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Wild, Frederik; Stadelmann, David

# Working Paper Coastal proximity and individual living standards: Econometric evidence from geo-referenced household surveys

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# Coastal Proximity and Individual Living Standards: Econometric Evidence from Geo-Referenced Household Surveys

Working Paper No. 2021-22

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## Coastal Proximity and Individual Living Standards: Econometric Evidence from Geo-Referenced Household Surveys<sup>\*</sup>

Frederik Wild<sup>†</sup> University of Bayreuth David Stadelmann<sup>‡</sup> University of Bayreuth & CREMA

#### June 2021

Abstract: We investigate geo-referenced household-level data consisting of up to 206,896 individuals living in 21,826 localities across 28 sub-Saharan African countries over 20 years. We analyse the relevance of coastal proximity as a predictor of individual economic living standards. Our setting allows us to account for country-time fixed effects as well as individual-specific controls such as age, gender, and most importantly, urbanity. Results reveal that individuals living further away from the coast are more disadvantaged than individuals living in coastal regions along an array of welfare indicators. The findings are robust to the inclusion of other geographic covariates of development such as climate (e.g. temperature, precipitation), elevation or terrain ruggedness. We also explore mechanisms through which coastal proximity may influence individual welfare and decompose the estimated effect of coastal proximity via formal mediation analysis. Our results highlight the role of human capital as well as infrastructural endowments in reconciling the large intra-national disparities in individual economic welfare.

JEL Classification: O15, O18, R12, O55

Keywords: Geography, Coastal Proximity, Sub-Saharan Africa, Mediation Analysis

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<sup>&</sup>lt;sup>†</sup> University of Bayreuth, Bayreuth, Germany. Corresponding author: Frederik Wild: <u>frederik.wild@uni-bayreuth.de</u>.

<sup>&</sup>lt;sup>‡</sup> University of Bayreuth, Germany; Centre for Behavioural Economics, Society and Technology (BEST); CREMA - Center for Research in Economics, Management and the Arts; and IREF - Institute for Research in Economic and Fiscal Issues; Affiliate of the Ostrom Workshop (IU).

#### I. INTRODUCTION

Cross-country studies investigating the link between physical geography and economic development consistently provide evidence of an independent, positive and statistically significant effect of coastal proximity on national incomes (Bloom et al. 1998; Radelet and Sachs 1998; Gallup et al. 1999; Redding and Venables 2004; Putterman and Weil 2010; UN-OHRLLS 2013; Carmignani 2015). Recent literature analysing subnational variation in economic activity suggests coastal proximity as a relevant factor in explaining within-country income differences (e.g. Motamed et al. 2014; Mitton 2016; Flückiger and Ludwig 2018; Henderson et al. 2018; Jetter et al. 2019).

We exploit a repeated cross-sectional dataset spanning almost 20 years and consisting of up to 206,896 individuals living in 21,826 geo-referenced localities across 28 sub-Saharan African countries. We assess the role of coastal proximity on individual economic welfare and thereby extend the literature employing development indicators at the national or regional level. Our data enable us to control for the influence of individual-level covariates while accounting for country-time specific influences through fixed-effects as well as further geographic and climatic characteristics such as elevation, terrain ruggedness, precipitation, and temperature. The individual level data also allows us to explore factors mediating the relationship between coastal proximity and individual welfare.

Our results suggest that coastal proximity, as measured by continuous geospatial distance to coast, predicts a relevant part of individual economic welfare: Living further away from the sea significantly increases the occurrence of cash-, food-, and medicinal droughts, decreases the likelihood of having (part- or full-time) cash employment, and is associated with lower overall household wealth. The results are robust to the inclusion of covariates and fixed effects, and notably, independent of whether individuals reside in urban or rural areas. Hence, coastal proximity seems to provide additional explanations independent of the well-studied urbanisation-agglomeration nexus influencing development (Young 2013; Motamed et al. 2014; Chauvin et al. 2017; Gollin et al. 2017; Flückiger and Ludwig 2018; Henderson et al. 2018). Exploring mechanisms and decomposing the estimated effect of coastal proximity through mediation analysis highlights human capital as well as infrastructural endowments as likely channels via which differences in individual economic welfare may be explained.



Figure 1: Sample Coverage within Coastal and Landlocked Countries

#### II. DATA AND EMPIRICAL STRATEGY

#### Data

We employ the complete set of the Afrobarometer survey rounds, spanning a timeframe of 20 years (from 1999 to 2018) across seven survey waves (Afrobarometer 2019).<sup>1</sup> Afrobarometer surveys are representative at the national level and respondents are adults of the sampled households. They carry individual- and household level information on basic characteristics, including living conditions, and additionally, provide information on individuals' sentiments towards the economy, democracy, as well as governance and society. Afrobarometer fits Geocoordinates (latitude and longitude) to respondents at the level of their respective enumeration area (BenYishay et al. 2017).<sup>2</sup> The sampling procedure aims for eight individuals/households per EA. Our main (extended) sample of countries consists of up to 126,424 (206,896) individuals living in 14,111 (21,826) geo-referenced localities across 17 (28) sub-Saharan African countries (see Figure 1). The main sample is composed of coastal countries only, allowing us to separate a sheer distance effect from a more general "landlockedness" effect which potentially confounds distance with other influences (UN-OHRLLS 2013; Carmignani 2015). We investigate the extended sample in the section on robustness.

To construct our main explanatory variable of interest, *distance to coast*, we calculate the shortest (ellipsoidal) within-country distance from a respondent's enumeration area to the coastline.<sup>3</sup> We add relevant covariates such as age, age squared, gender as well as a dichotomous indicator of living in urban/rural dwellings to all our specifications. Controlling

<sup>&</sup>lt;sup>1</sup> Surveys were sampled in 1999-2001, 2002-2004, 2005-2006, 2008-2009, 2011-2013, 2014-2015 and 2016-2018, respectively.

<sup>&</sup>lt;sup>2</sup> GPS tracking at survey sampling was only conducted in round 7, the most recent survey wave.

<sup>&</sup>lt;sup>3</sup> We also use the "beeline" distance in robustness tests, i.e. where country borders may be crossed. Shapefile data for country administrative areas as well as the physical coastline come from the Center for Spatial Sciences at the University of California (GADM 2020) and the Natural Earth database (Natural Earth 2018), respectively.

for urbanity allows us to take into account urbanisation-agglomeration aspects potentially affecting the relationship between coastal remoteness and underdevelopment, which has been argued to be particularly relevant in African contexts (see Young 2013; Motamed et al. 2014; Chauvin et al. 2017; Gollin et al. 2017; Flückiger and Ludwig 2018; Henderson et al. 2018). To separate coastal proximity from other geographical influences, we include further geographic covariates that may influence development (see e.g. Mitton 2016; Henderson et al. 2018). These include historical variables such as average temperature and precipitation retrieved from the WorldClim2 database (Fick and Hijmans 2017), as well as topographical characteristics, namely terrain ruggedness and elevation, from Nunn and Puga (2012) and the Shuttle Radar Topography Mission - SRMT (Farr et al. 2007), respectively.

For our main dependent variables of interest, we employ the following set of indicators: We investigate whether survey respondents currently have part- or full-time cash employment (*Cash Employment* (0-1)), whether respondents – or anyone in their family – have experienced cash-, food-, or medicinal droughts within the last year (*How often: Gone without enough* [...] (0-4)) and assess the ownership of common household wealth possessions (*Possessions: Radio, TV*, and *Motor Vehicle* (0-1)).

To explore the potential pathways through which coastal proximity may influence individual living standards, we first analyse individuals' own opinions regarding the most important issue of the country (*Most Important Issue: [Education/Institutions/Infrastructure]* (0-4)) and second, test the lived realities around these concerns (*Years of Schooling (0-18, Institutions Score (1-4)*<sup>4</sup>, *Present in EA: Electricity Grid (0-1)*). We further investigate individuals' sentiments towards supranational organisations aimed at increasing political as

<sup>&</sup>lt;sup>4</sup> To measure the quality of institutions, we construct an "Institutions Score" similar to Mitton (2016), which is based on an array of questions regarding local- authorities, processes and government.

well as economic integration, such as the African Union or the respective Regional Economic Community (*How much does the [AU or ECOWAS/SADC/EAC/IGAD...] help your country?* (0-3)). These institutions have the proclaimed aim to foster the movement of goods and people, and to improve living standards, particularly in economically neglected areas in Africa.

Descriptive statistics for all variables are presented in Table A1 of the Appendix.

#### **Empirical Strategy**

We employ the following regression control approach to analyse the link between coastal proximity and individual economic welfare:

$$Y_{i,c,t} = \alpha + \beta \log(Distance \ to \ Coast)_{i,c,t} + \gamma \mathbf{X}'_{i,c,t} + \delta_{c,t} + \varepsilon_{i,c,t}$$
(1)

 $Y_{i,c,t}$  represents the respective welfare indicator of individual *i* in country *c*, surveyed at time t.<sup>5</sup>  $\beta$  captures the influence of the logged (within-country) distance to coast. Standard errors are clustered at level of the survey enumeration area. Binary dependent variables are estimated through a *Probit* specification, non-binary dependent variables are estimated via OLS.<sup>6</sup>

*X* represents a matrix of control variables which allows us to account for within country influences that may correlate with distance to coast and individual welfare. In contrast to the cross-country literature on the effect of coastal proximity on economic development, our setting allows us to account for country-time fixed effects  $\delta_{c,t}$  such that we can explore a within-country estimate of distance to coast on individual outcomes *independent* of time-specific

<sup>&</sup>lt;sup>5</sup> The time-dimension of our data corresponds to broader survey collection periods, such that time fixed effects represent "survey-wave" fixed effects.

<sup>&</sup>lt;sup>6</sup> Employing a linear probability model (LPM) yields qualitatively identical and quantitatively similar results.

influences as well as country-specific influences at specific points in time, such as the Kenyan Post-Election Crisis of 2007-2008.  $\varepsilon_{i,c,t}$  is an idiosyncratic error term.

Results for the coefficient of interest  $\beta$  from equation (1) can be interpreted as the association between coastal proximity and individual living standards holding these factors constant, and accounting for individual influences such as age, gender, etc. as well as geographic indicators such as urbanity, climatic conditions, terrain ruggedness etc. We explore potential mechanisms and factors affecting the link between coastal proximity and individual living standards through mediation analysis. Numerous robustness checks for the persistence of the observed link are offered.

### **III. RESULTS**

Table 1 presents the main estimation results employing different individual welfare indicators in each column. All results reported include the full set of controls as well as country-time fixed effects and coefficients represent average marginal effects.<sup>7</sup> To facilitate interpretation regarding the effect of the main explanatory variable of interest *log(Distance to Coast)*, we report the predicted change of the respective dependent variable when moving from the minimum distance in the sample (i.e. living at the coast) to living as far as 490km away from the coastline (3<sup>rd</sup> quartile of sample). The predicted change of each individual welfare indicator can then be directly compared to the respective sample mean reported in brackets.

<sup>&</sup>lt;sup>7</sup> Estimations without individual-level controls yield statistically robust results and the absolute magnitude of the coefficients is similar.

				Dependent Variable	Dependent Variable										
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)								
log(Distance to Coast)	-0.015*** (0.002)	0.072***	0.017***	0.066***	-0.011***	-0.064***	-0.006*** (0.001)								
Discrete Change of Distance from the Coast to the 3 <sup>rd</sup> Quartile	-0.090	0.431	0.102	0.396	- <b>0.06</b> 7	-0.380	-0.036								
Sample Mean of Depdendent Var.	[0.39]	[1.91]	[0.98]	[1.16]	[0.74]	[0.47]	[0.30]								
Age	0.006*** (0.000)	0.008*** (0.001)	0.012*** (0.001)	0.017*** (0.001)	0.004*** (0.000)	0.002*** (0.000)	0.002*** (0.000)								
Age^2		-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)											
Female	-0.113*** (0.003)	0.048*** (0.006)	0.042*** (0.006)	0.003 (0.006)	-0.120*** (0.003)	-0.039*** (0.002)	-0.091*** (0.002)								
Urban	0.022*** (0.004)	-0.134*** (0.012)	-0.088*** (0.010)	-0.140*** (0.012)	0.046*** (0.004)	0.136*** (0.005)	0.043*** (0.003)								
Country-Time FE Observations	YES 115,242	YES 120,474	YES 126,426	YES 126,173	YES 102,614	YES 102,372	YES 102,196								
R <sup>2</sup>	0.126	0.177	0.073	0.118	0.0631	0.175	0.203								

#### Table 1: Coastal Proximity and Individual Living Standards

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. McFadden's Pseudo- $R^2$  is reported for binary dependent variables. The standard errors reported are clustered at the survey enumeration area level. \* p < .05, \*\*\* p < .01.

The results systematically indicate that distance to coast is inversely related to individual economic welfare.<sup>8</sup> Increasing individuals' distance to coast to the 3<sup>rd</sup> quartile corresponds to a 9 percentage-point decrease in the probability of having part- or full-time cash-employment and can explain 23% of the occurrence of monetary droughts. Respondents living more distant to the coast report having gone without enough food as well as lacking medicine or medical treatment more frequently. Increases correspond to 10% and 34% of the sample mean of the dependent variable, respectively. Lastly, coastal remoteness is significantly related to fewer wealth possessions: increasing individuals' distance to coast to the 3<sup>rd</sup> quartile corresponds to a 6.7, 38.0 and 3.6 percentage-point decrease in the probability of owning a radio, a tv or a motor vehicle, accordingly.

All results are robust to the inclusion of fixed effects such that the estimate of coastal proximity does not seem to be confounded by country-, time-, as well as country-time-specific determinants that may matter for individual welfare. Nor is it influenced by country-time specific developments (e.g. small scale civil wars in a given year). The relationship also holds over time, i.e. over all survey waves, when estimated separately. Additionally, the influence of remoteness is independent of whether respondents reside in rural or urban regions, i.e. the negative effect distance to coast does not seem to be driven by individuals living in structurally weaker, rural areas, more common in the hinterland of African countries. Coastal remoteness therefore provides additional information in explaining developmental gaps apart from the recently discussed potential advantages from urbanisation in African contexts (see Young 2013; Motamed et al. 2014; Chauvin et al. 2017; Gollin et al. 2017; Flückiger and Ludwig 2018; Henderson et al. 2018).

<sup>&</sup>lt;sup>8</sup> The variation in the number of observation stems from missing values. Particularly, outcome variable 1 was not asked in survey round 1, and outcome variables 5,6, and 7 were not asked in survey rounds 1 and 2.

#### **Robustness Checks**

We provide an array of robustness checks in the appendix: (1) We re-estimate our main results by altering the distance specification to a simple "beeline"<sup>9</sup> (Table A2). (2) We include survey sampling weights (Table A3). (3) We include additional controls relating to geographical and climatic influences such as monthly temperature, rainfall (precipitation), terrain ruggedness, and elevation (Table A4). All robustness checks corroborate our main findings of a negative, independent, and statistically significant relationship between coastal proximity and individual living standards. The results highlight coastal proximity as an influence on individual economic welfare which is quantitatively and statistically distinguishable from other geographic influences suggested in the literature (Mitton 2016; Henderson et al. 2018).

We expand our main sample to include individuals living in landlocked countries (see "Extended Sample" in Figure 1). Thereby, we explore a potential "placebo" group compared to individuals living in coastal countries, allowing us to separate the effect of sheer coastal distance from a nation-specific landlockedness-effect that is usually explored in the literature. The idea is that differences in coastal proximity *within* landlocked countries should influence individual welfare to a lower degree (if at all) since national borders need to be crossed.<sup>10</sup> Indeed, Table A5 suggests that distance to coast does *not* explain within-country differences in living standards in landlocked countries for all but two outcome variables. As expected, individual distance to coast matters mainly for welfare of individuals living in coastal countries. Inhabitants of landlocked countries may suffer from a more general, nation-specific landlockedness-effect (see e.g. UN-OHRLLS 2013; Carmignani 2015).

<sup>&</sup>lt;sup>9</sup> The "beeline" is the simple straight line to the coast, disregarding country-borders.

<sup>&</sup>lt;sup>10</sup> Empirically, we add an interaction term constituted of *log(Distance to Coast)* and a binary variable indicating whether the country is *Landlocked*. The sum of the coefficients *log(Distance to Coast)* and the interaction term represents the total effect of distance to coast for individuals living in landlocked countries.

				Depender	nt Variable			
	Most important Issue : Education (0/1)	<i>Education</i> : Years of Schooling (0-18) -0.438*** (0.017)	Most important Issue : Institutions (0/1) -0.008*** (0.001)	Institutions Score (1-4)	Most important           Issue :           Infrastructure           (0/1)           0.006***           (0.001)	Infrastructure Present in EA : Electricity Grid (0/1) -0.084*** (0.004)	How much do RECs help your country? (0-3) 0.037*** (0.006)	How much does the African Union help your country? (0-3) 0.028*** (0.005)
log(Distance to Coast)	0.003*** (0.001)			0.048*** (0.002)				
Discrete Change of Distance from the Coast to the 3 <sup>rd</sup> Quartile	0.019	-2.624	-0.043	0.288	0.036	-0.547	0.216	0.163
Sample Mean of Depdendent Var.	[0.06]	[7.28]	[0.09]	[2.11]	[0.06]	[0.64]	[1.79]	[1.68]
Age	-0.000*** (0.000)	-0.032*** (0.005)	-0.000*** (0.000)	-0.002*** (0.001)	0.000*** (0.000)	-0.002*** (0.000)	-0.002 (0.002)	-0.006*** (0.002)
Age^2		-0.001*** (0.000)		0.000*** (0.000)			0.000 (0.000)	0.000*** (0.000)
Female	0.001 (0.001)	-1.434*** (0.025)	-0.020*** (0.002)	0.011*** (0.003)	-0.010*** (0.001)	-0.002** (0.001)	-0.031*** (0.009)	-0.020** (0.008)
Urban	-0.001 (0.002)	0.862*** (0.047)	0.013*** (0.002)	-0.058*** (0.006)	-0.014*** (0.002)	0.122*** (0.008)	0.000 (0.014)	0.003 (0.012)
Country-Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	120,132	121,419	120,132	126,355	119,240	115,289	35,356	47,272
$\mathbf{R}^2$	0.0500	0.312	0.0762	0.219	0.0745	0.224	0.104	0.067

### Table 2: Potential Channels of Influence

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. Other controls include dummies for respondent's religious affiliation. For Probit estimations, McFadden's Pseudo-R<sup>2</sup> is reported. The standard errors reported are clustered at the survey enumeration area level. \* p < .05, \*\*\* p < .05.

#### Mechanisms Explaining the Relevance of Coastal Proximity

Table 2 explores mechanisms through which coastal proximity may influence individual welfare. We focus on the link between coastal proximity and educational attainment, institutional quality, infrastructural development and the perceived relevance of regional trade agreements to investigate potential (indirect) channels that explain the negative relationship between distance to coast and individual welfare indicators. Human capital, institution, infrastructure and trade have all been explored in the literature as drivers of differences regarding economic outcomes across countries and regions (see e.g. Frankel and Romer 1999; Acemoglu et al. 2001; Rodrik et al. 2004; Calderón and Servén 2010; Radeny and Bulte 2012; Gennaioli et al. 2013; Storeygard 2016; Feyrer 2019).

Individual educational attainment has been shown to positively affect economic welfare at the cross-regional level (Gennaioli et al. 2013; Flückiger and Ludwig 2018). Consistent with this evidence, we find that individuals living further from the coast more frequently report education as the most important issue (facing the country/government) according to their opinion. This sentiment is mirrored in respondent's reported educational attainment which is significantly lower when living in the interior of countries: moving from the coast to the 3<sup>rd</sup> quartile within the sample reduces completed schooling by 2.6 years, corresponding to about 36% of the sample mean.<sup>11</sup>

Regarding institutions, we proceed similar to Mitton (2016; 107) and construct a variable, *Institutions Score*, which combines responses concerning individuals' experiences with and opinions on local- authorities, offices and government.<sup>12</sup> The results suggest that individuals

<sup>&</sup>lt;sup>11</sup> This large negative link between costal proximity and individual educational attainment is consistent with recent evidence at the cross-regional level (Gennaioli et al. 2013; Flückiger and Ludwig 2018).

<sup>&</sup>lt;sup>12</sup> The score is constituted of 21 questions measuring individuals' trust in (local) courts, police and government, their experience with the procedures of local authorities, especially regarding bribery (corruption), the enforcement of crime, and the ease of handling matters.

living further away from the coast do not report institutions to be at the top of their concerns nor is the institutional score negatively affected when living further way from the coast.<sup>13</sup> In fact, individuals at interior regions evince better institutions compared to coastal areas.

Infrastructure has been highlighted as a relevant factor for regional development (Calderón and Servén 2010; Storeygard 2016; Jetter et al. 2019). Our results at the individual level suggest that distance to coast is positively associated with respondents' sentiments that infrastructure needs are the most important issue. Actual access to infrastructure (measured as access to the electricity grid) is negatively associated with distance to coast. Using alternative measures for infrastructural endowments (such as access to paved roads) reveals analogous results, in terms of quantitative- and statistical significance. Coastal distance may therefore matter for individual welfare by way of inadequate infrastructural provisions.

Survey respondents further away from the coast exhibit higher tendency to report Regional Economic Communities (RECs) or the African Union (AU) as helpful to their country. While the impact of these mechanisms is quantitatively smaller compared to educational- or infrastructural factors, these results suggest integration measures as relevant for individual welfare. Reduced market access in remote areas can explain this finding. The issue of lacking market access has recently shown to matter to a relevant degree in developmental settings (Henderson et al. 2018; Donaldson 2018; Jedwab and Storeygard 2020).

#### **Mediation Analysis**

To further evaluate the link between coastal proximity, its potential channels of influence and individual welfare, we conduct a formal mediation analysis. We empirically decompose the total effect of coastal proximity and individual welfare into *indirect effects*, i.e. effects which

<sup>&</sup>lt;sup>13</sup> Recent literature has also found a weak link between institutions and subnational development (Radeny and Bulte 2012; Michalopoulos and Papaioannou 2014; Mitton 2016). Our results certainly do not suggest any negative link between distance to coast and (perceived) institutional quality.

run through the proposed mediating factors, and *direct effects*, i.e. effects of coastal proximity that are unrelated to the proposed channels.

We employ the following system of equations to conduct this analysis:

$$Y_{i,c,t} = \alpha_1 + \beta_1 \log(Distance \ to \ Coast)_{i,c,t} + \theta M_{i,c,t} + \gamma_1 X'_{i,c,t} + \delta_{c,t} + \varepsilon_{i,c,t}$$
(2)

$$M_{i,c,t} = \alpha_2 + \beta_2 \log(Distance \ to \ Coast)_{i,c,t} + \gamma_2 \mathbf{X}'_{i,c,t} + \delta_{c,t} + \mu_{i,c,t}.$$
(3)

 $\beta_1$  measures the *direct effect* of coastal proximity on our different welfare indicators *Y*, and  $\beta_2$  measures the effect of distance to coast on the respective mediator *M* (e.g. education or infrastructure).  $\theta$  represents the direct effect of the mediator *M* on the outcome variable such that the *indirect effect* is retrieved by multiplying  $\beta_2 * \theta$  (Alwin and Hauser 1975; MacKinnon et al. 2007). The total effect is given by a summation of the *direct* ( $\beta_1$ ) and *indirect effects* ( $\beta_2 * \theta$ ).<sup>14</sup> Figure A1 provides a visual representation of the mediation analysis.<sup>15</sup>

Table 3 and 4 report the coefficients of the total, direct and indirect effects of coastal proximity on individual economic welfare. Estimations are preformed via generalized structural equation modelling (GSEM).<sup>16</sup> To save space, we present the mechanisms on which distance to coast had the largest quantitative impact, *Education* and *Infrastructure*, and estimate their mediating effect on all of our outcome variables (results for our proxies of *Institutions* and *Trade* are relegated to the appendix, in Tables A6, A7 and A8, respectively). The estimations include all of our usual control variables as well as country-time fixed effects to evaluate a stringent setting.

The results in Table 3 suggest that a substantial part of the total effect of distance to coast is mediated by educational attainment. Including respondents' completed years of schooling in

<sup>&</sup>lt;sup>14</sup> Slight deviations in coefficients between the total effect in Table 1 and Table 3 arise because of missing values of the respective mediator variables.

<sup>&</sup>lt;sup>15</sup> The figure depicts the analysis using column (1) of Table 3 as an example.

<sup>&</sup>lt;sup>16</sup> The combined/multiplied effect is retrieved via a non-linear combination of coefficients, i.e. STATA's *nlcom* command.

the main specification (equation 2) reduces the coefficient size of the direct effect of coastal proximity by 67% (see *proportion mediated* at the bottom of the table) on average. Distance to coast matters for educational outcomes, and through education, it subsequently matters for individuals' living standards. In two cases, column (4) and (7), the coefficient on the direct effect of distance to coast becomes statistically indistinguishable from zero, i.e. the effect on having gone without food or possessing a motor vehicle purely stems from its link with educational endowments. The direct effect of education on living standards is quantitively large and statistically significant throughout all estimations, indicating a relevant effect of education on economic welfare in general. These results are in line with cross-country and subnational evidence, identifying educational differences as an important factor for explaining disparities in economic welfare (Skoufias and Katayama 2011; Gennaioli et al. 2013; Chauvin et al. 2017).

Table 4 gives the analogous results, testing infrastructure's role employing the dichotomous indicator of access to an electricity grid. While part of the link between individual welfare and distance to coast is direct, a non-negligible part of is indirect, i.e. the mediator *Infrastructure* is picking up a substantial part of the total effect of coastal distance, in similar magnitude as do educational differences.

				Dependent Variable			
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)
Baseline (Total) Effect: log(Distance to Coast)		0.072*** (0.005)		0.063*** (0.005)	-0.011*** (0.001)	-0.059*** (0.002)	-0.006*** (0.001)
	-0.014*** (0.002)		0.016*** (0.004)				
Direct Effect:							
log(Distance to Coast)	-0.007*** (0.002)	0.048*** (0.00425)	-0.005 (0.00396)	0.042*** (0.00447)	-0.003** (0.001)	-0.046*** (0.002)	0.001 (0.001)
Indirect Effect:			· · · ·				
Distance to Coast via Education	-0.007*** (0.000)	0.024*** (0.001)	0.021*** (0.001)	0.021*** (0.001)	-0.008*** (0.000)	-0.013*** (0.001)	-0.007*** (0.000)
Direct Effect of Mediator:							
Education	0.016*** (0.000)	-0.055*** (0.00103)	-0.047*** (0.000943)	-0.049*** (0.000974)	0.018*** (0.000)	0.031*** (0.000)	0.017*** (0.000)
Proportion Mediated	[0.52]	[0.33]	[1.32]	[0.34]	[0.73]	[0.22]	[1.23]
Controls	YES	YES	YES	YES	YES	YES	YES
Country-Time FE	YES	YES	YES	YES	YES	YES	YES
Observations	110,064	115,223	121,131	120,891	98,167	97,961	97,786

### Table 3: Mediation Analysis: Direct and Indirect Links of Distance to Coast and Mediation through Education

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. Other controls include dummies for respondent's religious affiliation. For Probit estimations, McFadden's Pseudo-R<sup>2</sup> is reported. The standard errors reported are clustered at the survey enumeration area level. \* p < .1, \*\* p < .05, \*\*\* p < .01.

				Dependent Variable			
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)
Baseline (Total) Effect:		0.074*** (0.005)		0.072*** (0.005)	-0.011*** (0.001)	-0.059*** (0.002)	-0.006*** (0.001)
log(Distance to Coast)	-0.016*** (0.002)		0.019*** (0.004)				
Direct Effect:							
log(Distance to Coast)	-0.009*** (0.002)	0.043*** (0.005)	-0.006 (0.004)	0.034*** (0.005)	-0.004*** (0.001)	-0.035*** (0.002)	0.000 (0.001)
Indirect Effect:							. ,
Distance to Coast via Infrastructure	-0.006*** (0.000)	0.031*** (0.002)	0.025*** (0.001)	0.038*** (0.002)	-0.006*** (0.000)	-0.025*** (0.001)	-0.006*** (0.000)
Direct Effect of Mediator:							
Infrastructure (Electricity Grid)	0.080*** (0.004)	-0.398*** (0.012)	-0.320*** (0.012)	-0.483*** (0.013)	0.085*** (0.004)	0.331*** (0.005)	0.083*** (0.004)
Proportion Mediated	[0.40]	[0.42]	[1.33]	[0.53]	[0.60]	[0.41]	[1.01]
Controls	YES	YES	YES	YES	YES	YES	YES
Country-Time FE	YES	YES	YES	YES	YES	YES	YES
Observations	114,674	114,639	115,023	114,777	102,219	101,990	101,806

#### Table 4: Mediation Analysis: Direct and Indirect Links of Distance to Coast and Mediation through Infrastructure

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. Other controls include dummies for respondent's religious affiliation. For Probit estimations, McFadden's Pseudo-R<sup>2</sup> is reported. The standard errors reported are clustered at the survey enumeration area level. \* p < .05, \*\*\* p < .05, \*\*\* p < .01.

Table A6 explores the role of institutions in explaining the economic underdevelopment of remote areas. Contrary to human capital- and infrastructural endowments, the pronounced gap in living standards across distances does not seem to arise from differences in institutional quality, as can be depicted from the seemingly unchanged direct effect of distance. Hence, while institutional quality seems to positively affect within-country individual living standards, this effect does not seem to systematically operate along coastal distance.

The influence of coastal proximity on economic development has been often ascribed to trade-related factors, especially among "late developers" (see Henderson et al. 2018). Table A7 and A8 explore this link, estimating the direct and indirect effect of regional and supra-regional institutions fostering trade, as measured by respondents' evaluation of the African Union (AU) and their "corresponding" Regional Economic Community (REC), respectively.<sup>17</sup> The results show that, independent of coastal proximity, more *effective* trade institutions positively correlate with individual living standards. Hence, while distance to coast influences sentiments towards trade promoting institutions (Table 2), differences in their effectiveness do not seem to reconcile developmental disparities across distance, providing suggestive evidence against trade-related influence of coastal proximity.

#### **IV.** CONCLUSION

This article investigates the role of coastal proximity in explaining intra-national differences in individual living standards across sub-Saharan Africa economies. We employ geo-referenced household-level to complement the existing literature that focused on the effects of national or regional landlockedness.

Our results show that coastal proximity predicts a relevant part of individual living standards even when controlling for country-time fixed effects and an array of individual

<sup>&</sup>lt;sup>17</sup> The question asks "how much does the following [AU/REC] do to help your country?".

controls. Also, compared to established geographical influences of development (i.e. elevation, ruggedness, temperature, and rainfall), coastal proximity appears to be robust and an independently relevant predictor of individual living standards within coastal economies. Notably, our findings are independent of whether respondents reside in rural or urban areas, providing stimulating evidence in light of the recent urbanisation-agglomeration explanations of regional backwardness.

Exploring potential channels, we find that human capital as well as access to infrastructure provisions moderate relevant parts of the link between coastal proximity and economic backwardness. Distance to coast does not moderate the effect of institutional quality or effectiveness of supra-national trade authorities on individual welfare. This points to the relevance of policy decisions to foster education and infrastructure outlays, particularly in non-coastal areas.

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# **ONLINE APPENDIX**

Coastal Proximity and Individual Living Standards: Econometric Evidence from Geo-Referenced Household Surveys in sub-Saharan Africa





	Distribution across Sample						
	Mean	St. Dev	1st Quartile	Median	3rd Quartile	Max.	N
Basic Characteristics							
Age	36.2	14.2	25	33	45	130	126,970
Female	0.50	0.50	0	1	1	1	128,257
Residence: Rural (0-1)	0.48	0.50	0	0	1	1	126,970
Distance to Coast (in km)	329.5	276.7	91.6	284.7	490.4	1663.2	128,282
Geographical Covariates							
Average Monthly Temperature (in Celsius)	26.0	3.8	23.5	27.5	28.8	32.6	128,282
Average Monthly Rainfall (in mm)	107	63	67	93	126	384	128,282
Terrain Ruggedness (standardised)	-0.2	0.6	-0.5	-0.4	-0.1	11	128,282
Elevation (in m)	542.5	592.3	49	278	1094	3914	128,282
				Distribution a	cross Distance		
	Mean	St. Dev	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile	N
Dependent Variables							
(Cash-)Employment (0-1)	0.39	0.49	0.38	0.38	0.39	0.40	116,454*
How often: Gone without Cash-Income (0-4)	1.91	1.36	1.86	2.00	1.88	1.90	121,954
How often: Gone without Food (0-4)	0.98	1.17	0.98	1.00	0.98	0.96	127,931
How often: Gone without Medical Care (0-4)	1.16	1.27	1.13	1.23	1.15	1.14	127,679
Possessions: Radio (0-1)	0.74	0.44	0.75	0.73	0.75	0.74	103,419 <sup>†</sup>
Possessions: TV (0-1)	0.47	0.50	0.59	0.45	0.45	0.39	$103,174^{\dagger}$
Possessions: Motor Vehicle (0-1)	0.30	0.46	0.31	0.26	0.31	0.31	102,998 <sup>†</sup>
Pathways							
Most Important Issue : Education (0-1)	0.06	0.24	0.06	0.07	0.06	0.05	121,580
Most Important Issue: Institutions (0-1)	0.09	0.29	0.09	0.07	0.09	0.11	121,580
Most Important Issue: Infrastructure (0-1)	0.06	0.24	0.05	0.08	0.06	0.06	121,580
Education (0-18)	7.23	4.98	7.64	6.60	7.85	6.81	122,828
Institutions Score (1-4)	2.12	0.64	2.10	2.09	2.12	2.15	127,864
Present in EA: Electricity Grid (0-1)	0.64	0.48	0.76	0.61	0.58	0.59	116,508*
How Much do REC's help? (0-4)	1.80	0.97	1.70	1.73	1.95	1.76	35,644 <sup>‡</sup>
How Much does the AU help? (0-4)	1.68	0.99	1.64	1.66	1.75	1.64	47,659 <sup>‡</sup>

Notes: The table depicts summary statistics corresponding to the main sample used in estimations across the paper. Data encompasses individual-level responses from 17 coastal countries in sub-Saharan Africa and come from the 1999-2001, 2002-2004, 2005-2006, 2008-2009, 2011-2013, 2014-2015 and 2016-2018 (i.e. Round 1 through Round 7) Afrobarometer geo-referenced survey rounds. Variation in observation size stem from changes in questions asked across survey and from non-responses. Climatic covariates as well as elevation data come from the 2020 WorldClim (see https://worldclim.org). We use the Nunn and Puga (2012) database for terrain ruggedness. \* Not asked in survey round 1. <sup>†</sup> Not asked in survey round 1

	Dependent Variable									
	(Cash-) Employment (0/1) -0.018*** (0.001)	How often : Gone without enough Cash- Income (0-4) 0.075*** (0.004)	How often : Gone without enough Food to Eat (0-4) 0.017*** (0.004)	How often : Gone without enough Medical Care (0-4) 0.074*** (0.004)	Possessions : Radio (0/1) -0.012*** (0.001)	Possessions : TV (0/1) -0.069*** (0.002)	Possessions : Motor Vehicle (0/1) -0.003* (0.001)			
log(Distance to Coast)										
Discrete Change of Distance from the Coast to the $3^{rd}$ Quartile	-0.102	0.441	0.100	0.435	-0.071	-0.402	-0.015			
Sample Mean of Depdendent Var.	[0.39]	[1.91]	[0.98]	[1.16]	[0.74]	[0.47]	[0.30]			
Age	0.006*** (0.000)	0.008*** (0.001)	0.012*** (0.001)	0.017*** (0.001)	0.004*** (0.000)	0.002*** (0.000)	0.002*** (0.000)			
Age^2		-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)						
Female	-0.113*** (0.003)	0.048*** (0.006)	0.042*** (0.006)	0.003 (0.006)	-0.120*** (0.003)	-0.039*** (0.002)	-0.091*** (0.002)			
Urban	0.020*** (0.004)	-0.126*** (0.011)	-0.087*** (0.010)	-0.131*** (0.012)	0.045*** (0.004)	0.126*** (0.005)	0.044*** (0.004)			
Country-Time FE Observations	YES 115,242	YES 120,474	YES 126,426	YES 126,173	YES 102,614	YES 102,372	YES 102,196			
K <sup>-</sup>	0.126	0.179	0.073	0.120	0.0634	0.185	0.203			

### Table A2: Individual Living Standards and Coastal Proximity: "beeline" as a Distance Measure

Notes: Distance to Coast is measure by a simple *beeline* distance. Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. McFadden's Pseudo- $R^2$  is reported for binary dependent variables. The standard errors reported are clustered at the survey enumeration area level. \* p < .1, \*\* p < .05, \*\*\* p < .01.

	Dependent Variable										
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)				
log(Distance to Coast)	-0.015***	0.068***	0.016***	0.064***	-0.011***	-0.062***	-0.006***				
	(0.002)	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)				
Discrete Change of Distance from the Coast to the 3 <sup>rd</sup> Quartile	-0.089	0.408	0.096	0.384	-0.066	-0.373	-0.036				
Sample Mean of Depdendent Var.	[0.39]	[1.92]	[0.98]	[1.16]	[0.74]	[0.47]	[0.30]				
Age	0.006***	0.008***	0.012***	0.017***	0.004***	0.002***	0.002***				
	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)				
Age^2		-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)							
Female	-0.113***	0.053***	0.044***	0.002	-0.120***	-0.039***	-0.091***				
	(0.003)	(0.007)	(0.006)	(0.007)	(0.003)	(0.003)	(0.003)				
Urban	0.023***	-0.135***	-0.089***	-0.135***	0.047***	0.137***	0.039***				
	(0.004)	(0.012)	(0.011)	(0.013)	(0.004)	(0.006)	(0.004)				
Country-Time FE	YES	YES	YES	YES	YES	YES	YES				
Observations	115,242	120,474	126,426	126,173	102,614	102,372	102,196				
R <sup>2</sup>	0.127	0.174	0.073	0,116	0.0640	0.174	0.204				

### Table A3: Individual Living Standards and Coastal Proximity: Including Survey Weights

Notes: Estimates are weighted by the survey sample weights provided. Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. McFadden's Pseudo-R<sup>2</sup> is reported for binary dependent variables. The standard errors reported are clustered at the survey enumeration area level. \* p < .1, \*\* p < .05, \*\*\* p < .01.

	Dependent Variable									
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)			
log(Distance to Coast)	-0.015***	0.077***	0.034***	0.081***	-0.014***	-0.066***	-0.010***			
	(0.002)	(0.007)	(0.006)	(0.007)	(0.002)	(0.003)	(0.002)			
Discrete Change of Distance from the Coast to the 3 <sup>rd</sup> Quartile	-0.087	0.461	0.204	0.485	-0.089	-0.397	-0.061			
Sample Mean of Depdendent Var.	[0.39]	[1.91]	[0.98]	[1.16]	[0.74]	[0.47]	[0.30]			
Age	0.006***	0.008***	0.012***	0.017***	0.004***	0.002***	0.002***			
	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)			
Age^2		-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)						
Female	-0.113***	0.048***	0.042***	0.003	-0.120***	-0.039***	-0.091***			
	(0.003)	(0.006)	(0.006)	(0.006)	(0.003)	(0.002)	(0.002)			
Urban	0.022***	-0.130***	-0.085***	-0.136***	0.044***	0.133***	0.043***			
	(0.004)	(0.011)	(0.010)	(0.012)	(0.003)	(0.005)	(0.004)			
Monthly Temperature	-0.010***	0.038***	0.030***	0.034***	-0.007***	-0.008***	-0.002			
	(0.002)	(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)			
Monthly Rainfall (Standardised)	0.005	-0.017**	-0.013	-0.031***	0.012***	0.043***	-0.008***			
	(0.003)	(0.009)	(0.009)	(0.010)	(0.003)	(0.004)	(0.003)			
Elevation	-0.000	0.000	-0.000*	-0.000	0.000	0.000*	0.000			
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
Terrain Ruggedness (Standardised)	-0.001	0.013	0.001	0.020**	-0.003	-0.012**	-0.010***			
	(0.003)	(0.009)	(0.008)	(0.010)	(0.003)	(0.005)	(0.003)			
Country-Time FE	YES	YES	YES	YES	YES	YES	YES			
Observations	115,242	120,474	126,426	126,173	102,614	102,372	102,196			
R <sup>2</sup>	0.127	0.180	0.077	0.122	0.0647	0.180	0.204			

## **Table A4:** Individual Living Standards and Coastal Proximity: Adding Geographical Covariates

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. McFadden's Pseudo-R2 is reported for binary dependent variables. The standard errors reported are clustered at the survey enumeration area level. \* p < .1, \*\* p < .05, \*\*\* p < .01.

				Dependent Variable			
	(Cash-) Employment (0/1)	How often : Gone without Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)
log(Distance to Coast)	-0.015*** (0.002)	0.071*** (0.005)	0.016*** (0.004)	0.066*** (0.005)	-0.011*** (0.001)	-0.062*** (0.002)	-0.005*** (0.001)
Interaction:			( )			· · · ·	( )
Log Distance*Landlocked	0.006 (0.010)	-0.044* (0.026)	-0.035 (0.026)	0.010 (0.025)	-0.001 (0.008)	-0.027** (0.013)	0.014* (0.009)
Age	0.028*** (0.000)	0.011*** (0.001)	0.013*** (0.001)	0.018*** (0.001)	0.015*** (0.000)	0.010*** (0.000)	0.010*** (0.000)
Age^2	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Female	-0.115*** (0.002)	0.055*** (0.005)	0.053*** (0.005)	0.002 (0.005)	-0.126*** (0.002)	-0.037*** (0.002)	-0.088*** (0.002)
Urban	0.037*** (0.003)	-0.179*** (0.010)	-0.136*** (0.009)	-0.158*** (0.009)	0.061*** (0.003)	0.172*** (0.005)	0.054*** (0.003)
Isolated Effect of the Distance to C	Coast in Landlocked	Countries					
Combined Effect:							
Log Distance + Interaction	-0.009 (0.010)	0.027 (0.025)	-0.019 (0.025)	0.076*** (0.025)	-0.011 (0.008)	-0.089*** (0.013)	0.010 (0.008)
Country-Time FE	YES	YES	YES	YES	YES	YES	YES
Observations	188,133	200,806	206,896	206,371	166,171	165,837	165,620
$R^2$	0.150	0.169	0.094	0.110	0.075	0.233	0.268

Table A5: Individual Living Standards and Coastal Proximity: Placebo Tests Employing Individuals in Landlocked Countries

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. McFadden's Pseudo-R2 is reported for binary dependent variables. The standard errors reported are clustered at the survey enumeration area level. \* p < .05, \*\*\* p < .01.

				Dependent Variable			
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)
Baseline (Total) Effect:		0.072*** (0.005)		0.066*** (0.005)	-0.011*** (0.001)	-0.063*** (0.002)	-0.006*** (0.001)
log(Distance to Coast)	-0.015*** (0.002)		0.017*** (0.004)				
Direct Effect:							
log(Distance to Coast)	-0.0152*** (0.002)	0.0777*** (0.005)	0.0230*** (0.004)	0.0732*** (0.005)	-0.0103*** (0.001)	-0.0623*** (0.002)	-0.00600*** (0.001)
Indirect Effect:							
Distance to Coast via Institutions Score	0.000 (0.000)	-0.005*** (0.000)	-0.006*** (0.000)	-0.007*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	0.000 (0.000)
Direct Effect of Mediator:					. ,		
Institutions Score	-0.004 (0.003)	-0.121*** (0.008)	-0.125*** (0.007)	-0.156*** (0.008)	-0.0120*** (0.003)	-0.0257*** (0.003)	-0.003 (0.002)
Proportion Mediated	[0.01]	-[0.07]	-[0.35]	-[0.11]	[0.05]	[0.02]	[0.02]
Controls	YES	YES	YES	YES	YES	YES	YES
Country-Time FE	YES	YES	YES	YES	YES	YES	YES
Observations	114,946	120,139	126,058	125,804	102,309	102,070	101,894

#### Table A6 Mediation Analysis: Direct and Indirect Links of Distance to Coast and Mediation through Institutions

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. Other controls include dummies for respondent's religious affiliation. For Probit estimations, McFadden's Pseudo-R<sup>2</sup> is reported. The standard errors reported are clustered at the survey enumeration area level. \* p < .05, \*\*\* p < .05, \*\*\* p < .01.

_				Dependent Variable			
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)
Baseline (Total) Effect:		0.063*** (0.007)		0.043*** (0.007)	-0.005** (0.002)	-0.041*** (0.003)	-0.005* (0.002)
log(Distance to Coast)	-0.018*** (0.002)		0.004 (0.006)				
Direct Effect:							
log(Distance to Coast)	-0.0179*** (0.002)	0.0644*** (0.007)	0.005 (0.006)	0.0444*** (0.007)	-0.00545** (0.002)	-0.0411*** (0.003)	-0.00505** (0.002)
Indirect Effect:							
Distance to Coast via African Union	0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Direct Effect of Mediator:							
Effectiveness: African Union	0.00965*** (0.002)	-0.0390*** (0.007)	-0.0386*** (0.006)	-0.0399*** (0.006)	0.0104*** (0.002)	0.0111*** (0.002)	0.0159*** (0.002)
Proportion Mediated	-[0.01]	-[0.02]	-[0.28]	-[0.03]	-[0.06]	-[0.01]	-[0.11]
Controls	YES	YES	YES	YES	YES	YES	YES
Country-Time FE	YES	YES	YES	YES	YES	YES	YES
Observations	35,164	47,024	47,179	47,080	39,844	39,820	39,738

Table A7: Mediation Analysis: Direct and Indirect Links of Distance to Coast and Mediation through Trade (African Union)

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. Other controls include dummies for respondent's religious affiliation. For Probit estimations, McFadden's Pseudo-R<sup>2</sup> is reported. The standard errors reported are clustered at the survey enumeration area level. \* p < .05, \*\*\* p < .05, \*\*\* p < .01.

	Dependent Variable						
	(Cash-) Employment (0/1)	How often : Gone without enough Cash- Income (0-4)	How often : Gone without enough Food to Eat (0-4)	How often : Gone without enough Medical Care (0-4)	Possessions : Radio (0/1)	Possessions : TV (0/1)	Possessions : Motor Vehicle (0/1)
Baseline (Total) Effect:							
log(Distance to Coast)	-0.012*** (0.003)	0.064*** (0.009)	0.008 (0.008)	0.043*** (0.008)	-0.002 (0.003)	-0.033*** (0.003)	-0.003 (0.003)
Direct Effect:							
log(Distance to Coast)	-0.0119*** (0.003)	0.0652*** (0.009)	0.009 (0.008)	0.0440*** (0.008)	-0.003 (0.003)	-0.0333*** (0.004)	-0.004 (0.003)
Indirect Effect:					. ,		. ,
Distance to Coast via RECs	0.000*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Direct Effect of Mediator:							
Effectiveness: RECs	0.0104*** (0.003)	-0.0310*** (0.009)	-0.0413*** (0.007)	-0.0376*** (0.008)	0.0124*** (0.003)	0.0149*** (0.003)	0.0147*** (0.003)
Proportion Mediated	-[0.03]	-[0.02]	-[0.20]	-[0.03]	-[0.20]	-[0.02]	-[0.19]
Controls	YES	YES	YES	YES	YES	YES	YES
Country-Time FE	YES	YES	YES	YES	YES	YES	YES
Observations	35,164	35,175	35,277	35,228	27,702	27,694	27,634

Table A8: Mediation Analysis: Direct and Indirect Links of Distance to Coast and Mediation through Trade (RECs)

Notes: Binary dependent variables are estimated through a Probit specification and coefficients represent average marginal effects. Other controls include dummies for respondent's religious affiliation. For Probit estimations, McFadden's Pseudo-R<sup>2</sup> is reported. The standard errors reported are clustered at the survey enumeration area level. \* p < .1, \*\* p < .05, \*\*\* p < .01.