

Regional Market Integration and Household Welfare: Spatial Evidence from the East African Community

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1 Motivation

The distributional consequences of trade liberalization in Africa are under-researched. Only recently has literature started to investigate these issues, relying either on differential tariff exposure across regions (Erten et al. 2019), or for a less coarse analysis, on the use of economic proxies, i.e. nightlights (Eberhard-Ruiz and Moradi 2019).

Using a distinct set of geo-referenced household-level surveys, we study the spatial response of

household welfare to regional market integration among Kenya, Uganda and Tanzania.

We thereby treat the re-establishment of the East African Community (EAC) in 2001 – and the expansion to a customs union and a common market in 2005 and 2010, respectively – as a regional policy intervention with differential effects on households depending on their geo-spatial location within the countries.

2 Theory

We derive the differential impact of the EAC across households from a **New Economic Geography (NEG) model** with heterogenous intra-national space.

- A four-region economy
 - Region $i = 1$ is the domestic core (agglomeration)
 - Region $i = 2$ is the domestic border region
 - Region $i = 3$ is the foreign border region
 - Region $i = 4$ is the foreign core (agglomeration)
- 2 Sectors: Manufacturing and agriculture
- Iceberg transport costs
 - T_H : trade costs between domestic regions
 - T_F : trade costs between border regions
 - $T_H \cdot T_F$: trade costs between regions 1 (2) and 3 (4)
 - $T_H \cdot T_F \cdot T_F$: trade costs between regions 1 and 4

The NEG equilibrium provides a framework to analyze the following question: What happens to the **internal distribution** of economic activity in response to **external trade liberalization**?

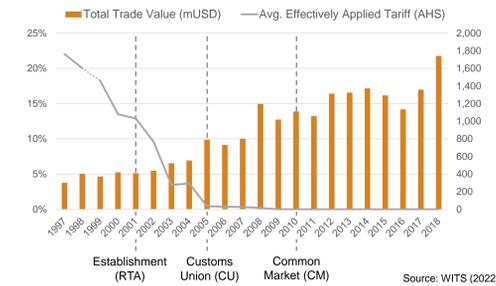
$$\omega_1 = \frac{[Y_1 \cdot I_1^{1-\epsilon} + Y_2 \cdot T_H^{1-\epsilon} \cdot I_2^{1-\epsilon} + Y_3 \cdot T_H \cdot T_F \cdot I_3^{1-\epsilon} + Y_4 \cdot T_H \cdot T_F \cdot T_F \cdot I_4^{1-\epsilon}]^{\frac{1}{1-\epsilon}}}{[\lambda_1 \omega_1^{1-\epsilon} + \lambda_2 (w_2 \cdot T_H)^{1-\epsilon} + \lambda_3 (w_3 \cdot T_H \cdot T_F)^{1-\epsilon} + \lambda_4 (w_4 \cdot T_H \cdot T_F \cdot T_F)^{1-\epsilon}]^{\frac{1}{1-\epsilon}}}$$

$$\omega_2 = \frac{[Y_1 \cdot T_H^{1-\epsilon} \cdot I_1^{1-\epsilon} + Y_2 \cdot T_H^{1-\epsilon} \cdot I_2^{1-\epsilon} + Y_3 \cdot T_H \cdot T_F \cdot I_3^{1-\epsilon} + Y_4 \cdot T_H \cdot T_F \cdot T_F \cdot I_4^{1-\epsilon}]^{\frac{1}{1-\epsilon}}}{[\lambda_1 (w_1 \cdot T_H)^{1-\epsilon} + \lambda_2 w_2^{1-\epsilon} + \lambda_3 (w_3 \cdot T_F)^{1-\epsilon} + \lambda_4 (w_4 \cdot T_H \cdot T_F)^{1-\epsilon}]^{\frac{1}{1-\epsilon}}}$$

The comparative statics we (empirically) test track the **changes in household welfare across regions (as given by real wages ω in the model) following a change in foreign trade costs T_F** from a former prohibitive level down to levels of trade costs that mirror those of the type within the home country T_H .

Assuming labor migrates between regions in the fashion $\lambda = \gamma(\omega_1/\omega_2)$, **dispersion** dictates a wage differential $\frac{\omega_1}{\omega_2} < 0$, and for **concentration** $\frac{\omega_1}{\omega_2} > 0$.

3 Intra-EAC-Trade



4 Empirical Strategy

We employ a **difference-in-differences specification** with treatment intensity given by households' distance to EAC border crossings. We compare DiD-estimates for households situated relatively closer to borders, ω_2 , with those relatively closer to "core" agglomerations ω_1 .

$$Y_{ict} = \alpha + \beta_1 Core_i + \beta_2 Dist_i^{EAC} + \sum_{t \in \{EAC, \dots\}} \beta_{3,t} (\gamma_t \cdot Core_i) + \sum_{t \in \{EAC, \dots\}} \beta_{4,t} (\gamma_t \cdot Dist_i^{EAC}) + X'_i + \delta_{ct}/i/h + e_{ict}$$

Y_{ict} = Individual/household welfare indicator
 γ_t = Dummy indicator (0/1) for EAC, CU, CM time periods
 $Dist_i^{EAC}$ = 1 - (relative) distance to nearest EAC border (0 - 1)
 $Core_i$ = Dummy indicator for living in "Core" (agglomerations)
 $\delta_{ct}/i/h$ = Country-year and household or individual fixed effects
 X'_i = Individual & geographic controls

For **dispersion**, we expect $\beta_4 \neq 0$ and $\beta_4 > \beta_3$.
 For **concentration**, we expect $\beta_3 \neq 0$ and $\beta_4 < \beta_3$.

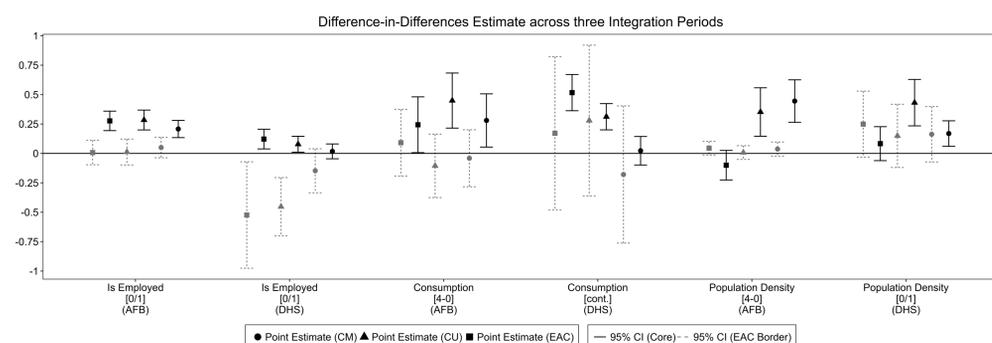
6 Results from the AFB & DHS

	Afrobarometer			DHS		
	Consumption Freq. gone without: [Consumption] (0-4)	Income Is Employed (0/1)	Income Occupation Type [Agr.-Worker-Prof.] (1-3)	Consumption Wealth Index [Assets] (cont.) (0-1)	Income Is Employed (0/1)	Income Paid in Cash (0/1)
Sample Mean of Dep. Var.	[1.36]	[0.31]	[1.77]	[-0.69]	[0.18]	[0.52]
EAC Border (0-1) * EAC 1[t ≥ 2001]	-0.040 (0.223)	0.029 (0.084)	0.112 (0.065)	-0.009 (0.370)	-0.218**	0.402 (0.348)
Core (0/1) * EAC 1[t ≥ 2001]	-0.315*** (0.060)	0.242*** (0.009)	-0.357*** (0.042)	0.464*** (0.135)	0.041** (0.018)	0.045 (0.033)
Full Controls	YES	YES	YES	YES	YES	YES
Country-Year Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	37,137	26,225	21,821	54,271	48,703	63,728
R-Squared	0.13	0.24	0.32	0.46	0.16	0.18

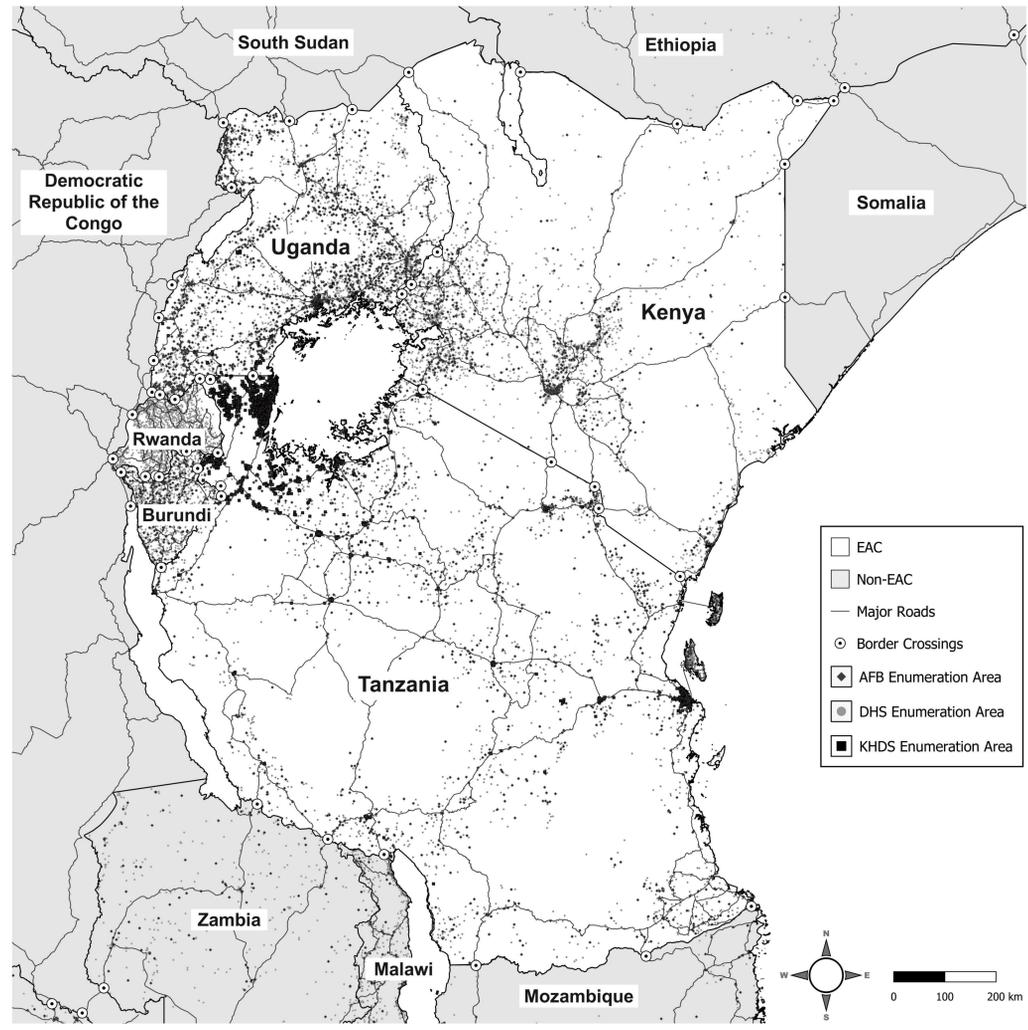
Notes: The results in each column are produced by a separate regression. In columns (1) through (3), data come from the Kenya, Uganda and Tanzania Afrobarometer surveys rounds 1 through 7. In columns (4) through (6), data come from the Kenya, Uganda and Tanzania Demographic and Health surveys (DHS) sampled between 1999 and 2020. EAC Border (0-1) is the inverse, relative within country distance to the nearest EAC border crossing. EAC 1[t ≥ 2001] switches on for individuals sampled from the second half of 2001 onwards. Core (0/1) is a dummy indicating individuals living in core agglomerations in their respective countries. All regressions include basic controls for respondent's age, gender, education, and the geographic controls average monthly temperature, avg. monthly rainfall, elevation, ruggedness, as well as dummies indicating closeness to harbors, lakes and navigable rivers. The regressions also include and country-year fixed effects. The sample mean of the respective dependent variable is given in brackets above the estimates. The standard errors reported allow for spatial correlation, i.e. Conley standard errors are used. ***, **, * represents significance at the 1, 5 and 10 percent level, respectively.

8 Temporal Evolution

We test for **differential effects across the EAC's deepening**, i.e. compare outcomes before the EAC with outcomes in the three distinct integration periods: the initial free trade regiment (EAC) between 2001-2004, the customs union (CU) between 2005-2009, and the common market era (CM) after 2010.



Notes: For comparability between the different measures, we take the inverse of 'Gone without Consumption (AFB)' and re-scale 'Population Density'.



5 Data

We analyze three repeated household-level surveys from Kenya, Uganda and Tanzania.

- Afrobarometer (AFB)**
 - 7 survey waves between 2000 – 2017
 - 39,740 households across 3,570 locales
- Kagera Health and Development Survey (KHDS)**
 - Panel dataset
 - 4 survey waves between 1991-94
 - 2 survey waves in 2004 and 2010, respectively
 - A total of 21,696 individuals across 2,029 locales
 - 3,848 fully re-interviewed respondent-household pairs
- Demographic and Health Surveys (DHS)**
 - 12 survey waves between 1999 – 2020
 - 213,803 households across 8,366 locales

We measure household welfare, as encapsulated by indirect utility (real wages) ω , with a set of income (work, employment, pay) and consumption (food, durable and non-durable assets) indicators.

7 Results from the KHDS

	KHDS					
	Annual p.c. HH. Consumption ('000 TZS)	Annual p.c. HH. Food Consumption ('000 TZS)	Value of Durable Assets ('000 TZS)	Income Is Employed (0/1)	Income Is paid a Salary (0/1)	Income Monthly Salary ('000 TZS)
Sample Mean of Dep. Var.	[553.78]	[349.89]	[112.23]	[0.26]	[0.01]	[1885.04]
EAC Border (0-1) * EAC 1[t = 2004]	-393.115 (790.647)	-129.548 (215.243)	822.506 (653.436)	-0.123 (0.256)	0.043 (0.038)	-57.278 (100.353)
EAC Border (0-1) * CU 1[t = 2010]	-1055.915 (1060.925)	-549.344 (494.346)		-0.191 (0.255)		
Core (0/1) * EAC 1[t = 2004]	360.312** (172.494)	133.157** (61.324)	1706.073*** (121.570)	-0.079 (0.064)	0.021*** (0.008)	25.874*** (9.309)
Core (0/1) * CU 1[t = 2010]	320.019*** (107.173)	103.290** (48.655)		-0.040 (0.039)		
Full Controls	YES	YES	YES	YES	YES	YES
Country-Year Fixed Effects	YES	YES	YES	YES	YES	YES
Individual / Household Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	5,657	5,659	4,573	16,687	14,367	1,817
R-Squared	0.86	0.86	0.94	0.85	0.72	0.99

Notes: The results in each column are produced by a separate regression. Data come from the Kagera Health and Development Surveys (KHDS) collected in 1991-1994, as well as 2004 and 2010. In columns (1) through (3) outcome variables represent aggregate household information, columns (4) through (6) are administered on an individual level. EAC Border (0-1) is the inverse, relative within country distance to the nearest EAC border crossing. EAC 1[2004] switches on for individuals (re-)sampled in 2004. CU 1[2010], switches on for individuals (re-)sampled in 2010, the second re-interview period of the KHDS. Core (0/1) is a dummy indicating individuals living in core agglomerations. All regressions include basic controls for respondent's age, gender, education, as well as the geographic controls avg. monthly temperature, monthly rainfall, elevation, ruggedness, dummies indicating closeness to harbors, lakes and navigable rivers, and also include an indicator whether the household is living in proximity to (former) refugee camps. The regressions testing household-level outcomes, columns (1) through (3), include household fixed effects, the regressions testing individual-level outcomes, columns (4) through (6), include individual fixed effects. All regressions include country-year fixed effects. The sample mean of the respective dependent variable is given in brackets above the estimates. The standard errors reported allow for spatial correlation, i.e. Conley standard errors are used. ***, **, * represents significance at the 1, 5 and 10 percent level, respectively.

9 Conclusion

- We do not observe positive welfare effects of households living closer to the border.
- Rather, our results hint at the **concentration of economic activity in preexisting agglomerations**.
- The estimated effects are persistent over time, albeit non-increasing, which is potentially indicative of a stable agglomerated equilibrium. This is **at odds with Krugman & Elizondo (1996)**, who predicted a dispersion of spatially concentrated developing economies in response to liberalization.

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