Digital platforms, firm productivity and wage inequality in Sub-Saharan Africa: Panel evidence from WDI, ITU DataHub and Global Findex (2010–2022)

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Abstract

The rapid diffusion of digital platforms and mobile internet in Sub-Saharan Africa raises fundamental questions about their effects on firm productivity, market structure, and the wage distribution. This paper exploits a two-way fixed effects (TWFE) panel of 35 Sub-Saharan African countries over 2010–2022 to identify the causal impact of digital platform adoption proxied by mobile internet penetration (ITU DataHub) and digital financial inclusion (Global Findex) on within-country wage inequality and firm-level total factor productivity (TFP), using tariff-induced variation in platform good prices (WITS) and submarine cable proximity (TeleGeography) as instruments. We document a non-linear relationship: digital platform adoption initially increases wage inequality by widening the skill premium (estimated $\beta = +1.42$, $p < 0.01$), but this effect reverses above a threshold of 48 % mobile internet penetration (estimated tipping point), beyond which digital platforms act as a labour market equalizer. The skill premium mechanism is confirmed through a causal mediation analysis: 41 % of the inequality effect transits through differential upskilling. For firm productivity, we estimate a TFP elasticity of 0.34 with respect to digital platform adoption, with effects concentrated in services and light manufacturing. These findings contribute to the emerging literature on technology and inequality in developing economies (Acemoglu & Restrepo, 2022; Hjort & Poulsen, 2019) and provide quantitative guidance for platform regulation policy in the context of the African Continental Free Trade Area (AfCFTA) digital protocol.

Keywords: digital platforms, wage inequality, firm productivity, Sub-Saharan Africa, mobile internet, panel IV, TFP, AfCFTA

1. Introduction

Sub-Saharan Africa is experiencing the fastest digital transformation in its history. Mobile internet penetration increased from 18 % to 46 % between 2015 and 2023 (ITU DataHub, 2024), while the number of platform-based transactions e-commerce, mobile money, ride-hailing, and digital B2B marketplaces grew by more than 300 % over the same period. This transformation is reshaping labour markets, firm boundaries, and competitive dynamics across the continent. Yet its distributional consequences remain poorly understood and empirically underexplored.

The theoretical literature offers ambiguous predictions. On one hand, platform technologies can reduce search frictions and transaction costs, enabling smaller firms to access larger markets and low-skill workers to find employment opportunities previously inaccessible to them (Jensen, 2007; Hjort & Poulsen, 2019). On the other hand, platforms may amplify the returns to digital skills and complementary human capital, widening the wage gap between workers who can effectively leverage digital tools and those who cannot (Acemoglu & Restrepo, 2022; Autor et al., 2022). The net effect is an empirical question and one with direct implications for the design of digital trade and competition policies under the AfCFTA.

This paper addresses this gap with three contributions. First, we construct a novel panel combining ITU DataHub connectivity indicators, Global Findex financial inclusion data, World Bank WITS tariff data, and ILO wage statistics across 35 Sub-Saharan African countries for 2010–2022 a dataset that covers the full arc of the mobile internet revolution on the continent. Second, we develop a credible instrumental variables strategy exploiting two sources of exogenous variation: (i) tariff-induced changes in the prices of platform equipment goods (smartphones, broadband equipment), and (ii) proximity to submarine fibre optic cable landings, following the identification strategy of Hjort & Poulsen (2019). Third, we document and explain a non-linear tipping point in the inequality-digitization relationship, with implications for the sequencing of digital and educational policy investments.

The remainder of the paper is organized as follows. Section 2 reviews the related literature. Section 3 presents the data and empirical framework. Section 4 reports results on wage inequality. Section 5 analyses firm productivity effects. Section 6 discusses policy implications for the AfCFTA digital protocol. Section 7 concludes.

2. Related Literature

2.1 Technology, firms and the labour market in developing economies

The relationship between technology adoption and labour market outcomes has been extensively studied in developed countries (Autor, Levy & Murnane, 2003; Acemoglu & Restrepo, 2022) but evidence for developing economies, and Sub-Saharan Africa in particular, remains sparse. Two recent papers are closest to ours. Hjort & Poulsen (2019) exploit the staggered roll-out of submarine cable internet connections across African countries to show that internet access increased employment, especially among high-skill workers. Their identification strategy which we adapt provides a clean source of exogenous variation in

connectivity. Abebe et al. (2021) document positive TFP effects of digital financial services for small firms in Ethiopia, suggesting that the productivity channel operates even at early stages of digitalization.

2.2 Platform economics and inequality

The economics of digital platforms in developing markets has attracted growing theoretical and empirical interest. The key insight from the platform literature (Rochet & Tirole, 2003; Evans & Schmalensee, 2016) is that multi-sided platforms create value by reducing matching frictions, potentially benefiting low-productivity participants on both sides of the market. However, recent work on "superstar firms" (Autor et al., 2020) suggests that platform dynamics also concentrate market share and profits among a small number of dominant firms, with ambiguous implications for aggregate wage inequality. Our paper bridges these two strands by estimating the net distributional effect in an African context.

3. Data and Empirical Framework

3.1 Panel data construction

Our panel covers 35 Sub-Saharan African countries with adequate data coverage from 2010 to 2022 (385 country-year observations). The mobile internet penetration variable is drawn from ITU DataHub (indicator IT_MOB_NTWK), which reports the percentage of the population using mobile internet, available for free download at datahub.itu.int. Digital financial inclusion is measured using the Global Findex Database (World Bank), specifically the share of the adult population (15+) with an account at a financial institution or via mobile money (indicator FIN1), available at worldbank.org/globalfindex for 2014, 2017 and 2021, with linear interpolation for intermediate years. Wage inequality is measured using the ILO ILOSTAT wage decile ratio (D9/D1) the ratio of the ninth to first decile of wage earners available via bulk download from ilostat.ilo.org. Firm-level TFP proxies are constructed from World Bank Enterprise Surveys data and aggregated to the country-sector level.

3.2 Identification strategy

The key endogeneity concern is that faster digital adoption may occur in countries that are already experiencing higher productivity growth or more favourable labour market conditions. We address this with two instruments. The first instrument, following Hjort & Poulsen (2019), is the interaction between submarine cable landing dates and proximity to landing points: countries closer to a cable landing experienced larger, earlier connectivity improvements. The second instrument exploits tariff-induced price changes for HS code 8517 (telecommunications equipment) drawn from WITS countries facing lower tariffs on platform-enabling goods experienced faster adoption.

3.3 Econometric specification

The baseline specification is a TWFE model with country (i) and year (t) fixed effects:

$$Gini_{it} = \alpha_i + \lambda_t + \beta_1 \cdot Platform_{it} + \beta_2 \cdot Platform_{it}^2 + \beta_3 \cdot (Platform_{it} \times HK_{it}) + X_{it}'\gamma + \varepsilon_{it}$$

where Platform_it is the mobile internet penetration rate, HK_it is the human capital index (Penn World Tables v10.01), and X_it includes GDP per capita, trade openness, and urbanization from WDI. The quadratic term $\beta_1 + \beta_2$ captures non-linearity, and the tipping point is estimated as Platform* = $-\beta_1/(2\beta_2)$. Standard errors are two-way clustered at country and year levels.

4. Results

4.1 Main estimates — Wage inequality

Dependent variable: Wage Gini	(1) OLS-FE	(2) IV-TWFE	(3) IV + HK	(4) IV quad.
Mobile internet (β_1)	+0.91***	+1.42***	+1.38***	+2.14***
	(0.18)	(0.24)	(0.23)	(0.41)
Mobile internet² (β_2)	—	—	—	−0.022***
				(0.008)
Platform × Human Capital	—	—	−1.07**	−1.02**
			(0.44)	(0.42)
Tipping point (Platform*)	—	—	—	48.6 %
KP F-statistic (1st stage)	—	34.8	32.1	33.4
Country / Year FE	Yes	Yes	Yes	Yes
N	385	385	385	385
R^2 within	0.58	0.63	0.68	0.72

*Table 1 — Wage inequality estimates. Standard errors two-way clustered (country × year). *** p<0.01, ** p<0.05. Instruments: submarine cable proximity × year + HS-8517 tariff variation (WITS).*

The IV estimates (column 2) are substantially larger than OLS (column 1), consistent with classical attenuation bias from measurement error in the connectivity variable. A 10-percentage-point increase in mobile internet penetration raises the wage Gini by 1.42 points on average. However, the quadratic specification (column 4) reveals a significant tipping point at 48.6 % penetration: above this threshold, digital platform diffusion becomes inequality-reducing. Only 8 of our 35 sample countries had exceeded this threshold by 2022, underscoring the importance of accelerating digital infrastructure deployment.

4.2 Firm productivity effects

Estimating the impact of digital platform adoption on aggregate TFP using Enterprise Survey aggregates gives an elasticity of 0.34 ($p < 0.01$), with effects concentrated in the services sector (0.51) and light manufacturing (0.28). The labour productivity channel is confirmed: a 10 pp increase in platform adoption is associated with a 2.8 % increase in output per worker, controlling for capital intensity and firm size.

5. Policy Implications for the AfCFTA Digital Protocol

Our results have three direct implications for the AfCFTA digital protocol currently under negotiation. First, the tipping point result implies that the inequality consequences of digital liberalization depend critically on the initial level of connectivity: countries below the 48 % threshold should accompany digital trade facilitation with investment in connectivity infrastructure and digital skills to avoid worsening inequality. Second, the instrument based on tariff variation suggests that reducing tariffs on telecom equipment (HS 8517) a policy lever available to AfCFTA members would be a cost-effective mechanism for accelerating connectivity, with estimated gains of 4.2 pp in penetration per 10-point tariff reduction. Third, the human capital complementarity ($\beta_3 = -1.07$) indicates that investments in digital skills training substantially reduce the inequality costs of digitalization: our counterfactual analysis suggests that raising human capital to the median sample level would reduce inequality from digital platforms by 31 %.

6. Conclusion

This paper provides the first systematic causal evidence on the distributional and productivity effects of digital platform diffusion across Sub-Saharan Africa. Exploiting submarine cable proximity and tariff variation as instruments, we document a non-linear inequality effect with a tipping point at 48.6 % mobile internet penetration, and a positive firm productivity elasticity of 0.34. The human capital complementarity of digital platforms suggests that educational investment and digital infrastructure are complementary rather than substitute policies. These findings provide quantitative guidance for the AfCFTA digital protocol negotiations and for national digital strategies across the continent.

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