"Glocalizing" digital policymaking: the impact of the EU Digital for Development (D4D) policy on ICT policy adoption in the Global South

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Abstract

As the notions of "digital sovereignty" and "digital colonialism" are gaining increasing political and scholarly attention, this paper examines how the EU's regulatory approach to the digital space affects the adoption of digital policies in developing regions. While noting the global reach of the EU's most prominent digital policies and their role in asserting "digital sovereignty" vis-à-vis big technology companies, the paper argues that the EU reinforces the diffusion of its own regulation-oriented perspective of "digital sovereignty" through its Digital4Development policy and the Global Gateway. It further hypothesizes that a solid regulatory framework would provide the tools for developing countries to avert "digital colonialism". Since the Digital4Development policy and Global Gateway focus primarily on Africa, a regression analysis tests to what extent this geographical emphasis affects digital policy adoption among developing countries from different macro-regions. The preliminary findings suggest that, indeed, countries in Africa are more likely to adopt digital policies compared to developing countries in other regions. The early conclusion is that the EU's own regulation-based approach to "digital sovereignty" combined with its Digital4Development focus on Africa may help deter practices of "digital colonialism" by big technology companies.

Note to the reader:

This is an early attempt to conceptualize EU-Africa relations in the digital realm through the lens of "digital sovereignty" and "digital colonialism". Any suggestions pointing at relevant branches of literature or useful concepts and notions are highly appreciated.

1. Introduction

Digital policy adoption can be crucial for developing countries to resist "digital colonialism". While the European Union has been driving the global momentum for digital policymaking, its influence on domestic policy adoption in developing countries and Africa in particular is largely overlooked. However, the EU's strategy on digital development in the Global South shows that the bloc does not solely rely on the "Brussels effect" to diffuse its regulatory approach to the digital space. The Digital4Development (D4D) policy and the Global Gateway reveal a distinct geographic focus on Africa—the continent that finds itself between the historical influence of the Old Continent and the increasingly assertive presence of China. This paper therefore inquires:

1) To what extent does the geographic focus in the D4D policy affect digital policy adoption in developing countries and, therefore, make them more resilient against digital colonialism?

2) To what extent does Chinese influence through the Belt and Road Initiative (BRI) enhance or mitigate the EU's effects on ICT policy adoption?

As the EU emerged as a forerunner in digital policymaking, many of its policies are explicitly or implicitly intended to uphold the "digital sovereignty" of the EU and its member states. Although the concept is not clearly defined, the EU has perfected the art of drafting regulations that shield EU member states and European users from the pervasive influence of big technology companies, mainly from the United States and China. However, due to the "Brussels effect", the apparent protection is not limited to European users. Instead, EU digital policies became the regulatory benchmark both inside and outside its borders. The most wide-reaching implications of this global reach are found in developing regions.

While the EU increasingly focuses on "digital sovereignty", many developing countries are concerned that the technology and business models of big companies and online platforms give rise to a new form of "digital colonialism". In an age where data is the new oil (Coleman, 2019), developing countries with patchy regulations and weak cybersecurity infrastructures are particularly prone to "data extractivism". Data from users in poor countries may be exploited for commercial reasons and, more worryingly, underpin human rights violations. Anecdotal evidence abounds on authoritarian regimes across Africa being accused of intercepting digital communications of political opponents or persecuted minorities. Although the EU flagship digital policies set promising standards to avert data-

related discrimination and abuse, the profoundly different context of developing countries dissuades from transplanting the same policies.

The adoption of digital policies in individual countries is therefore crucial. Based on the ICT Regulatory Tracker Score by the International Telecommunication Union, the paper employs multivariate regression analysis to measure the differences in policy adoption rates between macro-regions while controlling for several economic variables and BRI membership. The hypothesis is that developing countries in Africa yield higher digital policy adoption rates compared to developing countries in other regions because of its special position in the EU's digital development strategies.

The paper contributes to two distinct but related literature debates. On the one hand, the EU's influence on digital policy adoption in Africa illustrates that the regulatory "hegemony" of the EU achieves its global reach not only through the "Brussels effect" but also through other policy diffusion mechanisms. In fact, the analysis suggests that the EU's D4D policy and Global Gateway incentivize digital policymaking in developing regions, calling for a consideration of what the EU's digital sovereignty aspirations entail for developing regions and, especially, Africa. On the other hand, the paper advances discussions on global cooperation and geopolitical tensions by touching on the strategic competition between the European Union and China (Zeitz, 2020). In particular, the analysis also lends itself to examine whether China and the European Union are partners or rivals in the digital development of developing countries.

The next section explores various understandings of "digital sovereignty" and what the concept implies in the EU context. Section 3 takes the perspective of Africa as one of the focus regions for both the EU and China and this position interacts with the idea of "digital colonialism". Section 4 sets out the empirical analysis. Section 5 discusses the findings in view of "digital sovereignty" and "digital colonialism". Section 6 concludes.

2. The concept of "digital sovereignty" from an EU perspective

"Digital sovereignty" is not a clearly defined concept; yet, it has entered the political discourse around the world with different connotations and meanings (Glasze et al., 2023). When tracing the origins of "digital sovereignty", scholars highlight that sovereignty has an internal and external dimension (Pohle & Thiel, 2020). Internal sovereignty implies the supreme power over the territory of the state while external sovereignty refers to a state's independence vis-à-vis other states. In contrast to any notion of sovereignty, "cyber exceptionalism" and "multi-stakeholder internet governance" have governed the online

space since the 1990s. Yet, more recently various nations and regional blocs have sought to reaffirm their sovereignty in the digital sphere (Pohle & Thiel, 2020). The desire to reaffirm sovereignty arises from the perceived threats to the security of national infrastructures, to economic autonomy and competition, or to user autonomy and individual self-determination.

The emphasis and understanding of the concept vary between regions as well as democratic and authoritarian states. For instance, in the United States "digital sovereignty" is associated with negative connotations, viewing it as a tool by authoritarian governments like China to restrict access and content on the Internet (Couture & Toupin, 2019). Indeed, the term "cyber sovereignty" gained prominence after a Chinese white paper in 2010 used it to affirm that the Internet in China falls under the jurisdiction of Chinese sovereignty (Musoni et al., 2023). Concretely, the Chinese government implemented the "Great Firewall" which employs a wide range of measures to control access to and content on the Internet. In recent years, European countries and the European Union increasingly advocate for state sovereignty over the online space to counterbalance the power of big technology companies, mostly from the US and increasingly from China. To do so, the European Union adopted a series of digital policies that focus on protecting individual rights in the digital realm.

Starting with the General Data Protection Regulation (GDPR) which entered into force in 2018, the European Union adopted the Digital Market Act (2022) and elaborated the Digital Services Act. These policies aim at curtailing the ominous power of technological companies over consumers and over the national economy more broadly. Through the so-called "Brussels effect", many of these policies *de facto* affected the online regulatory space outside the EU as well (Musoni et al., 2023). One could therefore argue that the EU's digital policies also reinforced the sovereignty of other nations and individuals vis-à-vis big tech. Yet, one must bear in mind that the EU's unilateral approach reflects the European perspective and perception of rights and sovereignty. As such, it does not necessarily suit other contexts or fit profoundly different realities like those in the Global South.

Nevertheless, the EU devised various tools to promote its model of digital governance in other regions, especially in Africa, rather than relying on the fortuitous "Brussels effect". Initially, the Digital4Development (D4D) Policy (2016) aimed at "mainstreaming digital technologies and services into EU Development Policy". Responding to the growing influence of China's Digital Silk Road, in 2020 the EU announced its own "Global Gateway" strategy and formally launched the D4D Hub (Musoni et al., 2023). The geographic focus of these initiatives has been on Africa. For instance, the D4D policy mentions "Africa" (including North Africa and Sub-Saharan Africa) 52 times, "Asia" (including Central Asia,

East Asia, Southeast Asia) eleven times, and "America" (Central and Latin America) and the "Caribbean" combined only seven times. Under the D4D Hub, the African Union receives particular attention thanks to the "AU-EU D4D Hub Project" to foster the collaboration between African governments and regional organizations and European partners. While this focus reflects both historical relations and Africa's reliance on development assistance, it is crucial to consider how the European approach affects digital sovereignty in African states.

3. Digital sovereignty under technological dependence: Africa in the Sino-European crossfire

Next to the digital development initiatives by the EU, China is a long-standing player in the (digital) infrastructure development in Africa. Since the launch of the Digital Silk Road in 2015, the Chinese government stepped up its support to Chinese technology companies to deliver "telecommunications networks, artificial intelligence capabilities, cloud computing, e-commerce and mobile payment systems, surveillance technology, smart cities, and other high-tech" to developing countries (Kurlantzick & West, 2020). As most African states depend on both foreign technology and finance for their digital development, they represent an "easy terrain" for big technology companies to dominate in, especially from the United States and China (Ávila Pinto, 2018, p. 17). This power asymmetry also enables big companies and their governments to extract, analyze, and own user data for profit and market influence—a phenomenon that some have called "digital colonialism" (Ávila Pinto, 2018; Coleman, 2019).

Its peculiar political economy makes Africa particularly prone to "digital colonialism". Firstly, it suffers from a shortage of resources as it lacks ownership and control of cables, servers, and data, but also intellectual capacity in terms of advanced technicians and research institutions. Secondly, the current policy environment and international legal architecture in the field of competition and intellectual property are skewed in favor of historical hegemons. Thirdly, the necessary financial capital to experiment and design new models are generally available to those countries which are already at the forefront of research and development (Ávila Pinto, 2018). Consequently, structural changes in the global political economy are key to avert and revert "colonialist" practices. Since structural changes are difficult to bring about in the short term, developing countries must resort to domestic policies as a "second-best" solution to fend off "digital colonialism" by big companies.

Many scholars have focused on data policies to restrict "data extractivism". Several emerging economies, including China, India, and Russia, introduced data localization rules as a defense against data colonialism (Vila Seoane, 2021). However, in many authoritarian countries data localization laws go hand-in-hand with "backdoors" for intelligence services which may, for instance, request the decryption of personal communication (Glasze et al., 2023). Data localization as a tool to counter "digital colonialism" may therefore be abused for state surveillance. In this scenario, the market exploitation of data is compounded with human rights violations. More democratic countries have therefore strengthened their privacy and data protection legislation to limit the commercial and surveillance practices of big technology companies. In particular, the EU pioneered regulations to protect user rights and has not shied away from trade restrictions due to privacy concerns (Pohle & Thiel, 2020).

Other studies analyzed cyber governance and different models thereof more broadly. Salient issues are the weak cybersecurity capacities of developing countries (Schia, 2018), the shortcomings in governance mechanisms and political underpinnings that limit the implementation of international cyber standards in African countries (Ifeanyi-Ajufo, 2023), and the influence of the "China model" on digital governance across Africa (Gravett, 2020; Husami, 2022). To date, very few African countries are equipped to screen digital products from abroad to ensure their compliance with domestic law, although such measures might also inhibit innovation and restrict the free flow of goods and services. South Africa is one of them (Musoni et al., 2023). Most other African countries lack both regulatory frameworks and technical capacity to deter "digital colonialism". While domestic initiatives remain fragmented, continental policies such as the "AU Digital Transformation Strategy for Africa 2020-2030" or the 2011 African Union Convention on Cyber Security and Personal Data Protection ("Malabo Convention") face challenges in domestic implementation. Therefore, a distinct "African model" of cyber governance is yet to emerge.

Despite (or because of) the weak spots in Africa's cyber governance and digital development, a young and growing population and emerging economy renders African states the "disputed territory of tech empires, because whoever gets them locked into their digital feudalism, holds the key to the future" (Ávila Pinto, 2018, p. 17). In particular, for two decades China has promoted digital development through large-scale and often state-backed investments in backbone infrastructure. Due to its wide-ranging interventions in the digital development of Africa, China manages to secure both short-term and long-term influence over the digital sector in Africa and, by extension, in the Global South (Arnold, forthcoming). China's increasingly assertive presence challenges the long-standing dominance of European countries in Africa. Yet, as Europe lags behind in technological innovation, it has focused on digital policymaking to shape the use of foreign technologies

within its borders, often limiting the market authority of tech giants. Consequently, China and the European Union specialized in the technological and regulatory spheres, respectively.

Against this backdrop, African states find themselves confronted with extractive practices by big technology companies, mainly from the United States and China, and firm policies as a tool to assert digital sovereignty. As regulatory push-back remains the most viable approach to counter "digital colonialism" in the short run, the European digital policies remain the international benchmark. In addition, the geographic focus in the EU's D4D policy and D4D Hub stimulate the diffusion of the European regulatory model in African states. This paper therefore inquires:

1) To what extent does the geographic focus in the D4D policy affect digital policy adoption in developing countries and, therefore, make them more resilient against digital colonialism?

2) To what extent does Chinese influence through the Belt and Road Initiative (BRI) enhance or mitigate the EU's effects on ICT policy adoption?

4. Digital policy adoption in developing countries

The data

Digital policy adoption in any given year is derived from the annual change in the ICT Regulatory Tracker compiled by the International Telecommunication Union (ITU), a UN agency. It is a "composed metric based on a total of 50 indicators […] grouped into four clusters: Regulatory authority (focusing on the functioning of the separate regulator), Regulatory mandates (who regulates what), Regulatory regime (what regulation exists in major areas), and Competition framework for the ICT sector (level of competition in the main market segments)" (ITU Regulatory Tracker, ITU). The study considers the average adoption rate of ICT regulations from 2013 to 2018 since these regulations materialized amid the accelerating diffusion of modern ICTs including mobile phones and internet. The average policy adoption rate indicates the average year-to-year difference between the policy scores for each country.

The main independent variable are the geographic macro-regions. One analysis considers the macro-regions as adopted by the ITU (Appendix I) while the other runs the same model with the geographic subdivision followed by the geo-scheme of the United Nations Statistics Division (Appendix II) in order to triangulate the findings. To account for the

different levels of development and foreign investment, each analysis includes control variables on foreign direct investment (FDI) inflows, FDI stocks, net official development aid (ODA) received, and GDP per capita.

FDI inflows and stocks (in % of GDP), measured yearly by UNCTAD, could economically link the receiving country to the investments' origins. Even though foreign direct investments are made, in large part, among industrialized countries, leading world economies also invest a fraction of their outflows in developing countries. For the latter, these inflows can be vital to sustain certain industries. Therefore, in the analysis both FDI inflows and stocks serve as an indicator of dependency on foreign economic powers. It considers the inflows and stocks relative to the size of the economy since a higher percentage contribution to the national economy is deemed more likely to affect government decision-making and policy adoption.

Net ODA (in % of GNI) received, measured by the World Bank, is an even more pronounced indicator of foreign economic dependency of developing countries. Like for FDI inflows and stocks, the study considers the net ODA received relative to the size of the economy and expect a higher portion of ODA in the gross national income to be more likely to affect government decision-making and policy adoption, especially in those fields promoted by the main benefactors.

Finally, the analysis includes membership in the Belt and Road Initiative (BRI) to compare whether and where BRI member countries are more likely to adopt digital policies (Appendix III). The Belt and Road Initiative is a global infrastructure development strategy adopted by the Chinese government in 2013. By 2018, 130 countries across all continents and in different development stages joined the initiative. The exact terms of the membership are not always disclosed. Often membership agreements are supplemented with ad hoc arrangements which lay out the terms and conditions of specific infrastructure projects funded through the Belt and Road Initiative. For the present analysis membership in the Belt and Road Initiative is included as a binary variable based on whether a country had joined the strategy by 2018.

The method

To compare the digital policy adoption between developing countries in Africa and other macro-regions, this study examines 140 countries in an ordinary least square (OLS) regression. OLS regression in a common technique to quantify the effects of several independent variables (i.e., geographic macro-region) on the dependent variable (i.e.,

digital policy adoption). It is a statistical method reveals statistically significant correlations but not causation. For this study, OLS regression proved a useful tool to examine a large number of cases and identify overall trends which will pave the way for future, focused case studies.

In the case of the time-sensitive control variables (i.e., FDI inflows, FDI stock, net ODA received, GDP per capita), the analysis avoids any reciprocal effects between the dependent and control variables by introducing a time lag. In practice, the analysis relies on the mean values from 2007 to 2012 for the explanatory variables and on the mean ICT policy adoption rates from 2013 to 2018 for the dependent variable. By taking the mean of six consecutive years, the study averages out the yearly fluctuations in both the dependent and control variables.

Based on the preceding literature review and theoretical framework, the study ran four different models (Appendix IV). Models 1 and 2 follow the ITU macro-regions whereas model 1 ignores BRI membership and model 2 includes interaction terms between geographic region and BRI membership; models 3 and 4 triangulate the findings by adopting the geo-scheme by the UN Statistical Division which subdivides the countries into more numerous and therefore more homogenous geographic regions. Again, model 3 ignores BRI membership while model 4 contains the interaction terms with BRI membership.

The models are hence defined as:

Model 1 (ITU regions):

      log(ICT score) ~ ITU region + BRI membership +
               FDI inflows + FDI stocks + Net ODA received + GDP per capita

Model 2 (ITU regions interacting with BRI membership):

      log(ICT score) ~ (ITU region * BRI membership) +
               FDI inflows + FDI stocks + Net ODA received + GDP per capita

Model 3 (UNSD region):

      log(ICT score) ~ UNSD region + BRI membership +
               FDI inflows + FDI stocks + Net ODA received + GDP per capita

Model 4 (UNSD region interacting with BRI membership):

$$\text{log(ICT score)} \sim \text{(UNSD region * BRI membership)} +$$
$$\text{FDI inflows + FDI stocks + Net ODA received + GDP per capita}$$

The analysis

The multivariate regression analysis detects several statistically significant effects mostly consistent across the four models. Since the dependent variable is log-transformed, each coefficient represents the percent change in response to a one-unit increase in the independent variable.

Several consistent trends stand out with regards to the geographical regions. Within the ITU macro-regions, countries of the Commonwealth of Independent States (CIS) lag in ICT regulatory improvements but BRI membership reverses the tendency: all else being equal, being located in the CIS region decreases the ICT Regulatory Tracker score by -41.73 percent compared to Sub-Saharan Africa (model 1). When taking into account BRI membership, the ICT Regulatory Tracker score of non-BRI members in the CIS region is -88.61 percent lower compared to non-BRI members in Sub-Saharan Africa, but 516.57 percent higher among BRI members of the CIS compared to their peers in Sub-Saharan Africa (model 2). Models 3 and 4 substantially confirm the statistical significance of these findings, albeit with different effect sizes since the reference category is no longer "Africa" but "UNSD Central America". Moreover, models 3 and 4 reveal that, according to the UN geo-scheme, Central Asia rather than some of the Eastern European or Western Asian countries (in the Caucasus region) accounts for most of the overall effects associated with the CIS region.

The same pattern characterizes the East Asian and Pacific region. Overall, the ICT Regulatory Tracker score is -25.77 percent lower in East Asia and Pacific compared to Sub-Saharan Africa. When including BRI membership, the score of non-BRI members in East Asia and Pacific is -60.58 percent lower compared to non-BRI members in Sub-Saharan Africa, but 107.30 percent higher for BRI members. A more fine-grained geographic classification confirms the overall trend for Oceania but eliminates the statistically significant effects for countries in East and Southeast Asia.

The other statistically significant coefficients are not consistent across the models and could be spurious. According to model 1, the ICT Regulatory Tracker score of Arab States is -25.10 percent lower compared to Sub-Saharan African states, statistically significant at the 90 percent level. In model 3, the UNSD Western Asian region, which comprises the Arab States of the Middle East, achieves an ICT Regulatory Tracker score of -33.50 percent lower

compared to "UNSD Central America". Solely model 4 which interacts the UNSD geographic regions with BRI membership indicates a statistically significant difference of -54.25 percent between non-BRI members in Southern Africa compared to their peers in Central America.

Among the economically inspired variables, the net ODA received yields a statistically significant negative coefficient between -0.015 and -0.019 in three out of four models. According to the above formula, this implies that for every one-percentage-point increase in net ODA received the ICT Regulatory Tracker score decreases between about -1.49 and -1.88 percent in the subsequent sexennial. Among the other non-geographic variables, in model 1 membership in the Belt and Road Initiative increases the ICT Regulatory Tracker score by 21.41 percent compared to non-BRI members. However, the other three models do not confirm the statistical significance of BRI membership for the ICT Regulatory Tracker score, suggesting that this effect might be spurious.

5. Digital policy adoption in developing regions: building resilience against "digital colonialism"?

Although still preliminary, the study offers three main take-aways on the effect of the European D4D policy on digital policymaking in developing countries.

Firstly, the geographic focus of the European digital development strategy favors digital policy adoption in Africa, possibly equipping the region with the regulatory frameworks to restrict practices akin to "digital colonialism". The geographic discrimination reveals that the global macro-regions at the center of the European Digital4Development policy record higher digital policy adoption. When ignoring BRI membership, African countries, the focal point in the D4D policy, outcompete their developing peers in the CIS and East Asia and Pacific regions and possibly even among the Arab States (model 2). A closer look at the macro-regions suggests that the policy-weakest regions are Oceania, Central and Western Asia (model 4), even though some of these regions (i.e., Western Asia) receive considerable attention in other EU foreign policies (i.e., EU Neighborhood Policy). Therefore, specific policy goals aimed at digitalization seem to make the difference for ICT policy adoption in developing countries.

Secondly, foreign economic relations in and of themselves have a limited effect on ICT policymaking, suggesting that they neither facilitate nor avert "digital colonialism". According to all four models, ICT policy adoption is not related to foreign direct investment inflows and stocks. Membership in the Belt and Road Initiative offers ambiguous results—

only one model suggests that BRI membership could positively affect ICT policy adoption, albeit with limited statistical significance. The finding is coherent with China's official strategy of avoiding any policy interference abroad. A clear indication comes from official development assistance: foreign aid decreases subsequent ICT policy adoption in three out of four models. This implies that official development assistance is not only irrelevant but even discourages ICT policy adoption and questions the efficacy of EU digitalization efforts in developing regions: while a budget-less Digital4Development policy pushes digital progress, the policy-decoupled and often uncoordinated foreign aid flows hamper advances. It remains to be seen whether the coordination efforts under the Global Gateway succeed in reversing this trend.

Finally, with regards to the Sino-European competition in the digital policy space of developing countries, membership in the Chinese Belt and Road Initiative has a distinct positive effect on ICT policy adoption in developing regions if those regions are of limited European interest for digitization, namely in the CIS and East Asia and Pacific. In both macro-regions non-BRI members fare significantly below average in ICT policy adoption, but BRI membership reverses the trend into a significant above-average ICT Regulatory Tracker score. The same inversion occurs in the UNSD sub-regions of Central Asia and Oceania. As previously noted, none of these regions are central to European foreign policies. Therefore, it could be argued that the ICT policy improvement of these regions is possibly motivated by BRI projects, not policy influence from abroad. In contrast, in regions of European interest BRI membership neutralizes rather than reverses any statistically significant effects, both positive and negative, like in the Arab States and the partially overlapping UNSD sub-region of Western Asia. In fact, the findings imply that in the combined presence of European and Chinese interests both BRI members and non-members perform within their respective averages.

6. Conclusion

This paper examined to what extent the geographic focus of the D4D policy affects the adoption of digital policies in developing countries. The preliminary results of the analysis show that, indeed, the strong focus on Africa correlates with a higher rate of policy adoption in African states compared to countries in other developing regions. Following the core argument of the paper, these findings suggest that the EU's strategies vis-à-vis developing regions (i.e., D4D policy, Global Gateway) diffuse its regulation-oriented approach to the online space. While the EU's own policies aim at securing its "digital sovereignty" in face of big technology companies, digital policies of developing countries

may carry an additional function of averting "digital colonialism". Since this paper suggests that the EU encourages digital policy adoption in Africa, future research may analyze the content of those policies and to what extent they are apt to deter colonialist practices. Future studies may also establish whether the rapidly growing digital policy space in Africa tends towards the "European" or the "Chinese" model of cyber governance, or if it gives rise to a distinct "African" model that suits the local circumstances.

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Appendix I: Regional Grouping of ITU Telecommunication Development Bureau

Africa	**Arab States**	**East Asia and the Pacific**	**South Asia**	**CIS**	**Europe**	**Latin America & Caribbean**
Considered because net recipients of ODA (2007-2012)	*Considered because net recipients of ODA (2007-2012)*	*Considered because net recipients of ODA (2007-2012)*	*Considered because net recipients of ODA (2007-2012)*	*Considered because net recipients of ODA (2007-2012)*	*Considered because net recipients of ODA (2007-2012)*	*Considered because net recipients of ODA (2007-2012)*
Angola*		Bangladesh*	Afghanistan*	Armenia*	Albania*	Antigua and
Benin*	Algeria*	Cambodia*	Bhutan	Azerbaijan*	Bosnia and	Barbuda*
Botswana*	Comoros*	China*	India	Belarus	Herzegovina*	Argentina
Burundi*	Djibouti*	Fiji*	Iran (Islamic	Georgia*	Croatia*	Barbados*
Cameroon*	Egypt*	Indonesia	Republic of)*	Kazakhstan*	Montenegro*	Belize*
Cabo Verde*	Iraq*	Kiribati*	Maldives*	Kyrgyzstan*	North	Bolivia*
Central African	Jordan	Lao P.D.R*	Nepal*	Moldova	Macedonia*	Brazil
Rep.	Lebanon*	Malaysia*	Pakistan*	Tajikistan*	Serbia*	Chile*
Chad*	Libya*	Marshall Islands	Sri Lanka*	Turkmenistan*	Turkey*	Colombia
Congo (Rep. of)*	Mauritania*	Micronesia*		Ukraine		Costa Rica*
Cote d'Ivoire*	Morocco*	Mongolia*		Uzbekistan*		Cuba*
Dem. Rep. of the	Oman*	Myanmar*	*Not considered*		*Not considered*	Dominica*
Congo*	Saudi Arabia*	Papua New				Dominican Rep.
Equatorial	Sudan*	Guinea*	Brunei	*Not considered*	Andorra	Ecuador*
Guinea*	Syrian Arab	Philippines*	Darussalam		Austria	El Salvador
Eritrea	Republic	Samoa*		Russian	Belgium	Grenada*
Eswatini	Tunisia*	Solomon		Federation	Bulgaria	Guatemala
Ethiopia*	Yemen*	Islands*			Cyprus	Guyana*
Gabon*		Thailand*			Czech Republic	Haiti
Gambia*		Timor-Leste*			Denmark	Honduras
Ghana*	*Not considered*	Tonga*			Estonia	Jamaica*
Guinea*		Tuvalu			Finland	Mexico
Guinea-Bissau	Bahrain	Vanuatu*			France	Nicaragua
Kenya*	Kuwait	Viet Nam*			Germany	Panama
Lesotho*	Qatar				Greece	Paraguay*
Liberia*	Palestine				Hungary	Peru*
Madagascar*	Somalia	*Not considered*			Iceland	Saint Kitts and
Malawi	United Arab				Ireland	Nevis
Mali*	Emirates	Australia			Israel	Saint Lucia
Mauritius		Dem. People's			Italy	Saint Vincent and
Mozambique*		Rep. of Korea			Latvia	the Grenadines
Namibia*		Hong Kong			Liechtenstein	Suriname*
Niger*		Japan			Lithuania	Trinidad and
Nigeria*		Korea (Rep. of)			Luxembourg	Tobago*
Rwanda*		Macao			Malta	Uruguay*
Sao Tome and		Nauru			Monaco	Venezuela*
Principe		New Zealand			Netherlands	
Senegal*		Singapore			Norway	
Seychelles*					Poland	*Not considered*
Sierra Leone*					Portugal	
South Africa*					Romania	Bahamas
South Sudan*					San Marino	
Tanzania*					Slovakia	
Togo*					Slovenia	
Uganda*					Spain	
Zambia*					Sweden	
Zimbabwe*					Switzerland	
					United Kingdom	
Not considered					Vatican	
Burkina Faso						

*Belt and Road Initiative Members

Appendix II: Regional Grouping Based on Geo-scheme UN Statistical Division (UNSD)

Northern Africa	**Eastern Africa**	**Middle Africa**	**Southern Africa**	**Western Africa**	**Central Asia**
Considered Algeria* Egypt* Libya* Morocco* Sudan* Tunisia*	*Considered* Burundi* Comoros* Djibouti* Eritrea Ethiopia* Kenya* Madagascar* Malawi Mauritius Mozambique* Rwanda* Seychelles* South Sudan* Tanzania* Uganda* Zambia* Zimbabwe* *Not considered* Somalia	*Considered* Angola* Cameroon* Central African Rep. Chad* Congo (Rep. of)* Dem. Rep. of the Congo* Equatorial Guinea* Gabon* Sao Tome and Principe	*Considered* Botswana* Eswatini Lesotho* Namibia* South Africa*	*Considered* Benin* Cabo Verde* Cote d'Ivoire* Gambia* Ghana* Guinea* Guinea-Bissau Liberia* Mali* Mauritania* Niger* Nigeria* Senegal* Sierra Leone* Togo* *Not considered* Burkina Faso	*Considered* Kazakhstan* Kyrgyzstan* Tajikistan* Turkmenistan* Uzbekistan*
East Asia	**Southeast Asia**	**Southern Asia**	**Western Asia**	**Eastern Europe**	**Northern Europe**
Considered China* Mongolia* *Not considered* Hong Kong Macao Dem. Rep. of Korea Japan Rep. of Korea	*Considered* Cambodia* Indonesia Lao P.D.R.* Malaysia* Myanmar* Philippines* Thailand* Timor-Leste* Viet Nam* *Not considered* Brunei Darussalam Singapore	*Considered* Afghanistan* Bangladesh* Bhutan India Iran (Islamic Rep. of)* Maldives* Nepal* Pakistan* Sri Lanka*	*Considered* Armenia* Azerbaijan* Georgia* Iraq* Jordan Lebanon* Oman* Saudi Arabia* Syrian Arab Republic Turkey* Yemen* *Not considered* Bahrain Cyprus Israel Kuwait Qatar Palestine United Arab Emirates	*Considered* Belarus Moldova Ukraine *Not considered* Bulgaria Czech Republic Hungary Poland Romania Russian Federation Slovakia	*Not considered* Denmark Estonia Finland Iceland Ireland Latvia Lithuania Norway Sweden United Kingdom
Southern Europe	**Western Europe**	**Caribbean**	**Central America**	**South America**	**Oceania**
Considered Albania* Bosnia and Herzegovina* Croatia* Montenegro* North Macedonia* Serbia* *Not considered* Andorra Greece Italy Malta Portugal San Marino Slovenia Spain Vatican	*Not considered* Austria Belgium France Germany Liechtenstein Luxembourg Monaco Netherlands Switzerland	*Considered* Antigua and Barbuda* Barbados* Cuba* Dominica* Dominican Rep. Grenada* Haiti Jamaica* Saint Kitts and Nevis Saint Lucia Saint Vincent and the Grenadines Trinidad and Tobago* *Not considered* Bahamas	*Considered* Belize* Costa Rica* El Salvador Guatemala Honduras Mexico Nicaragua Panama	*Considered* Argentina Bolivia* Brazil Chile* Colombia Ecuador* Guyana* Paraguay* Peru* Suriname* Uruguay* Venezuela*	*Considered* Fiji* Kiribati* Marshall Islands Micronesia* Papua New Guinea* Samoa* Solomon Islands* Tonga* Tuvalu Vanuatu* *Not considered* Australia Nauru New Zealand

*Belt and Road Initiative Members

Appendix III: Long Definitions of Independent Variables

Foreign Direct Investment Inflows in % of GDP (UNCTAD)
An investment made by a resident enterprise in one economy (direct investor or parent enterprise) with the objective of establishing a lasting interest in an enterprise that is resident in another economy (direct investment enterprise or foreign affiliate). The lasting interest implies the existence of a long-term relationship between the direct investor and the direct investment enterprise and a significant degree of influence on the management of the enterprise. The ownership of 10% or more of the voting power of a direct investment enterprise by a direct investor is evidence of such a relationship. FDI flows comprise mainly three components: (1) acquisition or disposal of equity capital. FDI includes the initial equity transaction that meets the 10% threshold and all subsequent financial transactions and positions between the direct investor and the direct investment enterprise; (2) reinvestment of earnings which are not distributed as dividends; (3) inter-company debt.

Foreign Direct Investment Stocks in % of GDP (UNCTAD)

Net official development assistance (ODA) in % of GNI (World Bank)
Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent).

GDP per capita in current USD (World Bank)
GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.

Appendix IV: Multivariate Regression Analysis Results

	Dependent variable:			
	Log (ICT Score)			
	(1)	(2)	(3)	(4)
FDI inflows (in % of GDP)	-0.005	0.001	0.003	0.005
	(0.015)	(0.014)	(0.015)	(0.014)
FDI stocks (in % of GDP)	0.002	0.001	0.001	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)
Net ODA received (in % of GNI)	**-0.018**	**-0.015**	**-0.017**	-0.010
	(0.006)	(0.005)	(0.006)	(0.006)
BRI Membership	**0.194**	0.081	0.155	0.142
	(0.106)	(0.165)	(0.104)	(0.255)
GDP per capita (2012)	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
UNSD Eastern Africa			-0.018	0.215
			(0.196)	(0.296)
UNSD Middle Africa			-0.151	0.015
			(0.202)	(0.308)
UNSD Southern Africa			-0.226	**-0.782**
			(0.231)	(0.382)
UNSD Western Africa			-0.072	-0.260
			(0.195)	(0.392)
Arab States	**-0.289**	0.180		
	(0.146)	(0.405)		
UNSD Northern Africa			-0.085	-0.077
			(0.236)	(0.256)
UNSD Western Asia			**-0.408**	0.131
			(0.205)	(0.382)
CIS	**-0.540**	**-2.172**		
	(0.145)	(0.411)		
UNSD Central Asia			**-1.153**	**-2.239**
			(0.233)	(0.389)
East Asia and Pacific	**-0.298**	**-0.931**		
	(0.113)	(0.278)		
UNSD East Asia			-0.353	-0.349
			(0.324)	(0.322)
UNSD Oceania			**-0.483**	**-1.506**
			(0.235)	(0.366)
UNSD Southeast Asia			-0.324	-0.124
			(0.205)	(0.405)
Europe	0.164	0.202		
	(0.199)	(0.180)		
UNSD Eastern Europe			-0.347	-0.349
			(0.276)	(0.285)
UNSD Southern Europe			0.067	0.065

	(1)	(2)	(3)	(4)
			(0.251)	(0.267)
Latin America & Caribbean	0.068	0.119		
	(0.125)	(0.193)		
UNSD Caribbean			0.102	0.133
			(0.270)	(0.296)
UNSD South America			-0.073	0.135
			(0.187)	(0.238)
South Asia	0.023	0.121		
	(0.180)	(0.304)		
UNSD Southern Asia			-0.062	0.052
			(0.210)	(0.293)
UNSD Eastern Africa : BRI				-0.339
				(0.369)
UNSD Middle Africa : BRI				-0.256
				(0.386)
UNSD Southern Africa : BRI				0.684
				(0.465)
UNSD Western Africa : BRI				0.145
				(0.443)
Arab States : BRI		-0.481		
		(0.424)		
UNSD Northern Africa : BRI				-
UNSD Western Asia : BRI				-0.614
				(0.452)
CIS : BRI		1.819**		
		(0.429)		
UNSD Central Asia : BRI				1.343**
				(0.469)
East Asia and Pacific : BRI		0.729*		
		(0.296)		
UNSD East Asia : BRI				-
UNSD Oceania : BRI				1.157**
				(0.398)
UNSD Southeast Asia : BRI				-0.225
				(0.464)
Europe : BRI		-		
UNSD Eastern Europe : BRI				-
UNSD Southern Europe : BRI				-
Latin America & Caribbean : BRI		-0.137		
		(0.227)		
UNSD Caribbean : BRI				-0.189
				(0.503)
UNSD South America : BRI				-0.317
				(0.338)
South Asia : BRI		-0.166		
		(0.356)		
UNSD Southern Asia : BRI				-0.160
				(0.384)
Constant	4.090**	4.151**	4.190**	4.200**
	(0.130)	(0.163)	(0.151)	(0.160)

Observations	118	118	118	118
R^2	0.300	0.467	0.418	0.598
Adjusted R^2	0.227	0.383	0.297	0.454
Residual Std. Error	0.414 (df = 106)	0.370 (df = 101)	0.394 (df = 97)	0.348 (df = 86)
F Statistic	4.121*** (df = 11; 106)	5.539*** (df = 16; 101)	3.477*** (df = 20; 97)	4.133*** (df = 31; 86)

Note: $p<0.1$; ***$p<0.05$;*** $p<0.01$