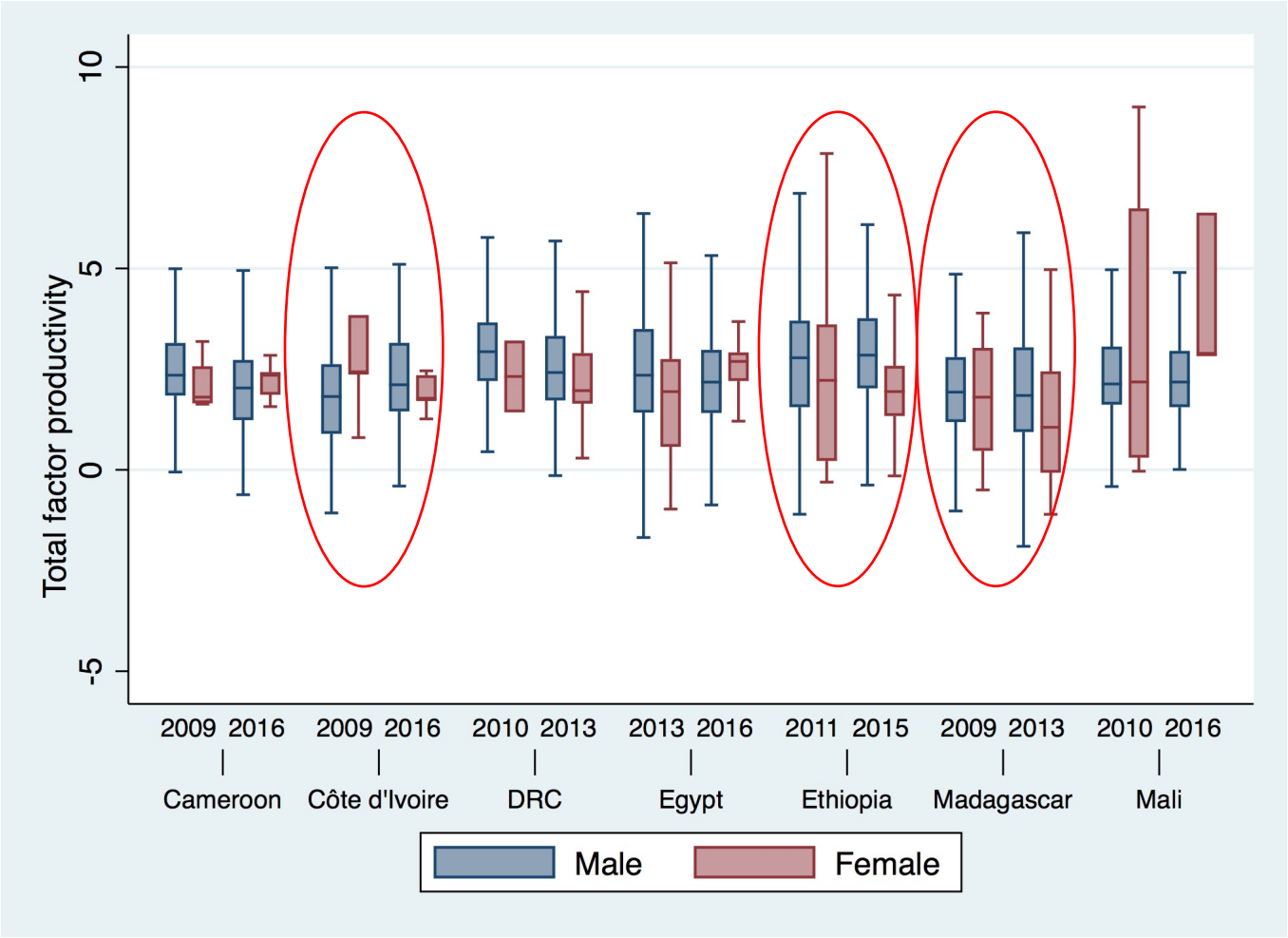


Source: Authors' computations based on World Bank Enterprise Surveys

- There is significant heterogeneity in the gender TFP gap across African subregions.

Motivation: Other even more worrying!

Evolution of gender TFP gaps in selected African countries 2009-2016



Source: Authors' computations based on World Bank Enterprise Surveys

Motivation: Why does this matter?

- The gender TFP gap hampers Africa's realization of its full economic growth and job-creation potentials, perpetuating tremendous efficiency and welfare losses.
- Often overlooked development implications: Women reinvest up to 90% of their income in the education, health, and nutrition of their family and community—compared to up to 40% for men.

Empirical evidence: What do we know so far? And what we do not!

- **Gender productivity differential:** Few studies report on the gender differential in firm-level TFP in developing countries and the evidence provided is mixed.
  - Innovation and TFP
  - Institutional barriers and TFP

- **Gender effect pathways:** There is even less evidence on the causal pathways underlying the gender productivity gap:
  - Behavioral differences (e.g., risk aversion)
  - Differences in talents and perspectives
  - Barriers that arise from existing institutional structures

Objectives

1) Test for the presence of gender differences in TFP in Africa, focusing on North and East Africa

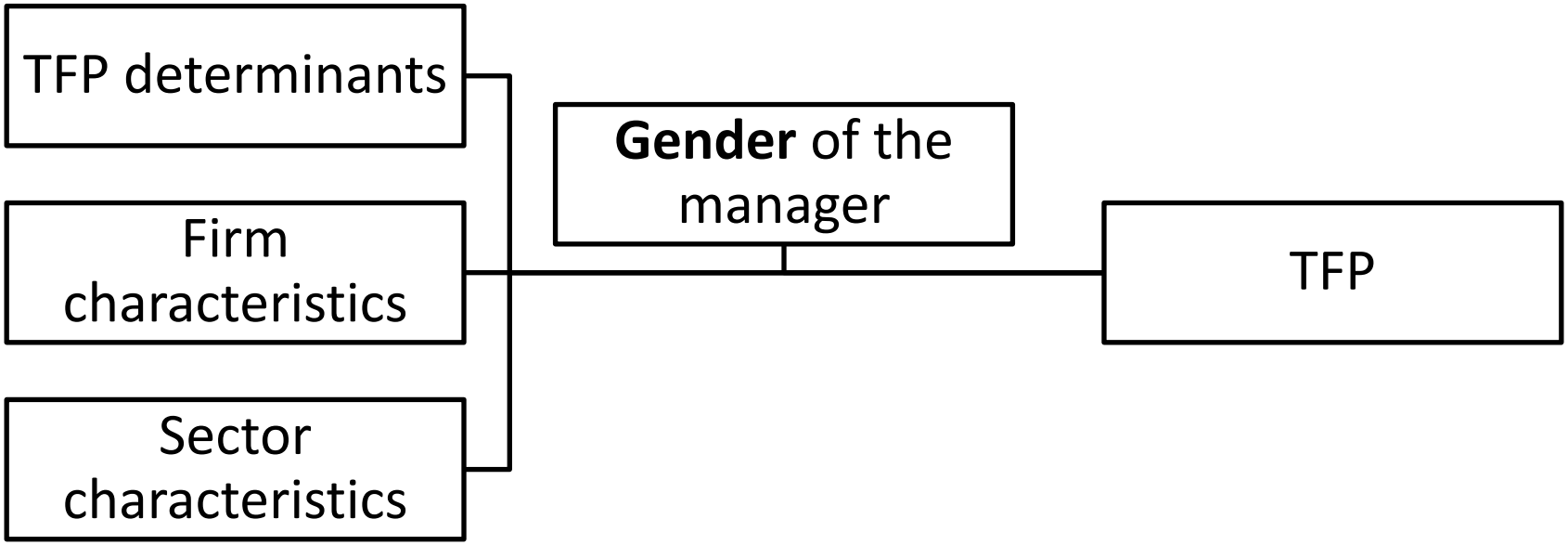
2) Identify the association pathways where gender productivity gaps are observed

3) Investigate the possibility of heterogeneity of firms' behavior at different points of the productivity distribution

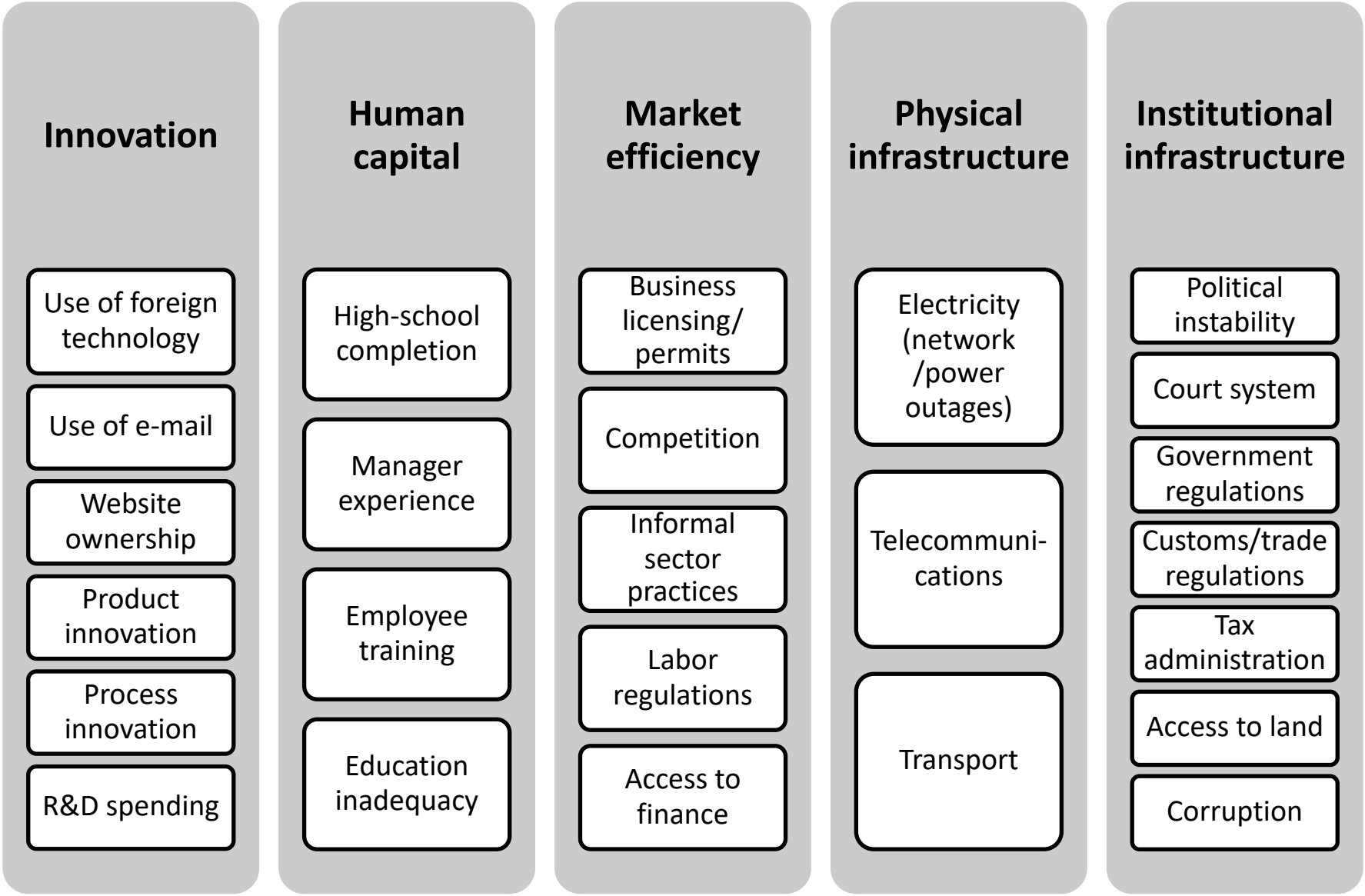
Data: Coverage

- **Source:** World Bank Enterprise Survey data
- **Sample size:**
  - Africa: >37,000 firms in 46 African countries
  - North Africa: >6,000 firms in 4 countries
  - East Africa: >8,000 firms in 10 countries
- **Years:** 2006-2018
- **Sectors:** Manufacturing and services

Data: Analytical framework

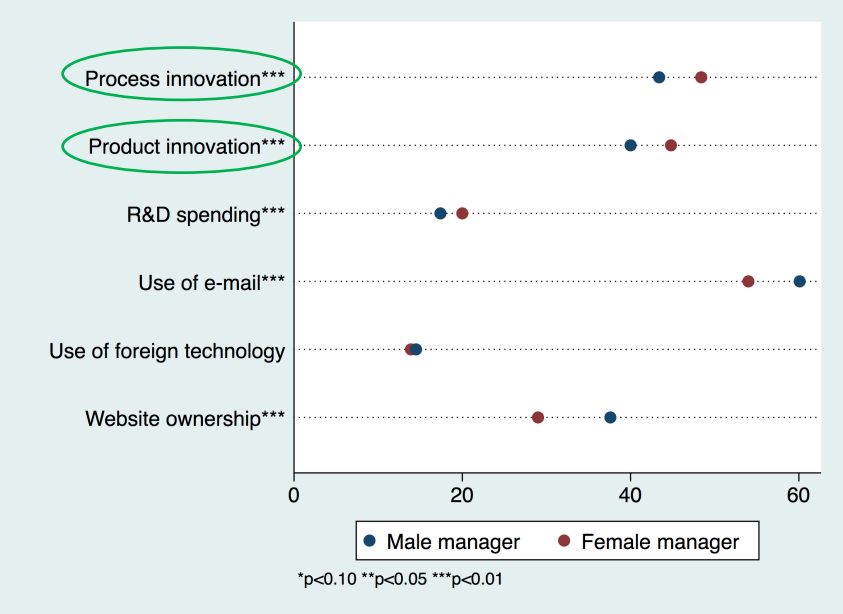


Data: TFP determinants



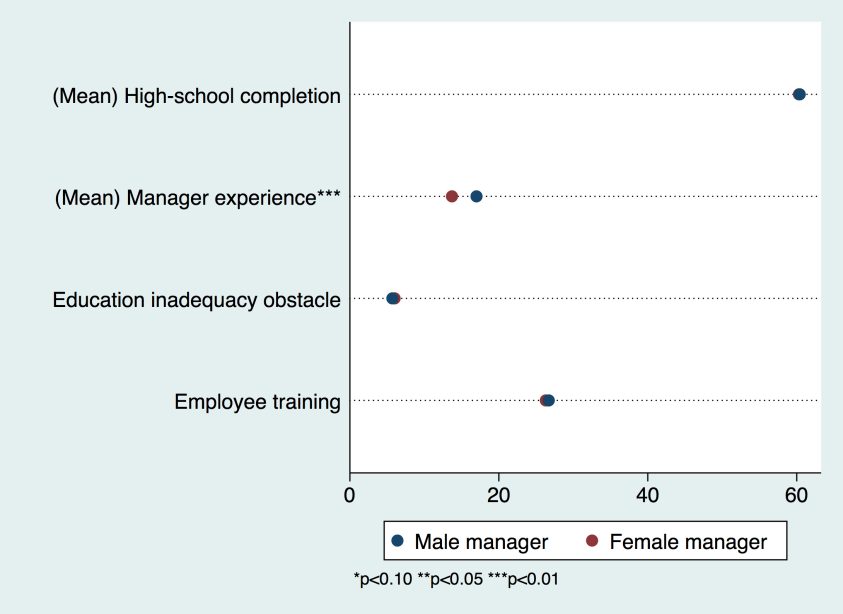
Data: Gender aspects of TFP determinants (1/3)

Innovation by gender of manager in Africa (Two-sample tests)



Source: Authors' computations based on World Bank Enterprise Surveys

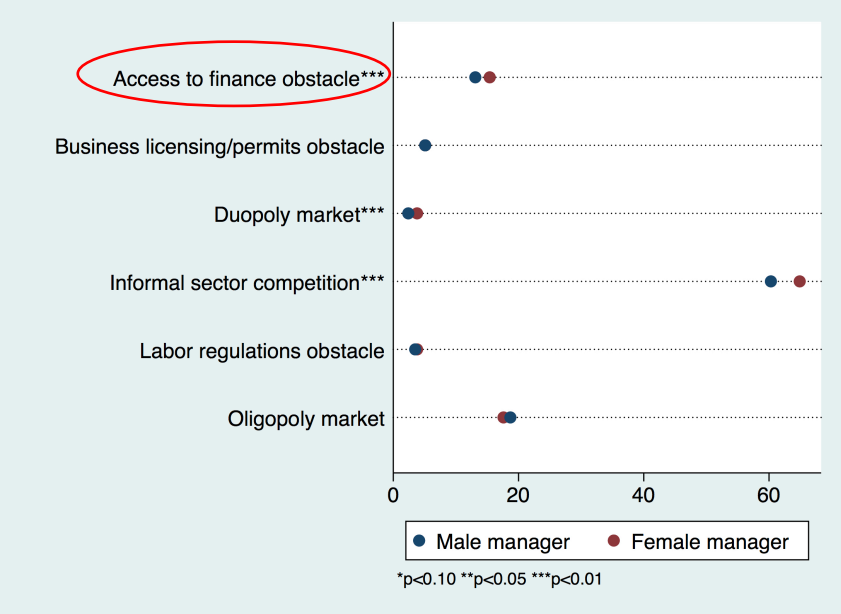
Human capital by gender of manager in Africa (Two-sample tests)



Source: Authors' computations based on World Bank Enterprise Surveys

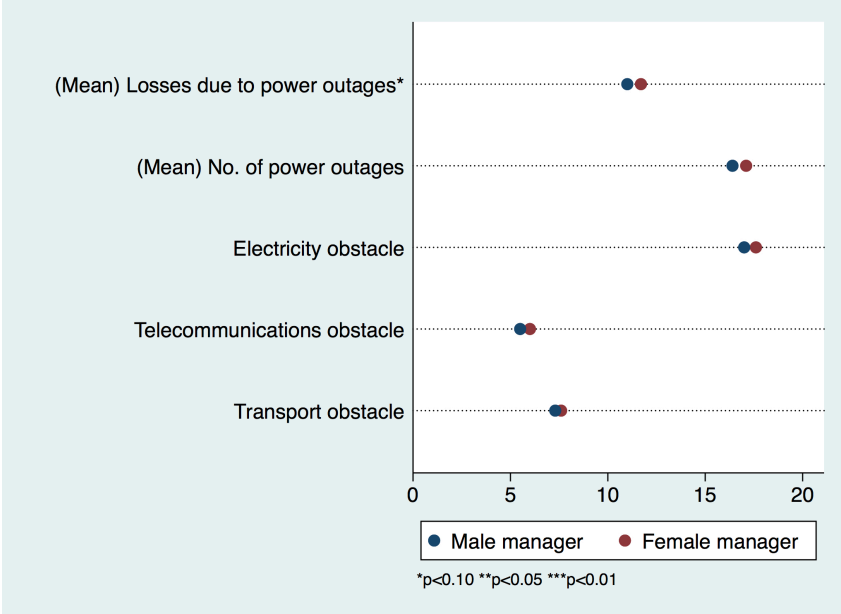
Data: Gender aspects of TFP determinants (2/3)

Market (in)efficiency by gender of manager in Africa (Two-sample tests)



Source: Authors' computations based on World Bank Enterprise Surveys

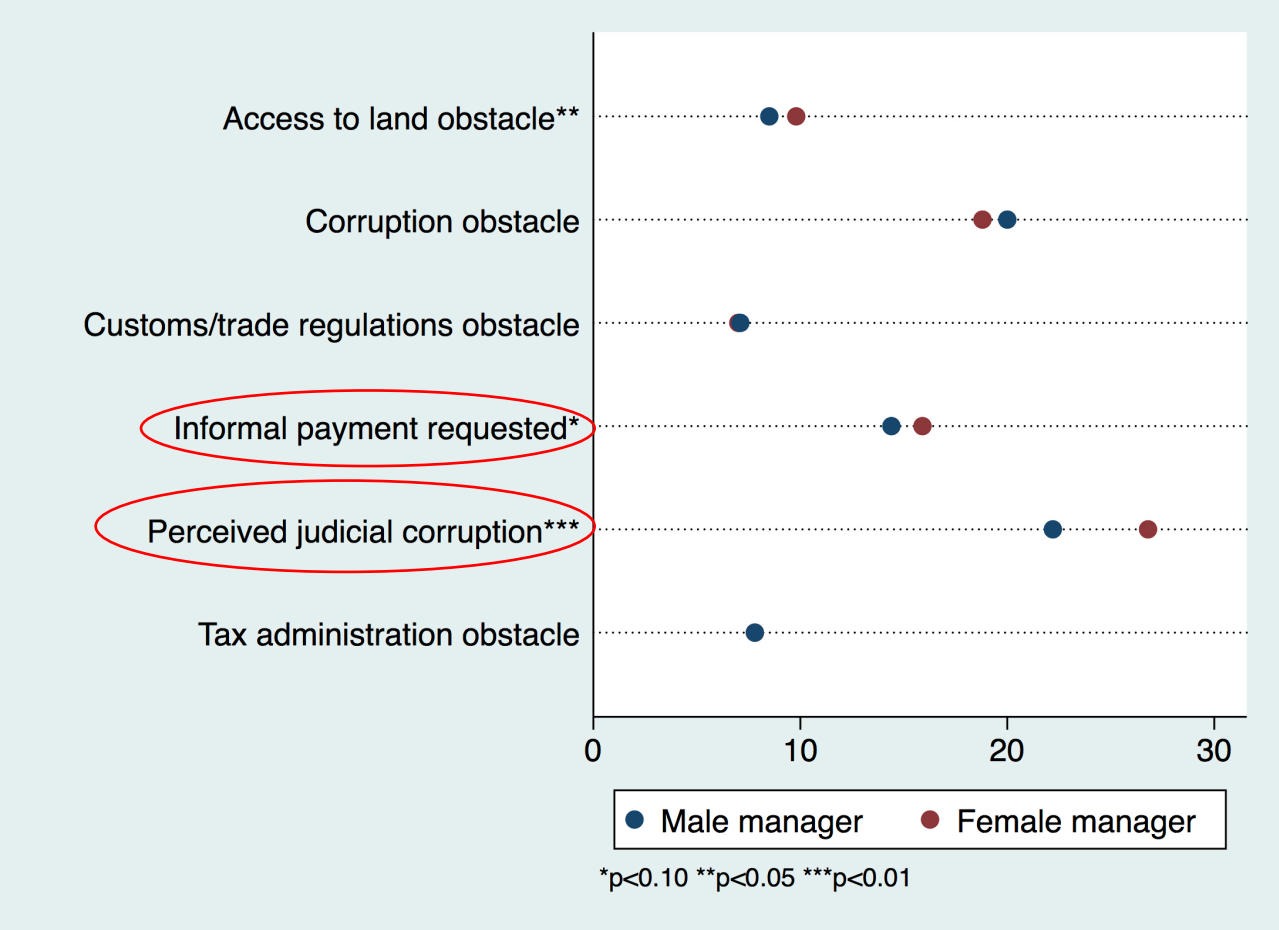
Physical infrastructure (barriers) by gender of manager in Africa (Two-sample tests)



Source: Authors' computations based on World Bank Enterprise Surveys

Data: Gender aspects of TFP determinants (3/3)

Institutional infrastructure (barriers) by gender of manager in Africa
(Two-sample tests)



Source: Authors' computations based on World Bank Enterprise Surveys

Empirical approach: General framework

- Firm-level TFP is estimated within the general framework of the Cobb-Douglas production function:

$$Y_{ise} = A_{ise} K_{ise}^{\alpha_k} L_{ise}^{\alpha_l} M_{ise}^{\alpha_m}$$

- Gender differences in behavior, encountered barriers, etc. are likely to affect firm heterogeneity, and therefore TFP, both directly and indirectly through other TFP determinants:

$$ln(A_{ise}(\boldsymbol{Gender}_{ise}; D_{ise})) = a_0 + a_g \boldsymbol{Gender}_{ise} + a_d D_{ise} + a_z Z_{ise} + \epsilon_{ise}$$

- Since the gender of the manager is the key policy variable and firm-level TFP is the outcome variable, we specify this TFP equation:

$$TFP_{ise} = \gamma_0 + \gamma_g \boldsymbol{Gender}_{ise} + \gamma_d D_{ise} + \gamma_z Z_{ise} + u_{ise}$$

Empirical approach: Mean- and quantile-based decompositions

- Blinder-Oaxaca decomposition: We decompose the **mean** differences in TFP between male- and female-managed firms:

$$TFP_{iseg} = X'_{iseg}\gamma_x + u_{iseg}$$

$$MD = E(TFP_{isem}) - E(TFP_{isef}) = E(X_{isem})'\gamma_m - E(X_{isef})'\gamma_f$$

$$MD = \left[E(X_{isem}) - E\left(X_{isef}\right)\right]'\gamma_f + E\left(X_{isef}\right)'\left(\gamma_m - \gamma_f\right) + [E(X_{isem}) - E(X_{isef})]'(\gamma_m - \gamma_f)$$

- Recentered Influence Functions decomposition: We apply an unconditional quantile regression procedure providing the decomposition estimates **at each specified point of the TFP distribution.**

Results: Baseline estimates of gender differential in TFP

	Africa	North Africa	West Africa	East Africa	Central Africa	South Africa
Female top manager	-0.315**	-0.330*	-0.181	-0.768**	0.024	-0.097
	(0.153)	(0.181)	(0.240)	(0.342)	(0.190)	(0.269)
Constant	3.613***	2.408***	3.284***	2.911***	2.717***	3.693***
	(0.402)	(0.079)	(0.414)	(0.181)	(0.153)	(0.279)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes

Results: Blinder-Oaxaca decomposition estimates of TFP differential by gender of manager in Africa

	TFP (Y)		TFP (VA) imputed		Log sales per worker	
	(1)	(2)	(3)	(4)	(5)	(6)
OVERALL						
Male-managed firms	2.479***		3.037***		9.608***	
Female-managed firms	2.194***		2.454***		9.305***	
Difference	0.285**		0.582***		0.303***	
Endowments (Explained)	0.082		0.159		0.162**	
Coefficients (Unexpl'd)	0.393**		0.652***		0.162*	
Interaction	-0.190		-0.229		-0.021	
EXPLANATORY VARIABLES	Explained	Unexpl'd	Explained	Unexpl'd	Explained	Unexpl'd
TFP determinants (MCA indices)						
Innovation	-0.021	-0.175	-0.022	-0.679*	-0.030*	0.032
Human capital	-0.031	0.502*	0.048	-0.437	-0.005	0.116
Market inefficiency	-0.004	0.329	0.006	-0.442	-0.021	-0.579**
Physical inf barriers	-0.052	-0.645*	-0.019	-0.173	0.018	0.413
Institutional inf barriers	0.037	1.334**	0.045	1.526*	0.000	-0.104
Controls	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	4,603		7,347		14,215	

Results: Blinder-Oaxaca decomposition estimates of TFP differential by gender of manager in NORTH Africa

	TFP (Y)		TFP (Y) imputed		TFP (VA) imputed	
	(1)	(2)	(3)	(4)	(5)	(6)
OVERALL						
Male-managed firms	2.471***		1.959***		2.513***	
Female-managed firms	2.079***		1.467***		1.847***	
Difference	0.392**		0.492*		0.666***	
Endowments (Explained)	0.140		-0.097		-0.126	
Coefficients (Unexpl'd)	0.515**		0.543*		0.751**	
EXPLANATORY VARIABLES	Explained	Unexpl'd	Explained	Unexpl'd	Explained	Unexpl'd
TFP determinants (Proxies)						
Innovation						
Use of foreign technology	-0.013	0.517	-0.001	1.252*	-0.001	1.209*
Use of e-mail	0.012	-0.181	0.024	-0.165	0.036	-0.427*
Website ownership	-0.015	0.117	-0.008	0.215	-0.039	0.361
Product innovation	-0.024	-0.591	-0.044	-0.596	-0.041	-0.660
Process innovation	-0.018	0.314	-0.012	0.422	-0.021	0.724*
R&D spending	-0.062	1.055	-0.046	1.024	-0.029	0.738

Results: Blinder-Oaxaca decomposition estimates of TFP differential by gender of manager in NORTH Africa (Cont'd)

	TFP (Y)		TFP (Y) imputed		TFP (VA) imputed	
	(1)	(2)	(3)	(4)	(5)	(6)
Human capital						
Manager experience (0-5)	0.004	-0.027	-0.014	0.048	0.002	-0.002
Employee training	0.002	-1.002**	-0.003	-0.702	-0.002	-0.317
Market inefficiency						
Access to finance obstacle	0.090	0.158*	0.082	0.193*	0.090	0.229*
Physical inf barriers						
Electricity obstacle	0.061	0.080	0.020	-0.055	0.030	-0.012
Institutional inf barriers						
Courts uncorrupted						
Tend to agree	0.012	0.355**	0.019	0.459*	0.018	0.452*
Tend to disagree	-0.098	0.144*	-0.235*	0.303*	-0.237*	0.306**
Strongly disagree	0.110	0.299**	0.232	0.573**	0.158	0.478**
Other proxies	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	1,945		2,397		2,397	

Results: Recentered Influence Functions decomposition estimates of gender TFP differential

	TFP (Y) 15th percentile		TFP (Y) 85th percentile	
	(1)	(2)	(3)	(4)
OVERALL				
Male-managed firms	1.829***		3.571***	
Female-managed firms	0.948***		3.093***	
Difference	0.881***		0.477***	
Endowments (Explained)	0.424**		-0.447**	
Coefficients (Unexpl'd)	0.457***		0.925***	
EXPLANATORY VARIABLES	Explained	Unexpl'd	Explained	Unexpl'd
TFP determinants (Proxies)				
Innovation				
Use of foreign technology	-0.009	0.547	-0.010	0.078
Use of e-mail	0.146	-0.732***	-0.003	-0.305
Website ownership	-0.041	0.347	-0.063	0.361
Product innovation	0.000	-0.024	0.002	0.411
Process innovation	-0.012	0.161	0.003	-0.299
R&D spending	-0.019	0.344	-0.036	0.894*

Results: Recentered Influence Functions decomposition estimates of gender TFP differential (Cont'd)

	TFP (Y) 15th percentile		TFP (Y) 85th percentile	
	(1)	(2)	(3)	(4)
Human capital				
Employee training	0.003	-1.086***	0.002	-0.816**
Market inefficiency				
Access to finance obstacle	0.016	0.022	0.062	0.047*
Physical inf barriers				
Electricity obstacle	0.076	0.082*	0.011	0.002
Institutional inf barriers				
Courts uncorrupted				
Tend to agree	0.002	0.122	-0.004	-0.140
Tend to disagree	-0.040	0.101	-0.002	0.093
Strongly disagree	0.081	0.133***	-0.031	0.002
Other proxies	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
No of observations	3,651		3,651	

Conclusion

- Gender gaps in TFP performance persist in Africa, specifically in the Northern and Eastern regions.
- The observed gaps are driven by women being more negatively affected by institutional barriers, such as corruption and perceptions about it, and market inefficiencies, such as the lack of access to finance.
- Differences in the *endowments* of TFP determinants between male and female managers, such as educational and entrepreneurial abilities, or between their respective firms, such as the *levels* of encountered physical and institutional infrastructure barriers, do not contribute to the gaps.

Thank you.