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‘Ground-truthing’ Chinese development finance in Africa

Field evidence from South Africa and Uganda

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Abstract: A new methodology, Tracking Under-Reported Financial Flows (TUFF), allows us to systematically gather open-source information—e.g. news reports, case studies, project inventories from embassy websites, and grant and loan data published by recipient governments—about Chinese development finance activities in Africa that can be updated and improved through crowd-sourcing. In this study we create and field-test a replicable ‘ground-truthing’ methodology following an established protocol to verify and update existing data with in-person interviews on Chinese development finance and site visits in Uganda and South Africa. Ground-truthing generally revealed close agreement between open-source data and answers to protocol questions from informants with official roles in the Chinese-funded projects.

Keywords: China, aid, development finance, Africa, data collection, ground-truthing

JEL classification: C80, F35, O19, O55

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1 Introduction: the challenge of non-Western donors for empiricists

International media, research institutions, and donor agencies closely scrutinize the grants, loans, and other forms of assistance that China provides to other countries. Yet much of the conventional wisdom about Chinese development finance relies on untested assumptions, individual case studies, and incomplete data sources. The fact that a large body of research on China's overseas development finance exists and much of this scholarship rests on fragile empirical foundations makes systematic data collection on the topic especially important. China's development finance activities in Africa are closely examined because of the perceived economic, diplomatic, and geostrategic implications of their assistance.

Western policy makers, for instance, have accused China of using development finance as a mechanism for securing access to natural resources, subsidizing Chinese firms and exports, cementing and expanding political alliances, and pursuing global economic hegemony. Manson (2012). Beijing counters that its investment in Africa '... is based on respecting the will of Africa, listening to the voice of Africa and caring about the concerns of Africa, thus earning the trust of most African countries'.¹

In an attempt to provide a better evidence base to support the debate over the causes and consequences of Chinese assistance, AidData has produced a new methodology, Tracking Under-Reported Financial Flows (TUFF), which draws extensively from open-source information produced by the news media, scholarly research, and government reports. The application of the TUFF methodology has resulted in a database (available at china.aiddata.org) that captures 1,957 projects worth financial commitments of approximately US\$83.3 billion from 2000 to 2012. While these publicly available data have the potential to provide missing evidence in the discussion of Chinese aid, it is also possible that the data are fundamentally biased, incomplete, or otherwise flawed. In an attempt to investigate the accuracy of the TUFF-based data, this paper reports the results of an extensive effort in two countries—Uganda and South Africa—to “ground-truth” AidData's project-level information on Chinese development finance by undertaking site visits and extensive in-person interviews with recipient government officials and other individuals possessing knowledge of Chinese projects.

To preview the findings, the ground-truthing exercise uncovered some new information that corrected and amended the TUFF data in several instances, but by and large the findings from the interviews tended to corroborate the online sources from which the AidData information base on Chinese development finance was compiled. Importantly, however, the attempt to complete in-person interviews succeeded in uncovering information on less than one third of the projects uncovered through the TUFF data collection exercise. Despite extensive contacting and snowball sampling, our research team could not obtain information on a large share of projects, suggesting that on-the-ground interviewing is not a fool-proof supplement to more comprehensive data-collection methods. In the remainder of this paper, we provide some contextual information about Chinese development finance in Africa, attempts to collect data on the topic, and the general approaches taken with the TUFF methodology and the ground-truthing effort. We then present our findings and draw general lessons from the exercise.

¹ 'Is China an irresponsible friend of Africa?' *People's Daily Online*, 6 August 2012, available at <http://english.peopledaily.com.cn/90883/7899133.html>.

1.1 Background and literature

Assistance from non-Western donors represents a growing share of global development finance (Manning 2006; Woods 2008; Dreher et al. 2011; Walz and Ramachandran 2011; Tierney 2013; Coppard et al. 2013; Fuchs and Vadlamannati 2013). Members of the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD) are, therefore, no longer the only significant actors in the aid business. Western and non-Western suppliers of development finance increasingly operate in the same countries and sectors, creating uncertainty over how these different actors will compete and cooperate. Developing countries also face new challenges and opportunities. For instance, higher levels of donor competition have apparently made it possible for governments in low income and lower-middle income countries to "shop around" for the funding partners who will most effectively support their interests (Brainard and Chollet 2007; Whitfield 2009).

The rise of non-Western development finance also poses a methodological challenge to scholars and practitioners of development finance. While it is widely believed that non-Western governments are providing significant amounts of development finance, many of these governments do not participate in international reporting regimes such as the OECD's Creditor Reporting System (CRS) or the International Aid Transparency Initiative (IATI).² In the absence of new methods and data sources, it is difficult to gauge the nature, scale, scope, and impact of these new forms of global development finance. In particular, it is hard to assess where non-DAC development finance goes and how it affects economic, social, political, and environmental outcomes in the developing world. A dearth of reliable and detailed data on non-Western donor activities also makes it far more difficult for governments interested in coordinating their aid with others to achieve better development outcomes.

These challenges will likely persist. Many non-DAC donors, including China, India, Russia, Saudi Arabia, and Venezuela consider Western aid mechanisms to be intrusive and outdated. In 2011 at the High Level Forum on Aid Effectiveness in Busan, a cohort of emerging donors argued that their "south-south cooperation" activities are qualitatively different from Western aid and should not be governed by traditional aid principles (Fraeters 2011). China, considered to be the largest and most influential of all emerging donors, is particularly insistent on its own development model. Chinese officials at Busan claimed that the "principle of transparency should apply to north-south cooperation, but ... it should not be seen as a standard for south-south cooperation".³

More broadly, Western and non-Western donors diverge in the way that they design and deliver development finance (Strange et al. 2013a).⁴ While occasional cooperation occurs, most researchers characterize the present aid landscape as more emblematic of a rivalry than a partnership. For instance, US and Chinese development finance in Africa is often perceived as part of a larger strategic rivalry in the media (Joselow 2013; Ching 2012).

² There are widely varying levels of commitment to transparency among non-DAC suppliers of development finance. For example, Brazil, India, South Africa, and many of the new eastern and central European donors have demonstrated a higher level of interest in data disclosure and/or compliance with international reporting standards—Basu et al. (2013); Aufrecht et al. (2012); Sinha and Hubbard (2012). Russia has recently started to provide bilateral aid data to the OECD's CRS database.

³ M. Tran, , 'Nigerian and Indonesian Officials Join Post-Busan Aid Effectiveness Panel,' *The Guardian*, 7 August 2012.

⁴ In a leaked State Department cable, the former U.S. Ambassador to China Jon Huntsman noted that 'China's fast, efficient, "no strings attached" bilateral approach is popular in [Africa], as is the PRC preference for infrastructure over governance projects. ... In addition, African officials believe that competition between donors has had positive consequences for African development, giving the African countries options after several decades of a largely Western development model' (Huntsman 2010).

The perceived volume and opacity of its contemporary development finance make China a uniquely important case among non-DAC donors. China has a rich history of 20th century development finance that continues to influence contemporary Chinese aid policy and practice. While Beijing's official statistics on foreign aid are gradually becoming more detailed, the domestic authorities release very little information at the project-level.⁵ China's Ministry of Commerce (MOFCOM) ranked in the lowest tier of Publish What You Fund's 2013 Aid Transparency Index (Basu et al. 2013).

To analyse citizens' perceptions of aid and government projects in a developing country, Milner et al. (2013) conducted a field experiment that included 3,600 participants in Uganda. Their results suggest that citizens' views about Chinese 'aid' projects are less positive than their views on US or World Bank aid projects. Indeed, Ugandans in the randomized experiment were significantly less willing to tell their local leaders of their support for Chinese aid projects compared to identical projects from the US and the World Bank, and they actually sent text messages significantly less frequently in support of Chinese projects than US projects.

Meanwhile, African policy makers are divided on the issue of whether, to what degree, and how Chinese development finance impacts social, economic, environmental, and government outcomes. While some leaders perceive Chinese financing as better suited to Africa's needs, others feel threatened by China's growing presence in their countries (Wallis 2007; Kagame 2009; Wade 2008; BBC 2011).

Notwithstanding the polarized nature of scholarship on the scale and impact of China's development finance in Africa, a rare point of consensus among scholars is the need for better information in order to assess China's development finance based on the conventional empirical methods found in the aid allocation literature.⁶ However, as the next section illustrates, there is equally contentious debate on how such data should be obtained.

2 Efforts to quantify Chinese development finance

Multiple scholars have attempted to organize information on China's overseas development finance activities (Lancaster 2009; Bräutigam 1998, 2011). Given the scarcity of systematic, project-level official data, media-based methods have been the *modus operandi* for scholars attempting to quantify China's development finance to Africa (Wolf et al. 2013; Strange et al. 2013a; US EX-IM Bank 2012; Lum et al. 2009; Foster et al. 2008). The degree of transparency, level of detail, and general quality of the methods used in these studies varies considerably.

Other scholars, citing the shortcoming of media-based methods,⁷ insist on qualitative, field-based approaches to understanding China's role in African development. Some of these scholars have also

⁵ The State Council's release of the inaugural 'White Paper on China's Foreign Aid' in April 2011 is one of several encouraging developments in this regard People's Republic of China (PRC) (2011). In 2013 the State Council Information Office published 'China-Africa Economic and Trade Cooperation' and is reportedly releasing the country's second foreign aid white paper later this year.

⁶ The group of advocates for better information includes some of China's most authoritative voices on the subject. During conversations in 2013, one of the authors spoke with over a dozen of China's leading Africa scholars, all of whom expressed their desire for better data.

⁷ Strange et al. (2013b) outline several potential shortcomings of open-source data collection methods in tracking non-DAC development finance. They include: failing to track the status of projects temporally; double-counting projects; misclassifying development finance flows; not making research methods transparent; relying disproportionately on English-language resources; and providing a single media source as evidence for a project.

offered estimates of China's 'aid,' though they typically reveal few systematic details on the methods used for data collection and analysis (Bräutigam 2011). Not surprisingly, different approaches have generated vastly different results: estimates generated by scholars on Chinese annual aid to Africa range from roughly US\$500 million to more than US\$17 billion (Strange et al. 2013a). While scholars are clearly paying more attention to the development finance activities of China and other non-DAC donors, there is no consensus on how these flows should be tracked and understood. A general lack of methodological progress to date reflects the academy's inability to keep pace with the rapidly changing global development finance architecture.

The absence of a strong empirical foundation presents a major obstacle for those who seek to draw systematic conclusions about China's impact on African development at the community-, country-, region-, and continent-levels. The absence of a shared development finance data tracking system also does a great disservice to the intended beneficiaries of Beijing's support across the continent. Without better information about what the Chinese are doing, where they are doing it, and to what effect, local African communities have a limited ability to agitate for changes that might benefit their communities.

Yet information about non-DAC project-level development finance does exist, including China's development activities in Africa. One way to consider the state of the existing data is as an archipelago of 'data islands.' These islands take many forms, including: official data published by the Chinese government; data posted on Chinese embassy websites; media reports published in Chinese, English, French, Portuguese, Spanish, and Arabic; case study research performed by academic researchers and journalists; African and Chinese company reports; and aid information management systems managed by finance and planning ministries across the continent.

In response to this challenge, AidData recently concluded an 18-month pilot research project that tracked 1,673 Chinese official finance projects to 50 recipient countries over the 2000-11 period. The data were collected using a new methodology called 'Tracking Under-Reported Financial Flows' (TUFF).⁸ The TUFF approach differs from other media-based and fieldwork-centric initiatives tracking Chinese development finance to Africa in several ways. First, the scope of AidData's Chinese Official Finance to Africa Dataset, Version 1.0 was not 'foreign aid'; rather, it grouped projects reportedly funded by official Chinese agencies that resembled development finance activities reported by OECD states as 'Official Development Assistance' (ODA) and 'Other Official Flows' (OOF).

Second, while researchers can download static versions of the data in order to maintain comparability and reliability of results across different updates, the database is an interactive, web-based platform that centralizes different types of data on Chinese development finance to Africa into a live information grid. The platform, china.aiddata.org, allows stakeholders from Africa, China, and the international community to pool their knowledge about specific Chinese development projects. It enables filtering, manipulation, and visualizations of the data, and features tools that enable users to vet and improve the data. AidData staff update the database on a regular basis. Since the launch of the first iteration of the dataset (version 1.0), AidData has revised 384 existing project records and created 143 additional project records for the 2000-11 period. AidData has also generated 249 new records for projects that were pledged, committed, and implemented in 2012. As of 17 December 2013, the database tracked US\$83.3 billion in official finance commitments from 2000-12.

⁸ AidData's pilot methodology for tracking under-reported financial flows was initially termed 'Media-Based Data Collection'. However, upon publication of the initial dataset and methodology it quickly became clear that this name was confusing because it implied that AidData's methodological approach relied exclusively on media reports. While analysis of media reports is an important step in the TUFF process, the methodology is a comprehensive approach designed to incorporate diverse sources of information that collectively corroborate Chinese-financed official finance projects.

Third, the methods used to construct the database were crafted explicitly to avoid the problems that plagued previous media-based approaches (Strange et al. 2013b). AidData researchers classified Chinese-financed projects according to their reported status rather than lumping all projects into a singular category, allowing researchers to sort data for projects that have been reported as ‘pledged,’ ‘committed,’ ‘implemented,’ ‘completed,’ ‘cancelled,’ and ‘suspended.’ Additionally, in order to avoid potential double counting, all project records were compared for each African recipient country and duplicate projects were eliminated. AidData also published a detailed categorization scheme for classifying different Chinese official finance flows in a way that could be mapped back to OECD-style categories, and upon publication of the initial dataset, published a detailed methodology that other researchers can use to scrutinize and replicate the TUFF data collection process.⁹ Finally, AidData took extra care to avoid relying upon individual media reports to track Chinese-funded official finance projects.¹⁰ In the 1.0 version of the dataset, the average official finance project relied on 2.2 unique sources of information.¹¹

Fourth, the creation of a dynamic online database platform has catalysed diverse contributions from an extensive global network of users who are interested in supplying—and accessing—more detailed, accurate, and timely information about China’s development finance to Africa. Researchers, investigative journalists, and civil society organizations from across the globe have voluntarily supplied additional information both supplementing sources and correcting errors on the china.aiddata.org platform, including photos, videos, case studies, and media reports. Moreover, several research, advocacy, and investigative journalism groups in Rwanda, Namibia, Zimbabwe, and the Republic of the Congo have drawn inspiration from AidData’s data collection initiative to dig deeper and learn more about Chinese development finance in their own countries and communities. These groups were the first to contact AidData, but more organizations stand to benefit from a common tracking system that makes it possible to monitor the status and performance of Chinese development finance projects.

Notwithstanding the methodological advantages of TUFF, data collection efforts that utilize media and other electronic sources face several obstacles that impede researchers’ ability to accurately quantify finance flows. The nature of data collection processes, utilizing media sources, face limits with regard to data completeness, accuracy, quality, and credibility (Woolley 2000; Reeves et al. 2006). First, human errors can occur during online searches as well as during the data entry stage. Second, information from media outlets cannot replace complete and accurate statistical data from authoritative official sources. Data that relies upon media reports is only as valid as the imperfect sources on which journalists and reporters rely. Nor is there a fail-safe way to adjudicate between media that provide conflicting information about a single project.¹² This problem may be more acute in countries with relatively low

⁹ For instance, the 1.0 pilot database includes US\$75.4 billion in official finance commitments from 2000-11. However, using the OECD’s definition of ODA, the pilot uncovered US\$13.0 billion in ‘ODA-like’ official finance commitments. The latter category includes projects that appear to fit into the definition of ODA based on all available information. Interestingly, AidData’s initial estimate of Chinese development finance resembling ODA averages approximately US\$1.1 billion per year from 2000-11, 21 per cent lower than Deborah Bräutigam’s estimate of Chinese ODA flows to Africa of US\$1.4 billion in 2009. In her widely read blog, *China in Africa: The Real Story*, Bräutigam (2013) wrote that she believes AidData’s figures are ‘way too high’.

¹⁰ AidData employed a team of native Chinese speakers to analyse Chinese-language media reports, business publications, and official documents to complement English-language data collection.

¹¹ However, given the often-limited availability of project-specific news sources, 47 per cent of AidData’s project records still rely on a single source. With greater access to supplementary project documentation, sole-sourced project records should be corroborated and improved.

¹² However, it is also not the case that official sources are always more credible (and valuable) than media-based information. See Strange et al. (2013a) for a discussion of this point.

levels of press freedom and small cadres of independent and well-trained journalists (Musakwa 2013).¹³ Finally, using media reports risks ‘detection bias,’ the possibility that states with lower levels of press freedom are less likely to permit journalists to report on development finance from certain donors. Sociologists and scholars of conflict and terrorism have found that the use of media reports to identify inherently political ‘events’ (e.g. political protests and terrorist attacks) introduces a risk of selection bias (McCarthy et al. 1996; Drakos and Gofas 2006; Drakos 2007).¹⁴

The validity of the TUFF methodology is testable and can be gauged through fieldwork by researchers on the ground. In the next section of this paper, we introduce and describe a ground-truthing exercise carried out in South Africa and Uganda from August–November 2013.

3 Ground-truthing: an alternative approach to data collection

To gauge the efficacy and accuracy of the TUFF approach, we created and field-tested a ‘ground-truthing’ protocol. This protocol was based on ‘AidData’s Methodology for Ground-Truthing Development Finance’ (Strange et al. forthcoming 2014). This protocol establishes detailed procedures for verifying, updating, and enhancing existing project-level data with in-person interviews with Chinese embassy officials and with donor and recipient personnel at Chinese project sites in Uganda and South Africa. In other words, it consists of systematic fieldwork procedures designed to extract information that might otherwise not be accessible through media-based data collection, academic publications, government records, or other web-based resources. This section summarizes the methods we employed to collect evidence in the field. It also discusses the potential advantages and shortcomings of this approach.

For the purposes of this paper, ‘ground-truthing’ refers to systematic fieldwork, primarily in the form of interviews and project site visits.¹⁵ Like TUFF data collection methods, ground-truthing follows a step-by-step procedure that is systematic, transparent, and replicable. This approach ensures that other researchers can trace the precise origin of all data collected. We employ ground-truthing in order to test how effectively, or ineffectively, AidData’s TUFF approach—based as it is on electronic sources—is able to track Chinese development finance in Africa at the project level.

Our ground-truthing methodology is codified in a 15-page methodology document that guided our team of researchers (Muchapondwa et al. 2013). It covers the training that enumerators must complete before engaging in ground-truthing. Training required background literature to be read and the government authorizations required to conduct the research. Projects were randomly assigned to enumerators in given blocking strata based on enumerators’ mastery of languages for visits to sites where the main language used was not English. Projects were randomly assigned within each blocking strata. After project assignment, enumerators assess the feasibility of the project by listing known physical locations, project personnel, required travel, possible legal or administrative restrictions, and the extent of the TUFF-generated information. This assessment period enables judgment of the feasibility of the project for ground-truthing. Some projects, especially agreements on cooperation

¹³ Additionally, if the motives of media reporting are economic or political in nature, the objectivity and utility of the data are questionable.

¹⁴ However, given that research on aid allocation and aid effectiveness has not benefited significantly from the use of media-based data collection methods, the existing literature does not offer much insight regarding whether, to what degree, and how detection bias might influence media-based aid and development finance data and the inferences we draw based on such data.

¹⁵ See Strange et al. (forthcoming 2014) for the full methodology.

principles between countries, provided little that was tangible and few people—other than heads of state—to contact, so in this triage process the projects were relegated to lower priority, especially because money did not typically change hands.

After the project pre-assessment, enumerators read thoroughly all of the online media on the project, conducted additional Google searches to supplement the TUFF information, and identified any additional project contacts beyond those supplied in the TUFF record. After project managers coordinated the contact generation and consolidated lists to avoid duplicate contacting, enumerators then began correspondence with contacts through email and phone calls, especially employing snowball methods to accumulate additional contacts with potential information. All emails were based on a template supplied by the project manager. Where possible, enumerators secured in-person appointments to meet with contacts and other informants. If appointments could not be obtained, enumerators were instructed to still make field visits to take photographs and gather as much on-site information as possible.

During the actual interviews, researchers made clear that the research was apolitical and fully transparent, and asked for additional contacts that could help deepen the data collection. During site visits, enumerators photographed the project, tagged the geo-location of the project, and engaged local personnel as much as possible. Enumerators were given a set of scripted questions that enquired about background information on the informant, descriptive information on the project (start date, status, revision of project timetable, financing details, and disbursement schedule).¹⁶ They also asked about implementers, government agencies involved, project personnel, and donors. If China was not mentioned in the early stage of the interviews, enumerators explicitly asked, ‘Did the Chinese government provide assistance for this project?’ See appendix below for the list of questions.

Our team was large: 19 professional enumerators undertook the ground-truthing efforts in Uganda, spending roughly eight hours per day on data-gathering efforts for two weeks each (roughly 1,500 researcher hours total). This does not include time spent on travel outside of immediately accessible metropolitan areas. All of the Ugandan enumerators were college graduates and on average they had four years of experience performing social science research, mostly through in-person interviews. In a different project, the same team succeeded in interviewing 354 current and former members of the Ugandan parliament (capturing 71 per cent of the sitting members) (see Milner et al. 2013). So they had significant recent experience contacting and meeting with government officials, suggesting meaningful task-relevant skill. In South Africa, four professional researchers pursued ground-truthing for a similar interval.

Ground-truthing provides an imperfect but useful way for measuring how well TUFF captures Chinese development finance. In principle, data collected through TUFF methods and ground-truthing methods can be compared to examine the extent to which different approaches yield the same results, as well as to identify areas where they uncover different and potentially contradictory information. This is especially valuable given the challenges researchers face in choosing data collection methods to track the activities of non-Western donors. A common criticism of TUFF and other methods that employ media-based approaches is that this kind of research relies on speculative information found in media reports. Ground-truthing is different from media- and web-based approaches in that it involves direct observation of project sites and interaction with actual project stakeholders and infrastructure instead of relying on intermediary data sources.

¹⁶ While each site visit followed the same interview protocol, certain visits required enumerators to ask additional questions. For instance, during visits to projects reportedly financed by a loan, enumerators prompted interviewed subjects to answer additional questions regarding specific loan terms.

Apart from helping to identify potential weaknesses and biases in the TUFF methodology, ground-truthing has several stand-alone advantages over TUFF and other web-based approaches to data collection. Valuable data can be gathered by directly corresponding with African and Chinese professionals and officials affiliated with specific development finance activities, interviewing subjects on site, photographing project sites, and recording the geographic coordinates of Chinese-financed projects. This method of data collection poses a lower risk that information will be ‘contaminated’ since it flows, in theory, directly from the project site to the researcher. Web-based data collection, by contrast, involves a multi-step process where information is passed from one source to another before being collected by the researcher.

Ground-truthing may in some cases expose researchers to official and/or quasi-official data, such as an interview with a local government official. Similarly, while it is difficult to make decisions on how to code development finance when two or more media reports present conflicting data, ground-truthing may be less likely to force the researcher to make judgment calls.

Additionally, as discussed in section two, electronically accessible data may fail to adequately uncover development finance projects in regions or communities that have low levels of press freedom, and it also might fail to uncover smaller or less observable projects on which media outlets do not bother to report. Ground-truthing can in theory avoid these pitfalls since researchers are not limited to studying only projects picked up by media reports. This is potentially why our pilot data collection exercise, the results of which are outlined in the proceeding section, was able to uncover additional Chinese official finance projects in South Africa and Uganda not included in AidData’s TUFF database.

Finally, ground-truthing should not face major biases resulting from conflicts of interest among researchers. The enumerators who we employed to undertake ground-truthing activities are well-trained freelance researchers who had no prior affiliation with AidData and no stake in the TUFF approach. Ground-truthing should, therefore, be able to uncover information previously not captured by TUFF, including entire projects on which media outlets did not report.

At the same time, the field-based data collection approach that we undertook in the summer and fall of 2013 faces several weaknesses that could limit its ability to produce alternative data to TUFF that might prove comprehensive. First, and perhaps most importantly, ground-truthing methods are subject to significant selection bias problems. Despite repeated attempts to contact South African, Ugandan, or Chinese officials with knowledge of individual projects, we were unable to collect information for approximately 34 per cent of the projects (or 22 of 64 projects) in Uganda and 50 per cent of the projects (18 of 36 projects) in South Africa. Local officials either could not be located or were not comfortable sharing project details. The latter problem proved to be far more challenging than the former.¹⁷

It is likely that the projects we could not verify are not missing at random. The TUFF data on Chinese official finance to Uganda and South Africa contains 100 total projects—with 36 in South Africa and 64 in Uganda. Many of the South Africa projects were diplomatic agreements and principled commitments to share resources and engage in mutual investment. This made the South Africa projects less tangible and therefore less amenable to ground-truthing. In the end, we successfully ground-truthed only 18 of the 36 projects. In Uganda, many more projects were tangible, so we successfully

¹⁷ Besides selection biases, all interview-based approaches may suffer from the fact that their subjects have incentives to hide or mis-represent information. The possibility of enumerator error can also negatively impact the accuracy of ground-truthing when enumerators collect, record, or categorize information.

ground-truthed 42 of 64 projects, or 66 per cent. Table 1 documents the extent of our ground-truthing fieldwork in both countries.

Table 1: Ground-truthing Chinese official finance in South Africa and Uganda

Location	# Projects in TUFF database	# Successfully ground-truthed	# 'New' projects
South Africa	36	18	3 ¹⁸
Uganda	64	42	0
Total	100	60	3

Source: See text.

We tested the sources of selection bias systematically by performing logistic regression analysis with the dependent variable, capturing whether or not the projects were successfully ground-truthed and various features of the projects as independent variables including financial size, observability, the amount of time that had elapsed since project announcement, specificity of physical location, existence of specified contacts in the TUFF record, and distance from the national capital. Our results (presented in Table 2) suggest that projects for which ground-truthing succeeded in generating new information were, not surprisingly, in the more observable sectors, were local rather than national in character, had individual contacts listed in the TUFF-generated records, and had occurred more recently. The results for 'Contact Specified' and 'Years Elapsed' are significant at the most modest 0.1 level in Model 2, where the variables not approaching statistical significance in the more fully specified Model 1 were dropped, but both 'Observable Sector' and 'Local' are significant at the more stringent 0.05 and 0.01 levels in both models, respectively.

Table 2: Logistic regression analysis of selection effects in ground-truthing success

VARIABLE	Model 1	Model 2
Observable Sector	1.286** (0.616)	1.097** (0.553)
Local	2.457*** (0.615)	2.186*** (0.548)
Contact Listed	1.451* (0.808)	1.300* (0.716)
Years Elapsed	-0.131 (0.0862)	-0.144* (0.0795)
Near Capital	0.347 (0.629)	
Project Amount	3.03e-10 (1.36e-09)	
Constant	-3.018** (1.211)	-2.447*** (0.930)
Observations	92	99

Note: Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1.

Source: Authors' calculations.

¹⁸ While we only found 3 additional projects using the strict ground-truthing methodology, enumerators did find 51 memoranda of understanding (MOUs), Letters of Intent, or Technical Cooperation Agreements within which potential projects might be found. These documents contained seven projects that were already in the TUFF database, and ten potential projects that still need to be researched.

The marginal effects suggest that whether or not a project is in an observable sector—as the binary variable shifts from 0 to 1—is associated with an increase in the probability of successful ground-truthing of 0.21. Given that the baseline probability of successful ground-truthing is 0.25, this suggests substantive as well as statistical significance. Even more notably, a project being local (located at the village, municipality, or district level) rather than national is associated with a jump in the probability of successful ground-truthing of 0.42. Having contacts listed in the TUFF record was associated with an increase in the probability of ground-truthing success of 0.20, and each additional year of removal from the project’s inception was associated with a decrease in the probability of successful ground-truthing of 0.027.

This is *prima facie* evidence that ground-truthing methods are quite vulnerable to selection bias. Of course, we have no additional source of information to provide a template of all Chinese assistance projects with which to compare the TUFF and ground-truthed data. But clearly there are very large differences between the projects that were successfully ground-truthed and those that were not when compared against the universe of TUFF projects. The fact that we could ground-truth only 60 per cent of the project total suggests that the TUFF methodology produced a considerably more comprehensive picture of Chinese assistance to the two countries than was recoverable through our field research.

In addition to these methodological limitations, the ground-truthing method is time-consuming and costly, as it requires hiring, training, and fielding many local enumerators. While attempts could be made to gather information on the 1,900+ projects currently in the TUFF-generated database of Chinese development finance activities at china.aiddata.org, we estimate that the data collection for all existing Chinese development finance activities in Africa from 2000-11 would cost nearly US\$700,000 (based on the direct costs we incurred to complete the Uganda and South Africa pilot data collection exercises). This does not include projects reportedly committed by China from 2012 onward, nor does it capture the recurring costs of maintaining such a database over time. Additionally, the results from our ground-truthing pilot exercise reveal that taking this methodology ‘to scale’ would yield data for only a subset of the projects in the TUFF database—and it is likely that the subset would be tarnished by selection bias. We were able to ‘ground-truth’ 66 per cent of the projects in Uganda and 50 per cent of the projects in South Africa. Perhaps most importantly, our ground-truthing exercise was supported by pre-existing data on Chinese official finance projects in South Africa and Uganda. Without baseline information provided by the TUFF database, one can imagine the significant costs that might arise from having to locate and classify Chinese official finance projects throughout both countries before ground-truthing could occur.

The relatively high cost of ground-truthing poses a significant challenge to researchers who seek to draw generalizable conclusions about Chinese development finance and must decide how to allocate scarce resources, including time, money, and intellectual energy. Data collected through ground-truthing often add precision and detail to the project records identified through open-source methods, such as TUFF; however, there is a clear trade-off between the informational richness acquired through field-based data collection and the comprehensiveness of data collected through media-based and other open-source methods.

In summary, ground-truthing provides field evidence that can complement media- and internet-based data on Chinese development finance by collecting local information from sources on the ground. It also, conveniently, provides a valuable way to test the rigor of other methods that track non-Western development finance, such as AidData’s TUFF methodology. The following section discusses the results of our ground-truthing pilot exercises in South Africa and Uganda over a period of four months in 2013.

4 How tough is TUFF? Comparison of open-source data and field-based data

Our South African sample included 36 official finance project records found in AidData's Chinese Official Finance to Africa Dataset, Version 1.0. The scope of our ground-truthing research in Uganda covered 64 official finance projects.

Our results for South Africa and Uganda demonstrate the limits of ground-truthing as a method for tracking development finance flows from China. First, shortly after initiating in-country field research, it became clear that many of the official finance project records in AidData's dataset were too 'intangible' for ground-truthing. That is to say, many records in the china.aiddata.org database pertained to bilateral agreements and/or transactions between China and the recipient country and were not likely to have a physical project site that researchers could visit, photograph, and enquire about in interviews. This is reflected in the logit analysis above with the strong selection effects recovered for the 'Observable Sector' variable. Common examples of less observable projects included debt-relief agreements, MOUs, and other project records for which AidData's pre-existing information was not detailed enough to provide researchers with an idea of where and how to undertake ground-truthing activities.

This is a major limitation of ground-truthing. We considered 18 of 36 official finance projects in South Africa to be insufficiently tangible for ground-truthing. By contrast, we found that approximately one third of the known universe of Chinese development finance activities in Uganda (22 projects) fell into the same category. The lack of a tangible project site and/or sufficient information needed to implement ground-truthing activities effectively cut our sample substantially in these two countries.

Second, we found the ground-truthing methodology to be limited in its ability to uncover financial values in cases where pre-existing financial values did not already exist (in AidData's Chinese Official Finance to Africa Dataset, Version 1.0, which is described in Strange et al. 2013a). In South Africa, ground-truthing methods only resulted in the identification of a previously unreported financial value for a single project. There were two such cases in Uganda. Our results therefore suggest that ground-truthing methods may be more effective for confirming or challenging existing financial details rather than uncovering financial details in the first place.

Despite its limitations as a primary form of data collection, our findings suggest that ground-truthing is helpfully complementary to other types of data collection methods. For example, through ground-truthing methods we managed to identify substantial amounts of information not captured by AidData's TUFF methodology, which employs a combination of media-based and other electronic data collection techniques. Specifically, we identified new information for 18 out of 36 total projects in South Africa (including the broader MOUs and Agreements) and we identified new information on three of seven 'tangible' Chinese official finance projects in South Africa.¹⁹ We were also able to collect new information for 25 of 42 projects in Uganda. When one includes intangible projects, ground-truthing methods resulted in new information for 28 per cent (28 of the 100) official finance records included in our sample.

Further, our results suggest that despite its limitations, the TUFF approach is a fairly robust method of independent data collection. In only one of the ground-truthed projects in South Africa did the information collected conflict with the information uncovered through AidData's TUFF methodology. This figure increased to 17 projects in Uganda. However, most of the corrections involved minor

¹⁹ The 'tangible' projects were those with physical locations, while the intangible projects were often promises to share information or simple transfers of capital from Chinese entities to South African organizations.

amendments of dates, status, or contact information—the major items of sector, scale, scope, and size remained substantially unchanged.²⁰ In the combined sample of projects in both countries, we found a statistically significant positive bivariate correlation of 0.311 between (a) whether the ground-truthing uncovered new information, resulting in the recoding of one or more variables in our dataset, and (b) the number of TUFF sources for that project. This result suggests that ground-truthing methods may not help fill many data gaps for projects that lack good open-source information. Rather, ground-truthing may be more helpful as a methodological tool for expanding and refining project-level information uncovered through open-source data collection. Perhaps more importantly, users should now be more confident in the accuracy of the original TUFF-generated data and the prospects for using this method to track the development finance activities of other non-DAC donors.

Apart from its impact on project numbers, ground-truthing affects aggregate financial estimates of Chinese official finance at the recipient country level. Ground-truthing methods changed our aggregate estimate of Chinese official finance to South Africa by adding only US\$150,000 (and this change was limited to the education sector); however, in Uganda, the absolute value of the change in official finance was US\$26,787,303. This number represented a 2.7 per cent change in our overall estimate of Chinese official finance to Uganda. This change in reported financial commitments was spread across a number of sectors: government and civil society (US\$16,457,564); water supply and sanitation (US\$8,851,613); other social services (US\$1,007,400); education (US\$294,266); population policies (US\$266,000); and health (US\$60,460). For the government and civil society sector, we were unable to definitively conclude whether the TUFF methodology has systematically overestimated or underestimated financial commitments. In some cases, such as the construction of a new office building for the Ugandan Ministry of Foreign Affairs (project ID# 2498), our ground-truthing report found that the cost of the project was US\$14.2 million, almost US\$10 million more than the TUFF findings. However, for the construction of Uganda's new presidential offices (project ID# 12127), TUFF overestimated the project's cost by US\$7 million. Without a sufficiently large sample, it is not possible to draw any strong inferences for whether TUFF commitment estimates are inflated or too low.

In addition to its impact on information related to reported financial commitments, we also examined the extent to which ground-truthing methods affect the reported status of Chinese official finance projects. In South Africa and Uganda, ground-truthing methods uncovered a previously unreported value for the status of nine projects. In two cases we updated project status from 'Pipeline Commitment' to 'Implementation' or 'Completion.' Three projects were changed from 'Pipeline: Pledge' to either 'Implementation' or 'Completion.' No projects were shifted from 'Implementation' or 'Completion' status to a 'Pipeline Commitment' or 'Pipeline Pledge' status. While the sample size is admittedly small, this suggests that the AidData TUFF methodology may systematically underestimate the number and financial value of completed projects and projects in implementation. These findings have potentially important implications for researchers who choose to aggregate Chinese development

²⁰ When comparing the results of the ground-truthing pilot to our findings from the TUFF data collection exercise, we considered a single discrepancy in any one of the 36 database fields to mean that the ground-truthing survey had uncovered 'contradictory' information. For example, in project ID 2517, the project entry lists 2006 as the commitment year for the project. During the onsite interview, however, researchers determined that the Chinese government had committed to the project in 2001. Similarly, when onsite visits revealed that an announced project had entered the implementation stage or been completed (project IDs 2517, 11357, 11391), that information was treated as contradicting existing data. In this context, it follows that a large portion of ground-truthed projects containing 'contradictory' information improves the accuracy of our existing data and shows the limits of remote monitoring. However, this does not constitute evidence that TUFF methods are unreliable since the new information has predominately resulted in minor adjustments to existing project entries.

finance based on the reported status of Chinese-financed projects. Excluding all projects, but those in the completed or implementation category, will likely undercount.

In South Africa, the projects for which our team collected data included a platinum mine, a Chinese studies centre, and a cement factory. Both industry projects are joint ventures and financed via official investment; the Chinese studies centre was funded through a monetary grant. The field researchers were able to ground-truth more projects in Uganda, but no clear trends emerge. The CRS sectors that the field researchers were able to ground-truth vary from agricultural to government and civil society projects. These projects also represent a wide range of flow types, from joint ventures to in-kind contributions. Thus, beyond the logit results reported above, it remains unclear which variables contribute to value-added ground-truthing efforts. Possible explanations include how closely a project relates to recipient and donor countries' national interests and even the personality and willingness of the person interviewed to divulge information.

However, in their project summaries, the field researchers in Uganda specified reasons why they were unable to ground-truth specific projects. In seven cases, the researchers were unable to reach specific contacts or were unable to schedule interviews within the allocated timeframe of a few weeks. The second most frequent reason, occurring in six cases, was that the person interviewed had no knowledge of the project in question. Additionally, in multiple cases the field researchers either needed additional but unforeseen permission from local or national government officials in order to conduct research on certain projects. Some researchers were unable to find the specific location of projects. These reasons suggest that ground-truthing researchers need ample time to schedule interviews, which would further increase costs.

Researchers were informed on two separate occasions that they needed approval from a higher authority to conduct research despite producing a letter from the Ugandan national science council authorizing the research. The methodology does not include a mechanism for capturing why certain bureaus demanded consent from higher authorities. Some projects could be more closely tied to national interests and, therefore, require higher security clearances. Alternatively, based on past experiences with researchers, some agencies may simply have stricter interview policies. It would require more contacts to determine which agencies are considered more transparent and willing to cooperate with researchers.

When the researchers were granted access, however, several of the respondents had no knowledge of the project in question. Regardless of an informant's connection with the project, we still do not have a systematic method for identifying and locating contacts. It seems likely that this ground-truthing method would require more time and persistence to find the few contacts that were directly involved in given projects, and this would of course require extensive additional resources.

An interesting question also emerges from the analysis. Although unrelated to the pilot project's original goal of verifying TUFF's data, ground-truthing can be used to examine a project's functioning and what citizens who nominally benefit from Chinese aid think of the project. While these questions are a bit beyond the scope of original AidData's TUFF data collection initiative, scholars and policy makers are also interested in the *results* of Chinese aid, and an extension of ground-truthing to sampling and surveying of the surrounding citizenry might help to close the 'broken feedback loop' between donors and recipients.

Our pilot exercise also revealed that ground-truthing is undoubtedly superior to TUFF and other data collection methods in its ability to uncover visual evidence of the current status of Chinese development projects. We visually confirmed the existence of four projects in South Africa, while in

Uganda we compiled visual evidence for 14 official finance projects through site visits.²¹ See photos below.

<p>Project #2517: Grant for Refuse Collection Pipeline: Commitment → Implementation</p> 	<p>Project #11357: Construction of Industrial School Pledge → Completion</p> 
<p>Project #16469: China Uganda Friendship Agricultural Technology Demonstration Center Completion → Implementation</p> 	<p>Project #15936: Confucius Institute at Stellenbosch University Pledge → Completion</p> 
<p>Project #14235: Entebbe-Kampala Toll Road Confirmed Implementation</p> 	<p>New Project: Free State Gariep Fish Hatchery & Demonstration Centre Newly uncovered</p> 

Source: See text.

Another important strength of ground-truthing is its ability to construct a more nuanced narrative about a development finance project, uncovering information that typically goes unreported in other information sources. During interviews with members of the Kampala City Council, we learned that some road equipment supplies by China First Automobile Workers as part of an Exim Bank loan had

²¹ One of these ground-truthed projects (an aquaculture demonstration centre) was not uncovered through TUFF-generated data, but rather through the ground-truthing process itself. The enumerators quickly learned that the South African Treasury's Department of International Development Cooperation maintains a database with a list of all Chinese projects and this database included a project status report for the aquaculture demonstration centre project, which was not part of the original sample of TUFF-generated projects that the principal investigators supplied. A member of the enumeration team subsequently identified (through a media report) a local politician and a broader network of contacts who were knowledgeable about the aquaculture demonstration centre project.

since malfunctioned (project ID# 11579). Enumerators in South Africa were also able to uncover loan conditions for a US\$650 million joint venture in a platinum mining operation (project ID# 2479). In another interview, enumerators were able to determine the completion date for the construction of Uganda's new ministry of foreign affairs building (project ID#2498).

Ground-truthing also adds significant informational value in that it helps to identify official finance projects that are not uncovered through the TUFF data collection methodology. For instance, in South Africa, our ground-truthing efforts resulted in the identification of three Chinese-financed project sites and 51 bilateral agreements between the governments of China and South Africa that were not previously captured by AidData's TUFF methodology. While many of these agreements likely involve activities that fall outside the definition of official finance (see Strange et al. 2013b), it is possible that others are linked to Chinese development finance contributions. For example, enumerators discovered a fish hatchery and demonstration centre in South Africa's Free State that was not in the TUFF-generated database of Chinese official finance activities. This project appears to be a clear example of Chinese official financing.

Similarly, our ground-truthing efforts highlight the need to strictly follow protocol when applying TUFF or other web-based data collection methods. Specifically, all of the fifty-one agreements between China and South Africa previously undocumented by AidData's TUFF methodology were located through South African government websites and correspondence with relevant officials. AidData's TUFF methodology instructs researchers to search all possible recipient government electronic resources to find potentially valuable project-level information. However, given that the 1.0 version of the database was a pilot project undertaken with a modest budget under a compressed timeline, this step of the methodology was evidently not implemented as systematically as we had originally thought. If it had been, South Africa enumerators would have likely inherited a larger sample of official finance projects to ground-truth, which might have yielded more information. More generally, our ground-truthing efforts in Uganda and South Africa underscore the value of recipient government data and the importance of systematically following protocol to ensure that all potentially valuable recipient official data is taken into consideration.

Additionally, we must acknowledge that while ground-truthing yielded some key corrections to TUFF-generated project records, it also left many projects unverified and demonstrated that many others may be effectively unverifiable.

More broadly, we believe these findings contribute to an ongoing dialogue about whether our collective understanding of development finance activities of China and other non-Western governments can be improved through the application of novel methods such as open-source and field-based data collection approaches. Our experience with ground-truthing Chinese development finance in South Africa and Uganda suggests that the answer is yes.

5 Conclusion

We find that ground-truthing is a valuable way to collect project-level data on development finance. It could potentially be applied to donors and regions outside of China and Africa. However, given its various limitations and relatively high cost, ground-truthing may add the most value as a supplementary rather than primary approach to data collection. We also find that it is a valuable tool for assessing AidData's other approaches, TUFF in particular, for studying non-DAC development finance. While ground-truthing undoubtedly revealed multiple imperfections in TUFF data for Chinese official finance in South Africa and Uganda, the vast majority of our ground-truthing findings reinforce information found in the TUFF database.

These findings are significant when one considers the fundamental shifts occurring in international development finance. Non-Western governments are not eager to comply with a set of voluntary disclosure norms created decades ago by and for Western governments. Therefore, scholars and policy makers who are interested in understanding the distribution and impact of global development finance face a dilemma. New forms of development cooperation may have significant implications for economic growth, debt sustainability, state capacity, poverty reduction, human rights, and environmental sustainability in Africa. But existing reporting systems are not up to the task of tracking the activities of non-Western development financiers, which makes it nearly impossible to objectively understand the nature, distribution, or effects of these activities without new methods of data collection.

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Appendix: Ground-truthing interview questions

Project Name:

Project ID Number:

Project Location (Province, City, GPS Location):

Enumerator Name:

Person Interviewed:

Interview Contact Information (Phone, Email, Address):

1. Introduce yourself.
2. Learn about respondent.
3. What is your position?
4. How long have you been working in the post?
5. What has been your involvement in the project?
6. How is this project benefitting the community?
7. What is the closest trading center/local council (LC1)?
8. In what year was this project announced?
9. When did this project begin?
10. Is this project complete? If not, has work officially begun?
11. And when was the project originally planned to commence?
12. When was the project completely finished?
13. And when was the project originally planned to be finished?
14. Was this project financed by a grant or a loan?
15. What was the total project amount?
16. How much has already been disbursed?
17. Which donors or government agencies provided funding for this project?
 - a. List them all
 - b. For each funding source, ask:
 - c. Which activities did funding source A finance?
 - d. Which activities did funding source B finance?
 - e. Etc.
18. What company or agency implemented this project?
19. What government agencies were also involved with this project?
20. How much money did each donor or funding agency provide for this project?
21. If China was not mentioned, ask: Did the Chinese government provide assistance for this project?
22. [IF LOAN] was this loan a line of credit?
23. [IF LOAN] Was this loan made at or below market rates?
24. [IF LOAN] What was the interest rate of the loan?
25. [IF LOAN] Are you familiar with any other details of the loan?
26. What individuals managed parts of the project during planning, funding, or implementing stages?
27. [End of interview, open-ended] What else can you say about this project?