

Good Intentions Gone Bad? The Dodd-Frank Act and Conflict in Africa's Great Lakes Region

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Abstract: The Dodd-Frank Act imposes reporting requirements on US companies regarding supply chain links to conflict minerals. Previous research uses within-DRC variation in the location of mineral mines to identify the effect of the Dodd-Frank Act on conflict. Due to the presence of spillovers, these previous estimates may underestimate the effect. Moreover, the legislation regulates reporting on minerals mined in the DRC and all countries surrounding the DRC. To fully evaluate this legislation, I investigate the prevalence of conflict events in the DRC and all surrounding countries. Difference-in-differences estimates suggest that, although there is no evidence of any reduction in conflict within all covered countries pooled together, the unintended consequences of this legislation within the DRC may be larger than previously reported. Supplemental analyses (i) investigate possible mechanisms that drive these results and (ii) find that the enforcement suspension of the legislation is unlikely to reduce conflict in the DRC.

Keywords: Conflict, Minerals, Natural Resources, International Trade Policy, Civil War

JEL Codes: D74, F14, O25, Q17

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“In the Congo, despite the occasional hue and cry raised by the media, corporate responsibility has been largely ignored—the supply chain is more convoluted, passing through traders, brokers, smelters, and processing companies. The tin and coltan that come from the Congo are mixed with those from Brazil, Russia, and China before they make it into our cell phones and laptops. There is a burgeoning consensus in international law that we should care about the conditions under which the products we consume—sweatpants, sneakers, and even timber—are produced. If we can hold companies accountable for their business practices, we will give an incentive to the Congolese government to clean up the mining sector. The ‘conflict minerals’ legislation signed into law by President Obama in July 2010 is a step, albeit a small one, in the right direction” - Stearns, J. (2012) *Dancing in the Glory of Monsters: The Collapse of the Congo and the Great War of Africa*

“When his father could no longer make enough money from the tin mine, when he could no longer pay for school, Bienfait Kabesha ran off and joined a militia. It offered the promise of loot and food, and soon he was firing an old rifle on the front lines of Africa’s deadliest conflict. He was 14.” - Raghavan, S. (2014) *The Washington Post*

1 Introduction

Minerals—such as tin, tantalum, tungsten, and gold—contribute to the production of a large share of consumer products, including mobile phones, laptops, jewelry, eyeglasses, cars, airplanes, and medical equipment. Revenues from the extraction and international trade of these minerals also fuel conflict across the continent of Africa (Berman et al. 2017). This motivates the characterization of these minerals as “conflict minerals.” Over the past two decades, between 2 and 6 million people have been killed due to violent conflict in the Democratic Republic of Congo (DRC) and surrounding countries (Spagat et al. 2009). The presence of violent conflict also stalls and reverses economic development and efforts to alleviate poverty (Collier et al. 2003).

In 2010, US lawmakers passed legislation with the intention of severing the connection between US consumers and armed rebel groups, and thereby reducing conflict in Africa’s Great Lakes region. Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act requires companies registered with the US Securities and Exchange Commission (SEC) to disclose whether any tin, tantalum, tungsten, and gold (3TG) in their supply chain originated in the DRC and surrounding countries.¹ In particular, companies must perform due diligence about whether any of these minerals were obtained from mines connected to armed rebel groups.

The passage of this legislation was—and remains—controversial. Companies in the US claim

¹The full list of covered countries includes the DRC and any country that shares a national boarder with the DRC: Angola, Burundi, Central African Republic, the Democratic Republic of Congo, the Republic of Congo, Rwanda, South Sudan, Tanzania, Uganda, and Zambia.

that compliance costs impose an undue burden on US manufacturing.² Critics also claim that the policy is built on an incomplete assumption about the relationship between minerals and conflict in Africa’s Great Lakes Region. Ultimately, civil conflict and violence in the DRC and surrounding countries is driven by a complex combination of poverty, land use, corruption, local political and social frustrations, and hostile relationships between a myriad of local actors—all factors that may be influenced by the passage of the Dodd-Frank Act (Autesserre 2012; Geenen 2012; Seay 2012; Radley and Vogel 2015; Vogel and Raeymaekers 2016; Wakenge 2018).

This raises an important question: What is the impact of the Dodd-Frank Act on the prevalence of conflict in the DRC and surrounding countries? Numerous studies examine the effects of the Dodd-Frank Act on livelihoods in the DRC (Cuvelier et al. 2014; Geenen 2012; Radley and Vogel 2015; Vogel and Raeymaekers 2016; Wakenge 2018). Although these studies provide suggestive evidence that the Dodd-Frank Act may have unintended consequences, they ultimately struggle to estimate the causal relationship between the Dodd-Frank Act and conflict (Stearns 2014). More recent contributions compare outcomes between geographic areas with and without 3TG mines within the DRC and find evidence that, while well-intentioned, the Dodd-Frank Act may be causing harm in the DRC (Parker et al. 2016; Parker and Vadheim 2017; Stoop et al. 2018a). These studies provide an important and worthwhile methodological improvement, in terms of causal identification, but still may suffer from concerns about endogeneity.

If conflict spreads within countries, rather than remaining isolated within given local geographical areas, then causal estimates of the impact of the Dodd-Frank Act—based on within country comparisons—may be biased.³ Technically, if conflict spills over from geographic areas with 3TG mineral mines into areas without 3TG mineral mines, then the stable unit treatment value assumption (SUTVA) is violated and existing empirical studies estimate the lower bound of the effect of the Dodd-Frank Act. Additionally, as Maystadt et al. (2014) note, the statistical relationship between minerals and conflict in the DRC may possess characteristics of an ecological fallacy; whereby extraction of minerals is not found to cause conflict when analyzing data within territories, but is found to cause conflict across territories. Moreover, since the Dodd-Frank Act imposed regulations on minerals exported not only from the DRC but also surrounding countries, a complete impact evaluation of the Dodd-Frank Act should include these surrounding countries. Therefore, empirical

²There are large discrepancies in estimates of the total compliance cost. The U.S. Securities and Exchange Commission estimates the cost is \$71 million, while the National Association of Manufacturers estimates the cost are between \$9 and \$16 billion.

³Note that even if conflict does not directly spillover, migration of internally displaced people from “treated” areas into “comparison” areas may lead to an indirect spillover of conflict.

analysis that examines cross-country variation in the coverage of the Dodd-Frank Act provides a worthwhile addition to the existing literature. This paper aims to build on the existing literature on the impact of the Dodd-Frank Act on conflict by directly addressing the issue of bias from spillover effects and by evaluating the effects within all covered countries.

I estimate the impact of this legislation using a difference-in-differences estimation strategy with data from the Armed Conflict Location and Event Data (ACLED) project. Specifically, I compare the prevalence of conflict over time at the second sub-national administrative level across countries covered by the Dodd-Frank Act and other sub-Saharan African countries not covered by the legislation. By examining the prevalence of conflict at sub-national levels across countries, these estimates provide additional and broader insight into the causal impact of the Dodd-Frank Act on the prevalence of conflict within the DRC (Parker and Vadheim 2017; Stoop et al. 2018a). Due to the design of the legislation that aims to limit cross-country spillover effects, this method avoids some of the concerns of statistical identification present in within-DRC analysis. This study is also closely related to the existing literature on the impacts of international trade regulations on locally extracted natural resources and civil conflict (Janus 2012) and the relationship between commodity price fluctuations and conflict (Berman et al. 2017; Bazzi and Blattman 2014; Bellemare 2015; Dube and Vargas 2013; Fearon 2005; Koren 2018).

My results suggest the presence of unintended consequences within the DRC stemming from the passage of the Dodd-Frank Act. Impact estimates show that the Dodd-Frank Act roughly doubled the probability of conflict at the second sub-national administrative level within the DRC. This general result persists across different types of conflict. Violence against civilians, rebel group battles, riots and protests, and deadly conflict all increase within the DRC due to the passage of the Dodd-Frank Act. The estimated effect sizes are larger than existing effect estimates calculated using within-DRC comparisons (Parker and Vadheim 2017; Stoop et al. 2018a), which is consistent with the idea that previous estimates only estimate the lower bound of the true effect due to the potential bias from spillover effects. Therefore, the unintended consequences of the Dodd-Frank Act within the DRC may be more dramatic and devastating than previously reported. These results are also robust to a variant of Fisher’s permutation test (Fisher, 1935; also see Buchmueller et al. 2011; Cunningham and Shah 2018), and to synthetic control estimation (Abadie et al. 2010; 2015).

Although the DRC is the primary focus of the conflict mineral legislation within the Dodd-Frank Act, the legislation also regulates minerals from countries that border the DRC. A complete impact evaluation of the Dodd-Frank Act should therefore consider the prevalence of conflict in

these countries. I find no evidence of systematic increase or decrease in the prevalence of conflict attributable to the passage of the Dodd-Frank Act within all of these countries pooled together. Although pooling all covered countries together may potentially hide important heterogeneity, these results further support the conclusion that the Dodd-Frank Act did not achieve the intended outcome of a reduction in violence and conflict in the region.

The core contribution of this paper is threefold. First, in the primary analysis of this paper I address the potential for bias driven by spillover effects in previous quantitative work in this literature (Parker and Vadheim 2017; Stoop et al. 2018a) and conduct the first complete evaluation on the impact of the Dodd-Frank Act on all countries covered by the conflict mineral legislation. Parker and Vadheim (2017) examine the impact of the Dodd-Frank Act on the prevalence of conflict within the DRC through 2012, two years before the SEC fully implemented Section 1502 of the Dodd-Frank Act. Stoop et al. (2018a) extend the same identification strategy, comparing conflict events within the DRC, through 2015. I implement a cross-country analysis that extends the impact evaluation through 2016, two full years after Section 1502 was officially implemented. While providing an additional methodological approach for estimating the impact of the Dodd-Frank Act and corroborating within-country analysis, this cross-country analysis has the added benefit of examining the impact of the Dodd-Frank Act on the full list of covered countries, rather than only the DRC. Effect estimates align with the early warnings by political scientists and other researchers performing ethnographic field work in eastern DRC that “top-down” regulations do not address the root cause of conflict and may make the situation worse (Autesserre 2012; Geenen 2012; Seay 2012).

Second, I also present an investigation of the potential mechanisms driving the overall effect of the Dodd-Frank Act in the DRC. There are, at least, two relevant theoretical mechanisms that could explain the primary results. The feasibility mechanism (see Fearon 2005; Collier et al. 2009; Nunn and Qian 2014; Dube and Naidu 2015; Bellemare 2015; Christian and Barrett 2017; Koren 2018) suggests that limiting the revenue earned by armed rebel groups through the extraction of 3TG minerals tightens the budget constraint of armed rebel groups and limits their ability to cause conflict. Alternatively, the opportunity cost mechanism (see Becker 1968; Ehrlich 1973; Hirshleifer 1995; Collier and Hoeffler 1998; Grossman 1991; Fearon and Latin 2003; Dube and Vargas 2013; Bazzi and Blattman 2014) suggests that a reduction of income earned by families, households, and individuals in Eastern DRC decreases the opportunity cost of joining a rebel group and increases the ability of armed rebel groups to perpetuate conflict. Consistent with the primary results of large

unintended consequences of the Dodd-Frank Act in the DRC, I find evidence the the opportunity cost mechanism may outweigh the feasibility mechanism.

Finally, this paper reports estimates of the effect of the decision by the US SEC to suspend enforcement of the conflict minerals legislation in April of 2017. Extending the same difference-in-differences estimation strategy as discussed above to the time period between May 2014 and September 2018, I find that suspending enforcement of the conflict mineral legislation has had little effect on conflict in both the DRC and all covered countries pooled together. This result provides some early insights into how to design future policy that reverses the unintended consequences of past policies experienced in the DRC over the past decade.

The remainder of this paper is organized as follows. The next section provides a discussion of the design, theory of change, and implementation of Section 1502 of the Dodd-Frank Act. Section three describes the empirical framework of this study and explains the identification strategy used to estimate causal effects. Section four discusses the core results. Section five investigates possible mechanisms that explain the estimated effects. Section six reports on an investigation of the effect of enforcement suspension by the US SEC. Finally, section seven concludes with a discussion of all of the results.

2 Section 1502 of the Dodd-Frank Act

The Dodd-Frank Act’s conflict mineral legislation aims to address concerns that the extraction and international trade of tin, tantalum, tungsten, and gold finances conflict in the DRC and surrounding countries. The legislation directs the US SEC to issue rules that require publicly traded US companies to disclose the use of conflict minerals if those minerals are “necessary to the functionality or production of a product” (Dodd-Frank Act, Section 1502, 2.B). As currently implemented, the legislation requires companies to disclose whether conflict minerals originated in the DRC or surrounding countries. If the company knows that their minerals did not originate in the DRC or surrounding countries, then the company must provide a brief description of how they determined the origins of their minerals. If the company knows or has reason to believe that their minerals may have originated in the DRC or surrounding countries, then the company must undertake “due diligence” on the source mine and supply chain links to armed groups. In both cases, companies are required to publicly report the conclusion of their investigations by filing “Form SD” with the US SEC.

A few details about the conflict minerals legislation in the Dodd-Frank Act should be briefly

clarified. First, although the DRC is the focus of the legislation, all countries that share a border with the DRC are also included in the legislation as a “covered country”. This is presumably to limit the smuggling of these minerals from the DRC to a neighboring country, a practice that already persists, to circumvent the legislation. Second, there is no official penalty for non-compliance of US companies to the rules set by the US SEC. Rather, the legislation implements measures to increase the transparency of the international trade of conflict minerals and the financing of armed groups in the DRC and surrounding countries. Therefore, a critical mechanism in the ideal implementation of the legislation is to “name and shame” those companies that are unable to demonstrate a clean supply chain. Third, the Dodd-Frank Act does not prohibit the purchase of minerals from the DRC and surrounding countries. As long as 3TG minerals are mined in sites not connected to armed groups then the international trade of these minerals can continue as usual. As I will discuss in the next subsection, a *de facto* ban implemented by some key buyers of 3TG minerals mined in the DRC complicates this detail of the policy.

2.1 Policy Implementation and Reaction

The Dodd-Frank Act was officially passed by the US Congress and signed into law in July 2010. In September 2010, upon the passage of the Dodd-Frank Act and before the law was officially implemented, the government of the DRC shut down its mineral export industry as a direct reaction to the passage of the Dodd-Frank Act (de Koning 2010; Parker and Vadheim 2017). This reaction publicly communicated an effort of the DRC government to clean up the mineral sector. Although the mineral mines eventually re-opened in 2011, by April of that year the Malaysia Smelting Corporation (MSC), a leading tin exporter, and the Electronic Industry Citizenship Coalition (EICC), an organization comprised of the world’s leading electronics companies, began a *de facto* boycott on minerals originating from the DRC and surrounding countries. These actions, which occurred even before the official implementation of Section 1502 of the Dodd-Frank Act, lead to a dramatic reduction in mineral exports.⁴ More specifically, estimates cited by Seay (2012) suggest that in North Kivu, a DRC region bordering Uganda and Rwanda, exports of tin dropped by roughly 90 percent after the passage of—and reaction to—the Dodd-Frank Act.

In August of 2012 the US Securities and Exchange Commission voted on the final rules to require publicly traded companies to disclose information related to their use of conflict minerals. A year later, in July 2013, the National Association of Manufacturers, the Chamber of Commerce,

⁴See figure 3 in Parker and Vadheim (2017).

and the Business Roundtable filed a lawsuit against the SEC. *National Association of Manufacturers v. Securities and Exchange Commission* ultimately focuses on two key objections: First, that the SEC ignored its statutory obligations and engaged in rule-making that was arbitrary and capricious. Second, that the statute and rule violated the Constitution’s First Amendment freedom of speech grantee. This lawsuit has gone to various federal courts after each decision and appeal. Meanwhile, US publicly traded companies filed their first disclosures (e.g., Form SD) in May of 2014. In April of 2015 a US federal appeals court struck down some aspects of the reporting requirements as a violation of corporations’ freedom of speech, by requiring companies to label their products, but left other aspects of the legislation in place (Seitzinger and Ruane 2015). After this ruling companies are not required to describe certain products as having been “not found to be DRC conflict free”, but must still file an annual report on the linkages of their products to armed rebel groups in the DRC and surrounding countries.

Most recently, in April 2017, the US SEC suspended enforcement of the legislation after a court remanded the law due to violations to the US Constitution. This followed a public statement made by Acting Chairman of the SEC Michael Piwowar after visiting the Great Lake Region in Africa, saying, “It is unclear that the rule has in fact resulted in any reduction in the power and control of armed gangs or eased the human suffering of many innocent men, women, and children in the Congo and surrounding areas” (SEC 2017). The Financial CHOICE Act of 2017 included official legislation that would abolish the conflict mineral regulations of the Dodd-Frank Act. Although this legislation passed the US House of Representatives it was subsequently dismissed in the US Senate. Despite these recent developments, the legislation is still part of US law and can be enforced again quite quickly. This being the case, many companies are still complying with the rules. Some companies—such as Apple, Intel, and Tiffany & Co.—have publicly stated that they intend to follow the rules of the legislation even if it is abolished, responding to what they perceive as a market expectation for “conflict free” products (Frankel 2017).

2.2 Conceptual Framework

The theory behind the implementation of Section 1502 of the Dodd-Frank Act rests on the strength of the link between revenues earned by armed groups and the export of conflict minerals. In particular a critical assumption within the theory of change of the legislation is that mineral revenues are the primary cause of conflict in the DRC and surrounding countries. Material published by the *Enough Project*, an NGO that played a leading role in advocating for the passage of Section 1502

within the Dodd-Frank Act, claims that 3TG minerals are the most lucrative source of revenue to armed groups in Central Africa. Citing their own study, they estimate that armed groups earned roughly \$158 million from conflict minerals in 2008 alone (Enough Project, 2009). Once this stylized fact is established, it may seem reasonable to conclude that limiting US imports of conflict minerals will establish beneficial international norms and perhaps reduce the prevalence of conflict in the DRC and surrounding countries.

Previous theoretical work identifies several key channels in which natural resources in general, and minerals in particular, relate to conflict (see Bazzi and Blattman 2014; Berman et al. 2017 for more general discussions). Each of these channels are concerned with mechanisms in which minerals may cause conflict. It is important to keep in mind that the direction of this effect is not always clear, as discussed by Brunnschweiler and Bulte (2008; 2009) who find that mineral resource dependence may be a direct consequence of conflict, rather than a direct causal factor. In the remainder of this section, I will discuss the various channels in which minerals may interact with conflict and apply these mechanisms to the implementation of the Dodd-Frank Act.

Feasibility—Natural resources can improve the feasibility of conflict (Fearon 2005; Collier et al. 2009; Nunn and Qian 2014; Dube and Naidu 2015; Bellemare 2015; Christian and Barrett 2017; Koren 2018). In this channel, revenue earned through looting, extortion, or informal taxation relaxes the financial constraints facing rebel groups. This is the key channel through which the Dodd-Frank Act intends to make a difference in the DRC and surrounding countries. By regulating minerals originating from the Great Lakes Region, the Dodd-Frank Act aims to reduce the revenue earned by armed groups and therefore reduce conflict.

Greed or rapacity—Natural resources increase the “prize” awarded through the capture of a geographical region (Reuveny and Maxwell 2001; Grossman and Mendoza 2003; Hodler 2006; Caselli and Coleman 2013). This channel is similar, but distinct, from the first channel. Whereas the feasibility channel typically focuses on informal revenue streams for rebel groups, the greed or rent-seeking channel typically focuses on formal revenue streams such as taxation of the natural resource industry by the central government (Bazzi and Blattman 2014). It is unclear how the Dodd-Frank Act may affect conflict through this channel. On the one hand, the Dodd-Frank Act led to a compete shut-down of the mineral industry within the key mineral provinces of North and South Kivu and Maniema by the central government. This at least signaled a potential strengthening of regulation and transparency of the mining sector within the DRC. This could increase the “prize” of controlling or influencing the central government in the DRC and increase conflict. On the

other hand, the Dodd-Frank Act also led to a dramatic reduction in the international export of minerals originating in the DRC, signaling a—perhaps permanent—negative shock to the revenue earning potential of controlling mineral mines. This could decrease the “prize” of institutional rule or influence over the mining sector in the DRC and decrease conflict.

Weak state capacity—A consequence of rent-seeking political institutions, perhaps due to resource wealth, is that they do not properly develop sufficient state capacity to organize and administer a free and fair society (Fearon 2005; Besley and Persson 2011; Bell and Wolford 2015). This underdevelopment of state capacity makes states vulnerable to coups and broad-reaching political instability. It is difficult to predict how the Dodd-Frank Act influences conflict through this channel. The Dodd-Frank Act, first and foremost, is a legislation implemented by the US government. The DRC government did respond to the passage of the legislation by shutting down the mineral sector for several months, but there is no evidence that these actions improved the legitimacy and capacity of key political institutions within the DRC or in surrounding countries (Wakenge 2018).

Capital input intensity—Natural resource extraction and production is more capital intensive than it is labor intensive. This being the case, an increase in the price of natural resources will incentivize an increase in capital-intensive sectors (e.g., the natural resource sector) and dis-incentivize labor-intensive sectors (e.g., the agricultural sector), which leaves excess labor available for joining rebel groups (Dal Bo and Dal Bo 2011; Dube and Vargas 2013). The Dodd-Frank Act, implemented as designed, reduced the price of minerals originating in the DRC and surrounding countries. In theory, effects operating through this channel should decrease conflict. In practice, however, this prediction is ambiguous. Although natural resource extraction may be relatively capital intensive, compared to agriculture, mineral extraction and production still requires some labor. In 2008, for example, the World Bank estimated that there are between 750,000 and 2,000,000 artisanal miners living in the DRC (World Bank 2008). A reduction in mineral prices not only has the potential to shut down machines, but also reduce the demand for labor of those who work in the mineral industry. These workers now have a choice to either join the agricultural sector—often at a subsistence level—or join a rebel group.

Grievances—Due to frustrations stemming from land access, environmental degradation, income and/or wealth inequality, or a myriad of other factors, the extraction of natural resources can lead to intensified conflict (Collier and Hoeffler 2004; Collier et al. 2009). It is again unclear how the Dodd-Frank Act influences conflict through this channel. On one hand, the reduction in the profitability of the mineral sector may attenuate grievances caused by access to and revenues earned

from mineral mines, and reduce conflict. On the other hand, the Dodd-Frank Act may contribute to deepening poverty and inequality, which may further aggravate grievances, and increase conflict (Wakenge 2018).

Migration—Changing migration patterns can meaningfully change the demographic composition of the local population in terms of ethnicity, age, gender, and standard of living (Le Billon 2001; Ross 2004; Humphreys 2005; Sarsons 2015). Demographic changes of this sort may spur conflict in local areas. Migration can occur following either a boom or a bust, and in both cases these changes can increase conflict. In regards to the Dodd-Frank Act, this channel implies an increase in conflict due to migration and the changing demographic composition of local populations.

Opportunity cost—Natural resource extraction, particularly of lucrative minerals, can increase the income level within a given region and can therefore increase the opportunity cost of joining a rebel group (Becker 1968; Ehrlich 1973; Hirshleifer 1995; Collier and Hoffer 1998; Grossman 1991; Fearon and Laitin 2003; Dube and Vargas 2013; Bazzi and Blattman 2014). The symmetric effect also holds. A reduction in natural resource extraction can decrease the income level and opportunity cost of joining a rebel group. Effects operating through this channel imply that the Dodd-Frank Act will increase conflict by decreasing local-level income earning potential and the opportunity cost of joining rebel groups.

Taken together, the overall impact of the Dodd-Frank Act on the prevalence of conflict is *ex ante* ambiguous. Those who contend that the Dodd-Frank Act will reduce conflict claim either that the *feasibility* channel dominates the *opportunity cost* and *migration* channels or that the channels with ambiguous effects will end up reducing conflict. Those who warn about the unintended consequences of the Dodd-Frank Act in the DRC and surrounding countries claim that the *opportunity cost* and *migration* channels dominate the *feasibility* channel or that the channels with ambiguous effects will end up increasing conflict.

3 Empirical Framework

Previous research assessing the effect of the Dodd-Frank Act on the prevalence of conflict fall into two broad categories. The first category consists of highly detailed political and anthropological fieldwork that is mostly qualitative (Autesserre 2012; Geenen 2012; Radley and Vogel 2015; Vogel and Raeymaekers 2016). This research is informative but ultimately not specifically designed to quantitatively calculate the causal effect of the Dodd-Frank Act on the prevalence of conflict in the DRC and surrounding countries. The second category consists of within-country, and more specif-

ically within-DRC, econometric analysis of the effect of the Dodd-Frank Act on conflict (Parker and Vadheim 2017; Stoop et al. 2018a), and child mortality (Parker et al. 2016). This research makes an important methodological contribution, in terms of estimating the causal effect of the Dodd-Frank Act, but may still suffer from concerns with endogeneity—such as spillovers of conflict between geographic regions. Moreover, since the Dodd-Frank Act also regulates mineral mines in countries surrounding the DRC, a complete evaluation of this legislation also needs to consider effects in these countries.

This paper adds to both of these strands of the literature by estimating the effect of the Dodd-Frank Act on conflict across countries. Following Parker and Vadheim (2017) and Maystadt et al. (2014) I perform analysis using sub-national administrative units. This is a preferable approach as administrative units identify more meaningful topographical boundaries, compared to grid cells of arbitrary size. In practice, these difference-in-difference estimates compare the likelihood a conflict event occurs within the second sub-national administrative region in a given month between the DRC and other sub-Saharan African countries not covered by the Dodd-Frank Act. In order to estimate the effect on all covered countries, some specifications compare all countries covered by the Dodd-Frank Act with other sub-Saharan African countries.

3.1 Data

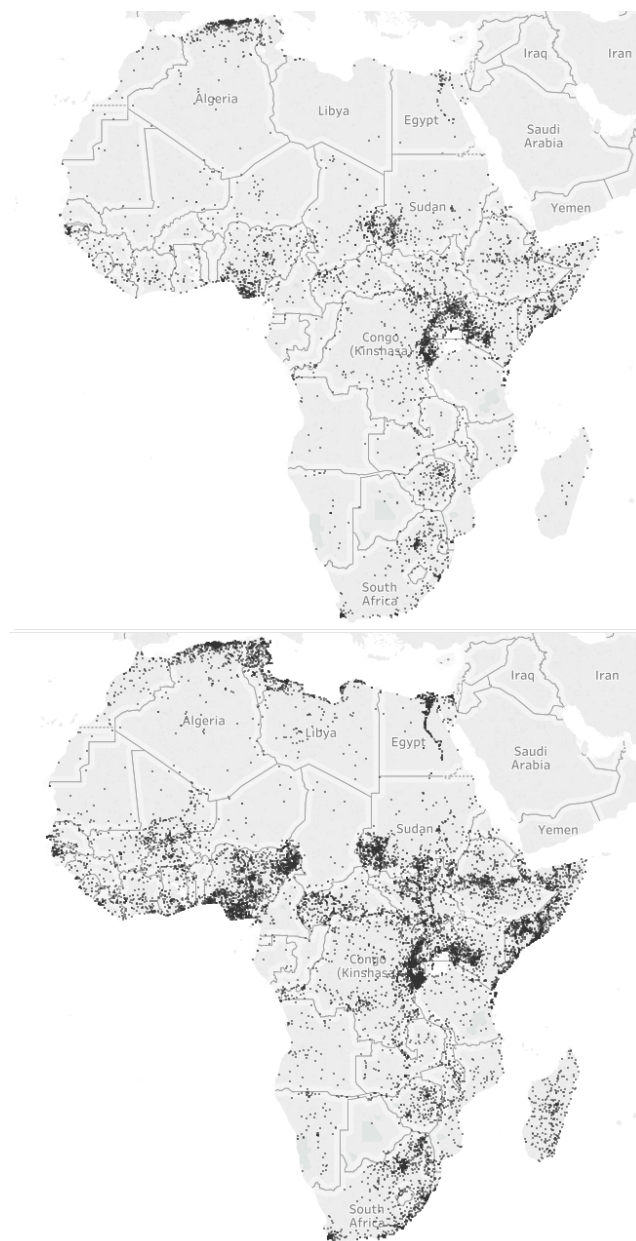
The primary source of data for this empirical analysis comes from the Armed Conflict Location and Event Data (ACLED) project (Raleigh et al. 2010). ACLED provides geocoded information on conflict events across many developing countries. The full ACLED dataset includes close to 200,000 individual events spanning from 1997 through the present. I use a subset of the ACLED database, which includes events from 38 sub-Saharan African countries from 2004 through 2016 for the core analysis, and through September 2018 for analysis of the suspension of enforcement of the legislation.⁵

Countries included in this analysis are the DRC and surrounding countries—as defined by Section 1502 of the Dodd-Frank Act—and other sub-Saharan African countries, excluding Sudan, South Sudan, and Somalia.⁶ These countries are excluded due to complications with their own

⁵Following Parker and Vadheim (2017), this analysis begins in 2004 in order to avoid any effects driven by the Second Congo War.

⁶The countries included in this analysis are as follows: The DRC, Uganda, Rwanda, Burundi, Tanzania, Zambia, Angola, the Republic of Congo, the Central African Republic, Kenya, Ethiopia, Chad, Cameroon, Gabon, Mozambique, Malawi, Botswana, Namibia, Zimbabwe, South Africa, Nigeria, Senegal, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, the Gambia, Guinea-Bissau, Togo, Benin, Burkina Faso, Eritrea, Djibouti, Lethoto, Swaziland, Niger, and Mali.

Figure 1: Conflict Events in Africa



Notes: The top panel plots the geographic distribution of conflict events in Africa from 2004 through 2010. The bottom panel plots the geographic distribution of conflict events in Africa from 2011 through 2016. Source: The Armed Conflict Location and Event Data Project (ACLED).

civil wars and state failures. Another reason for excluding both Sudan and South Sudan is South Sudan became a country in the middle of the study period. This complicates identifying consistent geographical areas over time. Figure 1 shows the location of these conflict events across the entire continent of Africa, split apart for years before and after the passage of the Dodd-Frank Act in July of 2010.

A second source of data is the GADM database of global administrative areas. GADM provides geocoded information on administrative areas from all countries, at all levels of sub-division. I use the GADM database to construct a set of second sub-national administrative regions within each of the countries included in the analysis. Combining the subset of ACLED data with the GADM set of administrative regions, I construct a monthly panel dataset with information about the prevalence of conflict at the second sub-national administrative region within each country. This panel data set includes 156 time periods and 3,681 administrative regions within 38 countries, for a total of 574,236 units of observation.

With these data I construct binary outcome variables that indicate whether a given administrative region experienced a conflict event within a given month.⁷ ACLED codes conflict events into different categories. With this information, I construct five different outcome variables. The first pools all types of conflict together. The second, violence against civilians, is defined directly by ACLED. The third, rebel group battles, is defined by combining ACLED categories: “Battle—Government regains territory”, “Battle—no change of territory”, and “Battle—non-state actor overtakes territory”. The fourth, riots and protests, is defined by combining ACLED categories: “Headquarters or base established”, “Non-violent transfer of territory”, “remote violence”, “Riots/protests”, and “Strategic development”. The fifth, deadly conflict, is defined as being a conflict event of any type with at least one fatality.

Table 1 shows summary statistics, for months prior to the passage of the Dodd-Frank Act, of these variables for the DRC, all covered countries, and all non-covered countries. The third column of Table 1 records the trend of each of these outcomes variables prior to the passage of the Dodd-Frank Act. Figure 2 visualizes these trends in these binary outcome variables both before and after the passage of the Dodd-Frank Act.

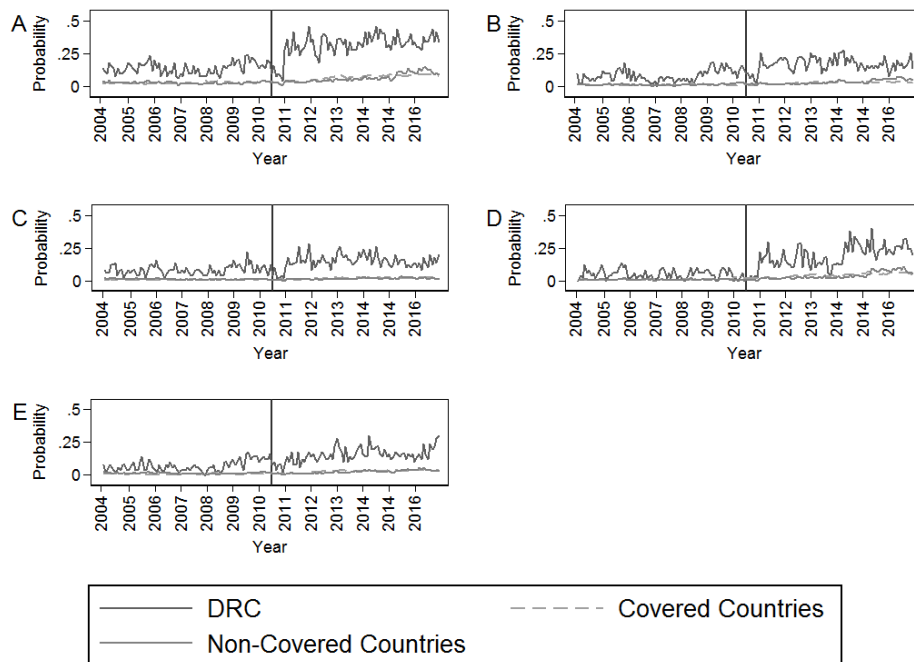
⁷In principle performing this analysis with count variables, rather than binary variables, is possible. In practice, however, many second sub-national regions experience no conflict events within a given month, which results in many conflict counts of zero. In fact, the mean count of each of the five types of conflict within a given month and geographic region are less than one. Nevertheless, Table 6 in the appendix shows the robustness of results to alternative dependent variable definitions. Specifically, these alternative dependent variables equal 1 if a region had greater than 5 (Table 6, Panel A) or ten (Table 6, Panel B) conflict events in a given month.

Table 1: Summary Statistics, Pre-Dodd-Frank Act

	Mean	Std. Dev.	Trend ^a
Panel A: DRC Only			
(i) Conflict, all types	0.141	0.347	0.000 (0.000)
(ii) Violence against civilians	0.084	0.277	0.001* (0.000)
(iii) Rebel group battles	0.082	0.274	0.000 (0.000)
(iv) Riots and protests	0.050	0.219	-0.000 (0.000)
(v) Deadly conflict	0.072	0.259	0.001* (0.000)
Panel B: All Covered Countries			
(i) Conflict, all types	0.030	0.170	-0.000 (0.000)
(ii) Violence against civilians	0.015	0.123	0.000** (0.000)
(iii) Rebel group battles	0.013	0.114	-0.000*** (0.000)
(iv) Riots and protests	0.010	0.100	-0.000 (0.000)
(v) Deadly conflict	0.015	0.122	-0.000 (0.000)
Panel C: All Non-Covered Countries			
(i) Conflict, all types	0.022	0.148	0.000*** (0.000)
(ii) Violence against civilians	0.010	0.100	0.000*** (0.000)
(iii) Rebel group battles	0.007	0.0814	0.000*** (0.000)
(iv) Riots and protests	0.010	0.097	0.000*** (0.000)
(v) Deadly conflict	0.007	0.085	0.000*** (0.000)

Notes: ^a Pre-Dodd-Frank Trend is the linear fit of the given outcome variable prior to the passage of the Dodd-Frank Act. Standard errors, clustered by the 2nd subnational administrative area, in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Figure 2: Conflict Trends by Type



Notes: Each panel refers to the trend in the probability of each of the five outcome variables calculated at the 2nd subnational level within each country. Panel A refers to all conflict. Panel B refers to violence against civilians. Panel C refers to rebel group battles. Panel D refers to riots and protests. Panel E refers to deadly conflict. In each graph, the solid line represents the point estimate when the DRC is “treated”. Probability of conflict computed at the 2nd subnational level in each country within each month from 2004 through 2016. Source: The Armed Conflict Location and Event Data Project (ACLED).

A few details are worth a brief comment, based on Table 1 and the visual representations of these data in Figures 1 and 2. First, Figure 1 shows that while there is a wide geographic distribution of conflict events across the continent of Africa, many of these events tend to be clustered in a general region commonly referred to as Africa’s Great Lakes Region. Second, Table 1 reports that although there is a difference in levels, there is very little trend over time in these variables prior to the passage of the Dodd-Frank Act. Additionally, there is very little difference in these trends between the DRC, all covered countries, and all non-covered countries. Third, Figure 2 shows that, compared to both the covered and non-covered countries, the trends in the probability of conflict in the DRC is much more volatile. This detail presents complications when performing causal inference and is addressed by implementing a variant of Fisher’s permutation test (Fisher 1935). Finally, in the months after the passage of the Dodd-Frank Act, the trends in the probability of conflict increase considerably for the DRC. This pattern largely persists across all types of conflict.

3.2 Estimation and Identification Strategy

I empirically estimate whether the Dodd-Frank Act increased or decreased the prevalence of conflict, in the DRC specifically and in all countries covered by the Dodd-Frank Act more generally. Formally, this relationship is specified with the following linear probability regression model:

$$y_{rct} = \alpha_{rc} + \gamma_t + \beta \cdot \mathbf{1}\{c = DRC\} \cdot \mathbf{1}\{t \geq \text{July 2010}\} + \epsilon_{rct} \quad (1)$$

The variable y_{rct} represents an outcome variable in administrative area r in country c and in month t . The main outcome of interest is a measure of any type of conflict event. Other outcomes include specific types of conflict such as: violence against civilians, rebel group battles, riots and protests, and deadly conflict. The specification also includes geographic (α_{rc}) and month (γ_t) fixed effects, and an error term (ϵ_{rct}). The coefficient of interest (β) is the difference-in-differences estimate of the effect of the Dodd-Frank Act on the prevalence of conflict in the DRC. In this specification the other countries covered by the Dodd-Frank Act (e.g., the countries that border the DRC) are excluded from the analysis. From a research design perspective, this is a beneficial feature of the implementation of the Dodd-Frank Act. It essentially ensures that there will be little spillover effects from the implementation of the legislation in the DRC to other regions within comparison countries. These results are shown in Panel A of Table 2.

As discussed by Cunningham and Shah (2018) and Buchmueller et al. (2011), inference from this difference-in-differences strategy relies on asymptotic assumptions, which may not be reasonable

since “treatment” occurs in only one country (e.g., in the specification where we only examine the effects of the Dodd-Frank Act in the DRC). To address this issue, I implement a variant of Fisher’s permutation test (Fisher 1935). I re-estimate equation (1) an additional 29 times, each time replacing the DRC with an indicator for one of the other 29 sub-Saharan African countries not covered by the Dodd-Frank Act. Next I compare the effect estimate for the DRC with the other 29 placebo estimates. This provides a distribution of effects. Robust effect estimates will consistently be an outlier in these distributions, for all outcome variables. In Figure 3, I graph both the placebo estimates and the DRC estimate for each of the five outcome variables. The vertical dashed lines represent the 5th and 95th percent confidence interval of the distribution of placebo estimates (excluding the estimate from the DRC). The solid line represents the difference-in-differences effect estimate for the DRC.

In some versions of the specification detailed in equation (1), all countries covered by the Dodd-Frank Act (e.g., the DRC plus all surrounding countries) are included in the regression. These specifications estimate the effect of the Dodd-Frank Act for all covered countries combined by comparing administrative regions in all covered countries to administrative regions in other non-covered sub-Saharan African countries. These results are shown in Panel B of Table 2. Concerns stemming from having only one treated unit are not present in the specifications when all countries covered by the Dodd-Frank Act are included in the analysis.

A core identifying assumption for the validity of the effect estimates calculated in equation (1) is that conflict in the DRC would have followed a trend along a path similar to other countries in the absence of the Dodd-Frank Act. In order to test the validity of this assumption, I estimate equation (2):

$$y_{rct} = \eta_{rc} + \lambda_t + \delta_t \cdot \mathbf{1}\{c = DRC\} \cdot \mathbf{1}\{t = 2005, 2006, 2007, \dots, 2016\} + \xi_{rct} \quad (2)$$

In equation (2) all variables are the same as in equation (1). Outcomes in administrative area r in country c and in month t are regressed on geographic (η_{rc}) and month (λ_r) fixed effects, with an error term (ξ_{rct}). The key difference is in equation (2) δ_t , the coefficient on the difference-in-difference interaction, is a vector that takes on a value for each associated year for months between January 2004 through December 2016. In principle, equation (2) could be estimated with interactions for each month between January 2004 and December 2016. In practice, for ease of exposition, I estimate equation (2) with interactions for each year. This averages the monthly effect estimates over the associated year. Similar to equation (1), in some versions of this specification all

countries covered by the Dodd-Frank Act are included in the regression. These specifications aim at estimating the effect of the Dodd-Frank Act in all covered countries, rather than only within the DRC. Estimation results calculated using equation (2) are reported graphically in Figures 4 and 5. If the identification strategy of this paper is valid, then effect estimates in time periods prior to July 2010 will be statistically insignificant and/or relatively small in magnitude. Lastly, in all estimates the standard errors are clustered at the country level to account for possible serial correlation within countries (Bertrand et al. 2004) and to reflect the fact that treatment varies at the country level (Abadie et al. 2017).

4 Did the Dodd-Frank Act Increase or Decrease Conflict?

The effect of the Dodd-Frank Act on the prevalence of conflict in the DRC and surrounding countries is controversial. Advocacy organizations report overwhelming positive effects of the Dodd-Frank Act within the DRC. For example, the *Enough Project* published a report in 2016 claiming, “... positive advances corresponding to the stated purpose of Section 1502 [of the Dodd-Frank Act]” (Dranginis 2016). These positive advances include, “... increased security for civilians...” and “... a significant reduction in armed group control of mining areas...” (Dranginis 2016). On the other hand, numerous accounts associate the Dodd-Frank Act with the opposite of the intended outcomes (see Seay 2012 for a review). Additionally, econometric analysis suggests that, at least in years immediately following the passage of the legislation and before full policy implementation, the Dodd-Frank Act may have increased conflict in the Eastern DRC (Parker and Vadheim 2017). As highlighted by *The Washington Post*—and noted at the beginning of this paper—one mechanism for unintended consequence of requiring due diligence and reporting requirements is prominent buyers of minerals shifting away from purchasing minerals from the DRC (Raghavan 2014). In reducing the revenue earning potential of mineral mines, the Dodd-Frank Act may have removed a viable economic alternative to substance agriculture or joining rebel groups for much of the rural population. If these sorts of dynamics persists, then there is a real possibility that the Dodd-Frank Act may have increased the prevalence of conflict in Africa’s Great Lakes Region. An outcome that is entirely the opposite of the legislation’s intentions.

Table 2 reports the difference-in-differences effect estimation results from equation (1). Panel A shows results when only examining the effect of the Dodd-Frank Act in the DRC, excluding all other covered countries from the analysis, and comparing trends in conflict to other non-covered sub-Saharan African countries. Column 1 considers all conflict event types pooled together and

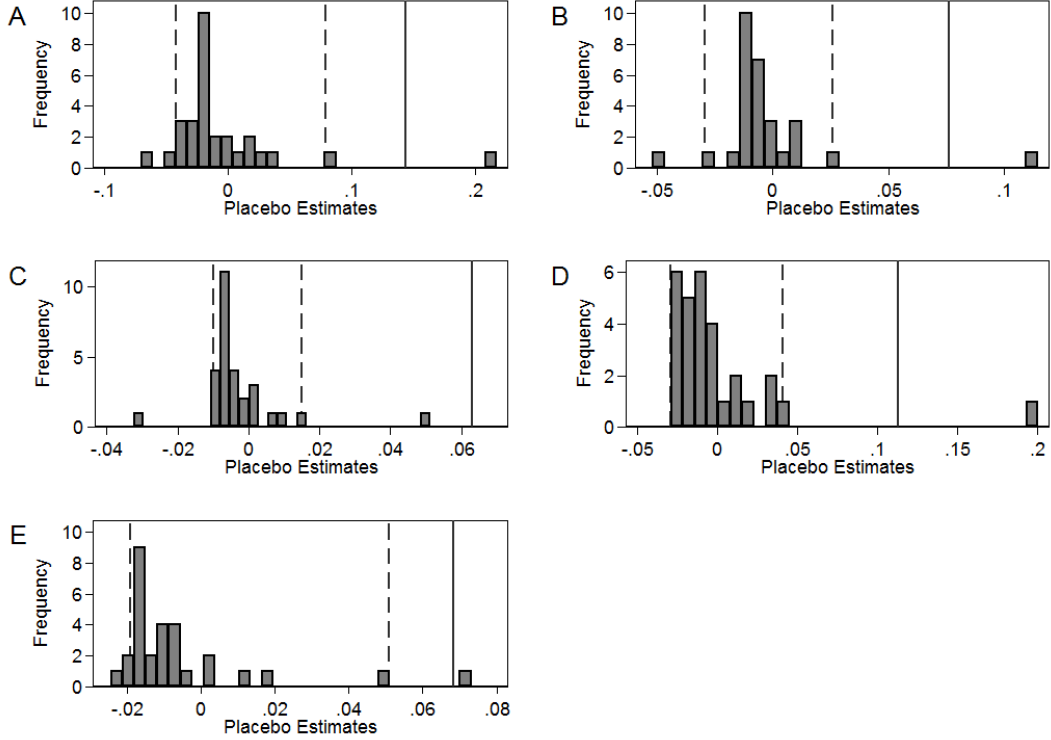
Table 2: Effect of the Dodd-Frank Act on Conflict

	(1)	(2)	(3)	(4)	(5)
	Conflict, All Types	Violence Against Civilians	Rebel Group Battles	Riots and Protests	Deadly Conflict
Panel A: DRC Only					
Effect of Dodd-Frank	0.143*** (0.007)	0.076*** (0.004)	0.063*** (0.002)	0.113*** (0.005)	0.068*** (0.005)
Placebo tests (other countries)					
5th percentile	-0.042	-0.029	-0.010	-0.028	-0.020
95th percentile	0.080	0.026	0.015	0.041	0.051
p-value (two-tailed)	0.13	0.13	0.06	0.13	0.13
Observations	433,992	433,992	433,992	433,992	433,992
Baseline DRC mean	0.140	0.084	0.082	0.050	0.072
Geographic and time FEs	Yes	Yes	Yes	Yes	Yes
R-squared	0.141	0.097	0.084	0.125	0.074
Panel B: All Covered Countries					
Effect of Dodd-Frank	0.001 (0.016)	0.008 (0.010)	-0.001 (0.007)	0.003 (0.012)	-0.004 (0.010)
Observations	574,236	574,236	574,236	574,236	574,236
Baseline covered mean	0.030	0.015	0.013	0.010	0.015
Geographic and time FEs	Yes	Yes	Yes	Yes	Yes
R-squared	0.129	0.087	0.076	0.116	0.067
<i>Notes:</i> The dependent variable is a binary variable indicating the existence of a conflict event at the second sub-national administrative area within a given month. Standard errors clustered at the country level are in parentheses. Bonferroni adjusted p-values are noted as follows *** p<0.01, ** p<0.05, * p<0.1.					

shows a statistically significant effect indicating an increase in conflict. The magnitude of the effect is also relatively large, representing a 102 percent increase in the probability a conflict event occurs within a given sub-national administrative region. Columns 2 through 5 consider different types of conflict events. The effect estimates are again positive and statistically significant across each of these disaggregated outcomes. Again, the magnitudes of these effects are relatively large. Column 2 shows that violence against civilians increased by 90 percent. Column 3 indicates rebel group battles increased by 76 percent. Column 4 reports a 226 percent increase in riots and protests. Finally, column 5 highlights an increase in deadly conflict of 94 percent.

Panel A also includes the 5th and 95th percentiles of the distribution of placebo estimates from the permutation tests. Importantly, for each of the five outcome variables, the DRC estimate is well outside of this interval. Figure 3 illustrates the results of the permutation tests. Each panel shows a histogram of the placebo estimates for a different outcome variable. The dashed lines represent the 95 percent confidence interval of the placebo effect estimates and the solid line represents the DRC effect estimate. These figures show that for each of these outcomes, the DRC estimate is well outside the 95 percent confidence interval. Note that, particularly in the present context, this is a very demanding test to achieve statistical significance at conventional levels. With 30 countries, it is impossible to achieve statistical significance from a two-tailed test at the 5 percent

Figure 3: Placebo Estimates from Permutation Tests, DRC Only



Notes: This figure shows country effects estimated from placebo permutation tests for each column in Table 1. Each panel refers to a placebo test for each of the five outcome variables. Panel A refers to all conflict. Panel B refers to violence against civilians. Panel C refers to rebel group battles. Panel D refers to riots and protests. Panel E refers to deadly conflict. In each graph, the solid line represents the point estimate when the DRC is “treated”. The dashed lines represent the 5th and 95th percentiles.

level. Achieving significance at the 10 percent level occurs if and only if the DRC is ranked first or last in the placebo effect distribution. This occurs only in the case of rebel group battles. For the rest of the outcome variables the DRC effect estimate is ranked second largest in the distribution of placebo estimates. P-values associated with these permutation tests, from two-tailed tests of statistical significance, are also reported in Panel A of Table 2.

Panel B of Table 2 reports the difference-in-differences estimates for the effects of the Dodd-Frank Act in all covered countries, rather than only within the DRC. In each of the five columns I find a precisely estimated statistically insignificant, null effect. Taken together, the effect estimates for all covered countries pooled together are muted in terms of both effect size and statistical significance compared to the results only within the DRC. This suggests that within the complete

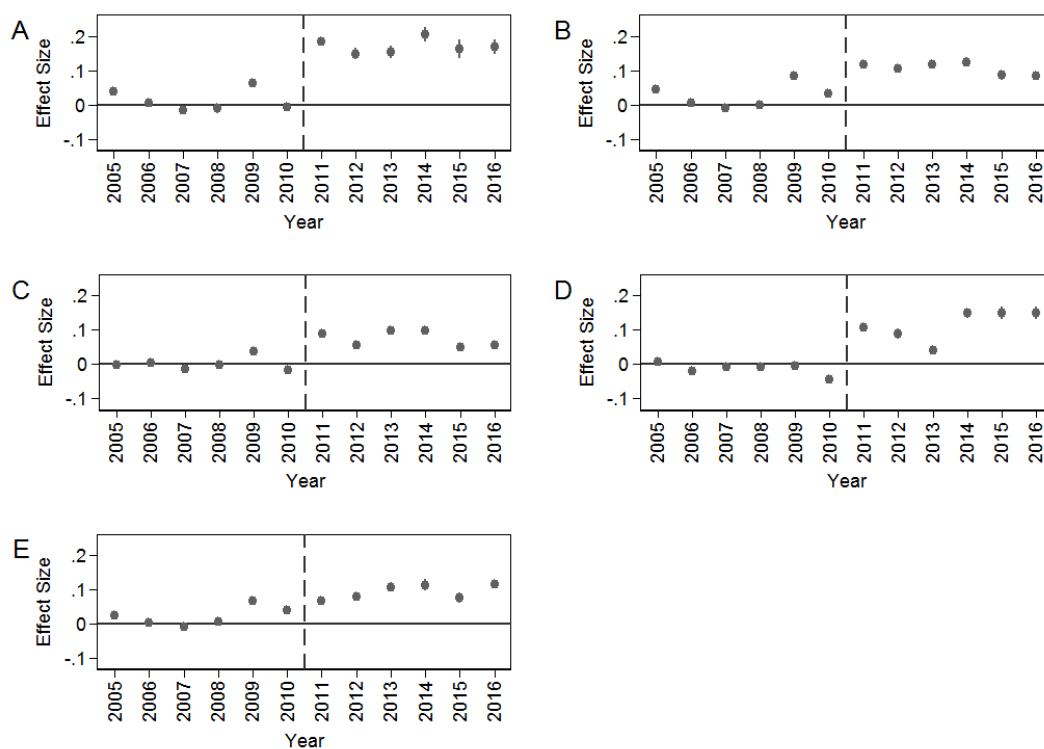
set of countries covered by the Dodd-Frank Act there are many other factors that are much more important for predicting conflict than the passage of the legislation. While there is no evidence that the Dodd-Frank Act systematically increased the prevalence of conflict in all of these countries combined, there is similarly little evidence that the legislation lead to any systematic reduction in the prevalence of conflict.

This broad conclusion about the effect of the Dodd-Frank Act in all countries covered by the legislation pooled together may hide important heterogeneity. Table 5, in the Appendix, shows these country-specific effects among the various countries covered by the Dodd-Frank Act. The prevalence of conflict—both in general and in the disaggregated measures—decreased in Angola, the Republic of Congo, Rwanda, Tanzania, and Uganda. On the other hand, similar to the DRC, the prevalence of conflict increased in the Central Africa Republic and Burundi. The magnitudes of each of these effects, however, are substantially smaller than the estimated effects in the DRC. The majority of these country-specific effects, for countries covered by the Dodd-Frank Act, are within the 95 percent confidence interval for the distribution of the placebo estimates generated from the permutation tests. Therefore, although the effects for each country covered by the Dodd-Frank Act are mixed, statistical inference from only the strongest effects are robust to permutation tests. This is consistent with the implementation of Section 1502 of the Dodd-Frank Act which specifically targeted the DRC, but also regulated minerals exported by surrounding countries.

A key identifying assumption for the validity of this estimation framework is that conflict in the DRC, or the other covered countries, would not trend differently compared to other sub-Saharan African countries in the absence of the Dodd-Frank Act. Effect estimates from equation (2) help explore the validity of this assumption in the present context. If year-specific effect estimates are statistically insignificant and/or relatively small prior to July 2010, then this suggests evidence in favor of the validity of the identification strategy used in this paper.

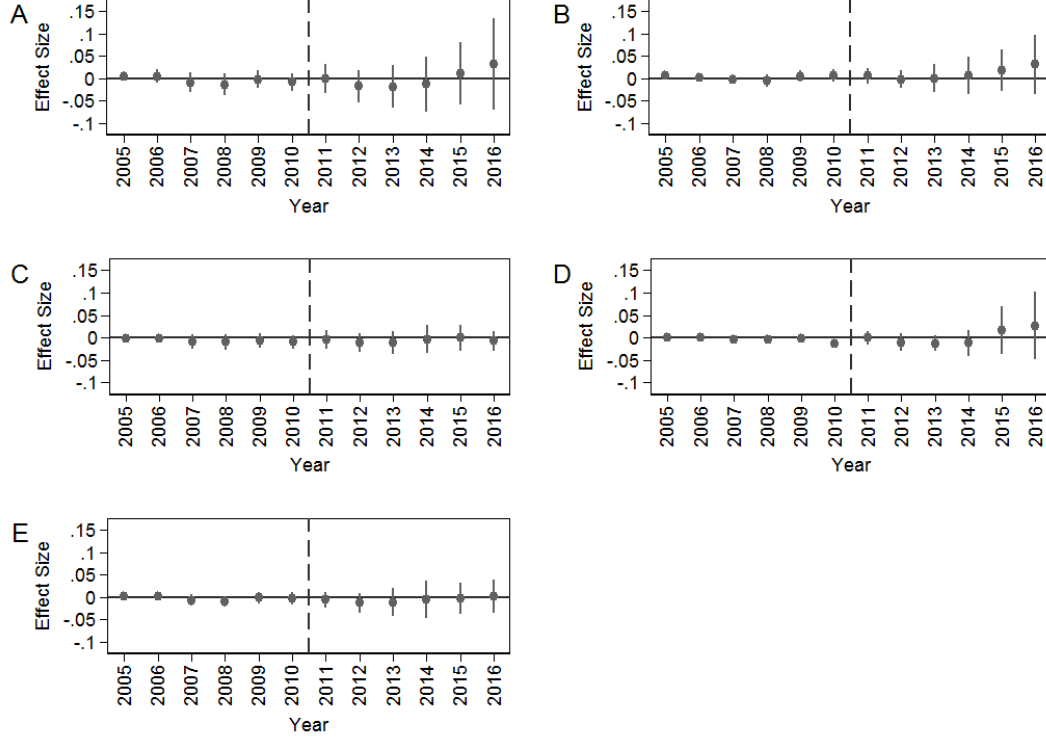
Figure 4 reports the year-specific effect estimates for each of the five outcome variables. In Panel A, year-specific effect estimates are statistically insignificant between the years 2006 and 2008. In 2005 and 2009 the estimates are statistically significant but relatively small compared to the effect estimates for years after the passage of the Dodd-Frank Act. Specifically, the effects in 2005 and 2009 both have a coefficient smaller than 0.1, whereas beginning in 2011 the effect estimates are twice as large with coefficients roughly around 0.2. This key finding is qualitatively similar across all other outcome variables. Although the effects are strongest in Panel A, when all types of conflict are pooled together, Panels B through E each report a statistically significant increase in conflict

Figure 4: Year Specific Effect Sizes, DRC Only



Notes: Each panel refers to each of the five outcome variables. Panel A refers to all conflict. Panel B refers to violence against civilians. Panel C refers to rebel group battles. Panel D refers to riots and protests. Panel E refers to deadly conflict. In each graph, the dashed line represents when the Dodd-Frank Act was signed into US law.

Figure 5: Year Specific Effect Sizes, All Covered Countries



Notes: Each panel refers to each of the five outcome variables. Panel A refers to all conflict. Panel B refers to violence against civilians. Panel C refers to rebel group battles. Panel D refers to riots and protests. Panel E refers to deadly conflict. In each graph, the dashed line represents when the Dodd-Frank Act was signed into US law.

in years after the passage of the Dodd-Frank. This indicates that the overall effect on all types of conflict is not primarily driven by a change in a specific type of conflict. Moreover, the effects are relatively stable over time. This indicates that the effects reported in Table 1 are not driven by a dramatic spike in conflict in any one year. Taken together the findings presented in Figure 4 support the validity of the identification strategy for estimating the effect of the Dodd-Frank Act on conflict within the DRC.

Figure 5 reports year-specific effect estimates for each of the five outcome variables, when all countries covered by the Dodd-Frank Act are included in equation (2). In each of these panels, the effect sizes are considerably smaller than the corresponding effect sizes in Figure 4. This is consistent with the results reported in Panel B of Table 2. Pooling all types of conflict together,

in Panel A, the impact estimates prior to the passage of the Dodd-Frank Act are statistically insignificant and relatively small. In years after the passage of the legislation, the effects indicate a null effect of the Dodd-Frank Act within all countries pooled together. Effect estimates on violence against civilians and riots and protests, reported in Panels B and D respectively, report small and statistically insignificant results in years prior to the Dodd-Frank Act. This trend continues in the years immediately following, however in 2015 and 2016 the probability of violence against civilians increases slightly but remains statistically insignificant. In Panels C and E, the results support the finding that factors other than the passage of the Dodd-Frank Act predict these types of conflict in the full set of countries covered by the legislation. Similar to the results reported in Panel B of Table 2, there is very little evidence that the Dodd-Frank Act systematically increased or decreased the prevalence of conflict within all countries covered by the legislation.

Overall these results indicate that the Dodd-Frank Act increased the prevalence of conflict in the DRC. This result is qualitatively similar when considering all types of conflict pooled together or when considering disaggregated types of conflict. These effect estimates are also relatively large in size. The probability of any type of conflict roughly doubled within the DRC after the passage of the Dodd-Frank Act. Disaggregated types of conflict increased by rates between 75 and over 225 percent. This is evidence of unintended consequences of the Dodd-Frank Act in the DRC.

When considering all countries covered by the Dodd-Frank Act, the estimated effects are much more muted. There is no evidence that the Dodd-Frank Act increased or decreased all types of conflict across all of these countries together. Examining each of the covered countries individually uncovers potentially important heterogeneity across countries. Each of these effect sizes, however, are relatively small and statistical inference of these estimates is not robust to permutation tests. Therefore, although there is no evidence of systematic unintended consequences among all countries covered by the legislation, there is also no evidence the Dodd-Frank Act systematically reduced the prevalence conflict.

5 Mechanisms within the DRC

There are a number of possible mechanisms that, in theory, could explain the estimated effects of the Dodd-Frank Act. The most relevant mechanisms to disentangle are feasibility (Fearon 2005; Collier et al. 2009; Nunn and Qian 2014; Dube and Naidu 2015; Bellemare 2015; Christian and Barrett 2017; Koren 2018) and opportunity cost (Becker 1968; Ehrlich 1973; Hirshleifer 1995; Collier and Hoffer 1998; Grossman 1991; Fearon and Laitin 2003; Dube and Vargas 2013; Bazzi and Blattman

2014). The assumed theory of change of Section 1502 of the Dodd-Frank Act rests on the strength of the link between minerals and conflict. If this mechanism persists, then the presence of armed groups at relevant mineral mines will decrease and so will the revenue earned by armed groups from mineral extraction. This could effectively tighten the budget constraint of armed groups and reduce their ability to perpetuate conflict. On the other hand, if the opportunity cost mechanism persists, then either a reduction in incomes or a reduction in the number of workers employed by relevant mineral mines could decrease the opportunity cost of joining a rebel group. This could effectively strengthen the capacity of armed groups and increase their ability to perpetuate conflict.

To test for these potential mechanisms I use data from the International Peace Information Service (IPIS), an independent research institute that collects detailed information about mineral mining within the DRC. The complete set of IPIS data includes information on 3,687 visits to mineral mines in the eastern provinces of the DRC from 2009 through 2017. I specifically use information on the timing of the visit to each mineral mine, the number of workers involved, and the presence of an armed group at the mining site. Although these data include valuable information, they are imperfect. IPIS tries their best to ensure that their visits to mineral mines are representative of specific provinces in Eastern DRC. In some years, concerns relating to the security of surveyors prohibit visits to all planned mining sites. In order to test for the sensitivity of these details, I present two sets of results: one that uses the full set of IPIS data and another that excludes visits in the years 2016 and 2017 due to their more focused and less representative nature. Another limitation of the IPIS data is that it only exists within the DRC. Therefore, although exploring potential mechanisms within the full list of covered countries and throughout the rest of sub-Saharan Africa would be interesting, it is currently not possible given the availability of detailed data on mineral mines.

The identification strategy used in this section to explore potential mechanisms follows that used by Parker and Vadheim (2017) and Stoop et al. (2018a). I compare outcomes between mining cites that extract tin, tantalum, and tungsten (3T mineral mines) and mining cites that extract all other minerals including gold. Parker and Vadheim (2017) cite two key reasons why the extraction of 3T minerals are more likely to be influenced by the Dodd-Frank Act than gold even when all four minerals are technically regulated by the legislation. First, the majority of the gold mined in the DRC supplies jewelry markets in Middle Eastern and Asian countries (de Koning 2011). Second, gold is more difficult to trace gold back to mines controlled by armed groups since it is quite easy to melt and separate from any access rock (de la Sierra 2016). Alternatively, 3T minerals are easier

to trace because they are extracted with additional rock that can help distinguish the origin of the the mine (Lezhnev and Prendergast 2009).

I specifically estimate the following difference-in-differences regression specification:

$$y_{ir} = \phi \cdot (3T_{ir} \cdot Post_{ir}) + \rho \cdot 3T_{ir} + \tau \cdot Post_{ir} + \theta_r + \mu_{ir} \quad (3)$$

In equation (3) y_{ir} represents the outcome of interest—either number of workers or the presence of an armed group—for mine site visit i in administrative region r . The variable $3T_{ir}$ is a binary dummy variable indicating if the mine site extracts a 3T mineral. The variable $Post_{ir}$ is a binary dummy variable indicating if the mine site visit occurred after July 2010 or the passage of the Dodd-Frank Act. The coefficient ϕ is the coefficient of interest on the interaction of $3T_{ir}$ and $Post_{ir}$ and estimates the impact of the Dodd-Frank Act on the outcome y_{ir} . Finally, θ_r is an administrative area fixed effect and μ_{ir} is the error term.

Table 3 reports the the estimates from equation (3). As previously noted, due to the limitations of the IPIS data, I show two sets of estimates. Panel A shows results when using the the complete set of all IPIS data with mine site visits from 2009 through 2017. Panel B shows results when using a truncated set of IPIS data omitting data from 2016 and 2017 which included visits to a much more specialized selection of mine sites and is therefore less representative of provinces in Eastern DRC.

IPIS data recording the number of workers associated with each mine is highly non-Gaussian, with a long right tail on the distribution. Therefore, I transform the number of workers variable by using the inverse hyperbolic sine (IHS) transformation (Burbidge et al. 1988; MacKinnon and Magee 1990; Pence 2006). This transformation is similar to the natural log transformation, but is mathematically capable of handling zeros. In order to interpret these coefficients, I follow the derivations provided by Bellemare and Wichman (2018).⁸ In Columns (1) through (3) in Panel A of Table 3 report the effect of the Dodd-Frank Act on the number of workers at 3T mineral mines during IPIS visits. These estimates suggest that there is between a 42 and 51 percent reduction in the number of workers due to the passage of the Dodd-Frank Act. The effect estimates are slightly larger in Columns (1) through (3) in Panel B of Table 3, when using the truncated set of IPIS data. Although the result is only marginally significant in Column (3) of Panel A, the results are qualitatively robust to the inclusion of year and territory fixed effects. These results broadly

⁸In the arcsine-linear with dummy independent variables, as specified in equation (3), the semi-elasticity is approximately equal to $100 \times \exp(\hat{\phi}) - 1$.

Table 3: Effect of the Dodd-Frank Act on Number of Mine Workers and Presence of Armed Groups

	(1) IHS number workers	(2) IHS number workers	(3) IHS number workers	(4) Binary presence of armed group	(5) Binary presence of armed group	(6) Binary presence of armed group
Panel A: All IPIS Data (2009 - 2017)						
Effect of Dodd-Frank	-0.733** (0.248)	-0.718** (0.242)	-0.532* (0.250)	-0.252 (0.143)	-0.199 (0.148)	-0.172 (0.125)
3T Mineral Mine	0.760** (0.252)	0.742** (0.261)	0.379 (0.237)	-0.130 (0.113)	-0.131 (0.117)	-0.00434 (0.105)
Post July 2010	-0.00904 (0.217)	-0.439 (0.473)	-0.425 (0.452)	0.0832 (0.113)	-0.180 (0.157)	-0.0942 (0.132)
Observations	3,029	3,029	3,029	3,439	3,439	3,439
Baseline 3T mean	-	-	-	0.327	0.327	0.327
R-squared	0.016	0.076	0.223	0.128	0.179	0.389
Panel B: Truncated IPIS Data (2009 - 2015)						
Effect of Dodd-Frank	-0.978*** (0.264)	-1.001*** (0.285)	-0.765** (0.255)	-0.308* (0.130)	-0.287* (0.136)	-0.268* (0.119)
3T Mineral Mine	0.760** (0.252)	0.742** (0.261)	0.557* (0.254)	-0.130 (0.113)	-0.131 (0.117)	0.0785 (0.0959)
Post July 2010	0.209 (0.245)	0.119 (0.326)	-0.154 (0.404)	0.161 (0.0917)	0.0895 (0.120)	0.150 (0.102)
Observations	2,371	2,371	2,371	2,621	2,621	2,621
Baseline 3T mean	-	-	-	0.327	0.327	0.327
R-squared	0.021	0.053	0.185	0.149	0.166	0.426
Year FEs	No	Yes	Yes	No	Yes	Yes
Territory FEs	No	No	Yes	No	No	Yes

Notes: The first three columns show the effect of the Dodd-Frank Act on the number of workers working in 3T mineral mines. The dependent variable is transformed by the inverse hyperbolic sine (IHS) transformation. This transformation is log-like, and thus helps account for the highly non-Gaussian form of these data on number of workers, but is capable of mathematically handling zeros. The last three columns show the effect of the Dodd-Frank Act on the presence of armed groups at mineral sites. The dependent variable is expressed in terms of a binary dummy variable. Panel A uses the complete set of IPIS data with mine visits from 2009 through 2017. Panel B uses a truncated set of IPIS data from 2009 through 2015 that discards the more focused, and less representative, visits from 2016 and 2017. Standard errors clustered at the territory level are shown in parentheses. Bonferroni adjusted p-values are noted as follows *** p<0.01, ** p<0.05, * p<0.1.

suggest that one of the persisting mechanisms driving the overall effect of the Dodd-Frank Act on the prevalence of conflict is the opportunity cost mechanism.

Columns (4) through (6) in Panel A of Table 3 report the effect of the Dodd-Frank Act on the presence of an armed rebel group at the mining site. These columns show that the effect of the Dodd-Frank Act on the presence of an armed rebel group is statistically insignificant when using the full set of IPIS data. Although the magnitude of these effects are quite large—representing roughly an over 50 percent reduction in the probability an armed group is present at a mining site—these estimates are relatively imprecise. In Columns (4) through (6) in Panel B of Table 3—when using the truncated set of IPIS data—both the magnitudes and statistical significance of effect estimates increase. These effects range between an 81 and a 94 percent decrease in the probability that an armed group is present at a mining site. These results provide weak evidence suggesting that the passage of the Dodd-Frank Act reduced the presence of armed rebel groups at 3T mineral mines.

Taken together these results suggest that both the feasibility and opportunity cost mechanisms persist within the DRC as a result of the Dodd-Frank Act. Consistent with the core results presented above, however, the feasibility mechanism seems to be dominated by the opportunity cost mechanism. These results may help explain both reports of reductions in armed group activity around mining areas (Graginis 2016) and the consistent finding in this literature of the Dodd-Frank Act leading to an increase, rather than a decrease, in the prevalence of conflict in the DRC.

6 The Effect of Enforcement Suspension

In April 2017 the US SEC suspended enforcement of the conflict minerals legislation.⁹ This followed an attempt to overhaul the entire Dodd-Frank Act, which ultimately did not pass US Congressional approval. Some express optimism the suspension of enforcement will lead to positive outcomes in the DRC and surrounding countries (Geenen 2017; Stoop et al. 2018b). As previously noted, however, the entire Dodd-Frank Act remains part of the US law and can be enforced quite quickly again. Furthermore, some companies—such as Apple, Intel, and Tiffany & Co—have publicly stated that they intend to follow the requirements of the conflict minerals legislation even if it is officially removed from US law. Therefore, although suspending enforcement of a law that has

⁹A statement made by the US SEC on April 7, 2018 notes the following, “In light of the uncertainty regarding how the Commission will resolve those issues and related issues raised by commenters, the Division of Corporation Finance has determined that it will not recommend enforcement action to the Commission if companies, including those that are subject to paragraph (c) of Item 1.01 of Form SD, only file disclosure under the provisions of paragraphs (a) and (b) of Item 1.01 of Form SD.” Reports from news outlets, such as Reuters (Lynch 2017) and Supply Chain Dive (Lopez and Burt 2017), support the interpretation of this statement to indicate that the US SEC is, for the time being, suspending enforcement of the conflict minerals legislation within the Dodd-Frank Act.

Table 4: Effect of Enforcement Suspension on Conflict

	(1) Conflict, All Types	(2) Violence Against Civilians	(3) Rebel Group Battles	(4) Riots and Protests	(5) Deadly Conflict
Panel A: DRC Only					
Effect of Enforcement Suspension	0.007 (0.007)	0.027*** (0.004)	0.010*** (0.003)	-0.012 (0.005)	0.014*** (0.003)
Placebo tests (other countries)					
5th percentile	-0.046	-0.036	-0.015	-0.020	-0.021
95th percentile	0.093	0.082	0.056	0.051	0.080
p-value (two-tailed)	0.666	0.333	0.266	0.600	0.400
Observations	147,976	147,976	147,976	147,976	147,976
Baseline DRC mean	0.357	0.179	0.156	0.247	0.184
Geographic and time FEs	Yes	Yes	Yes	Yes	Yes
R-squared	0.181	0.116	0.135	0.164	0.131
Panel B: All Covered Countries					
Effect of Enforcement Suspension	-0.002 (0.0111)	0.005 (0.010)	-0.006 (0.005)	-0.014 (0.008)	-0.006 (0.004)
Observations	195,676	195,676	195,676	195,676	195,676
Baseline Covered mean	0.092	0.052	0.022	0.051	0.037
Geographic and time FEs	Yes	Yes	Yes	Yes	Yes
R-squared	0.177	0.129	0.125	0.153	0.122

Notes: The dependent variable is a binary variable indicating the existence of a conflict event at the second sub-national administrative area within a given month. Standard errors clustered at the country level are in parentheses. Bonferroni adjusted p-values are noted as follows *** p<0.01, ** p<0.05, * p<0.1.

unintended and negative consequences may theoretically lead to a reversal in outcomes, it is not at all clear whether this effect is present in the context of the Dodd-Frank Act in Africa's Great Lakes region.

This raises the question: What is the effect of suspending enforcement of the conflict minerals legislation in the DRC and surrounding countries? I investigate this question by repeating a similar estimation strategy as performed above over a different time period.¹⁰ I examine the prevalence of conflict within the DRC, all covered countries, and all non-covered sub-Saharan African countries from May 2014—when the conflict minerals legislation was officially implemented by the US SEC—through September 2018. This analysis tests the effect of enforcement suspension of the conflict minerals legislation on the prevalence of conflict in the DRC and surrounding countries.

Table 4 reports the difference-in-differences estimates of the effect of enforcement suspension. Panel A shows results when only examining the effect of enforcement suspension in the DRC, excluding all other covered countries from the analysis, and comparing trends in conflict to other non-covered sub-Saharan African countries. Column 1 considers all conflict event types pooled together and shows a relatively precise null effect, suggesting enforcement suspension has so far

¹⁰This estimation strategy is similar to that defined by equation (1), but over a different time-frame. Results from an estimation strategy similar to equation (2) for this analysis of the effect of enforcement suspension are shown in Figures 12 and 13 in the Appendix.

had little effect on the prevalence of conflict within the DRC. A similar finding persists among the riots and protests type of conflict, reported in column 4, suggesting that the prevalence of this type of conflict is unaffected by suspending enforcement of the legislation. Effect estimates for violence against civilians, rebel group battles, and deadly conflict—reported in columns 2, 3, and 5 respectively—all increase in response to enforcement suspension. This may seem like a rather surprising result, however, two details must be acknowledged. First, the effects are quite small relative to the effects reported in Table 2 on the effect of the passage of the Dodd-Frank Act—representing between a 5 and 15 percent increase in each type of conflict. Second, and perhaps more importantly, permutation tests find that none of these effects fall outside of the 5th or 95th percentile of placebo estimates, suggesting that these effects are likely to be spurious artifacts of the estimation strategy.¹¹ Taken together, the results presented in Panel A of Table 4 suggest that the suspension of enforcement of the conflict minerals legislation has little effect on conflict within the DRC.

Panel B of Table 4 reports the difference-in-differences estimates of results for all covered countries pooled together, rather than for only the DRC. In each of the five columns I find a precisely estimated null effect. Similar to the results in Table 2—which estimated the effects of the passage of the Dodd-Frank Act—the effect estimates reported in Panel B of Table 4 suggest that enforcement suspension has very effect on conflict in all covered countries. Again, this suggests that within the complete set of countries covered by the Dodd-Frank Act there are many other factors that are much more important for predicting conflict than the suspension of enforcement of the legislation.

There are at least two reasons to interpret these results estimating the effect of enforcement suspension with caution. First, although the US SEC has made it known that the conflict minerals legislation—for the time being—will not be enforced, the entire Dodd-Frank Act as well as the conflict minerals legislation are still US law. Therefore, US companies may still be complying with the regulation due to either legal ambiguity or a belief the legislation will be enforced again in the future. Additionally, as previously discussed, some companies have expressed the belief that there is a market expectation for conflict free products and therefore have intentions of complying with the legislation even if the law were to be officially changed. Second, these estimates only consider a relatively short time-frame and alternative findings may manifest in due time. The results reported in Table 4 estimate the effect of enforcement suspension by using just over a year and a half (e.g. 20 months) of “post treatment” periods. It is entirely plausible that estimates taking into account

¹¹Results for these permutation tests are reported in Figure 11 in the Appendix.

a longer time-frame may find different results.

Keeping these details in mind, the results reported in Table 4 suggest that simply suspending enforcement of the Dodd-Frank Act’s conflict minerals regulation has little effect on conflict in the DRC and surrounding countries. This provides some insights that may be helpful when thinking about appropriate responses and re-designs of US policy with the intention of limiting the role of US consumers in supporting conflict in Africa’s Great Lakes region. First, if these trends continue, it may be unlikely that a more official repeal of the conflict minerals legislation—that is, actual changes to US law—will have an overwhelming corrective effect in the DRC. Given the foregoing, it seems reasonable to conclude that simply removing the conflict minerals legislation from US law will be insufficient in restoring the DRC to pre-Dodd-Frank Act levels of conflict, let alone any reduction from these levels. Second, perhaps a more effective policy will include localized economic and social support for those households that have been adversely affected by the Dodd-Frank Act. This could include aid that supports human rights and promotes economic opportunities in the region. That said, much more work and research is needed to better understand and design more effective future policies.

7 Discussion and Conclusion

I find evidence of unintended consequences of the Dodd-Frank Act in the DRC. I estimate that the passage of the Dodd-Frank Act lead to roughly a doubling of the prevalence of conflict in the DRC. This finding is constant with both qualitative (Cuvelier et al. 2014; Geenen 2012; Radley and Vogel 2015; Vogel and Raeymaekers 2016; Wakenge 2018) and quantitative (Parker et al. 2016; Parker and Vadheim 2017; Stoop et al. 2018a) research investigating the effects of US conflict mineral legislation. In relation to previous quantitative studies, my study suggests that the unintended consequences of the Dodd-Frank Act in the DRC may be much more dramatic than previously reported. This is consistent with the idea that, due to bias generated by the presence of spillovers, previous studies estimate the lower bound of the effect.

Estimates fall in both size and statistical significance when considering effects among all countries covered by the Dodd-Frank Act. This suggests that the Dodd-Frank Act did not lead to any meaningful change—positively or negatively—in terms of the prevalence of conflict when pooling all covered countries together. As the DRC-specific analysis highlights, however, pooling all countries covered by the legislation together hides important heterogeneity in the country-specific effects. None of the effects in countries surrounding the DRC come close to the magnitude of the estimated

effects in the DRC, however, and statistical inference is not robust to permutation tests.

These results are not without limitations. Most importantly, the identification strategy rests on the assumption that trends in conflict would not have evolved differently in the absence of the Dodd-Frank Act. Despite tests of parallel trends in the prevalence in conflict prior to the passage of the Dodd-Frank Act, this identification assumption cannot be directly tested. Concerns relating to endogeneity or other forms of unobserved heterogeneity may persist. For example, the DRC held presidential elections in 2011. An important question, in this case, is whether conflict events associated with the 2011 presidential election confound estimated effects of the Dodd-Frank Act or are fueled by the passage of the legislation. If the former is correct, then the estimates reported in this study represent an estimate of the upper bound of the effect of the Dodd-Frank Act. Coupling these findings with that of Parker and Vadheim (2017) and Stoop et al. (2018) provide bounds on the true effect of the Dodd-Frank Act on the prevalence of conflict in the DRC. If the later is correct, and conflict events associated with the 2011 presidential election are fueled by the passage of the Dodd-Frank Act, then the estimates of this study may represent more credible estimates of the effect of the conflict mineral legislation in Africa’s Great Lakes Region.

An additional concern relates to the validity of the comparison with all other sub-Saharan African countries not covered by the Dodd-Frank Act. To address this concern I implement the synthetic control estimation strategy as a robustness test (Abadie et al. 2010; 2015). Since the synthetic control approach is a generalization of the difference-in-differences estimation strategy it is well suited to serve as a robustness test for the core results in this paper. Specifically the synthetic control approach generates a convex combination of administrative areas from comparison countries that best match the pre-intervention trend in conflict within the DRC. If there is any concern that non-covered sub-Saharan African countries do not form a valid comparison group, this method should address the associated issues. I find that the effect for all types of conflict is robust to synthetic control estimation and associated inferential techniques. The disaggregated conflict types are less robust to synthetic control estimation and inference, but largely support the qualitative result that the Dodd-Frank Act increased the prevalence of conflict within the DRC. These results are presented in the appendix.

Moving beyond these core results, I also present results from two supplemental investigations. The first tests for the existence of potential mechanisms driving the core results. This supplemental analysis suggests that although the passage of the Dodd-Frank Act may have reduced the presence of armed groups at 3T mineral mines, the legislation also reduced the number of workers employed

by 3T mineral mines. These findings suggest that although both the feasibility and opportunity cost mechanisms may be present in the DRC, consistent with the overall finding of unintended consequences, the opportunity cost mechanism dominates. The passage of the Dodd-Frank Act and in particular the DRC's response to shut down all mineral exports from 2010 through 2011, may have caused a labor market shock to the mineral industry. Households who rely on income from working in the mineral mines may therefore struggle to find sufficient alternative activities. This deepens poverty, perpetuates socio-economic inequality, and generates more motivation to perpetuate conflict. Moreover, although the Dodd-Frank Act may have levied a shock in revenue earning of armed rebel groups, these groups are likely able shift to alternative revenue streams.

In second supplemental investigation, I examine the effect of the decision of the US SEC to suspend the enforcement of the conflict mineral legislation in April 2017. This supplemental analysis suggests that the enforcement suspension had little and likely no effect on the prevalence of conflict in both the DRC and all covered countries. This finding highlights a particularly tricky aspect of the direct policy implications of these results. It seems that abolishing the conflict mineral legislation of the Dodd-Frank Act is unlikely to reverse the increase in conflict. As previously noted, many large and influential companies have publicly stated that they plan on complying with conflict mineral regulations due to a perception of a market expectation for conflict-free products. This being the case, a more successful version of this legislation could provide development assistance to the mining communities adversely affected by the unintended consequences the Dodd-Frank Act. Without this assistance, the negative impacts identified by this analysis may threaten to continue in future years effectively perpetuating and deepening Africa's deadliest conflict.

Finally, this paper provides suggestive insight into the underlying causes of conflict in the DRC and other countries in sub-Saharan Africa (Berman et al. 2017; Bazzi and Blattman 2014; Blattman and Miguel 2010; Brunnschweiler and Bulte 2008; Collier and Hoeffler 2004). These results support the notion that minerals may not necessarily be the primary cause of conflict. Rather conflict may be driven by a host of additional factors such as chronic poverty, socio-economic inequality, and weak political institutions. Although policies and norms that push the private sector toward more accountable business practices are likely necessary, they are not sufficient. Ultimately, it seems likely that the Dodd-Frank Act, while perhaps forming beneficial international norms regarding natural resource extraction in the context of weak political institutions, has also made life much more difficult for many in Africa's Great Lakes Region.

Future work could focus on understanding what actually causes conflict in the DRC and sur-

rounding countries. It is through understanding these dynamics that beneficial public policies with the objective of mitigating conflict in Africa's Great Lakes region can be designed and implemented. Future research could also do well to focus on how to best support and assist those who are adversely affected by the labor market consequences of economic sanctions.

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Supplemental Appendix A: Additional Tables and Figures

In this section, I describe the tables and figures in Supplemental Appendix A. Table 5 reports the country-specific estimates for each of the covered countries under the Dodd-Frank Act. This includes the Democratic Republic of Congo (DRC), Angola, Burundi, Central African Republic, Republic of Congo, Rwanda, Tanzania, Uganda, and Zambia. Each of these country-specific estimates are reported within their own panel in Table 5. Additionally, Table 5 reports the 5th and 95th percentile from the permutation tests, described in Section 3 of the main manuscript.

Table 6 reports results from a robustness test that defines two alternative binary dependent variables. The first alternative, shown in Panel A, equals 1 if a region had greater than 5 conflict events within a given month. The second alternative, shown in Panel B, equals 1 if a region had greater than 10 conflict events within a given month.

Figure 6 shows results from permutation tests supporting the estimation strategy reported in Table 4, estimating the effect of enforcement suspension. Similar to Figure 3, in the main manuscript, each panel in Figure 6 represents a distribution of placebo estimates for each outcome variable: all types of conflict events, violence against civilians, rebel group battles, riots and protests, and deadly conflict.

Figures 7 and 8 show results from a variation of equation (2) in the main manuscript with a different time-frame. These results provide a test of the assumption that conflict in the DRC, in Figure 7, and all covered countries pooled together, in Figure 8, would have followed a trend along a path similar to other non-covered sub-Saharan African countries in the absence of the suspension of enforcement of the legislation.

Table 5: Country-Specific Effects of Dodd-Frank on Conflict

	(1) Conflict, All Types	(2) Violence Against Civilians	(3) Rebel Group Battles	(4) Riots and Protests	(5) Deadly Conflict
Panel A: Democratic Republic of Congo					
Effect of Dodd-Frank	0.143*** (0.007)	0.076*** (0.004)	0.063*** (0.002)	0.113*** (0.005)	0.068*** (0.005)
Observations	434,031	434,031	434,031	434,031	434,031
R-squared	0.141	0.098	0.084	0.125	0.074
Panel B: Angola					
Effect of Dodd-Frank	-0.031*** (0.007)	-0.011* (0.004)	-0.005* (0.002)	-0.023*** (0.005)	-0.014* (0.005)
Observations	451,620	451,629	451,620	451,620	451,620
R-squared	0.115	0.071	0.042	0.111	0.047
Panel C: Burundi					
Effect of Dodd-Frank	0.034*** (0.007)	0.033*** (0.004)	0.001 (0.002)	0.036*** (0.005)	0.005 (0.005)
Observations	450,372	450,372	450,372	450,372	450,372
R-squared	0.112	0.069	0.040	0.109	0.046
Panel D: Central African Republic					
Effect of Dodd-Frank	0.072*** (0.007)	0.060*** (0.004)	0.030*** (0.002)	0.022*** (0.005)	0.055*** (0.005)
Observations	437,580	437,580	437,580	437,580	437,580
R-squared	0.116	0.074	0.045	0.112	0.051
Panel E: Republic of Congo					
Effect of Dodd-Frank	-0.027*** (0.007)	-0.011** (0.004)	-0.005 (0.002)	-0.018*** (0.005)	-0.013** (0.005)
Observations	433,836	433,836	433,836	433,836	433,836
R-squared	0.115	0.071	0.042	0.112	0.047
Panel F: Rwanda					
Effect of Dodd-Frank	-0.003 (0.007)	0.005 (0.004)	-0.004 (0.002)	-0.012 (0.005)	-0.016** (0.005)
Observations	431,028	431,028	431,028	431,028	431,028
R-squared	0.114	0.071	0.041	0.111	0.047
Panel G: Tanzania					
Effect of Dodd-Frank	-0.022** (0.007)	-0.008 (0.004)	-0.004 (0.002)	-0.018** (0.005)	-0.010 (0.005)
Observations	454,896	454,896	454,896	454,896	454,896
R-squared	0.113	0.070	0.041	0.110	0.046
Panel H: Uganda					
Effect of Dodd-Frank	-0.035*** (0.007)	-0.016*** (0.004)	-0.028*** (0.002)	-0.007 (0.005)	-0.034*** (0.005)
Observations	452,556	452,556	452,556	452,556	452,556
R-squared	0.114	0.071	0.045	0.114	0.049
Panel I: Zambia					
Effect of Dodd-Frank	-0.005 (0.007)	0.003 (0.004)	-0.003 (0.002)	-0.006 (0.005)	-0.011 (0.005)
Observations	437,892	437,892	437,892	437,892	437,892
R-squared	0.113	0.070	0.041	0.109	0.047
Placebo tests (other countries)					
5th percentile	-0.042	-0.029	-0.010	-0.028	-0.020
95th percentile	0.080	0.026	0.015	0.041	0.047
Geographic and time FEs	Yes	Yes	Yes	Yes	Yes

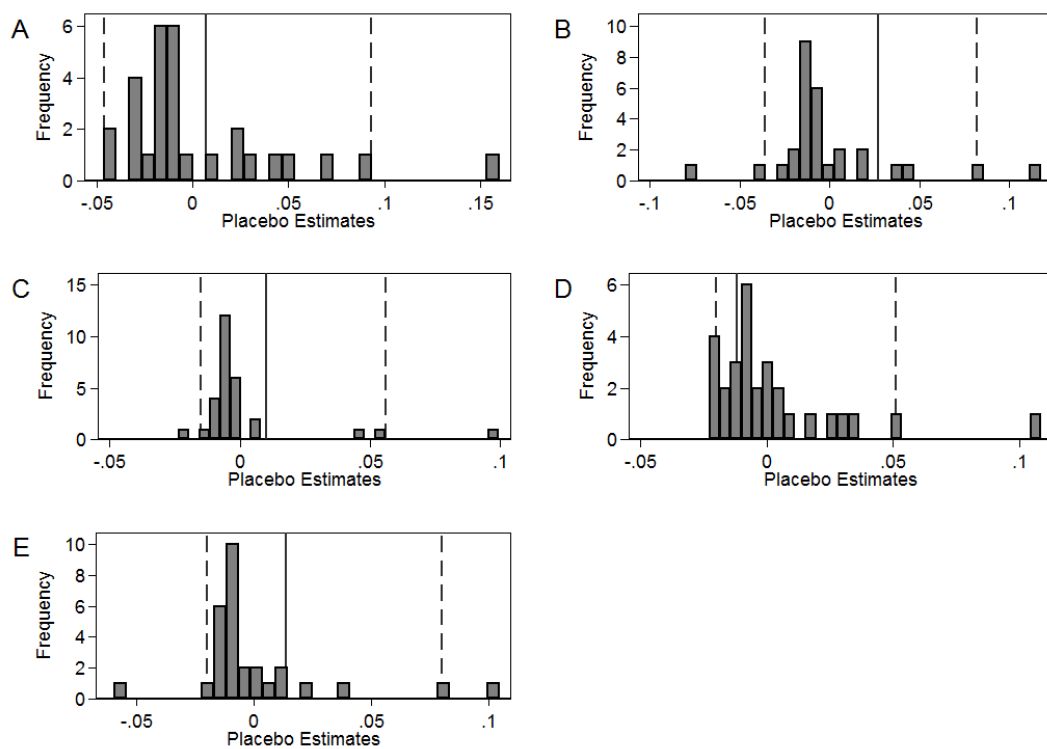
Notes: The dependent variable is a binary variable indicating the existence of a conflict event at the 2nd sub-national administrative area within a given month. Standard errors clustered at the country level are in parentheses. Bonferroni adjusted p-values are noted as follows *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Effect of the Dodd-Frank Act, Alternative Dependent Variable Definitions and DRC Only

	(1) Conflict, All Types	(2) Violence Against Civilians	(3) Rebel Group Battles	(4) Riots and Protests	(5) Deadly Conflict
Panel A: DV = 1 if > 5 Conflict Events					
Effect of Dodd-Frank	0.039*** (0.002)	0.017*** (0.000)	0.009*** (0.000)	0.013*** (0.001)	0.019*** (0.003)
Observations	433,992	433,992	433,992	433,992	433,992
Baseline DRC mean	0.030	0.009	0.015	0.001	0.049
Geographic and time FEs	Yes	Yes	Yes	Yes	Yes
R-squared	0.132	0.117	0.070	0.067	0.059
Panel B: DV = 1 if > 10 Conflict Events					
Effect of Dodd-Frank	0.019*** (0.001)	0.005*** (0.000)	0.003*** (0.000)	0.002*** (0.001)	0.013*** (0.002)
Observations	433,992	433,992	433,992	433,992	433,992
Baseline DRC mean	0.014	0.003	0.007	0.000	0.035
Geographic and time FEs	Yes	Yes	Yes	Yes	Yes
R-squared	0.085	0.048	0.047	0.040	0.049

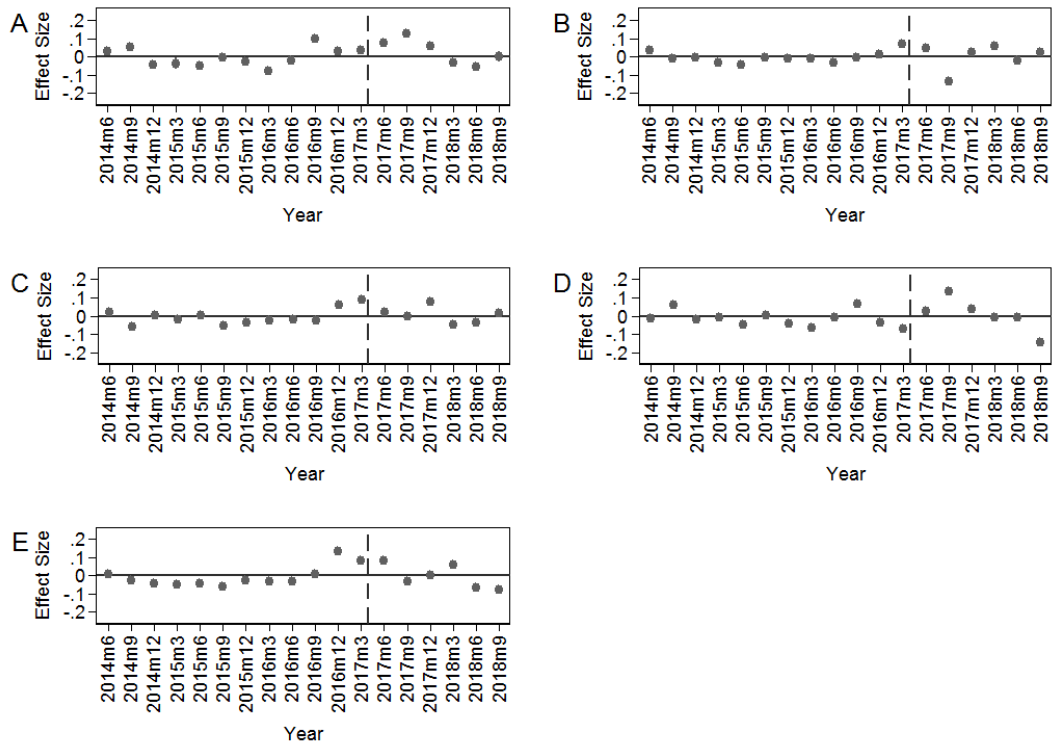
Notes: The dependent variable is a binary variable indicating the existence of either more than 5 or ten conflict events at the second sub-national administrative area within a given month. Standard errors clustered at the country level are in parentheses. Bonferroni adjusted p-values are noted as follows *** p<0.01, ** p<0.05, * p<0.1.

Figure 6: Placebo Estimates from Permutation Tests, Enforcement Suspension and DRC Only



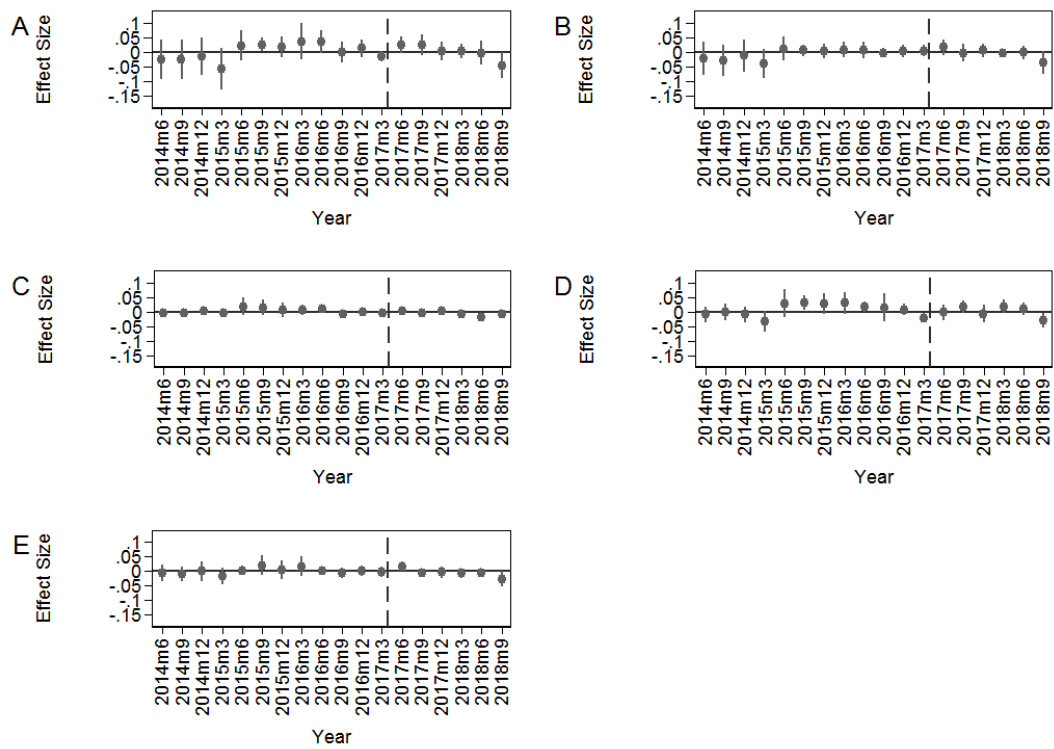
Notes: This figure shows country effects estimated from placebo permutation tests for each column in Table 4. Each panel refers to a placebo test for each of the five outcome variables. Panel A refers to all conflict. Panel B refers to violence against civilians. Panel C refers to rebel group battles. Panel D refers to riots and protests. Panel E refers to deadly conflict. In each graph, the solid line represents the point estimate when the DRC is “treated”. The dashed lines represent the 5th and 95th percentiles.

Figure 7: Year Specific Effect Sizes, Enforcement Suspension and DRC Only



Notes: Each panel refers to each of the five outcome variables. Panel A refers to all conflict. Panel B refers to violence against civilians. Panel C refers to rebel group battles. Panel D refers to riots and protests. Panel E refers to deadly conflict. In each graph, the dashed line represents when enforcement of the legislation was suspended by the US SEC.

Figure 8: Year Specific Effect Sizes, Enforcement Suspension and All Covered Countries



Notes: Each panel refers to each of the five outcome variables. Panel A refers to all conflict. Panel B refers to violence against civilians. Panel C refers to rebel group battles. Panel D refers to riots and protests. Panel E refers to deadly conflict. In each graph, the dashed line represents when enforcement of the legislation was suspended by the US SEC.

Supplemental Appendix B: Synthetic Control Estimation

An alternative method of analysis to estimate the causal effect of the Dodd-Frank Act is synthetic control analysis. Since the synthetic control approach is a generalization of the difference-in-differences estimation strategy it is well suited to serve as a robustness test for the core results in this paper. Unlike the difference-in-differences approach, however, synthetic control analysis uses a subset of comparison countries. Specifically the synthetic control is a convex combination of administrative areas from comparison countries that best match the pre-intervention trend in conflict within the DRC. Therefore, if there is any concern that non-covered sub-Saharan African countries do not form a valid comparison group, this method should address the associated issues.

I follow Abadie et al. (2010; 2015) and use techniques designed to rigorously inform causal inference with synthetic control estimation. The synthetic control method selects the optimal weights, for each of the administrative areas of comparison countries which make up the donor pool, that minimizes the root mean squared prediction error (RMSPE) prior to the treatment period. These weights are then applied to the comparison countries after the treatment, and used to estimate effects and inform causal inference. In the following exercise, I take the trends in each conflict category—for the DRC and other non-covered sub-Saharan African countries—and calculate an 11 month moving average across months. This procedure limits the volatility in the probability of conflict within a given month and helps the synthetic control method more accurately match the pre-treatment trends in each conflict category in the DRC.

Next I perform a placebo test that reassigns the treatment status from the DRC to a country within the set of comparison countries (e.g., the donor pool). This test is similar to the variant of Fisher’s (1935) permutation test discussed above and creates a distribution of placebo effects against which to compare the effect estimate for the DRC. In particular, I compare the ratio of the post-Dodd-Frank Act RMSPE and the pre-Dodd-Frank Act RMSPE. The RMSPE is a measure of the magnitude of the gap in prevalence of conflict between each country and its synthetic comparison. As noted by Abadie et al. (2015) a relatively large post-intervention RMSPE does not necessarily indicate a relatively large effect of the intervention if the pre-intervention RMSPE is also relatively large. This leads to the rationale for using the ratio of the post-Dodd-Frank Act RMSPE and the pre-Dodd-Frank Act RMSPE. A relatively large ratio indicates that the post-Dodd-Frank Act RMSPE is large compared to the pre-Dodd-Frank Act RMSPE.

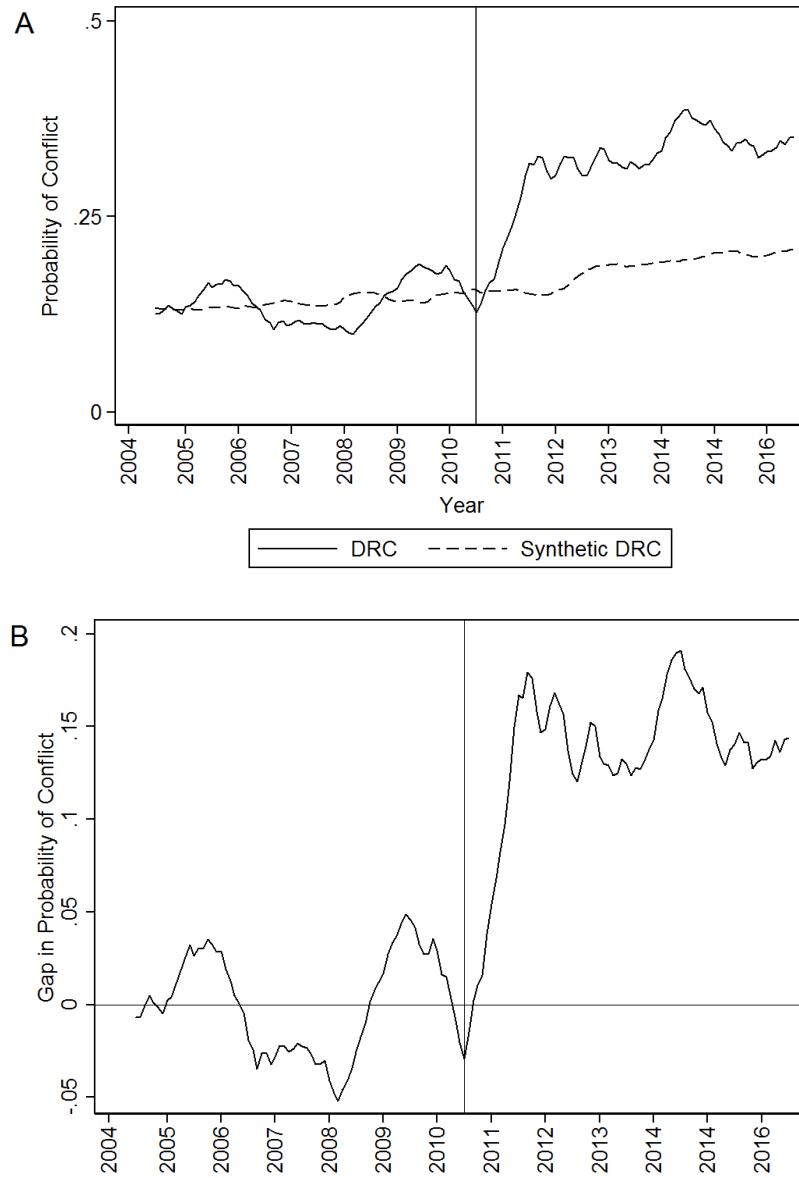
Panel A in Figure 9 shows the synthetic DRC trend before and after the passage of the Dodd-Frank Act and compares this trend to the actual probability of conflict within the DRC. Panel B

in Figure 9 shows the gap between these two trends over time. Taken together these two figures illustrate the dramatic increase in the prevalence of conflict within the DRC after the passage of the Dodd-Frank Act. Specifically, the synthetic control estimation method finds that the passage of the Dodd-Frank Act resulted in an increase in the probability of conflict at the second sub-national administrative region within the DRC of roughly 93 percent. This is only slightly smaller than the difference-in-difference effect estimate of 102 percent increase. Next, I apply the synthetic control method to all 29 other sub-Saharan African countries not covered by the Dodd-Frank Act. The DRC has the sixth highest ratio of post-Dodd-Frank Act RMSPE to pre-Dodd-Frank Act RMSPE.

The results are much more ambiguous for the various disaggregated types of conflict, and are reported in Figures 10 through 13. Panel A in Figure 10 shows the synthetic DRC trend in violence against civilians compared with the actual DRC trend, and Panel B shows the gap in these trends over time. The synthetic control estimate finds a 96 percent increase in the probability of violence against civilians at the second sub-national administrative region within the DRC. Difference-in-differences estimates, shown in Table 2, report a 90 percent increase in the probability of violence against civilians. Similar to the results for all types of conflict pooled together, effect estimates from these two procedures are very similar. However, the DRC is ranked 16th out of 30 in terms of the ratio of post-Dodd-Frank Act RMSPE to pre-Dodd-Frank Act RMSPE.

The results for the rebel group battles, riots and protests, and deadly conflict are much less robust. Figure 11 illustrates the synthetic control estimates for rebel group battles. The synthetic control estimate reports a 135 percent increase in the probability of rebel group battles. This estimate is almost twice the size of the difference-in-difference estimate of 76 percent, reported in Table 2. This discrepancy is likely caused by a high amount of variability in the rebel group battles outcome variable. Moreover, the DRC is ranked 19th out of 30 in terms of the pre-post RMSPE ratio. Figure 12 reports the synthetic control estimates for riots and protests, and finds a 166 percent increase in the probability of these events. This compares to a larger difference-in-differences estimate of a 226 percent increase. Additionally, the pre-post RMSPE ratio for the DRC is ranked 5th out of 30. In this case, given the relatively high RMSPE ratio, the synthetic estimate is likely a more accurate estimate of the true effect. Finally, Figure 13 shows the synthetic control estimates for deadly conflict. In this case, the synthetic control method most poorly fits the data. In fact, the pre-post RMSPE ratio for the DRC is ranked last when deadly conflict is the outcome variable. Nevertheless the synthetic control effect estimate suggests a 33 percent increase in the probability of deadly conflict. This is quite a bit smaller in magnitude from the

Figure 9: Synthetic Control, All Conflict Types

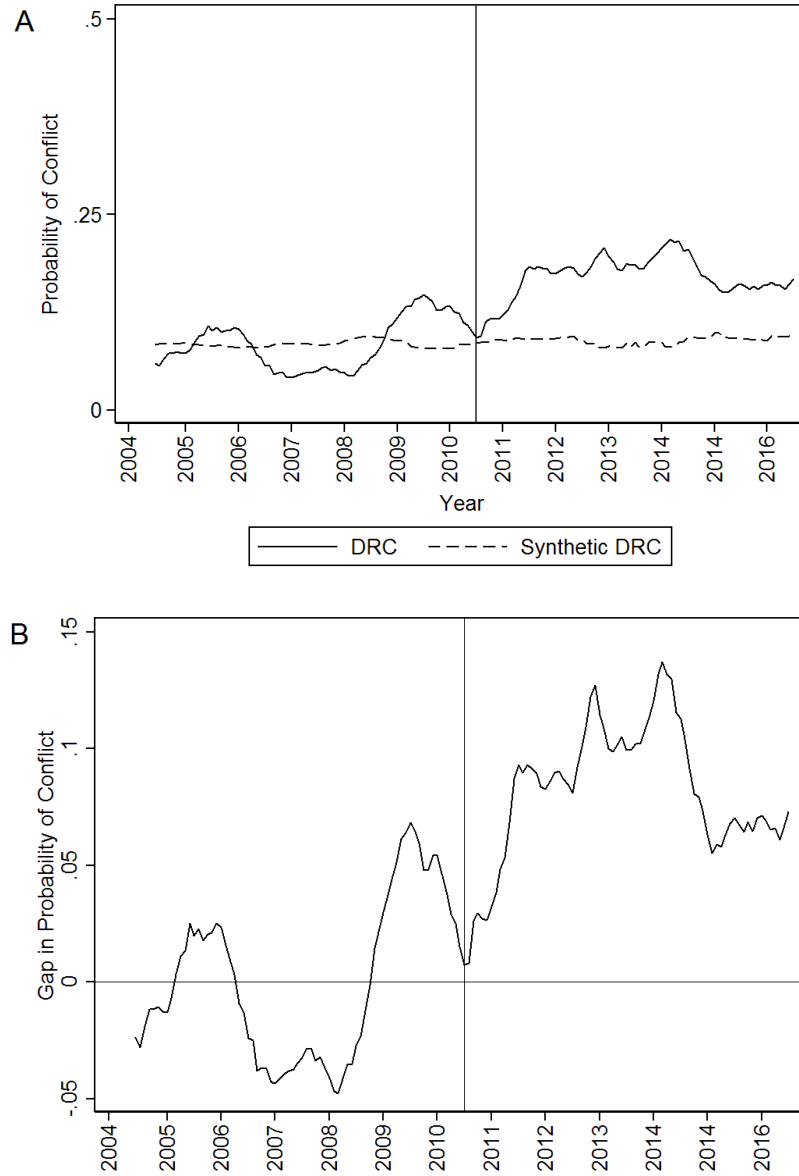


Notes: Panel A shows results of trends in the probability of conflict, within the DRC and the synthetic DRC, at the second sub-national level within each month from 2004 through 2016. Panel B shows the gap in the probability of conflict at the second sub-national level within each month from 2004 through 2016 between the DRC and the synthetic DRC.

difference-in-difference estimate of a 94 percent increase in the probability of deadly conflict.

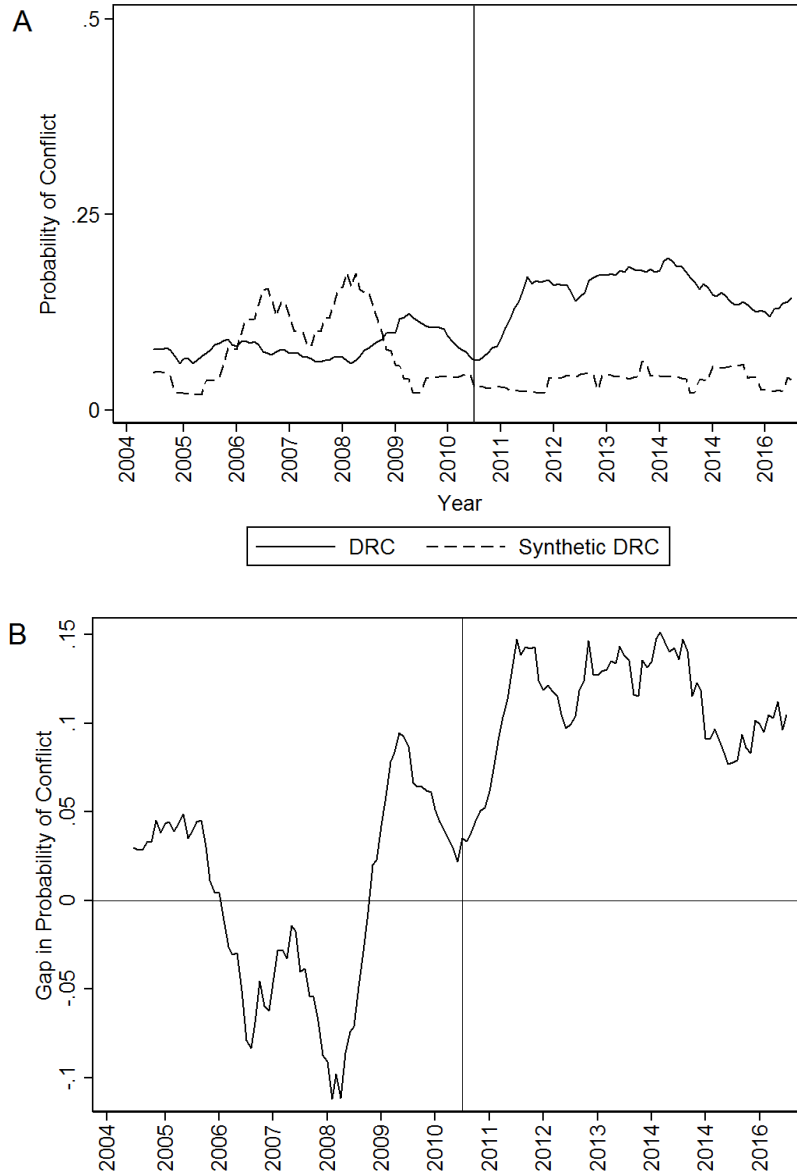
These synthetic control estimates provide a useful robustness check on the primary results reported in this paper. Using a different estimation methodology the effect estimate on all types of conflict pooled together is relatively robust. When looking at specific types of conflict, the effect sizes differ slightly in the case of violence against civilians, and largely in other cases of rebel group battles, riots and protests, and deadly conflict. Nevertheless, the core qualitative result holds between the two estimation strategies. There seems to be a dramatic increase in the prevalence of conflict within the DRC, relative to the prevalence of conflict in comparison countries, after the passage of the Dodd-Frank Act.

Figure 10: Synthetic Control, Violence Against Civilians



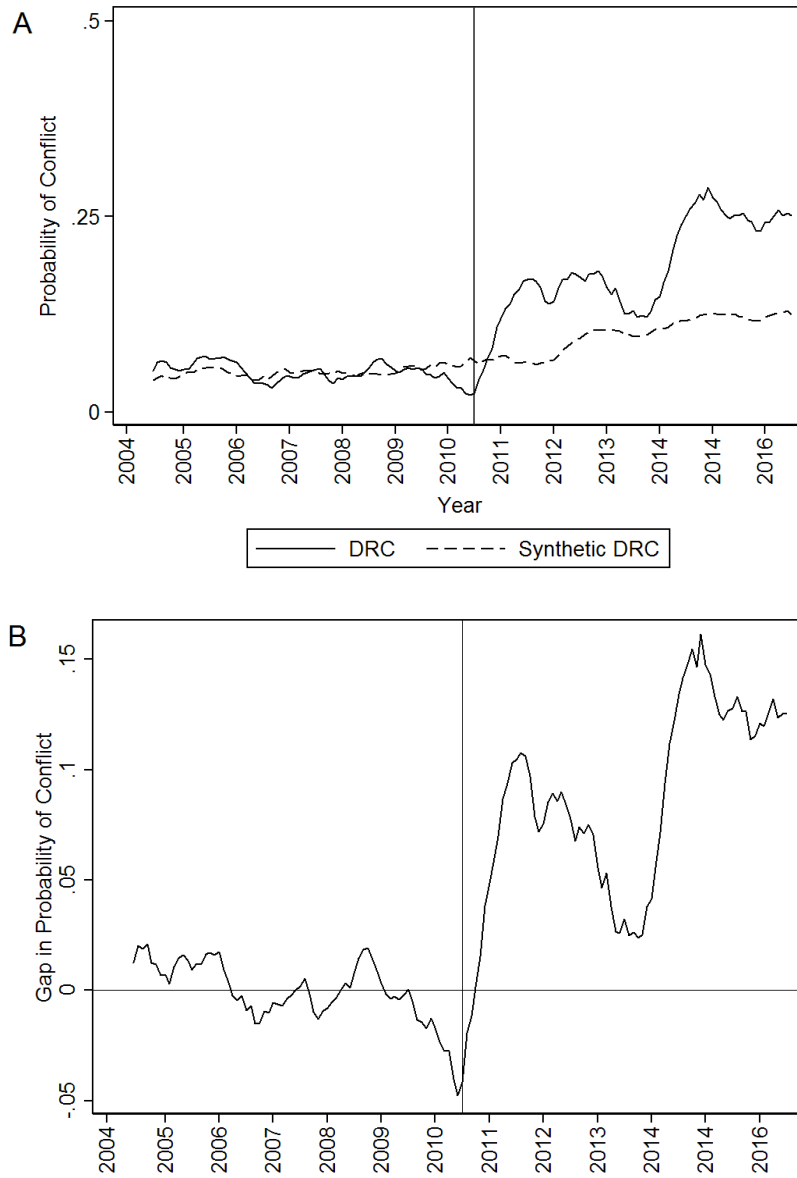
Notes: Panel A shows results of trends in the probability of conflict, within the DRC and the synthetic DRC, at the second sub-national level within each month from 2004 through 2016. Panel B shows the gap in the probability of conflict at the second sub-national level within each month from 2004 through 2016 between the DRC and the synthetic DRC.

Figure 11: Synthetic Control, Rebel Group Battles



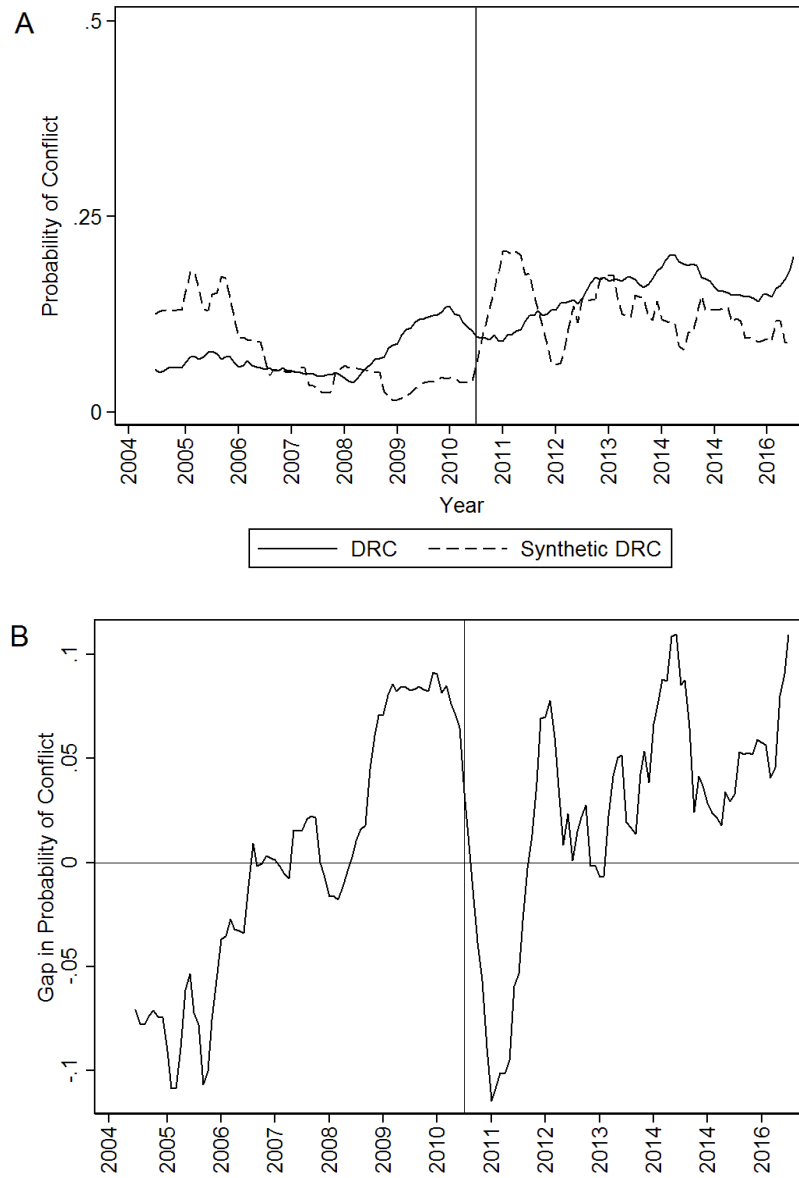
Notes: Panel A shows results of trends in the probability of conflict, within the DRC and the synthetic DRC, at the second sub-national level within each month from 2004 through 2016. Panel B shows the gap in the probability of conflict at the second sub-national level within each month from 2004 through 2016 between the DRC and the synthetic DRC.

Figure 12: Synthetic Control, Riots and Protests



Notes: Panel A shows results of trends in the probability of conflict, within the DRC and the synthetic DRC, at the second sub-national level within each month from 2004 through 2016. Panel B shows the gap in the probability of conflict at the second sub-national level within each month from 2004 through 2016 between the DRC and the synthetic DRC.

Figure 13: Synthetic Control, Deadly Conflict



Notes: Panel A shows results of trends in the probability of conflict, within the DRC and the synthetic DRC, at the second sub-national level within each month from 2004 through 2016. Panel B shows the gap in the probability of conflict at the second sub-national level within each month from 2004 through 2016 between the DRC and the synthetic DRC.