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Abstract

The Chinese government is revolutionizing digital surveillance at home. Are digital technology transfers from Huawei, China's leading information technology company, enabling recipient governments to expand their digital surveillance operations and engage in more targeted repression against dissidents? To answer this question, we focus on the African continent, which has received nearly half of all global Huawei technology transfers. Using a series of identification strategies, we show that the effect of Huawei transfers on digital surveillance and targeted repression depends on preexisting political institutions in recipient countries. In Africa's autocracies, which account for 81% of transfers to the continent, Huawei technology transfers facilitate digital surveillance, internet shutdowns, and targeted repression. In Africa's democracies, Huawei technology may induce a small reduction in human rights abuses, though the effects are less consistently estimated. Most broadly, this paper suggests that China's digital technology exports are reinforcing repressive governments.

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1 Introduction

The Chinese Communist Party (CCP) is revolutionizing digital surveillance. It is combining ubiquitous surveillance cameras, the world's most sophisticated facial recognition software, DNA samples, and massive volumes of private data from China's technology companies to let it reward supporters and punish dissidents with apparently unprecedented precision (Diamond 2019; Chin and Lin 2022). The CCP is exporting these digital surveillance technologies abroad. At the effort's forefront is Huawei Technologies, the largest global supplier of telecommunications equipment (Maizland and Chatzky 2020). Though technically privately held, Huawei is subject to substantial pressure from the CCP, which has intensified under President Xi Jinping (Maizland and Chatzky 2020). In 2017, Huawei identified 40 countries where its Smart City surveillance technology had been introduced; by 2018, its reach had expanded to at least 90 countries and 230 cities (Cave et al. 2019). Huawei pitches its digital surveillance technologies to national security agencies, with subsidized financing provided by China's Exim Bank (Feldstein 2019).

These digital technology exports have sparked widespread concerns that the CCP is exporting the tools of "digital authoritarianism" to "build a world in its image," as *The Washington Post* editorial board put it (*Washington Post* 2020). This possibility has received considerable attention among NGOs, think tanks, media outlets, and the United States Congress (Shahbaz 2018; Cave et al. 2019; Polyakova and Meserole 2019; Mozur, Kessel and Chan 2019; Andersen 2020; Barma, Durbin and Kendall-Taylor 2020; Feldstein 2020; U.S. Senate Committee on Foreign Relations 2020; Bernot 2021; Tiffert and McPherson-Smith 2022). Kendall-Taylor, Frantz and Wright (2020) summarized the emerging conventional wisdom in *Foreign Affairs*: "Technology strengthens autocracy."

Is this conventional wisdom right? How do digital technology transfers from the CCP condition politics in recipient countries? In this paper, we provide the first plausibly causal, cross-country evidence that Huawei digital technology transfers are strengthening the world's autocracies: by facilitating digital surveillance, internet shutdowns, and targeted repression. We focus on Huawei technology transfers to the African continent, which represents an appealing empirical context. The heterogeneity of the continent's politics lets us probe whether the effects of Huawei technology transfers are conditioned by political institutions in recipient countries. For both demand and supply reasons, we argue, digital technology transfers are much more likely to have pernicious effects in autocracies rather than democracies. On the demand side, autocratic governments have powerful incentives to block collective action, while democratic governments have stronger electoral incentives to provide public goods and foster economic growth. On the supply side, autocratic governments are less constrained than democratic governments, which generally confront transparency laws and independent media organizations that facilitate oversight and help signal to citizens when dual-use digital technologies are being used to infringe basic rights rather than advance living standards. Elected officials in democracies also confront a higher likelihood of prosecution for violating laws that protect expression, privacy, and protest.

We employ three identification strategies to study the effect of Huawei investment on repression and surveillance across Africa. First, we use a two-way fixed effects estimator with a lagged measure of Huawei technology transfers. This identification strategy focuses on changes: how increases in Huawei technology transfers condition changes in digital surveillance and targeted repression. The lagged outcome variable prevents reverse causality and the two-way fixed effects accommodate unobserved, time-invariant features that might condition both Huawei transfers and repression. Second, we use a staggered differences-in-differences (DiD) estimator that accommodates heterogeneous treatment effects (Baker, Larcker and Wang 2022), which exploits the phased roll-out of Huawei's technology transfers to the African continent. Finally, we employ the generalized synthetic control (GSC) estimator (Xu 2017), which is robust to violations of the standard "parallel slopes" assumption for DiD estimators and hence further rules out the possibility that some unobserved forces are driving both Huawei technology transfers and digital surveillance or targeted repression. The GSC estimator is akin to an out-of-sample prediction model, which constructs counterfactual outcomes for each treated unit in post-treatment periods using data from the control group.

We present three core results. First, roughly 81% of all Huawei technology transfers have flowed to Africa's autocracies. The top two autocratic recipients have each received more Huawei transfers than all of Africa's democracies combined. These transfers generally focus on the provision of telecommunications and surveillance equipment to recipient governments, training required to operate it, and energy provision to power it. Second, across identification strategies and outcome measures, we find that Huawei transfers to Africa's autocracies facilitate digital surveillance, internet shutdowns, and targeted repression. Third, we find none of these effects in Africa's democracies, which may even be slightly more likely to respect their citizens' human rights following Huawei transfers, though this effect is imprecisely estimated and inconsistent across models.

This paper advances three broad literatures. First, despite China's growing footprint across the African continent, there remains widespread disagreement about its implications for Africa's future. Some observers view China as a "rogue donor," which directs aid to non-democratic governments and props them up in the face of domestic opposition.[1] Chinese aid appears more easily targeted towards domestic political constituencies (Dreher et al. 2022), is associated with perceptions of local corruption (Isaksson and Kotsadam 2018), and induces the World Bank to attach fewer "good governance" conditions to its development projects (Hernandez 2016; Brazys and Vadlamannati 2021). The emerging consensus among scholars, however, is that Chinese engagement may well be a net plus (Brautigam 2009). Chinese development finance has generated substantial economic returns, in part by providing major infrastructure projects that link economically productive areas (Dreher et al. 2022). There is no evidence that Chinese engagement fuels civil conflict or state repression (Gehring, Kaplan and Wong 2019) or systematically targets autocracies over democracies (Dreher

[1] For an overview, see Dreher et al. (2022, 122-129).

et al. 2022; Carter 2022). To the best of our knowledge, this paper represents the first plausibly causal, cross-country evidence that Chinese technology transfers facilitate autocratic retrenchment by enabling targeted repression and digital surveillance.

Second, this paper contributes to a large literature about digital technologies and autocratic survival. When the Information Age dawned, scholars and policymakers were optimistic that digital technologies would let citizens coordinate against repressive governments (Diamond 2010). Censoring the internet, President Bill Clinton once quipped, was "sort of like trying to nail Jello to the wall" (Allen-Ebrahimian 2016). Notwithstanding some evidence (Manacorda and Tesei 2016; Christensen and Garfias 2018), it is increasingly clear that the world's autocracies have adapted, in part by adapting technologies that enable widespread censorship (King, Pan and Roberts 2013; Gallagher and Miller 2019), mass surveillance (Feldstein 2021; Chin and Lin 2022), and targeted repression (Xu 2021). This paper suggests that the effect of digital technology on domestic politics is shaped fundamentally by a society's political institutions.

Finally, with American hegemony receding into multipolarity, scholars are confronted with new questions about autocratic politics in the 21st century. This paper helps answer some of those questions. During the Cold War, with the United States and Soviet Union locked in geopolitical competition, the wold's autocrats were able to secure financial support in exchange for membership in the Western or Eastern blocs. When the Berlin Wall collapsed, they lost this leverage and were forced to permit democratic reforms. This unleashed both a global wave of democracy and the rise of nominally democratic institutions in autocracies (Dunning 2004; Levitsky and Way 2010; Carter 2022). Given China's rise, America's apparent decline, and the outsized role of global hegemons in shaping political institutions (Gunitsky 2017; Miller 2021), the prospect of a prolonged democratic recession seems increasingly likely (Diamond 2022). This paper suggests one key mechanism of diffusion: technology transfers from China, which are adapted by recipient governments to facilitate digital surveillance and targeted repression. This paper also suggests, however, that this mechanism may serve primarily to strengthen autocratic governments, as long as democratic governments have institutions in place that require transparency and reward public goods provision.

2 Theory

2.1 The CCP's Golden Shield

The Information Age has revolutionized surveillance in autocracies, due largely to the CCP. In 1998, the CCP launched the Golden Shield Project, which Xu (2021, 316) describes as "a domestic surveillance and filtering system that integrates online government databases with an all-encompassing surveillance network."[2] In the first phase, completed in 2005, the CCP built a massive network of population databases, ID tracking systems, and internet surveillance tools, which let it record

[2] See also Walton (2001).

the movement of potential dissidents as revealed, in part, by their online behavior. In 2017, the CCP announced the completion of its "Sky Net" program, which entails 176 million surveillance cameras across China and plans for 626 million by 2020, or nearly one camera for every two citizens (Hersey 2017; Russell 2017). The result, Qiang (2019) writes, is "the largest video-surveillance network in the world." By August 2015, central Beijing reportedly had "over 46,000 surveillance cameras" (Huang 2015). Simultaneously, the CCP built a facial database that encompassed every adult citizen (Chin and Lin 2017) and a DNA database that encompassed 54 million citizens and, by 2020, will reportedly reach 100 million (Qiang 2019).

Digital surveillance is now a conspicuous feature of everyday life. The CCP's facial recognition technology is employed for check-in and security at airports (Dai 2018; Yang 2018), train stations (Chen, Jing and Dai 2018), and hotels (Chan 2018). In 2017, the CCP applied facial recognition technology to detect jaywalkers, with offenders notified via text message and their pictures displayed at major intersections (Li Tao 2018). Unsurprisingly, this pervasive digital surveillance apparatus has profound political implications. It facilitates targeted repression and lets the CCP spend less on public goods (Xu 2021).

2.2 Exporting "Safe Cities"

The world's autocracies have sought to acquire the CCP's digital surveillance technology and emulate aspects of its surveillance apparatus. In Venezuela, one of China's other leading technology companies, ZTE, helped the government create a national ID card – the "fatherland card" – that records voting behavior, personal finances, and medical histories. Said one Venezuelan technical advisor, who was accused of treason after he objected: "What we saw in China changed everything. . . . They were looking to have citizen control" (Berwick 2018). In Cameroon, as the Anglophone Crisis raged in February 2017, the government announced a contract with Huawei that provided for "1,500 cameras in regional capitals and certain strategic points in the country," "2,000 portable listening devices . . . equipped with cameras," and "the construction of nine command centers" (Carter and Carter 2023). Simultaneously, the Serbian government announced that Huawei would install facial and license plate recognition software in 800 locations in Belgrade (Trevisan 2018; Le Corre and Vuksanovic 2019). In 2018, the Zimbabwean government "signed a strategic partnership with Chinese startup CloudWalk Technology to establish and implement a national facial recognition program" (Singh and Wetters 2018). In 2019, the Kenyan government signed a $174 million contract with Huawei for smart city technology (Yusuf 2021). The Ethiopian government has received loans from the Chinese government worth more than $3 billion to upgrade its digital infrastructure (Yusuf 2021).

The anecdotal evidence suggests that these technology transfers are reshaping politics in recipient countries. In August 2019, *The Wall Street Journal* reported that Huawei technicians "helped African governments spy on their political opponents" by "intercepting their encrypted communications and social media, and using cell data to track their whereabouts" (Parkinson, Bariyo and Chin 2019). In Uganda, where the police contracted a $126 million facial recognition system, Huawei engineers helped the government "hack the WhatsApp and Skype accounts" of Bobi Wine, a musician and leading opposition figure (Woodhams 2019). In Zambia, Huawei engineers "helped the government crack the communications of a team of bloggers running a pro-opposition news site, enabling police to track and arrest them" (Woodhams 2019). In Venezuela, the Maduro government is using the fatherland card system to divert state resources to loyalists and monitor dissidents (Berwick 2018). Huawei has also been accused of providing technologies for mass surveillance and targeted persecution in Belarus and Ecuador (Cave et al. 2019; Mozur, Kessel and Chan 2019), and censoring online content in at least 18 countries (Earp 2021).

Even when Huawei technology transfers do not include sophisticated facial recognition technology, they can still be easily adapted for digital surveillance. Huawei's telecommunications networks generally feature surveillance middleboxes with Deep Packet Inspection capabilities, which monitor users' internet activity, censor online content, and block access to virtual private networks (Weber and Ververis 2021). This technology powers China's Great Firewall, the most extensive censorship operation in human history (Weber and Ververis 2021). Huawei is responsible for as much as 70% of Africa's telecommunications network (Woodhams 2019), so the scope for digital surveillance is profound.

2.3 Differential Effects by Preexisting Political Institutions

Huawei technology transfers are intrinsically dual-use. They can be used for digital surveillance, as the examples above suggest, but they can also simply give governments and citizens access to the internet, which may facilitate citizen oversight of government, collective action, and economic growth. Huawei, indeed, is an attractive supplier of digital infrastructure on purely market terms. Its telecommunications equipment is generally high-quality and as much as 30% cheaper than competitors, due in part to financial subsidies from the Chinese government (El Kadi 2022) and preferential loan terms from the Exim Bank (Feldstein 2019).

There are good reasons to think that dual-use technology transfers have differential effects according to the recipient government's political institutions. On the demand side, autocracies and democracies may want digital technology for different reasons. In Africa, although the anti-coup norm may be weakening (Singh 2022), the chief threat to autocratic survival since the end of the Cold War has come from popular protests (Carter 2022). Consequently, Africa's autocrats have powerful incentives to use Huawei technology transfers to block collective action: by repressing potential protest leaders and making coordination among participants as difficult as possible. By contrast, Africa's democratically-elected governments have stronger incentives to provide public goods and foster economic growth (Bleck and van de Walle 2018). For these, Huawei's relatively cheaper technology is extraordinarily attractive. Accra, for instance, is emerging as one of Africa's leading tech hubs, especially in artificial intelligence (AI). In 2019, Accra became home to Google's first AI lab in Africa (Adeyemi 2021). Accra-based innovators are developing technologies to reduce identity theft (de Vergès 2020), facilitate electronic payments, improve agricultural output, strengthen cross-border supply chains, and monitor COVID's diffusion (Adeyemi 2021). Accra's technology boom has been facilitated by support from Huawei and IBM (Eduam 2016), as well as a relatively favorable regulatory environment (Jackson 2021). In January 2022, Ghana's aggregate internet penetration rate reached 53%,[3] considerably greater than the African average (28% in 2019) and only slightly lower than Mississippi (59% in 2020) and Texas (68% in 2020).[4]

On the supply side, autocracies and democracies may confront different constraints in their application of digital technology. Autocratic governments are generally unencumbered by transparency laws that might let citizens monitor to what extent dual-use technologies are used for digital surveillance and targeted repression. By contrast, in Africa's democracies, transparency laws let citizens monitor how governments use digital technologies, and hence ensure that technology transfers are used to provide public goods and facilitate economic growth rather than expand domestic surveillance (Adeniran and Osakwe 2021). In South Africa, for instance, Section 32 of the Constitution "provides that everyone has the right of access to any information held by the state," and was further enshrined by the Promotion of Access to Information Act 2 of 2000 (Restore Data Rights 2022). Moreover, democracies generally have free and independent media, which can investigate and reveal government malfeasance to citizens and let them punish elected officials at the ballot box. Elected leaders also confront the prospect of prosecution for violating laws that protect expression, privacy, and protest, which, in turn, shapes their behavior in office. Put simply, countries with democratic institutions are far better placed to ensure citizen oversight of new communications technologies (Acemoglu and Robinson 2019, 489-492).

This discussion suggests two hypotheses about the political effects of digital technology transfers in recipient countries.

Hypothesis 1: Digital technology transfers to autocratic governments should facilitate digital surveillance and targeted repression.

Hypothesis 2: Digital technology transfers to democratic governments should have less pernicious effects.

Though outside the scope of this paper, our theory is consistent with the possibility that digital technology transfers to Africa's democracies may help expand public good provision and generate economic growth over time. As we discuss in Section 7, we regard this as an important direction for future research, consistent with some extant work (Brautigam 2009; Wise 2020).

[3] See `https://www.statista.com/statistics/1171435/internet-penetration-rate-ghana/`.

[4] See `https://www.internetworldstats.com/unitedstates.htm`.

3 Data and Descriptive Statistics

To probe the political effects of Huawei technology transfers in recipient countries, we draw data from AidData's Global Chinese Development Finance Dataset, Version 2.0, which records 153 Huawei projects worth roughly $1.6 billion in 64 countries worldwide between 2000 and 2017 (Custer et al. 2021; Dreher et al. 2022). Of these, AidData counts 84 Huawei projects in 32 unique countries across the African continent, worth nearly $400 million.

AidData classifies Huawei's projects into 14 sectors, which appear, by shares, in the top left panel of Figure 1. The top right panel gives the leading sectors by project value. For both metrics, the most common sector for Huawei is communications, which, by value, accounts for fully 60% of all projects across the African continent. Projects in the communications sector generally focus on the provision of telecommunications and surveillance equipment to recipient governments, as well as the training required to operate it. By frequency, the second leading sector is education, but, by value, this constitutes just 3% of Huawei's projects across the continent. Many of these appear to be computer donations to educational institutions. By value, Huawei's second leading sector is energy. These projects include high-value transfers to Cameroon and Ethiopia, among Africa's more repressive governments, that strengthen electricity provision, which is key to powering cameras and other digital surveillance technologies.

The bottom left panel gives the 15 leading recipients of Huawei technology transfers, shaded according to their mean regime type during the sample period.[5] Countries that were autocratic for more than 66% of the sample period appear in black; countries that were autocratic for between 33% and 66% appear in dark gray; countries that were autocratic for less than 33% of the sample period appear in light gray. The top two recipients – Cameroon and Chad – each received more than all of Africa's democracies combined. Chinese aid and investment may flow roughly equally to Africa's autocracies and democracies (Brautigam 2009; Dreher et al. 2022), but technology transfers from Huawei flow overwhelmingly to Africa's autocracies.

The bottom right panel gives the cumulative value of Huawei technology transfers, by year, for Africa's autocracies and democracies. This yields the same implication: The leading recipients of Huawei transfers were overwhelmingly Africa's autocracies. By 2017, when the sample period ends, the cumulative value of Huawei technology transfers to Africa's autocracies was more than four times greater than to Africa's democracies, accounting for 81% of the total transfer value.

The bottom right panel is also noteworthy for what it reveals about the timing of Huawei transfers. It identifies a major discontinuity between 2014 and 2015, which coincides with the BRI's expansion to the African continent. Widely regarded as Xi Jinping's signature foreign policy project (He 2018), the BRI has origins in both international and domestic politics. Geopolitically, the BRI signaled Xi Jinping's more assertive international posture, which marked China as a major

[5]We draw data on regime type from Svolik (2012) and extend it through 2017. The substantive implications are unchanged if we draw regime type data from Marshall and Jaggers (2005).

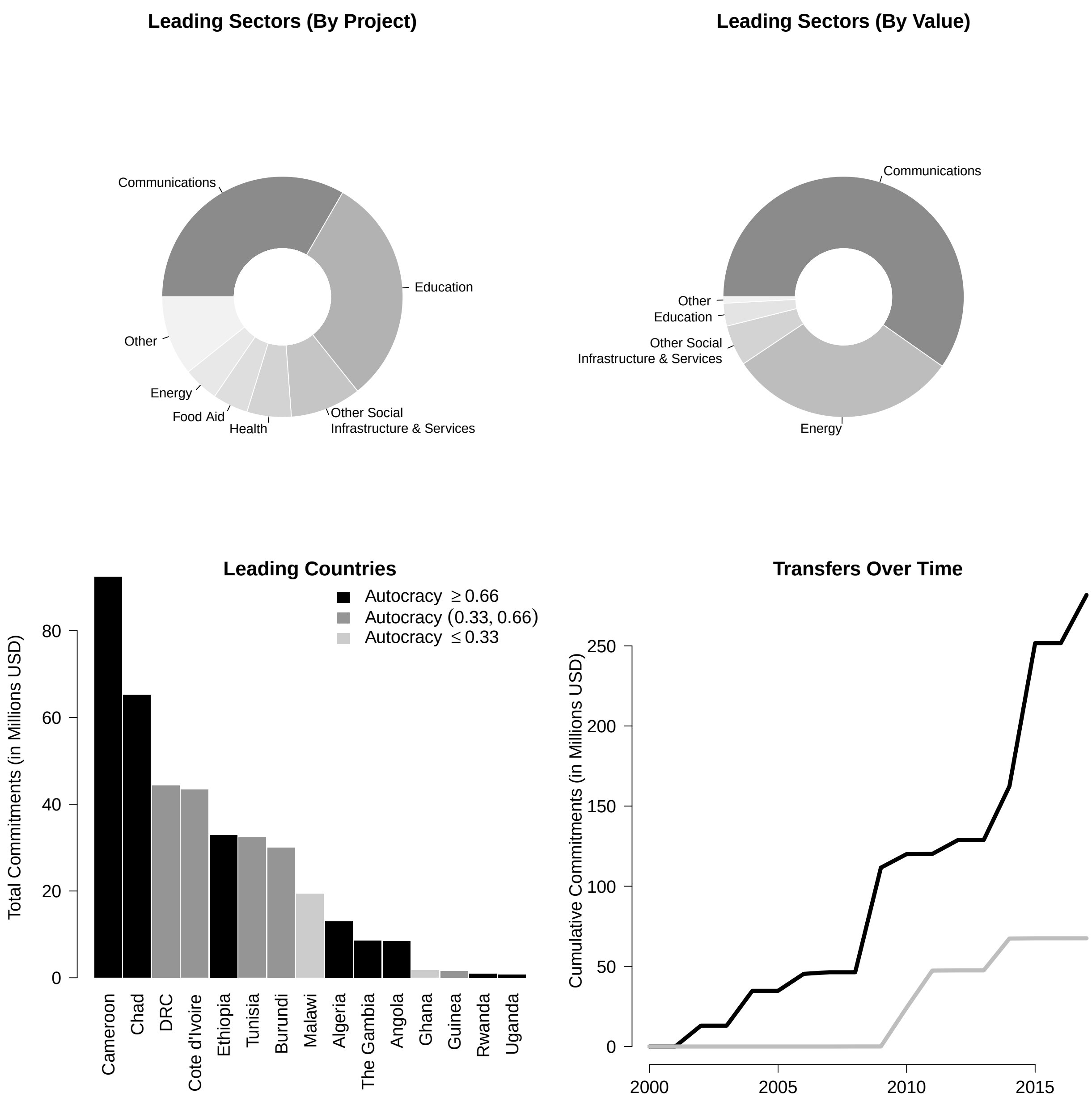

Figure 1: Descriptive Statistics

world power (Fallon 2015; Economy 2018). Domestically, BRI provided a crucial opportunity to stimulate foreign demand for domestically oversupplied industrial inputs, which helped ward off a debt crisis, and a crucial outlet for accumulated foreign exchange reserves, which in early 2014 reached roughly $4 trillion (CEIC Data 2022; Dreher et al. 2022). The BRI initially targeted Eurasia, but quickly expanded to Africa in in May 2014. During a speech at the African Union's (AU) headquarters, then-Premier Le Keqiang outlined the "461 Framework" for China-Africa cooperation, which announced a direct investment target of $100 billion and sough to align the BRI with the AU's Agenda 2063 development goals (African Press Organization 2014; Liu Wei 2017). Le's speech was codified in January 2015 with a 48-year Memorandum of Understanding (*China Daily* 2015). There were meaningful increases in Huawei commitments during the Global Financial Crisis of 2008, but the spike occasioned by the BRI's launch and expansion was the most significant. The years 2014 and 2015 alone accounted for 36% of all Huawei transfers to Sub-Saharan Africa during the AidData sample period.

4 The Political Effects of Huawei Technology Transfers

4.1 Estimation Strategy

To measure the political effects of Huawei transfers, our first identification strategy employs a two-way fixed effects estimator, which accommodates unobserved features that condition both Huawei transfers and various political outcomes. To ensure the statistical results are not driven by reverse causality – by political changes in year t inducing contemporaneous Huawei transfers – we lag our measure of Huawei transfers. This has an appealing theoretical motivation as well. Digital technology transfers presumably take some time to install and condition politics in recipient countries. We estimate models of the form:

$$Y_{it} \quad = \quad \alpha + \beta\,(\text{Huawei}_{it-1}) + \delta X_{it} + \gamma_i + \gamma_t + \epsilon \tag{1}$$

where i indexes country, t indexes year, γ_i gives country fixed effects, and γ_t gives year fixed effects. The explanatory variable of interest, $Huawei_{it-1}$, measures the value of Huawei's financial commitments to country i in year $t-1$. The vector X_{it} includes potential country- and time-varying confounders. We control for a range of features that may reflect underlying political instability, which could be associated with both Huawei transfers and domestic repression: the number of protest and civil conflict events as recorded the Armed Conflict Event and Location Dataset (ACLED) (Raleigh et al. 2010), any coup attempts (Powell and Thyne 2011), and whether country i witnessed an election (Hyde and Marinov 2012). We control for economic features that might be associated with Huawei transfers and domestic repression: country i's GDP per capita and oil production in year t. We also control for features of country i's infrastructure and informational environment, which might condition citizens' ability to engage in collective action or the efficacy of Huawei technology transfers: internet penetration and mobile phone penetration, both drawn from the World Bank. We estimate separate models for autocracies and democracies, which let the effect of Huawei technology transfers be a function of country i's preexisting political institutions. Descriptive statistics for all variables appear in the Online Appendix.

Our theory identifies three likely effects of Huawei technology transfers: internet shutdowns

Table 1: Measuring Digital Surveillance and Targeted Repression

Variable	Description
Internet Filtering	How frequently does the government censor political information (text, audio, images, or video) on the Internet by filtering (blocking access to certain websites)?
Social Media Monitoring	How comprehensive is the surveillance of political content in social media by the government or its agents?
Internet Shutdowns	How often does the government shut down domestic access to the Internet?
Arrests for Political Content	If a citizen posts political content online that would run counter to the government and its policies, what is the likelihood that citizen is arrested?

that block collective action by citizens, digital surveillance of citizens, and the sort of targeted repression that digital surveillance facilitates. The V-Dem project records several variables that capture these mechanisms, which are summarized in Table 1 (Coppedge et al. 2022). Two of these focus on digital surveillance: the government's capacity to censor or block online content and monitor social media. One focuses on how frequently the government shuts down domestic access to the internet. One focuses on targeted repression: how likely citizens are to be arrested for online political content. This form of targeted repression should capture, for instance, how the Ugandan government used Huawei surveillance technology to repress activist Bobi Wine and how the Zambian government used Huawei surveillance technology to repress journalists (Woodhams 2019). We rescale these variables to make them more intuitive for readers, such that a higher value indicates more surveillance or repression.[6]

4.2 Results

The results, which appear in Table 2, are strikingly consistent with the theory. Huawei technology transfers in year $t-1$ increased online censorship, the frequency of internet shutdowns, the extent of social media monitoring, and arrests in response to online dissent in year t. The effects are non-trivial. For each model, a 10% increase in Huawei transfers is associated with an increase in digital surveillance and targeted repression of roughly 10% of a standard deviation.

More intuitively, we can compare the magnitude of the effect to the average difference, for each variable, between autocracies and democracies. The mean value of V-Dem's internet filtering variable for Africa's autocracies is 0.60, which is almost precisely the mean sample value for Angola. Among Africa's leading oil producers, it was ruled by José Eduardo dos Santos between 1979 and his 2017 retirement, when he was succeeded by João Lourenço, his defense minister. Political opposition during the sample period was virtually prohibited (Freedom House 2017*a*). The mean internet filtering value for Africa's democracies is -0.87, which corresponds almost precisely to Senegal. Among Africa's democratic success stories, Senegal has a growing middle class and has

[6] In practice, this entailed flipping the sign on the V-Dem variables.

witnessed several peaceful alternations of power (Freedom House 2017*b*).

The results in Model 1 suggest that a 10% increase in Huawei transfers in year $t-1$ generates an increase in internet filtering that amounts to roughly 5.2% of the difference in means between Africa's autocracies and democracies. This implies that an increase of 50% in year $t-1$ is associated with an increase in internet filtering that amounts to 26% of the difference in means between Africa's autocracies and democracies, or between Angola and Senegal. The magnitude of this internet filtering effect is similar to the effect for internet shutdowns, social media monitoring, and arrests for online political content. For these, a 50% increase in year $t-1$ is associated with an increase of between 25% and 35% of the difference in means between Africa's autocracies and democracies. We find none of these effects in Africa's democracies, as Table 3 makes clear. There is no evidence that Huawei transfers in year $t-1$ lead to more online censorship, internet shutdowns, social media monitoring, or arrests for online dissent.

Together, these results suggest that the effect of Huawei technology transfers depends on the set of political institutions in recipient countries. In Africa's autocracies, Huawei transfers facilitate digital surveillance, internet shutdowns, and targeted repression. In Africa's democracies, we find no evidence that Huawei transfers facilitate democratic erosion.

4.3 Robustness Checks

The Online Appendix includes a series of extensions and robustness checks. First, we confirm that the results in Tables 2 and 3 are robust to using regime type classifications drawn from Marshall and Jaggers (2005) rather than Svolik (2012). For this, we define democracies as countries with Polity scores between 1 and 10, and autocracies as countries with Polity scores between -10 and 0. The results are substantively unchanged.

Second, since Huawei investment is often accompanied by increases in Chinese aid, investment, and weapons transfers, readers may be concerned that that the results in Table 2 are driven by Chinese support more broadly and not Huawei technology transfers specifically. To ensure this is not the case, we estimate variants of equation (1) that control for Chinese aid, overseas official finance, and weapons transfers. The effects of Huawei technology transfers are substantively unchanged. Moreover, we find no evidence that Chinese development aid, finance, or military aid has a clear or consistent effect on digital surveillance or targeted repression. The adverse effects of Chinese engagement are limited to Huawei technology transfers.

Third, readers may wonder whether the increase in digital surveillance and targeted repression after Huawei technology transfers is accompanied by an increase in more large-scale, brute-force repression. Our theory suggests that Huawei technology transfers should not have a strong, direct effect on these outcomes. Intuitively, by facilitating targeted repression, digital surveillance may obviate the need for more indiscriminate forms of repression (Xu 2021), which are routinely counterproductive (Rozenas and Zhukov 2019; Carter and Carter 2020). We draw these measures of

Table 2: Effects of Huawei Technology Transfers in Africa's Autocracies

	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Huawei_{t-1}	0.008^{**}	0.009^{***}	0.009^{***}	0.007^{**}
	(0.003)	(0.003)	(0.003)	(0.003)
Election	-0.012	0.003	-0.018^{*}	0.004
	(0.010)	(0.009)	(0.010)	(0.010)
Coup Attempt	-0.153^{***}	0.059	0.005	-0.018
	(0.057)	(0.049)	(0.056)	(0.056)
Protests	-0.0002	0.0004^{***}	-0.001^{***}	-0.0002^{*}
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Civil Conflict	0.0002	0.0005^{**}	0.0001	-0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
GDP per Capita	0.00000	0.00000	-0.00001	0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Oil Production	-0.0001	-0.0001	-0.0003^{***}	0.00004
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Internet Penetration	-0.005^{***}	-0.001	0.001	0.001
	(0.002)	(0.001)	(0.002)	(0.002)
Mobile Penetration	-0.002^{***}	-0.002^{***}	-0.006^{***}	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	1.184^{***}	1.083^{***}	2.443^{***}	0.912^{***}
	(0.193)	(0.165)	(0.187)	(0.190)
Country fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓
Observations	410	410	410	410
R^2	0.983	0.983	0.979	0.972
Note:				$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 3: Effects of Huawei Technology Transfers in Africa's Democracies

	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Huawei_{t-1}	−0.005	−0.001	0.0003	0.001
	(0.005)	(0.005)	(0.005)	(0.004)
Election	−0.017	−0.007	0.008	−0.005
	(0.016)	(0.013)	(0.014)	(0.010)
Coup Attempt	0.037	0.134^{*}	0.048	0.052
	(0.088)	(0.075)	(0.079)	(0.057)
Protests	−0.0002	-0.0003^{*}	0.00002	0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Civil Conflict	0.001^{*}	0.001^{***}	−0.0001	0.0001
	(0.0004)	(0.0004)	(0.0004)	(0.0003)
GDP per Capita	−0.00001	-0.00002^{*}	0.00000	−0.00000
	(0.00002)	(0.00001)	(0.00002)	(0.00001)
Oil Production	−0.0001	0.0001	−0.0001	-0.001^{***}
	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Internet Penetration	-0.012^{***}	-0.007^{***}	-0.009^{***}	-0.009^{***}
	(0.003)	(0.002)	(0.003)	(0.002)
Mobile Penetration	−0.001	0.001	−0.001	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	-2.041^{***}	-1.939^{***}	-0.789^{***}	-0.912^{***}
	(0.076)	(0.064)	(0.068)	(0.049)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Observations	381	381	381	381
R^2	0.936	0.941	0.954	0.981
Note:				*p<0.1; **p<0.05; ***p<0.01

repression from V-Dem, ACLED, and the Social Conflict in Africa Database (SCAD) (Salehyan et al. 2012). ACLED also records whether state security services respond to collective action with excessive force. We find that Huawei transfers have essentially no effect on large-scale repression in Africa's autocracies or democracies.

Fourth, although we control for various forms of political instability that could compel governments to seek Huawei technology transfers and expand digital surveillance or targeted repression, readers may be concerned that there remains some unobserved factor driving both. To probe how likely this is, we regress Huawei transfers in year t on our measures of digital surveillance and targeted repression in year $t-1$. Intuitively, if there is some unobserved factor driving Huawei transfers and digital surveillance or targeted repression, we should expect changes in Huawei transfers in year t to be correlated with changes in digital surveillance or targeted repression in year $t-1$. We find no evidence that changes in Huawei transfers in year t predict changes in digital surveillance and targeted repression in year $t-1$. This suggests that recipient governments are not "selecting into" Huawei transfers as a function of some earlier decision to expand digital surveillance and targeted repression.

5 Staggered Differences-in-Differences Estimation

5.1 The Belt and Road Initiative, Staggered Roll-Outs, and the Bad Comparisons Problem

Our identification strategy in Section 4 used a lagged outcome variable to prevent reverse causality and two-way fixed effects to accommodate unobserved features that might condition Huawei technology transfers and various outcomes of interest. This estimation strategy implicitly focused on changes: how changes in Huawei transfers condition changes in digital surveillance and targeted repression. It is likely, however, that the full effects of Huawei transfers take some time to materialize, perhaps because of implementation issues, and are then realized over time, during the life of the technology transfer itself. Put differently, a recipient country is "treated" at the moment of the technology transfer, and this transfer persists, though perhaps with heterogeneous effects due to an initial installation period or some other change in the recipient country.

To accommodate these features, we employ another identification strategy to estimate the effect of Huawei technology transfers on digital surveillance and targeted repression in Africa's autocracies: a DiD estimator with staggered treatments and heterogeneous treatment effects. As the descriptive statistics in Figure 1 made clear, the roll-out of Huawei digital technology across the African continent occurred in waves. The most significant of these followed the expansion of Xi Jinping's BRI to the African continent between 2014 and 2015, which accounted for 36% of all transfers to Sub-Saharan Africa during the 18-year AidData sample period. The second most significant expansion followed the Global Financial Crisis of 2009, when the CCP sought to generate foreign demand for Chinese goods – and hence reduce the likelihood of a domestic recession – partly by having state-owned enterprises undertake major construction projects abroad (China News 2008; Yu 2010; Lardy 2012; Wallace 2014). The Huawei transfers between 2009 and 2010 accounted for roughly 35% of all transfers during the 18-year sample period.

Although the staggered DiD estimator is increasingly common in the social sciences, it can yield biased estimates of the average treatment effect on the treated (ATT) even when treatment is randomly assigned (Baker, Larcker and Wang 2022). This is known as the "bad comparisons problem," and, when treatment effects can change over time, it can cause the standard staggered DiD estimator to yield estimates of the true ATT that are the opposite sign of the true ATT, even when the parallel trends assumption holds. Intuitively, the standard staggered DiD estimator potentially lets already-treated units serve as effective comparison units. The bad comparisons problem is especially likely in settings where treatment effects are heterogenous, either over time or across units. This heterogeneity is especially likely in areas of interest to political scientists. In our setting, for instance, Huawei transfers almost certainly have heterogeneous effects across countries, since the mix and volume of Huawei transfers generally differs across them. Moreover, as political conditions change over time, the ways that recipient governments – or their successors – employ Huawei technology may change as well.[7]

5.2 Estimation Strategy

We implement the staggered DiD estimator with heterogeneous treatment effects in three steps. First, we estimate a variant of the standard staggered DiD estimator with treatment effects for each unit:

$$Y_{it} \quad = \quad \alpha + \beta_i \left(\text{Treated}_{it}\right) + \delta X_{it} + \gamma_i + \gamma_t + \epsilon \tag{2}$$

where i indexes country, t indexes year, γ_i gives country fixed effects, and γ_t gives year fixed effects. The variable $Treated_{it}$ equals 1 if country i has received Huawei transfers greater than some financial threshold $\$T$ during year t or in some year since. We let this financial threshold $\$T$ vary: from a commitment of just \$500,000 in year t to transfers of \$1 million, \$5 million, and \$10 million in year t.[8] The vector X_{it} includes the same potential country- and time-varying confounders as above: protest, civil conflict, coup attempts, elections, GDP per capita, oil production, internet penetration, and mobile phone penetration.

The subscript i on β_i makes clear that equation (2) estimates a treatment effect for each treated unit. Next, we construct a contrast matrix that counts the number of periods during which each

[7] For more on how to overcome the bad comparisons problem, see Wheeler (2022).

[8] These treatment thresholds are substantively meaningful in the data. For country-years between 2000 and 2017, 11 autocracies and 5 democracies received Huawei transfers of \$500,000 or more, 9 autocracies and 5 democracies received transfers of \$1 million or more, 9 autocracies and 3 democracies received transfers of \$5 million or more, and 7 autocracies and 3 democracies received transfers of \$10 million or more.

country in the treatment group is treated. This lets us estimate the cumulative treatment effect of Huawei transfers. Finally, we use this estimated cumulative effect to calculate the average treatment effect per unit, per period. We estimate separate models for autocracies and democracies, which let the effect of Huawei technology transfers be a function of country i's preexisting political institutions.

Our theoretical prior is that Huawei transfers are likely to have a stronger effect on digital surveillance and targeted repression at higher financial thresholds for treatment. This is consistent with the results in Section 4, where Huawei transfers were measured in changes. It is also intuitive. As the Safe City contracts make clear, the most expansive digital surveillance apparatuses are generally the most expensive to implement.

DiD estimators require a parallel trends assumption. In our setting, this requires that countries that receive Huawei technology transfers would have maintained similar levels of digital surveillance and targeted repression as countries without Huawei transfers had treated countries not received them. In the standard, single-shot DiD setting, this parallel trends assumption can be visualized: Treatment and control groups should have the same trend in the outcome prior to the treatment and then diverge afterwards. To some extent, the staggered DiD estimator alleviates this concern, since the multiple treatment periods make it less likely that estimated treatment effects are driven by contemporaneous trends (Baker, Larcker and Wang 2022). Still, in Figure 2, we assess pre- and post-treatment trends for countries that received Huawei technology transfers. The x-axis gives years until and since treatment; the y-axis gives the mean value of the outcome measure for the treatment group. We focus on the four years before treatment and the four years after. The visual evidence suggests no clear pre-treatment trends, which suggests the estimates from equation (2) will have a plausibly causal interpretation. The possible exception is social media monitoring, in the bottom left panel, though we note that the only pre-treatment increase occurred in year $t-2$ and was comparatively modest. The Online Appendix gives analogous plots for our sample of democracies, which are generally similar.

5.3 Results

The results for Africa's autocracies appear in the top panel of Table 4. Note that the top panel reports the estimates of 16 separate regression models: one each for the treatment thresholds along the left and the outcome measures along the top. These results are noteworthy for two reasons. First, as expected, the effect of Huawei technology transfers increases with the financial threshold for treatment. At a treatment threshold of \$500,000, the effects are modest. The magnitude of these effects increase steadily as the treatment threshold increases to \$1 million. At treatment thresholds of \$5 million and, especially, \$10 million, the effects are statistically and substantively significant across outcome measures. For the \$5 million treatment threshold, Huawei transfers increase internet filtering by nearly 15% of the difference in means between Africa's autocracies

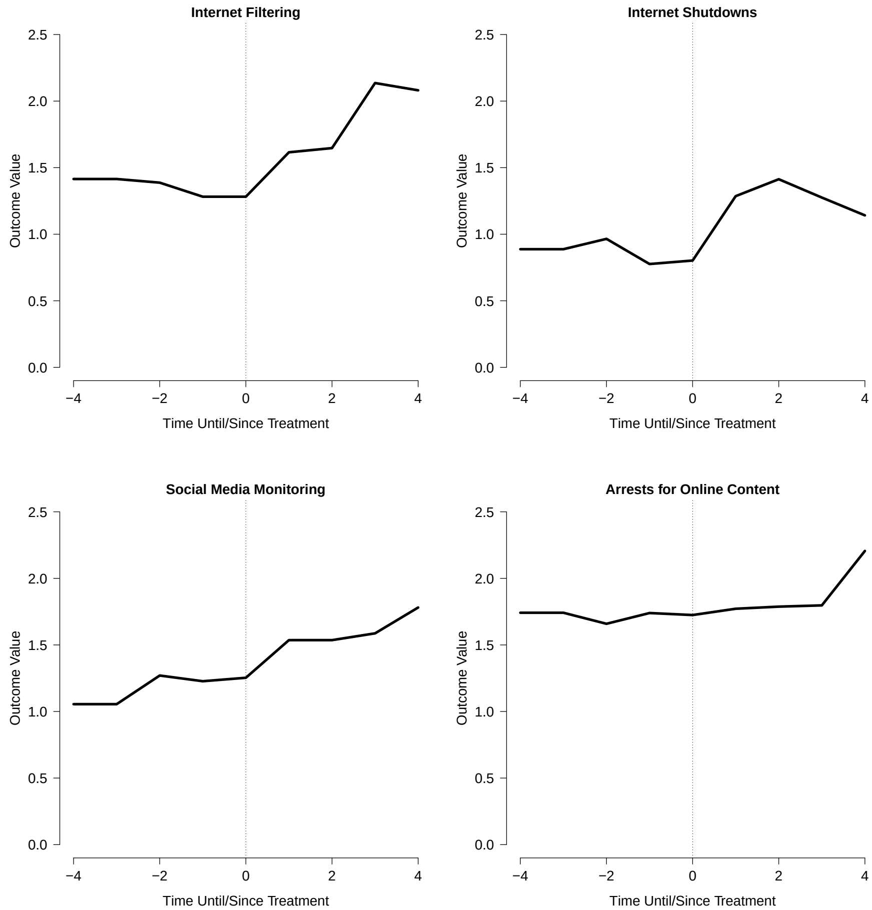

Figure 2: Pre- and post-treatment trends

and democracies, or between Angola and Senegal. For the $10 million threshold, Huawei transfers increase internet filtering by nearly 20% of the difference in means between Africa's autocracies and democracies. The effects for internet shutdowns, social media monitoring, and arrests for political content are similar in magnitude across the $5 million and $10 million treatment thresholds.

The second reason the results are noteworthy: They are similar in magnitude to the results from the two-way fixed effects models in Section 4, which focus on changes induced by Huawei transfers rather than per-unit, per-period treatment effects over time.

The results for Africa's democracies appear in the bottom panel of Table 4. Again, this bottom panel reports the estimates of 16 regression models, each with a different treatment threshold and outcome measure. As in Section 4, we find no clear and consistent evidence of adverse effects of Huawei transfers in Africa's democracies. It is possible that these transfers increase the frequency of internet shutdowns, but it is also possible that these transfers reduce arrests for online political content and civil society repression.

Table 4: Staggered Differences-in-Differences

	Autocracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.069*	−0.006	−0.101**	0.054
	(0.038)	(0.034)	(0.037)	(0.041)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.182***	0.040	−0.005	0.083*
	(0.044)	(0.039)	(0.044)	(0.046)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.203***	0.064*	0.006	0.091*
	(0.045)	(0.037)	(0.043)	(0.047)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.272***	0.086**	0.118**	0.102*
	(0.051)	(0.043)	(0.051)	(0.054)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	434	434	434	434

	Democracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.019	0.193**	−0.107	−0.126*
	(0.104)	(0.084)	(0.091)	(0.068)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.019	0.193**	−0.107	−0.126*
	(0.104)	(0.084)	(0.091)	(0.068)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.131	0.468***	−0.202	−0.164
	(0.1534)	(0.124)	(0.134)	(0.100)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.131	0.468***	−0.202	−0.164
	(0.153)	(0.124)	(0.134)	(0.100)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	382	382	382	382

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

5.4 Robustness Checks

The Online Appendix includes a series of robustness checks. As in Section 4.3, we confirm that the staggered DiD results are substantively unchanged when we control for other forms fo Chinese support, such as aid, investment, and weapons transfers. Likewise, we confirm that the staggered DiD results are substantively unchanged when we use regime type classifications drawn from Marshall and Jaggers (2005) rather than Svolik (2012). Across models, the results are consistent with Table 4.

6 Generalized Synthetic Control Method

6.1 Estimation Strategy

Finally, we employ a third identification strategy: the generalized synthetic control (GSC) estimator, developed by Xu (2017). The GSC estimator generalizes the synthetic control estimator developed by Abadie, Diamond and Hainmueller (2010, 2015) by accommodating multiple treated units and treatment periods. Perhaps more importantly, it accommodates the possibility that the parallel trends assumption required for the standard DiD estimator does not hold.

The GSC estimator imputes a counterfactual outcome for treated unit i at time t in three steps. First, using only data from the control group, it estimates a model using interactive fixed effects (IFE) or the matrix completion (MC) method proposed by Athey et al. (2021).[9] Then, it uses these results from the control group to estimate factor loadings for each treated unit by minimizing the mean squared error of the predicted treated outcome in pre-treatment periods. Finally, it constructs counterfactual outcomes for each treated unit in post-treatment periods and estimates the ATT based on the differences between the observed and these counterfactual outcomes. In this sense, the GSC estimator can be thought of as similar to an out-of-sample prediction method. The basic functional form is:

$$Y_{it} = \beta_{it}\,(\text{Treated}_{it}) + \delta X_{it} + \lambda_i f_t + \epsilon \tag{3}$$

where i indexes country and t indexes year. The variable $\textit{Treated}_{it}$ equals 1 if country i has received Huawei transfers greater than some financial threshold $\$T$ during year t or in some year since. Again, we let this financial threshold $\$T$ vary from a commitment of just \$500,000 in year t to transfers of \$1 million, \$5 million, and \$10 million. The subscripts it on β_{it} make clear that equation (3) estimates a treatment effect for each treated unit in each treated period. Again, the vector X_{it} includes potential country- and time-varying confounders: protest, civil conflict, coup attempts, elections, GDP per capita, oil production, internet penetration, and mobile phone penetration.

[9] In our application, we employ the MC method because it uses information from the treatment group in the pre-treatment period.

The term $\lambda_i f_t$ represents the factor component of the model: f_t is a vector of unobserved common factors and λ_i is a vector of unknown factor loadings. This factor component incorporates unit-specific intercepts with time-varying coefficients.[10] To minimize any potential bias, we set the minimum pre-treatment period used by the GSC estimator to impute counterfactual outcomes to eight years, or nearly half the full AidData sample period.

6.2 Results

Table 5 reports the ATT estimates averaged across countries and periods, and hence is analogous to Table 4. Again, it reports the estimates of 16 separate regression models: one each for the treatment thresholds along the left and the outcome measures along the top. The results for Africa's autocracies, which appear in the top panel, are again noteworthy for two reasons. First, the effect of Huawei technology transfers increases with the financial threshold for treatment. At the $500,000 threshold, the effects are modest. For the $5 million threshold, Huawei transfers increase internet filtering by nearly 23% of the difference in means between Africa's autocracies and democracies, or between Angola and Senegal. For the $10 million threshold, Huawei transfers increase internet filtering by 40% of the difference in means between Africa's autocracies and democracies. The effects for internet shutdowns, social media monitoring, and arrests for political content are similar in magnitude. Note that the estimated effects are very similar to the results from the staggered DiD model with heterogeneous treatment effects and the two-way fixed effects models.

Figures 3 through 6 visualize the estimated ATT by period for each of the four outcome variables of interest. For each, the estimated ATT for autocracies appears at left; the estimated ATT for democracies appears at right. The shaded areas represent 95% confidence intervals. The x-axes give years pre- and post-treatment; the y-axes report the averaged coefficient across units for a given period. As expected, after implementing the GSC estimator, the average actual outcomes and the average predicted outcomes match well in the pre-treatment periods and diverge after Huawei technology transfers. Notwithstanding some oscillations, the treatment effects for Africa's autocracies are generally stable over time, after an initial period of one to two years. This makes theoretical sense, as we first observed in Section 5.

As before, we find no evidence that Huawei technology transfers have expanded digital surveillance or targeted repression in Africa's democracies.

6.3 Robustness Checks

The Online Appendix again includes a series of robustness checks. We confirm that the GSC results are substantively unchanged when we control for other forms of Chinese support, such as aid, investment, and weapons transfers. We confirm that the GSC results are substantively unchanged when we use regime type classifications drawn from Marshall and Jaggers (2005) rather

[10] For more, see Xu (2017, 58).

Table 5: Generalized Synthetic Control Method

	Autocracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer $\geq$ \$500,000	0.160	0.099	0.080	0.093
	(0.133)	(0.105)	(0.104)	(0.064)
Treatment Threshold 2				
Transfer $\geq$ \$1,000,000	0.307**	0.197*	0.163	0.143**
	(0.131)	(0.107)	(0.114)	(0.067)
Treatment Threshold 3				
Transfer $\geq$ \$5,000,000	0.344**	0.221*	0.179	0.161**
	(0.140)	(0.124)	(0.144)	(0.074)
Treatment Threshold 4				
Transfer $\geq$ \$10,000,000	0.574***	0.390***	0.384***	0.247***
	(0.134)	(0.140)	(0.103)	(0.092)
Factor Components	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	434	434	434	434

	Democracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer $\geq$ \$500,000	−0.082	−0.164	0.064	0.002
	(0.600)	(0.353)	(1.174)	(0.330)
Treatment Threshold 2				
Transfer $\geq$ \$1,000,000	−0.082	−0.164	0.064	0.002
	(0.600)	(0.353)	(1.174)	(0.330)
Treatment Threshold 3				
Transfer $\geq$ \$5,000,000	−0.002**	−0.036	0.014	0.114***
	(0.072)	(0.015)	(0.020)	(0.018)
Treatment Threshold 4				
Transfer $\geq$ \$10,000,000	−0.073	−0.162	0.057	0.002
	(0.638)	(0.441)	(0.751)	(0.344)
Factor Components	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	382	382	382	382

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

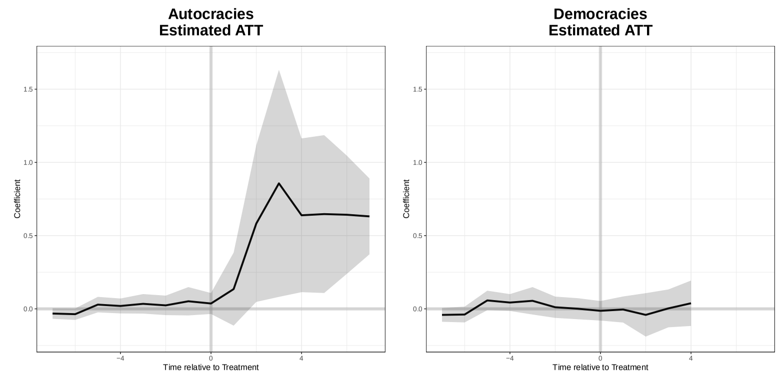

Figure 3: Internet Filtering

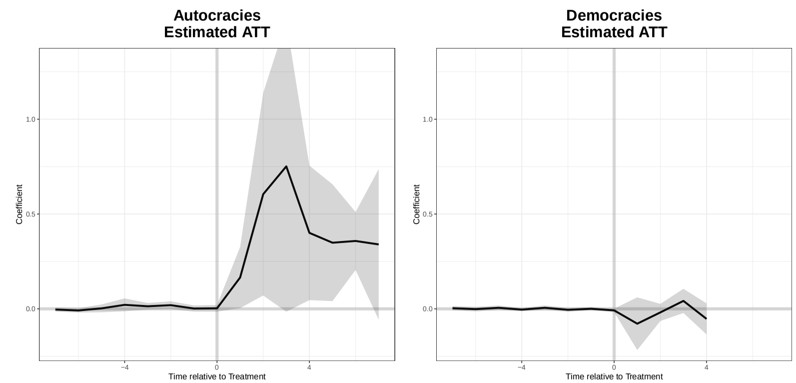

Figure 5: Social Media Monitoring

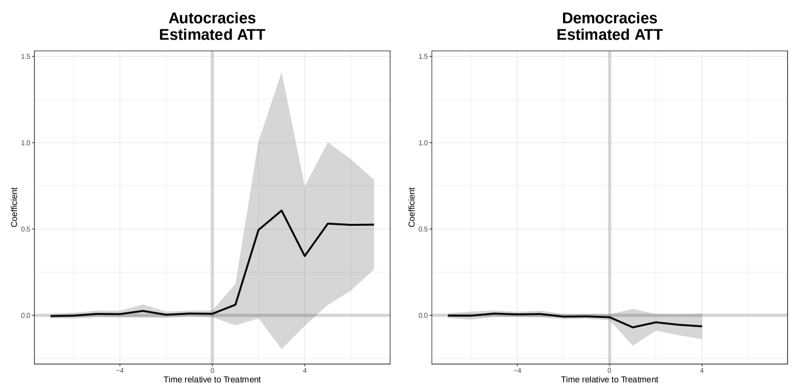

Figure 4: Internet Shutdowns

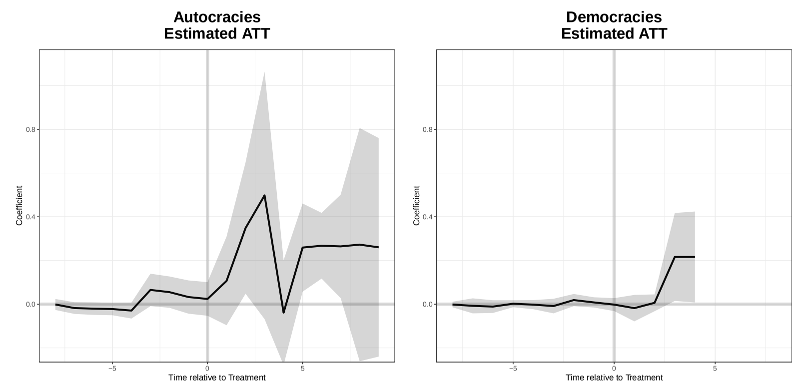

Figure 6: Arrests for Online Content

than Svolik (2012). Across models, the results are consistent with Table 5. We also show that the results are robust to changing the minimum pre-treatment period used by the GSC estimator to impute counterfactual outcomes.

Finally, we present a series of placebo tests developed by Liu, Wang and Xu (2022) that are appropriate for the matrix completion method that we use to implement GSC. These tests hide some observation periods before the treatment for treated units, and predict the untreated outcomes of the hidden periods with a model trained on the untreated units. There should be no differences between observed and predicted outcomes if the identifying assumptions are valid.[11] In our case, there are no significant differences between the observed and predicted values in the hidden periods, which lends additional confidence in the results.

7 Conclusion

The Chinese government, having revolutionized digital surveillance at home, is exporting its technologies abroad. These transfers have sparked widespread concern among observers. These tools of digital dictatorship, many observers have argued, will let recipient governments expand surveillance and reinforce the wave of autocratic retrenchment and democratic erosion currently underway. This paper presents the first cross-country, plausibly causal evidence that these concerns are justified, but also adds nuance.

By 2018, Africa's autocracies accounted for 81% of total Huawei technology transfers to the African continent. Chinese aid and investment may flow relatively evenly to Africa's autocracies and democracies, but Huawei technology transfers do not. The effects of Huawei technology transfers, we find, depend on the set of political institutions in recipient countries. In Africa's autocracies, where the chief political threat to incumbents is collective action by citizens and oversight is weak, Huawei transfers lead to an expansion in digital surveillance, internet shutdowns, and targeted repression. In Africa's democracies, by contrast, where citizen and media oversight is stronger, Huawei transfers have no clear or consistent effect on digital surveillance or targeted repression.

We suggest two critical directions for future research. First, although Huawei transfers have a plausibly causal effect on digital surveillance and targeted repression in Africa's autocracies, it remains unclear whether these transfers help reduce the probability of regime collapse. This may well be the case. Digital surveillance may help detect elite conspiracies and block collective action, which would reduce both the rate of coups and revolutions. Second, although we find no clear and consistent evidence that Huawei transfers have amplified digital surveillance and targeted repression in Africa's democracies, these results should be regarded as preliminary. It is possible, for instance, that Huawei transfers could be used by a legitimately elected government to erode the democratic institutions that brought them to power, as appears to have been the case in Zambia under former

[11] For more, see Liu, Wang and Xu (2022, 3-4, 18-20).

president Edward Lungu (Parkinson, Bariyo and Chin 2019; Woodhams 2019). Alternatively it is possible that, with more time, Huawei transfers could foster economic growth by increasing productivity and public goods provision. We regard these possibilities as potential longer-term effects that are key directions for further research, especially as Huawei builds a longer record of engagement on the African continent.

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Online Appendix

December 15, 2022

Contents

1 Descriptive Statistics

Descriptive statistics for the control variables used throughout the paper appear in Figure 1. The full country sample appears in Table 1.

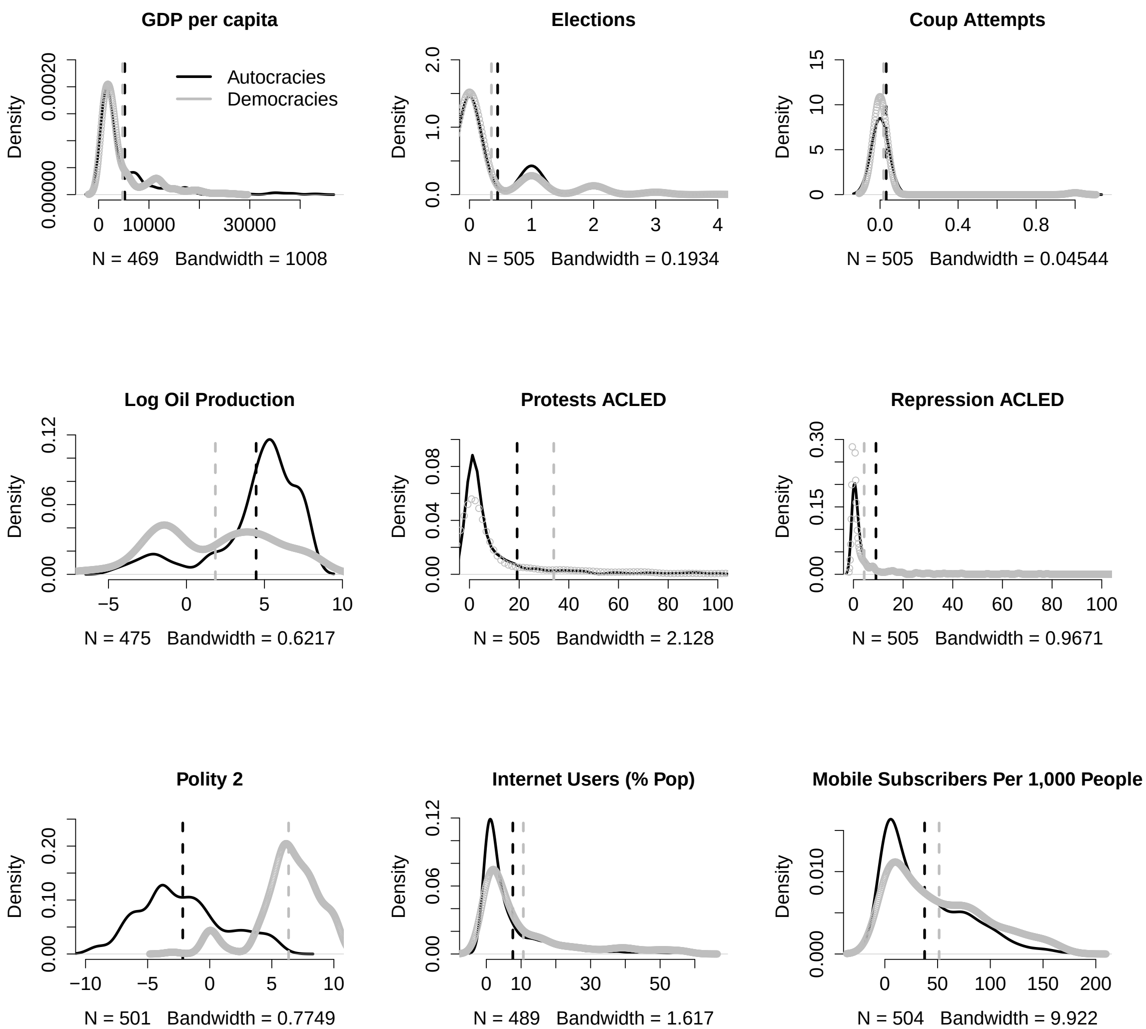

Figure 1: Descriptive statistics for autocratic country-years compared to democratic country-years over the 2000 to 2017 period. Dashed lines give mean values.

Table 1: Country sample

Country	Start	End	Country	Start	End
Algeria	2000	2020	Libya	2000	2020
Angola	2000	2020	Mauritania	2000	2020
Benin	2000	2020	Madagascar	2000	2020
Burkina Faso	2000	2020	Mauritius	2000	2020
Botswana	2000	2020	Malawi	2000	2020
Burundi	2000	2020	Mali	2000	2020
Cameroon	2000	2020	Morocco	2000	2020
Cape Verde	2000	2020	Mozambique	2000	2020
Cote d'Ivoire	2000	2020	Namibia	2000	2020
Central African Republic	2000	2020	Nigeria	2000	2020
Chad	2000	2020	Niger	2000	2020
Comoros	2000	2020	Rwanda	2000	2020
Congo	2000	2020	South Africa	2000	2020
Djibouti	2000	2020	Senegal	2000	2020
Democratic Republic of Congo	2000	2020	Seychelles	2000	2020
Egypt	2000	2020	Sierra Leone	2000	2020
Equatorial Guinea	2000	2020	Somalia	2000	2020
Eritrea	2000	2020	South Sudan	2000	2020
Ethiopia	2000	2020	São Tomé and Príncipe	2000	2020
Gabon	2000	2020	Sudan	2000	2020
Gambia	2000	2020	Swaziland	2000	2020
Ghana	2000	2020	Tanzania	2000	2020
Guinea-Bissau	2000	2020	Togo	2000	2020
Guinea	2000	2020	Tunisia	2000	2020
Kenya	2000	2020	Uganda	2000	2020
Liberia	2000	2020	Zambia	2000	2020
Lesotho	2000	2020	Zimbabwe	2000	2020

2 Two-Way Fixed Effects Models

The two-way fixed effects models reported in Section 4 of the main text are robust to a variety of alternative specifications. In Tables 2 and 3, we control for a variety of other forms of Chinese engagement with Africa, including official aid, finance, and military aid. The results are robust to these additional controls. In Tables 4 and 5, we present placebo tests that confirm that Huawei technology transfers do not predict surveillance and repression the prior year. This demonstrates that reverse causality concerns are unlikely in a two-way fixed effects setting. In Tables 6 and 7, we show that the results from Section 4 of the main text are robust to using Polity scores to define regime types, rather than Svolik's classification. We define democracies as countries with Polity scores between 1 and 10 and autocracies as countries with Polity 2 scores between -10 and 0 (Marshall and Jaggers 2005). In Table 8, we show that Huawei technology transfers do not generate increases in large-scale repression, as measured by SCAD, ACLED, or V-Dem.

Table 2: Effects of Huawei Technology Transfers in Africa's Autocracies (Controlling for Broader Chinese Engagement)

	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Huawei_{t-1}	0.007^{**}	0.009^{***}	0.008^{***}	0.006^{*}
	(0.003)	(0.003)	(0.003)	(0.003)
Election	−0.012	0.006	−0.015	0.005
	(0.010)	(0.009)	(0.010)	(0.010)
Coup Attempt	-0.151^{***}	0.058	0.010	−0.011
	(0.057)	(0.049)	(0.055)	(0.056)
Protests	−0.0002	0.0004^{***}	-0.001^{***}	-0.0003^{*}
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Civil Conflict	0.0002	0.0005^{**}	0.0002	−0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
GDP per Capita	0.00000	0.00000	−0.00001	0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Oil Production	−0.0001	−0.0001	-0.0003^{***}	0.00002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Internet Penetration	-0.005^{***}	−0.001	−0.0005	0.001
	(0.002)	(0.001)	(0.002)	(0.002)
Mobile Penetration	-0.002^{**}	-0.002^{***}	-0.006^{***}	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Chinese ODA_{t-1}	0.002	−0.0004	−0.001	0.003^{**}
	(0.002)	(0.001)	(0.002)	(0.002)
Chinese OOF_{t-1}	0.001	−0.00003	0.005^{***}	0.002^{*}
	(0.001)	(0.001)	(0.001)	(0.001)
Chinese Military Aid_{t-1}	−0.001	-0.004^{*}	−0.001	−0.0004
	(0.002)	(0.002)	(0.002)	(0.002)
Constant	1.191^{***}	1.084^{***}	2.508^{***}	0.939^{***}
	(0.194)	(0.165)	(0.186)	(0.189)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Observations	410	410	410	410
R^2	0.983	0.983	0.979	0.973
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 3: Effects of Huawei Technology Transfers in Africa's Democracies (Controlling for Broader Chinese Engagement)

	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Huawei_{t-1}	−0.003	0.0001	0.002	0.003
	(0.005)	(0.005)	(0.005)	(0.003)
Election	−0.022	−0.007	0.004	−0.009
	(0.016)	(0.013)	(0.014)	(0.010)
Coup Attempt	0.036	0.126^{*}	0.040	0.053
	(0.088)	(0.075)	(0.078)	(0.056)
Protests	−0.0002	-0.0003^{*}	0.00000	0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Civil Conflict	0.001^{*}	0.001^{***}	−0.0001	0.0002
	(0.0004)	(0.0004)	(0.0004)	(0.0003)
GDP per Capita	−0.00000	-0.00003^{*}	0.00001	0.00000
	(0.00002)	(0.00001)	(0.00002)	(0.00001)
Oil Production	−0.0001	0.00004	−0.0002	-0.001^{***}
	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Internet Penetration	-0.012^{***}	-0.007^{***}	-0.009^{***}	-0.009^{***}
	(0.003)	(0.002)	(0.003)	(0.002)
Mobile Penetration	−0.001	0.001	−0.001	−0.0001
	(0.001)	(0.001)	(0.001)	(0.001)
Chinese ODA_{t-1}	−0.001	−0.002	−0.003	−0.0005
	(0.002)	(0.002)	(0.002)	(0.001)
Chinese OOF_{t-1}	0.005^{***}	0.001	0.005^{***}	0.004^{***}
	(0.002)	(0.002)	(0.002)	(0.001)
$\text{Chinese Military Aid}_{t-1}$	0.005^{**}	−0.0004	0.003	0.004^{***}
	(0.002)	(0.002)	(0.002)	(0.002)
Constant	-2.030^{***}	-1.921^{***}	-0.762^{***}	-0.907^{***}
	(0.078)	(0.067)	(0.070)	(0.050)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Observations	381	381	381	381
R^2	0.938	0.941	0.955	0.982
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 4: Effects of Huawei Technology Transfers in Africa's Autocracies (Reverse Causality Placebo)

	Dependent variable:			
	Internet Filtering$_{t-1}$	Internet Shutdowns$_{t-1}$	Social Media Monitoring$_{t-1}$	Arrests for Political Content$_{t-1}$
	(1)	(2)	(3)	(4)
Huawei$_t$	0.002	−0.001	0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
Election	−0.014	−0.006	−0.012	0.009
	(0.010)	(0.008)	(0.009)	(0.009)
Coup Attempt	−0.065	−0.030	0.025	0.001
	(0.056)	(0.047)	(0.054)	(0.050)
Protests	0.0003^{**}	−0.0001	−0.0002	0.0002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Civil Conflict	−0.0003	0.0002	−0.0002	-0.001^{***}
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
GDP per Capita	−0.00000	0.00000	-0.00001^{*}	0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Oil Production	−0.00002	−0.0001	-0.0002^{*}	0.00004
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Internet Penetration	-0.004^{***}	−0.001	0.001	0.001
	(0.002)	(0.001)	(0.002)	(0.001)
Mobile Penetration	-0.002^{***}	-0.003^{***}	-0.006^{***}	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	1.163^{***}	1.241^{***}	2.359^{***}	0.941^{***}
	(0.189)	(0.158)	(0.181)	(0.169)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Observations	410	410	410	410
R^2	0.984	0.984	0.981	0.978
Note:				$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 5: Effects of Huawei Technology Transfers in Africa's Democracies (Reverse Causality Placebo)

	Dependent variable:			
	Internet Filtering$_{t-1}$	Internet Shutdowns$_{t-1}$	Social Media Monitoring$_{t-1}$	Arrests for Political Content$_{t-1}$
	(1)	(2)	(3)	(4)
Huawei$_t$	−0.007	−0.020***	−0.003	−0.001
	(0.005)	(0.004)	(0.004)	(0.003)
Election	−0.015	−0.008	−0.013	−0.015
	(0.015)	(0.012)	(0.013)	(0.010)
Coup Attempt	0.027	0.216***	0.036	0.052
	(0.083)	(0.069)	(0.074)	(0.057)
Protests	−0.0002	−0.0002	−0.00005	0.00001
	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Civil Conflict	0.001	0.001*	−0.0002	0.00001
	(0.0004)	(0.0003)	(0.0004)	(0.0003)
GDP per Capita	−0.00001	−0.00002	0.00000	−0.00000
	(0.00002)	(0.00001)	(0.00001)	(0.00001)
Oil Production	−0.00003	0.0002	−0.0001	−0.001***
	(0.0003)	(0.0002)	(0.0003)	(0.0002)
Internet Penetration	−0.010***	−0.008***	−0.007***	−0.008***
	(0.003)	(0.002)	(0.002)	(0.002)
Mobile Penetration	−0.001	0.001	−0.001	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−2.057***	−1.981***	−0.786***	−0.905***
	(0.072)	(0.059)	(0.063)	(0.049)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Observations	381	381	381	381
R^2	0.942	0.947	0.958	0.981
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 6: Effects of Huawei Technology Transfers in Africa's Autocracies (Polity Regime Types)

	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Huawei_{t-1}	0.009^{**}	0.008^{**}	0.009^{***}	0.009^{***}
	(0.003)	(0.004)	(0.003)	(0.003)
Election	-0.023^{**}	0.002	-0.025^{***}	-0.007
	(0.010)	(0.011)	(0.008)	(0.010)
Coup Attempt	-0.163^{***}	0.087	-0.032	0.025
	(0.057)	(0.061)	(0.047)	(0.056)
Protests	-0.001^{***}	-0.0002	-0.0004^{***}	-0.00004
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Civil Conflict	0.0004^{*}	0.001^{**}	0.0001	-0.0001
	(0.0002)	(0.0003)	(0.0002)	(0.0002)
GDP per Capita	0.00000	0.00001	-0.00001	0.00000
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Oil Production	-0.0001	-0.0002	-0.0002^{**}	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Internet Penetration	-0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Mobile Penetration	-0.003^{***}	-0.004^{***}	-0.004^{***}	-0.0002
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.997^{***}	1.342^{***}	2.466^{***}	0.812^{***}
	(0.207)	(0.219)	(0.172)	(0.202)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Observations	326	326	326	326
R^2	0.983	0.973	0.984	0.973

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

Table 7: Effects of Huawei Technology Transfers in Africa's Democracies (Polity Regime Types)

	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Huawei_{t-1}	−0.004	0.004	−0.004	−0.002
	(0.005)	(0.004)	(0.005)	(0.004)
Election	−0.010	−0.015	0.022	−0.005
	(0.014)	(0.013)	(0.014)	(0.011)
Coup Attempt	0.042	0.074	0.035	0.065
	(0.071)	(0.063)	(0.070)	(0.056)
Protests	−0.00003	−0.0003	−0.0001	−0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Civil Conflict	0.0004	0.001^{***}	−0.0002	0.001^{***}
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
GDP per Capita	0.00003	−0.00003	0.00004^{*}	0.00002
	(0.00002)	(0.00002)	(0.00002)	(0.00002)
Oil Production	−0.0001	−0.0001	−0.00004	-0.0005^{**}
	(0.0003)	(0.0002)	(0.0003)	(0.0002)
Internet Penetration	-0.016^{***}	-0.007^{***}	-0.009^{***}	-0.006^{***}
	(0.002)	(0.002)	(0.002)	(0.002)
Mobile Penetration	−0.0004	0.001	-0.003^{***}	−0.00005
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.950^{*}	1.320^{***}	1.328^{**}	1.676^{***}
	(0.556)	(0.499)	(0.553)	(0.441)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Observations	457	457	457	457
R^2	0.957	0.963	0.958	0.977
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 8: Large-Scale Repression in Autocracies

	Dependent variable:			
	Political Killings	Repression ACLED	Excessive Force	Repression SCAD
	(1)	(2)	(3)	(4)
Huawei_{t-1}	0.005	−0.097	0.191	0.018
	(0.006)	(0.264)	(0.162)	(1.195)
Election	−0.022	1.991^{**}	-0.885^{*}	4.434
	(0.018)	(0.846)	(0.521)	(3.835)
Coup Attempt	0.072	−7.312	-9.172^{***}	−2.221
	(0.103)	(4.828)	(2.971)	(21.877)
Protests	0.0001	0.075^{***}	0.132^{***}	0.006
	(0.0003)	(0.012)	(0.008)	(0.055)
Civil Conflict	0.001^{**}	0.049^{**}	0.020^{*}	0.055
	(0.0004)	(0.019)	(0.012)	(0.087)
GDP per Capita	0.00003^{**}	0.0001	−0.0002	0.002
	(0.00001)	(0.001)	(0.0004)	(0.003)
Oil Production	-0.001^{***}	−0.011	0.005	−0.008
	(0.0002)	(0.009)	(0.005)	(0.039)
Internet Penetration	−0.003	-0.311^{**}	−0.041	−0.553
	(0.003)	(0.141)	(0.087)	(0.639)
Mobile Penetration	-0.002^{*}	-0.126^{*}	−0.054	−0.150
	(0.001)	(0.065)	(0.040)	(0.295)
Constant	0.098	14.819	−14.617	28.559
	(0.345)	(16.238)	(9.994)	(73.583)
Country fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓
Observations	410	410	410	410
R^2	0.942	0.580	0.578	0.200
Note:				$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

3 Staggered Differences-in-Differences

The staggered DiD estimator with heterogeneous treatment effects models reported in Section 5 of the main text are robust to a variety of alternative specifications. In Table 9, we control for a variety of other forms of Chinese engagement with Africa, including official aid, finance, and military aid. In Table 10, we show that the results from Section 5 of the main text are robust to using Polity scores to define regime types, rather than Svolik's classification. We define democracies as countries with Polity scores between 1 and 10 and autocracies as countries with Polity 2 scores between -10 and 0 (Marshall and Jaggers 2005). Finally, Figure 2 shows pre- and post-treatment trends for our outcome variables in our sample of democracies.

In Figure 2, we assess pre- and post-treatment trends for democracies that received Huawei technology transfers, as we did for autocracies in Figure 2 of the main text. The x-axis gives years until and since treatment; the y-axis gives the mean value of the outcome measure for the treatment group. We focus on the four years before treatment and the four years after. The visual evidence suggests no clear pre-treatment trends, which suggests the staggered DiD estimates will have a plausibly causal interpretation. The possible exception is internet shutdowns, in the top right panel.

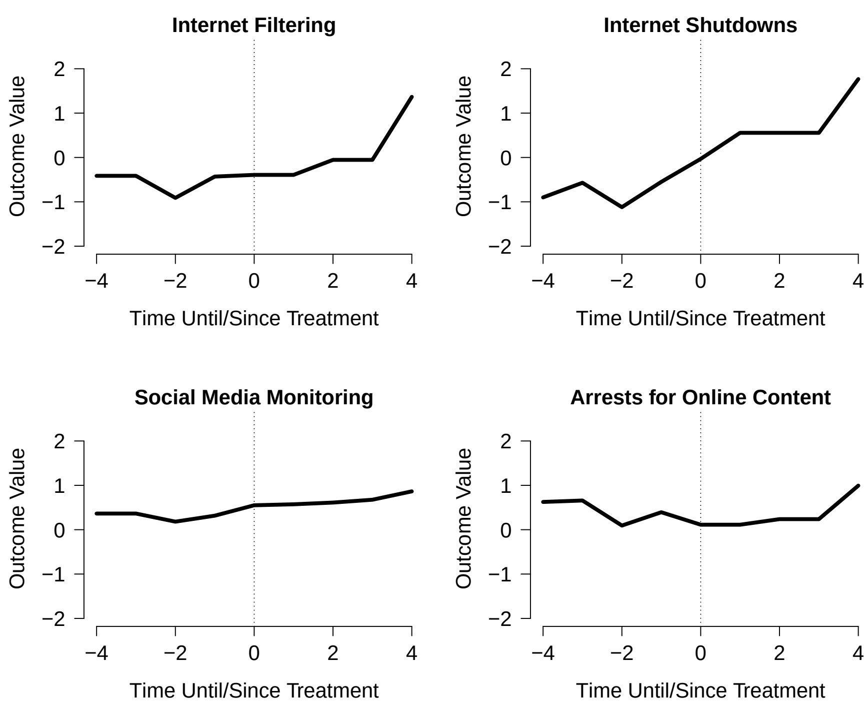

Figure 2: Pre- and post-treatment trends in democracies

Table 9: Staggered Differences-in-Differences (Controlling for Broader Chinese Engagement)

	Autocracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.064	0.005	-0.094^{*}	0.046
	(0.043)	(0.039)	(0.043)	(0.047)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.173^{***}	0.044	0.003	0.072
	(0.052)	(0.046)	(0.052)	(0.055)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.195^{***}	0.066	0.018	0.083
	(0.053)	(0.044)	(0.051)	(0.057)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.260^{***}	0.090^{*}	0.124^{**}	0.089
	(0.063)	(0.053)	(0.063)	(0.068)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	434	434	434	434

	Democracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.056	0.191	−0.075	−0.090
	(0.105)	(0.086)	(0.093)	(0.068)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.056	−0.075	−0.107	−0.090
	(0.105)	(0.086)	(0.093)	(0.068)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.165	0.482^{***}	−0.167	−0.129
	(0.154)	(0.127)	(0.136)	(0.099)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.165	0.482^{***}	−0.167	−0.129
	(0.154)	(0.127)	(0.136)	(0.099)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	382	382	382	382

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 10: Staggered Differences-in-Differences (Polity Regime Types)

	Autocracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.059	−0.010	0.014	0.099^{**}
	(0.041)	(0.047)	(0.034)	(0.043)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.155^{***}	0.076	0.081^{**}	0.099^{**}
	(0.048)	(0.054)	(0.039)	(0.049)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.172^{***}	0.099^{*}	0.093^{**}	0.106^{**}
	(0.049)	(0.054)	(0.037)	(0.051)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.226^{***}	0.150^{**}	0.192^{**}	0.096
	(0.058)	(0.064)	(0.046)	(0.061)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	351	351	351	351

	Democracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	−0.056	0.172^{***}	-0.178^{***}	-0.100^{*}
	(0.069)	(0.058)	(0.068)	(0.056)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	−0.056	0.172	-0.176^{***}	-0.100^{*}
	(0.069)	(0.058)	(0.068)	(0.056)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.027	0.422^{***}	-0.295^{***}	-0.128^{*}
	(0.090)	(0.076)	(0.088)	(0.073)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.027	0.422^{***}	-0.250^{***}	-0.128^{*}
	(0.090)	(0.076)	(0.088)	(0.073)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	479	479	479	479

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

4 Generalized Synthetic Control Method

The GSC estimator reported in Section 4 of the main text are robust to a variety of alternative specifications. In Table 11, we control for a variety of other forms of Chinese engagement with Africa, including official aid, finance, and military aid. In Table 12, we show that the results from Section 4 of the main text are robust to using Polity scores to define regime types, rather than Svolik's classification. We define democracies as countries with Polity scores between 1 and 10 and autocracies as countries with Polity 2 scores between -10 and 0 (Marshall and Jaggers 2005). In Figures 3 through 6, we visualize the estimated ATT by period for each of the four outcome variables of interest, but with the minimum pre-treatment period used by the GSC estimator to impute counterfactual outcomes set to six years rather than eight. Figure 7 presents the placebo tests for our GSC estimator discussed in the main text. As desired, the *p*-values are high, suggesting that the identifying assumptions of the model are not violated.

Table 11: Generalized Synthetic Control Method (Controlling for Broader Chinese Engagement)

	Autocracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.246**	0.174	0.127	0.119*
	(0.125)	(0.108)	(0.120)	(0.071)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.282**	0.184*	0.140	0.13*
	(0.127)	(0.112)	(0.130)	(0.070)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.317**	0.208	0.136	0.149**
	(0.132)	(0.135)	(0.135)	(0.070)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.550***	0.413***	0.385***	***0.234**
	(0.103)	(0.142)	(0.108)	(0.093)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	351	351	351	351

	Democracies *Dependent variable:*			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	−0.070	−0.214	0.067	0.013
	(0.323)	(0.357)	(0.662)	(0.316)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	−0.070	−0.214	0.067	0.013
	(0.323)	(0.357)	(0.662)	(0.316)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.008	−0.032	0.017	0.128***
	(0.057)	(0.023)	(0.020)	(0.014)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.008	−0.032	0.017	0.128***
	(0.057)	(0.023)	(0.020)	(0.014)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	479	479	479	479

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

Table 12: Generalized Synthetic Control Method (Polity Regime Types)

	Autocracies			
	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.173	0.101	0.100	0.121**
	(0.134)	(0.133)	(0.108)	(0.059)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.304**	0.208	0.173	0.163***
	(0.132)	(0.128)	(0.114)	(0.060)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.345**	0.238*	0.173	0.177**
	(0.141)	(0.146)	(0.128)	(0.070)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.566***	0.448***	0.360***	0.253***
	(0.114)	(0.119)	(0.104)	(0.094)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	351	351	351	351

	Democracies			
	Dependent variable:			
	Internet Filtering	Internet Shutdowns	Social Media Monitoring	Arrests for Political Content
	(1)	(2)	(3)	(4)
Treatment Threshold 1				
Transfer ≥ \$500,000	0.086	0.198	0.040	−0.031
	(0.762)	(0.516)	(0.647)	(0.369)
Treatment Threshold 2				
Transfer ≥ \$1,000,000	0.086	0.198	0.040	−0.031
	(0.762)	(0.516)	(0.647)	(0.369)
Treatment Threshold 3				
Transfer ≥ \$5,000,000	0.286*	0.524	0.056	−0.024
	(0.155)	(0.341)	(0.053)	(0.095)
Treatment Threshold 4				
Transfer ≥ \$10,000,000	0.286*	0.524	0.056	−0.024
	(0.155)	(0.341)	(0.053)	(0.095)
Country Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓
Control Variables	✓	✓	✓	✓
Observations	479	479	479	479

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

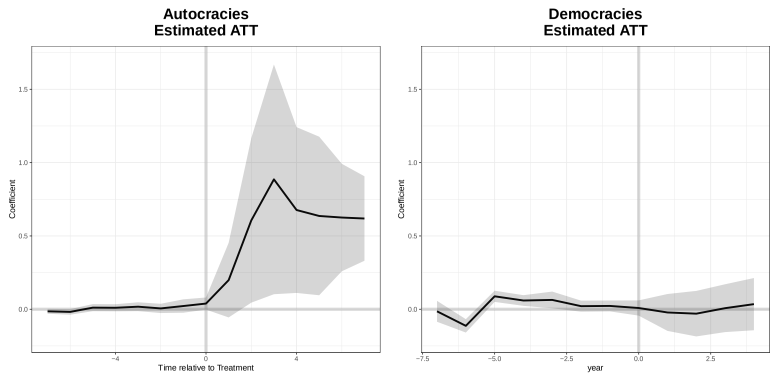

Figure 3: Internet Filtering with `min.T0` $= 6$

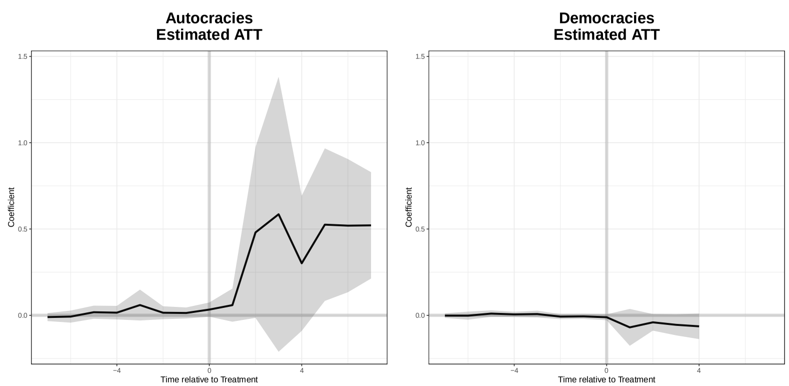

Figure 4: Internet Shutdowns with `min.T0` $= 6$

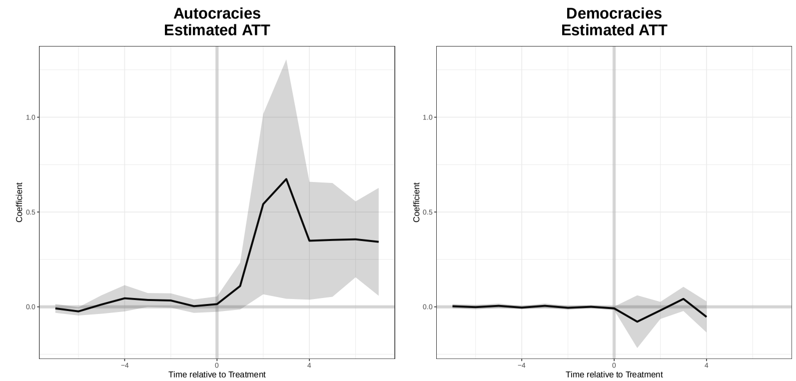

Figure 5: Social Media Monitoring with `min.T0` $= 6$

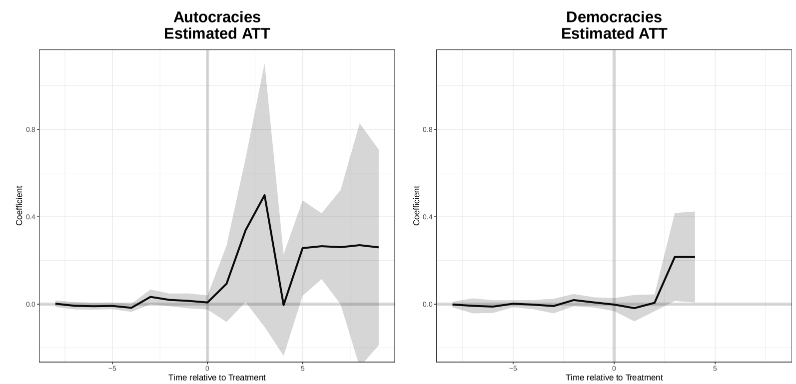

Figure 6: Arrests for Online Content with `min.T0` $= 6$

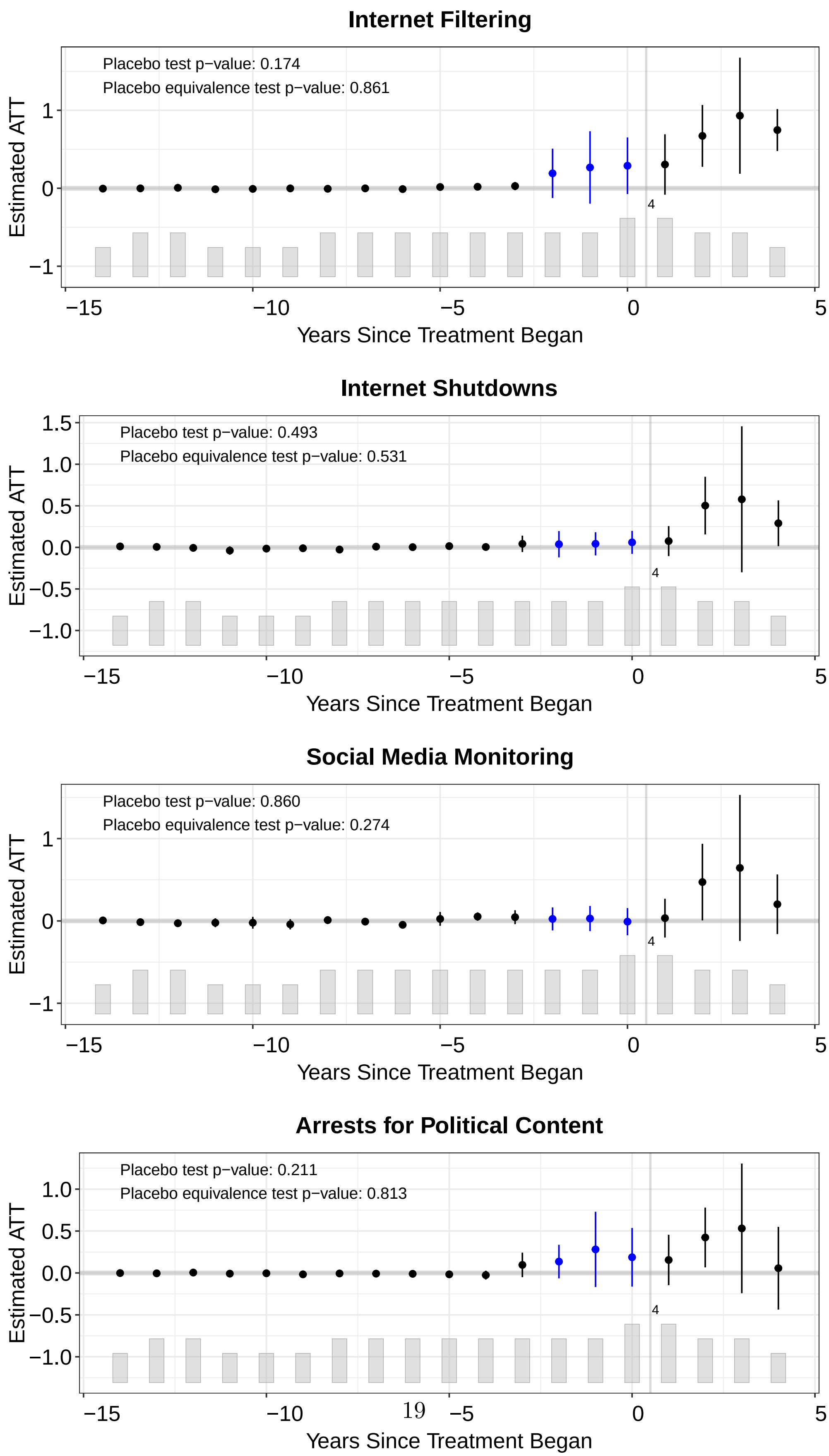

Figure 7: GSC placebo tests

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