

**No Blood in my Mobile:
Regulating Foreign
Suppliers**

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Ninon Moreau-Kastler

EU Tax Observatory

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Ninon Moreau-Kastler

EU Tax Observatory, Paris School of Economics

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Abstract

Can developed countries ensure that the goods they consume are not linked to human rights violations in the developing countries where they are produced? I study the U.S. Dodd-Frank Act Conflict Mineral Rule (2010), a due diligence policy limiting the use of conflict minerals extracted in the Democratic Republic of Congo (DRC) and adjoining countries in the supply chains of U.S. downstream electronic firms. The law increased the administrative costs of complying firms by 4.2%, showing that substantial regulatory constraints were created. I show that these firm-level adjustments changed global exports of minerals: exports of conflict minerals from DRC and its neighbours decreased by 76.5%. Around one-fifth of this change comes from circumvention through legal havens, which then re-export more intensively where foreign suppliers of U.S. firms are located.

JEL codes: F14, F63, F59, K33, O13, O24

Keywords: trade diversion; legal haven; due diligence; minerals; supply chains.

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1 Introduction

Can developed countries ensure that the goods they consume are not linked to human rights violations in the developing countries where they are produced? In 2017, around half of the world’s tantalum was extracted from Africa’s Great Lakes Region, where armed groups are present at up to 60% of mining sites (USGS, 2017; Weyns et al., 2015). As a result, suppliers of multinational companies, such as Apple and Bayer have been found to use inputs made of tantalum sustaining violence around extraction sites (United Nations, 2002; Global Witness, 2022). Concerns over harmful production practices are not limited to the mining sector: similar issues have been documented in the garment industry and in timber extraction for example.¹

Enforcing regulations on production processes within international supply chains remains difficult in practice. When a destination country seeks to regulate processes taking place abroad, it must rely on extraterritorial rules: exerting influence outside of its jurisdiction through economic linkages. Recently, such rules developed through *due diligence policies*.² In source countries, both governments and firms may lack the capacity or incentives to regulate production processes effectively. Where state capacity is weak, exporters face strong incentives to evade compliance, particularly when the costs of meeting international standards are high. Circumvention opportunities arise through jurisdictions taking advantage of these legal discontinuities, so-called *legal havens*: third-country that, as noted by Lemaître (2019), offer “advantages to hide illicit activity and exemptions from legal obligations linked to economic activities”.

This paper provides evidence on the effectiveness of regulating foreign sourcing in curbing demand for harmful production practices, using the U.S. Dodd–Frank Act Conflict Mineral Rule—the world’s first mandatory supply-chain due diligence policy. The 2010 rule required 1,621 large U.S. firms, representing over \$9 trillion in annual sales, to publicly verify that three specific metals—tantalum, tin and tungsten—used in their produc-

¹See the Rana Plaza Collapse <https://www.nytimes.com/2013/04/25/world/asia/bangladesh-building-collapse.html>, or illegal wood trade from Amazon deforestation <https://us.eia.org/press-releases/20210927-us-company-pleads-guilty-to-importing-illegal-timber-from-peru/>.

²Requirements to hold accountable foreign suppliers. Adopted by: USA in 2010, France in 2017, the EU in 2017 and 2024, Germany in 2024. There are at least 10 other active due diligence laws, and as many still under discussion.

tion processes did not contribute to violence in Democratic Republic of Congo (DRC) and neighboring countries. The rule introduced a light, unilateral extraterritorial constraint—*name and shame* on foreign sourcing, for big firms in a granular and large downstream market. In this paper, I show that regulating foreign suppliers triggered adjustments from U.S. firms: their sales decreased and compliance costs increased, particularly for firms with higher risk of conflict-mineral sourcing. Then, I show that micro responses from these firms created large macro changes in global demand for conflict minerals. Trade flows of tantalum, tin and tungsten from the DRC and neighboring countries fell sharply, with demand redirected toward alternative producers—demonstrating global compliance. Yet a sizable share of conflict minerals found an alternative route to global markets through opaque legal havens, motivated by arbitrages between lower local mineral prices and high world market prices.

The first part of the paper studies the reaction of regulated firm. The rule introduces new filing obligations for the largest U.S. firms filing to the Security Exchange Commission, concentrated in the electronic, measurement and machinery sectors. Firms are constrained to disclose information on their metal suppliers. Using a difference-in-difference strategy, I compare the dynamic of sales and costs of regulated firms, to other non-regulated firms within the same industrial sector. I find that regulated firms face a decline in global sales by 3%. Administrative costs change when firms start complying: an increase by 4.2% of cost per dollar earned, amounting to around 30,120 USD per year, for an average firm. From the firms filings, I build novel data on U.S. firm metal supplier linkages across the world. Interestingly, compliance cost is mostly borne by firms filing extensive reports, and with larger supplier networks, and operating in upstream sectors. I find that the price of some metal downstream products increase at the U.S. border, potentially turning to higher production costs.

In the second part of the paper, I turn to the changes in global mineral trade generated by this unilateral policy. The Dodd-Frank Act Conflict Mineral Rule targets specific metals and their ore (minerals): tin, tantalum and tungsten (hereafter 3T) from DRC and neighbouring countries. This design enables me to properly identify the response of trade flows and firms to the Dodd-Frank Act: it naturally yields other minerals' as a relevant

control group, leveraging the absence of substitutability between them. Only some producers countries of 3T fall are regulated, creating an ideal set-up for a triple difference strategy. I use the structural gravity framework to estimate the change in 3T global trade. By using bilateral trade data from BACI, I can observe global exports at a disaggregated product level in one of the least developed regions in the world. I find that the Dodd-Frank Act introduced substantial trade costs for regulated countries. 3T exports from the DRC and adjoining countries to the rest of the world decreased by 76.5%, equivalent to a 25% increase in tariffs on 3T products. Global demand is partly diverted to other producers of the same minerals: their exports increase by 22%.

To study regulation avoidance, I use a new classification of legal havens developed in a previous paper ([Moreau-Kastler, 2025](#)). The law raises the cost of sourcing conflict minerals for suppliers of U.S. firms, through the threat of reputational damage (*name and shame*), trade disruption, or potential U.S. retaliation. These costs are partly offset by the legal opacity provided by legal havens, which reduce available information on who buys and sells minerals from covered countries. This in turn reduces the ability of NGOs and civil society actors to challenge public information from firms filing and act as de facto enforcers of the law ([Eilstrup-Sangiovanni and Sharman, 2022](#)). Empirically, I verify that legal havens mitigate new trade costs from due diligence. Diversion is particularly pronounced when rules are strongly enforced, for exporters closer to the most violent region of Kivus. Making use of the general equilibrium of structural gravity, I find that 18% of the drop in 3T exports is due to regulation avoidance through legal havens. Finally, I find that legal havens re-export more 3T to countries hosting metal suppliers of the US-regulated firms. I show that this effect is not driven by other institutional factors, such as countries' control of corruption or being a tax haven. Findings are also robust to testing for leads and lags, placebo products, using sensitivity to the list of legal havens, or alternative specifications.

Finally, I assess which countries loose or gain from the trade reallocation created by the Dodd-Frank Act Conflict Mineral Rule. First, Democratic Republic of the Congo and adjoining countries face a large income shock, and local 3T prices drop by 16.45%. Regulation avoidance through legal havens mitigates this effect: 2.5 percentage points less than

if all importers complied. I discuss how this change might have translated in local welfare changes. Whether trade diversion through legal havens prevent the rule from reducing violence depends on the local distribution of this change in income. Legal havens still provide market access for conflict minerals and partially offset the drop in income for rebel groups that the law intended to cause. But local household living off artisanal mining could also suffer from reduced access to international markets. Finally, legal havens derive a rent from regulation avoidance, rationalizing their existence. I show they import 3T at lower prices from the regulated countries, without having to pay new trade costs caused by due diligence.

Related literature. This paper relates to several strands of the literature. First, the extent to international trade can be used to enforce rules abroad remains an open question ([Atkin et al., 2022](#)), and the regulation of international production processes is growing in response to demands in developed countries. For large trading firms, the salience of global production norms matters ([Harrison and Scorse, 2010](#)). Following sourcing scandals, importers often doubt the capacity of their partners to comply with these norms and reduce demand ([Bai et al., 2021](#); [Koenig and Poncet, 2022](#)). The literature on responsible sourcing mainly focuses on implementation of voluntary initiative to influence affiliates or suppliers abroad ([Podhorsky, 2013](#); [Boudreau, 2024](#); [Alfaro-Ureña et al., 2025](#)). Outside of economics, there is a developing literature in law, international relations and management on due diligence policies ([Berger-Walliser and Scott, 2018](#); [Berning and Sotirov, 2023](#); [Reinsberg and Steinert, 2025](#)) and the Dodd-Frank Act Conflict Mineral Rule more particularly ([Sarfaty, 2015](#); [Dalla Via and Perego, 2018](#); [Baik et al., 2021](#)). My paper is the first to evaluate the effects of due diligence policies on firms costs and trade reallocation, and is the first to show how the Dodd Frank Act changed targeted source countries' ability to export 3T. I provide the first estimates of internal compliance costs paid by firms, and show that these costs are manageable and depend on risk factors. I show that due diligence policies have great compliance potential: the Dodd-Frank Act Conflict Mineral Rule changed sourcing decisions for all trade partners of regulated countries. I discuss the conditions

under which trade reallocation changes local welfare.³

Second, this paper contributes to the developing literature on extraterritorial economic policies, and the condition of market access on foreign conduct. New instruments acting through trade flows seek to address global externalities, such as due diligence policies or carbon taxes at the border, seeking to condition foreign sourcing (Antras et al., 2017; Coster et al., 2024). Negotiated trade barriers are also increasingly supplemented by rules on foreign production processes, such as rule of origins or mirror clauses, changing sourcing choices (Conconi et al., 2018), or associated to other policy objectives (Borchert et al., 2021). This paper shows to what extent a large economy like the United States can use its economic linkages with the rest of the world to induce compliance of foreign private actors with sourcing standards. The effect of the Dodd-Frank Act on trade is close to a complete trade sanctions (Haidar, 2017; Corsetti et al., 2024; Felbermayr et al., 2025). Finally, policy objectives can be undermined by illicit trade and regulation avoidance (Fisman and Wei, 2004; Rotunno et al., 2013; Vézina, 2015; Tyazhelnikov and Romalis, 2024; Che et al., 2025). My paper is the first to show that the enforcement extraterritorial sourcing rules is challenged by legal havens, which is crucial to take into account in future designs of due diligence.⁴

Finally, I contribute to the developing literature on the control and access to mineral and metal inputs (Fally and Sayre, 2018; Amiti et al., 2019; OECD, 2024; Boer et al., 2024). This is the first paper to map supply links from metal refiners to downstream firms. It shows how unilateral change in downstream demand reallocates global mineral trade.

Outline. The rest of the paper is organized as follows. Section 2 discusses the institutional context of the Dodd-Frank Act Conflict Mineral Rule and the reactions it generated. Section 3 presents data and results at the firm level: the adjustment of regulated U.S. firms to due diligence. Section 4 details macro data and results: the empirical strategy built within the structural gravity framework, results on partial equilibrium adjustment, and

³Especially as a few papers provide evidence that the rule actually increased the level of violence (Parker and Vadheim, 2017; Stoop et al., 2018; Bloem, 2023).

⁴More generally, a literature in public economics shows that different types of "haven" jurisdictions can challenge international transparency and taxation regulations (Andersen et al., 2017, 2022; Johannesen and Zucman, 2014; Kavakli et al., 2023; Omartian, 2017; Vuillemeay, 2020).

general equilibrium changes. Section 5 concludes.

2 Dodd Frank Act Conflict Mineral Rule: Context

2.1 Section 1502 of Dodd-Frank Act

In 2010, the Dodd-Frank Act Section 1502 introduced the *Conflict Mineral Rule*. This rule implements new filing obligations to the Security Exchange Commission (hereafter the SEC) for U.S. firms sourcing minerals in Central Africa's Great Lakes Region. It regulates the use of tantalum, tungsten and tin (3T) and their minerals, to make sure that their extraction does not finance rebel groups in DRC. This law was motivated by civil society initiatives in the United States, such as the Enough Project, asking to increase accountability of downstream sectors for potential conflicts in Subsaharan Africa linked to their inputs. All 3T are used in specific industrial production technologies and are hardly substitutable inputs. Tantalum is used small-size capacitors, tin in many consumer goods, like ballons and tin cans, and tungsten is used as a component of light bulbs, electrodes, or machinery.

Firms required to comply with the rule are those filing to the SEC: typically large firms listed on US stock exchanges, but also smaller companies and some foreign issuers. These firms represent a large share of US sales and profits ([Asker et al., 2015](#)). Companies are subject to the rule if the products they manufacture, or subcontract to, contains 3T. If so, they should determine if the minerals' country of origin could be DRC or an adjoining country. If there is reseanable doubt that it could be the case, firm conduct enhanced due diligence on smelters/refiners, and describe their policies preventing to indirectly finance rebel groups through 3T. Conclusions are publicly disclosed in a Conflict Mineral Report (CMR), which is certified by an independent third-party audit.

Enforcement relies on a *name-and-shame* mechanism to discourage U.S. firms and their suppliers from sourcing conflict minerals. Firms can be sanctioned for failing to conduct due diligence in good faith ([Sarfaty, 2015](#)) or for providing false information under SEC rules, equivalent to misreporting financial statements. However, the law itself does not

impose direct penalties for sourcing conflict minerals. Instead, enforcement is largely delegated to civil-society actors, such as NGOs ([Eilstrup-Sangiovanni and Sharman, 2022](#)), which monitor sourcing practices and hold companies publicly accountable.⁵ The rule also aims to induce compliance among foreign suppliers by requiring firms to disclose information across their entire supply chain.⁶ The SEC estimated that the initial cost of compliance for regulated firms ranged from USD 3–4 billion in total, with annual updates costing an average of USD 34,000–101,000 per firm ([SEC, 2012](#)). These costs include collecting and verifying supply-chain data and paying third-party auditors.

Compliance incentives are further reinforced by the risk of legal penalties. In 2014, the Obama administration introduced secondary sanctions targeting direct or indirect support to armed groups through the illicit trade of natural resources in the DRC. Although these sanctions apply to all natural resources, they interact with increased transparency only for 3T, due to the Conflict Minerals Rule.

The bill was signed in July 2010, which started a period of high uncertainty for firms and local exporters, before rules were published in late 2012, and gradually implemented from 2013 to 2015. The Trump administration repealed mandatory reporting in 2017, after which firms could choose to keep complying. There was no other similar regulation before 2017, at which time the European Union signed its own Conflict Mineral Directive.

2.2 Covered countries: the Great Lakes region

The Dodd–Frank Act designates ten *covered countries*: the Democratic Republic of the Congo (DRC), Rwanda, Burundi, Angola, the Republic of the Congo, the Central African Republic, South Sudan, Tanzania, Uganda, and Zambia. Comparable in size to Western Europe, this region is rich in mineral resources—producing at least 14 different minerals—and the extractive sector accounts for 10–20% of GDP ([USGS, 2010](#)). The area is a major source of tantalum: between 2006 and 2009, the covered countries supplied 34% of global production. It made only 3.6% of tin and 2.9% of tungsten, but at lower prices than

⁵Campaigns have been shown to be effective in changing sourcing behavior in other contexts ([Harrison and Scorse, 2010](#)).

⁶The SEC explicitly notes that the competitiveness of U.S. producers should remain unaffected, as a sufficiently broad supplier network will need to comply to maintain access to regulated firms.

other producers. Local 3T mining is predominantly artisanal, and most sites in the DRC are controlled or taxed—directly or indirectly—by armed groups (United Nations, 2002). In the Kivus region, Weyns et al. (2015) estimate that armed groups were present at 65% of mining sites between 2013 and 2015. Local actors in the DRC and neighboring countries did not anticipate the Conflict Minerals Rule before its adoption (Cuvelier et al., 2014). To prevent product relabeling and smuggling, the law extends to all countries bordering the DRC. There is almost no local mineral refining capacity: large-scale processing takes place mainly in South and East Asia, with limited refining in the United States and Europe.

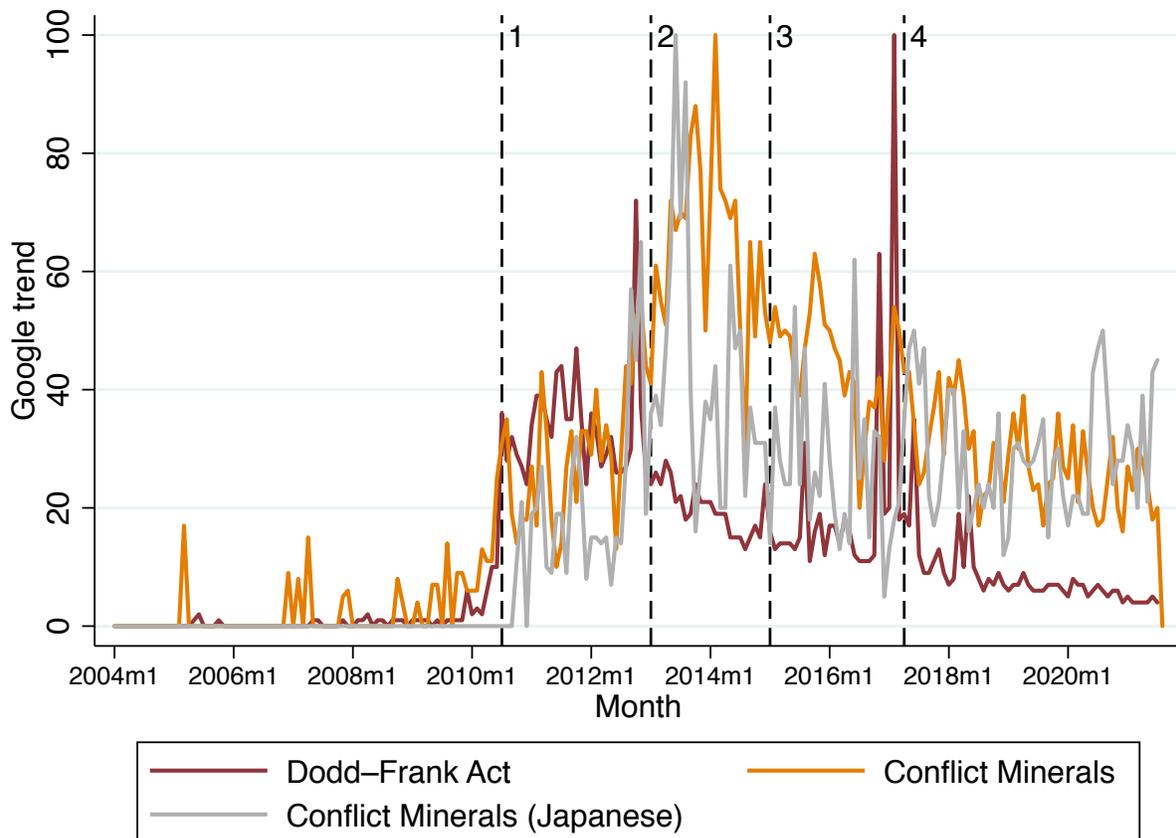
2.3 Reactions to due diligence

The Conflict Mineral Rule generated legal uncertainty on mineral trade. Firms might, knowingly or not, source conflict minerals and engage in commercial relationships with rebel groups involved with human rights violations.

Large international salience of the issue of conflict minerals in DRC and adjoining countries followed the adoption of the law. This is illustrated by Figure 1, which plots monthly worldwide Google Trend indexes for terms associated to the Dodd-Frank Act: the Dodd-Frank Act (red), and the term *conflict mineral*, a generic term to designate 3T after 2010, both in English (orange) and in Japanese (grey). Curves show each term's popularity relative to the most popular term in the period (set to 100), which is reached around implementation of the rules for terms *conflict minerals*. The two series are highly correlated with each other (0.80), as Japan is a large supplier of US regulated firms. The salience of the issue increases the risk of campaigns or consumer backlash. As conflict and conflict-free minerals are hard to distinguish in the covered countries, collective reputation is also likely to decrease foreign demand to DRC and adjoining countries (Bai et al., 2021).

Several firms and supply chains relied on *conflict-free* certifications, such as the iTSCI or the Responsible Mineral Initiatives. These private certifications tried to ensure close pipelines between conflict-free mines and certified smelters. Other firms decided to only source from non covered countries, sometimes contracting with their foreign suppliers to do so, to avoid all due diligence obligations (Dalla Via and Perego, 2018). The main

Figure 1 – Google trends in terms associated to Dodd-Frank Act



Reading: In July 2010, the term *Conflict Minerals* was searched at 40% of its maximum level, in January 2014.

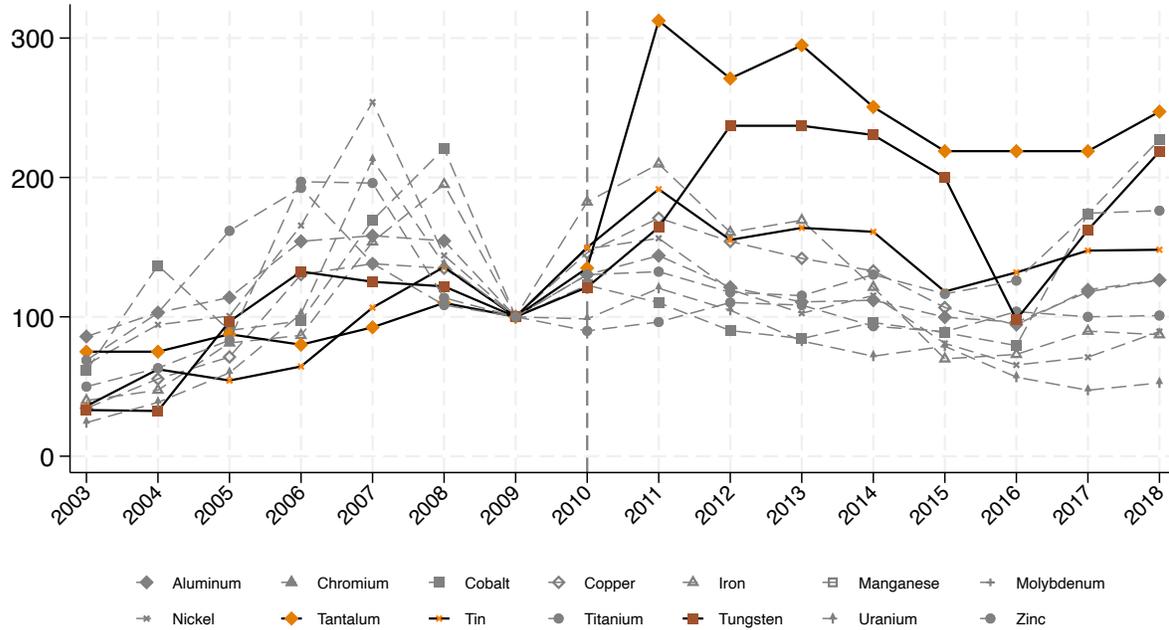
Data: Data retrieved from Google Trends.

Note: 1: Signature of the Dodd-Frank Act; 2: Partial implementation period; 3: Full application; 4: Trump administration relaxes mandatory disclosure. The Google trend denoted Dodd-Frank Act stands for the full law name "*Dodd-Frank Wall Street Reform and Consumer Protection Act*".

constraint of this embargo strategy lies in the limited availability of substitutes: minerals from other producers are typically more expensive, scarcer - especially in the case of tantalum - or of differing quality. Many local exporters in covered countries were also unable to meet the new due diligence and certification requirements: as noted by [Cuvelier et al. \(2014\)](#), the law plunged the entire region into a legal grey area. At the same time, global market adjustment to the Conflict Mineral Rule created arbitrage incentives for importers willing to avoid the rule. Figure 2 shows that after 2010, prices of tantalum and tungsten increased two to three times compared to their baseline level (see Figure A5 in [Online Appendix](#) for production volumes). In comparison, local prices of the same minerals in

covered countries largely dropped (Cuvelier et al., 2014).

Figure 2 – World metal price index



Reading: In 2011, the reference price of Tungsten reached 300% of its 2009 level.
Data: World market and reference prices from IMF, World Bank, US Geological Survey.
Note: Base 2009 indexes of corresponding metal prices.

Legal havens present several advantages exporters and importers avoiding due diligence. First, high financial secrecy creates useful opacity around international transactions of conflict minerals, especially relevant if minerals are exchanged in US dollars. Second, opaque legal vehicles, such as shell companies, can easily be set-up for intermediaries between exporters and importers. In 2013, the UN group of experts on DRC identified a conflict coltan trader called King Wood, headquartered in a letter box building in Hong-Kong, but not its beneficial owners or downstream clients. Third, lack of control of illicit flows lead to weak oversight of mineral origins. For instance, in Dubai, the recorded origin of metals corresponds to their last country of transit, creating incentives for refiners to overlook extraction conditions. Fourth, limited international legal cooperation shields entities and individuals from foreign investigations related to the conflict minerals trade. The instruments of opacity in legal havens hinder the enforcement role of actors from the civil society, by making it extremely difficult to identify firms that directly or indirectly

source from conflict mines. They also protect supply-chain actors from international pursuits, effectively countering the transparency of due-diligence requirements. Legal havens imports of conflict minerals reflect both wholesale re-exports and real economic activity. Metal smelters or refiners located in such jurisdictions can blend ores of different origins, making source identification impossible.⁷

3 Micro effects: firms and compliance

In this Section, I collect novel data on regulated firms' supply chains, and explore the micro-level adaptations of regulated firms to due diligence.

3.1 Firm level data

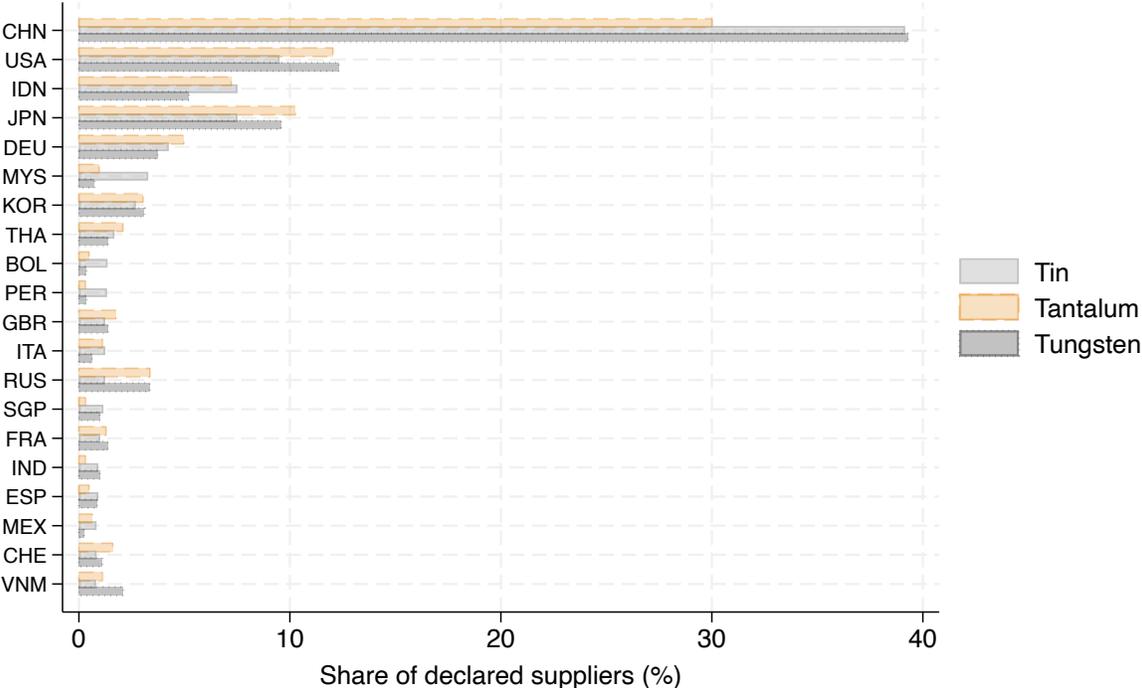
I use two sources of firm-level data: the Compustat North America database and the Form SD Exhibit 1.01 remitted by firms to the Security Exchange Commission under the Dodd-Frank Act.

Compustat provides data from consolidated income statements and balance sheets filed to the Security Exchange Commission by large firms. This is the group of firms subject to the Dodd-Frank Act if using 3T. Out of the 1,621 firms filing under the Conflict Mineral Rule, I am able to match 1,277 of them. The rest of the 4,686 firms in Compustat are comparable large public-listed firms. I observe consolidated: sales, administrative costs (selling, general and administrative expenses) and production cost (cost of goods sold) in USD millions every year. Administrative cost measures operating expenses and administration costs that are not directly related to the production of a good or a service, and reflect compliance costs of Dodd-Frank Act Conflict Mineral Rule. The cost of goods sold reflects the total input cost and reflects costs passed by suppliers. Variables are winsorized at 1%, and I restrict the sample to firms observed at least 10 years. Table [A1](#) reports

⁷Regulatory evasion may also be carried out by indirectly regulated suppliers rather than U.S.-regulated firms themselves, as supply chains often involve multiple intermediaries. For detailed case studies in legal havens, see *The Shadow of Gold* by Denis Delestrac, Robert Lang, and Sally Blake (2018); *The ITSCI Laundromat* by Global Witness (2022); *A Golden Racket: The True Source of Switzerland's "Togolese" Gold* by Public Eye (2015); and [United Nations](#) (2013).

the sectoral composition of control and treated groups, while Table A2 presents descriptive statistics for key variables in the Online Appendix. Regulated firms represent at least 9 000 billion USD global sales in 2010. They tend to be larger, more downstream, and operate in a small set of sectors (see also Figure 8).

Figure 3 – Reported metal suppliers of U.S. firms



Reading: Each bar correspond to the share of reported suppliers, between 2013 and 2017, in a country, for the corresponding metal.
Data: Collected data on metal suppliers disclosed in Conflict Mineral Reports filings by firms to the SEC (Forms SD).
Note: On this graph, Malaysia, Thailand, Bolivia, Singapore and Switzerland legal havens.

The second data source is the Form SD Exhibit 1.01 filed to the SEC under the Conflict Mineral Rule. Firms filing determine if there is a reasonable doubt that 3T could come from the covered countries, in which case firms remit a Conflict Mineral Report in Exhibit 1.01, detailing due diligence steps to ensure the legal origin of minerals. Among the 1,621 treated firms, 1,262 remit such a report and 739 provide detailed information on the name, product, location of their metal suppliers. I collect and harmonize these information for each supplier, and build a database of firm specific 3T supply chains: the network of 3T suppliers for each firm. The supplier linkages can be direct or indirect, and linkages are most of the time metal specific. The main limitation of this dataset is that it only includes

suppliers disclosed by firms after supply chains have adjusted to the Conflict Mineral Rule.

I identify 2,349 suppliers of 3T. Among them, 1,041 supply at least 10 of the regulated U.S. firms, and 88% of these substantial suppliers are located outside of the United States. In Figure 3, I chart the geography metal suppliers reported between 2013 and 2017. Each bar corresponds to the share of US suppliers located in a country for a metal. The share of metal suppliers located in the US is substantial, but not the majority: between 9 and 12% depending on the metal. The largest share of suppliers is in China: 30 to 39%. Other large countries are Indonesia, Japan and Germany.

3.2 Firm compliance

I study changes in sales and costs for regulated firms, following the Conflict Mineral Rule. I use other firms filing to the Security Exchange Commission within the same two-digit SIC sector, but not subject to the Conflict Mineral Rule, as a control group. My approach relies on a differences-in-differences strategy. The first identification assumption is that there is no anticipation of the regulatory change before 2010 by treated firms in the treated outcome. The second identification assumption is a parallel trend in outcomes, holding at the sector level: within the same sector, in the absence of the law firms would have behaved on average as the other control firms. I estimate the following specification:

$$y_{fst} = \alpha + \beta \text{Regulated}_f \times \mathbb{1}\{t \geq \text{July2010}\} + \nu X_{ft} + \mu_f + \mu_{st} + \varepsilon_{fst} \quad (1)$$

With y_{fst} the logarithmic transformation of consolidated sales, production, or administrative costs. Subscripts f correspond to firms, s to sectors defined by a 2-digit SIC codes, and t to years. The coefficient β captures the approximate average percent change in y_{fst} attributable to the Conflict Mineral Rule. Two way fixed effects for individual firms (μ_f) and sector-time (μ_{st}) account for the difference-in-difference structure, with the sectoral parallel trend. Additionally, I include firm-time varying controls X_{ft} : the logarithm of firm assets and the logarithm of firm employees.

A drop in sales and production could affect total costs negatively through production volume changes. Ideally, one would rather observe average unit cost than total cost, be-

cause the latter could also reflect changes in the volume of production. Computing unit cost $AC(Q) = \frac{C(Q)}{Q}$ requires data on production volumes, which is unavailable and would be challenging to compute for multiproduct firms. I normalize total administrative and production costs by the value of total sales, which measures $AC(Q) \times P$ and is the best available approximation of unit costs.⁸ In [Online Appendix](#), I also provide results without normalization. I estimate the model with OLS, standard errors are clustered at the firm level.

Table 1 – Differences-in-differences: filing firms

Dep. variable (log):	Baseline			By CMR status		
	Sales (value)	Prod. cost (over sales)	Admin. cost (over sales)	Sales (value)	Prod. cost (over sales)	Admin. cost (over sales)
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Regulated_f</i>	-0.031**	-0.012	0.041***			
× $\mathbb{1}_{\{t \geq \text{July 2010}\}}$	(0.014)	(0.010)	(0.015)			
× No CMR _f				-0.047**	0.000	0.026
				(0.020)	(0.013)	(0.023)
× CMR _f				-0.026*	-0.015	0.046***
				(0.015)	(0.010)	(0.016)
Assets _f (log)	0.308***	0.011	-0.037***	0.308***	0.011	-0.037***
	(0.015)	(0.008)	(0.012)	(0.015)	(0.008)	(0.012)
Employees _f (log)	0.573***	0.014*	-0.127***	0.573***	0.015*	-0.127***
	(0.018)	(0.008)	(0.014)	(0.018)	(0.008)	(0.014)
FE	<i>f, st</i>					
Observations	57,743	57,743	57,743	57,743	57,743	57,743
R-squared	0.983	0.780	0.882	0.983	0.780	0.882
Number of firms	4,182	4,182	4,182	4,182	4,182	4,182

Note: Sample includes firms with at least 10 observations (2000–2018). Standard errors clustered at the firm level. CMR stands for a firm filing a Conflict Mineral Report due to suspected 3T sourcing from DRC(+9).

Results are displayed in Table 1. Columns (1), (2) and (3) estimate the baseline model. In column (1), compared to firms in the same sector, treated firms' sales value decreases by 3.05% once the law is signed.⁹ The effect is statistically significant at the 5% level. The results is not straightforward as it reflects a drop in global consolidated sales, not only in the United States. Coefficients associated with assets and employees and positive and

⁸Sectoral fixed effects will partially alleviate the producer price changes at the sectoral level.

⁹ $\exp(-0.031) - 1 = -0.0305$

statistically significant, reflecting that larger firms sell more. Column (2) estimates the effect of the law on dollars spent on scaled input cost. Compared to non-treated firms in the same sector, the production cost change is not statistically different from zero, even though the coefficient is negative. Column (3) estimates the change in administrative cost compared to the treated group: scaled administrative cost increases by 4.2%.¹⁰ Coefficients associated with assets and employees are negative for administrative costs, reflecting the fact that larger firms are more efficient.

Columns (4), (5) and (6) explore heterogeneity, splitting the effect between firms declaring with certainty that no 3T in their supply chain comes from the African Great Lakes Region, and firms not able to prove it and required to thoroughly implement due diligence in their Conflict Mineral Report. Interestingly, firms not filing a CMR seem to face a slightly bigger sales drop than firms filing: -4.6% against -2.6%, although the difference is not statistically significant (p-value=0.26). In column (6), we can reject that the change in administrative cost is zero for firms filing a Conflict Mineral Report, but not for firms not filing a CMR. The administrative cost per dollar sold increases by 4.67%, reflecting that Conflict Mineral Reports are costly to implement.

In Figure A11 in [Online Appendix](#), I plot the full-time-flexible model of columns (1), (2) and (3), testing pretrend and dynamic effects with leads and lags. Effects start appearing around the time of implementation (year 2014). In Table A4 presents results without scaling costs and verifies that the coefficients estimated in columns (2), (3), (5) and (6) do not reflect the decrease in the denominator (sales). In column (6), the value of total administrative costs increases by 2.8% for firms filing a Conflict Mineral Report. Using the average administrative cost at baseline, it implies that firms pay around 30,120 USD more per year, corresponding to the lower bound of compliance cost estimated by the Security Exchange Commission when designing the rule.¹¹

In Table 2, I further explore the role of firm's supply chains in compliance cost. Columns (1) to (3) use scaled administrative costs as an outcome, and columns (4) to (6) the unscaled cost. In columns (1) and (4), I distinguish between the firms publicly disclosing in

¹⁰ $\exp(0.041) - 1 = 0.0418$

¹¹ $1,075,716 \times 0.028 = 30,120$.

their Conflict Mineral Reports the list of metal suppliers identified in their supply chain, and the ones who do not. Firms disclosing their suppliers display a lower administrative cost increase on average (+3.6% vs +6.1%), although the difference is not statistically significant (p-value=0.23).

Table 2 – Role of supply chains

Dep. variable (log):	Admin. cost (over sales)			Admin. cost (value)		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Regulated_f × 1_{t ≥ July 2010}</i>						
× No CMR _f	0.026 (0.023)	0.026 (0.023)	-0.056 (0.038)	-0.005 (0.021)	-0.005 (0.021)	-0.056* (0.033)
× CMR only _f	0.060*** (0.021)	0.062*** (0.021)	-0.014 (0.037)	0.043** (0.018)	0.044** (0.018)	-0.005 (0.032)
× Disclose suppliers _f	0.035** (0.017)	-0.104* (0.057)	-0.181*** (0.063)	0.019 (0.015)	-0.082* (0.043)	-0.133*** (0.050)
× Nb suppliers _f (log)		0.028*** (0.011)	0.028*** (0.010)		0.020** (0.008)	0.020** (0.008)
× Upstreamness _f			0.040*** (0.015)			0.026** (0.013)
Assets _f (log)	-0.037*** (0.012)	-0.037*** (0.012)	-0.039*** (0.013)	0.163*** (0.010)	0.163*** (0.010)	0.162*** (0.010)
Employees _f (log)	-0.127*** (0.014)	-0.127*** (0.014)	-0.123*** (0.014)	0.246*** (0.014)	0.246*** (0.014)	0.247*** (0.014)
Sales _f (log)				0.350*** (0.012)	0.350*** (0.012)	0.349*** (0.012)
FE	<i>f, st</i>					
Observations	57,743	57,743	55,878	57,743	57,743	55,878
R-squared	0.882	0.882	0.884	0.985	0.985	0.986
Number of firms	4,182	4,182	4,031	4,182	4,182	4,031

Note: Sample includes firms with at least 10 observations (2000–2018). Standard errors clustered at the firm level. CMR stands for a firm filing a Conflict Mineral Report due to suspected 3T sourcing from DRC(+9). The number of suppliers correspond to metal suppliers disclosed in Conflict Mineral Reports.

In columns (2) and (5), I check if the increase in compliance cost depends on the size of the firm’s supply network, by interacting the coefficient with the log of the number of the firm’s metal suppliers (see distribution in Figure A4). The baseline coefficient for a firm reporting only one supplier is negative and statistically significant at the 10% level.

In contrast, the coefficient associated to the log number of metal suppliers is positive and statistically significant at the 1% level. The net overall effect is positive and statistically significant for firm above the first quartile of the number of suppliers (p-value=0.093). For these firms, a 1% increase in the number of metal suppliers is associated with a 0.028% increase in the administrative cost, compared to another firm disclosing suppliers. This translates for the average firm in the sample in a 5.1% increase in administrative cost from the baseline period, equivalent to a 70,359 USD yearly compliance cost.¹² This corresponds to the yearly salary of an entry to mid-level job in administrative services.

In columns (3) and (6), I explore whether firms that are more upstream in the value chain face more increase in administrative cost. Upstream firms have less steps between extraction sites and them, and are more likely to directly import metals and minerals. Moreover, [Herkenhoff et al. \(2024\)](#) show that contractual incompleteness could drive lower level of corporate social responsibility higher in the value chain, which would make due diligence more costly at baseline. I use the variable from [Antràs et al. \(2012\)](#), which computes for each NAICS code the number of stages separating the sector from the final consumer (firms with no reported NAICS code are dropped). Firms that are more upstream face a higher increase in administrative cost after the Dodd Frank Act is signed. One more step between the final consumer and the firm increases scaled cost by 4%, and total cost by 2.6%.

Overall results show that the Dodd Frank Act Conflict Mineral Rule created substantial compliance costs among regulated firms, and these costs are exacerbated by the size of their suppliers network and the upstreamness of the firm in the value chain.

4 Macro changes: global mineral trade

In this section, I show that the micro responses from the previous section generate large macro changes in global 3T trade. I first describe data sources on mineral trade, mineral production, legal havens and trade barriers. I show that there are large reallocation of 3T global trade in partial equilibrium, following the Conflict Mineral Rule. Finally I estimate

¹² $1,379,606 * \exp(-0.104 - 0.028 * \ln(248.6)) - 1) * 100 = 70,359.$

which countries lose or win from the Conflict Mineral Rule in general equilibrium.

4.1 Trade data

Legal Havens list. I use the classification of legal havens from [Moreau-Kastler \(2025\)](#). Legal havens is a notion from the international law scholar [Delmas-Marty \(2004\)](#): “[countries or independent territories which] adopt laws offering advantages to entities or individuals enabling them to conceal illicit activity and evade legal obligations related to their economic activities” ([Lemaître, 2019](#)). The literature in law and economics identifies four key dimensions of opacity created by their legal system: (i) financial secrecy, (ii) opaque legal structures, (iii) opaque domestic policies, and (iv) low international cooperation with other jurisdictions. Using legal variables from over ten international comparative sources, supplemented with national legal data, I measure legal opacity with a composite index on 191 territories, covering the decades 2000–2009 and 2010–2019. Legal havens are the top 25% opaque countries.¹³

Legal havens include both large economies often classified as financial secrecy jurisdictions, small island states offering offshore services, and emerging economies. The legal havens list only partially overlaps with traditional tax haven or offshore financial center classifications. I let the reader refer herself to the relevant working paper for more details on data construction and comparisons to existing measures ([Moreau-Kastler, 2025](#)). I check the sensitivity of my results to the construction of the list of legal havens in later analysis.

Among trade partners of covered countries, there are several types of legal havens. There are large trading hubs such as Hong Kong, Singapore, Panama, United Arab Emirates. There are legal havens also hosting a metal transformation industry, such as Switzerland, Luxembourg, Malaysia, Thailand. Finally there are sub-Saharan developing countries

¹³Legal havens are (*trade partner of covered countries): Afghanistan, Angola, Antigua and Barbuda, Aruba, Bahamas, Belize, Bolivia*, Brunei Darussalam, Chile, Comoros*, Costa Rica, Dominica, Dominican Republic*, Ecuador, Gibraltar*, Grenada, Guinea, Hong Kong*, Kenya*, Lao People’s Democratic Republic, Luxembourg*, Maldives, Malaysia*, Mauritius, Mozambique*, Namibia*, Nepal, Panama*, Paraguay, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles*, Sierra Leone, Singapore*, Suriname, Switzerland*, São Tomé and Príncipe, Thailand*, Turks and Caicos Islands, Uganda, United Arab Emirates*, United Republic of Tanzania, Vanuatu, Viet Nam*

with low transparency, such as Mozambique, Kenya and Namibia. I explore these different types of countries in my analysis. Thailand is classified as a legal haven but also hosts a very large industry in tin refining. Prior to Dodd-Frank, it is a large importer of tin from covered countries, as for many tin exporters in Subsaharan Africa. In following analysis, I verify that my results are robust with and without the inclusion of Thailand in the legal havens list.

Trade in minerals. I use two data sources to measure trade flows in minerals, at country pair-product-year level. First, bilateral trade flows at the product and year level from the BACI database ([Gaulier and Zignago, 2010](#)). This database has the advantage of reconciling exporter and importer-reported trade flows from UN Comtrade, and minimizes discrepancies in declared values. The process allows the validation or completion of the information reported by covered countries, to avoid quality concerns.¹⁴ I restrict the trade matrix to products for which data on production is available to reconstruct internal trade flows (see below). I include only upstream forms of minerals and their metal, at the least processed stage. The list of mineral products and HS codes is provided in [Table A3](#).¹⁵ Similarly to the 3T, control minerals and metals tend to be unsubstituable inputs for specific industries. The list includes minerals also intensely extracted in the region, linked conflict, such as Copper and Cobalt. The final sample includes flows from 152 countries exporting 16 different products at two transformation stages to a total of 211 destinations over the years 2006 to 2017. I recover zero trade flows from BACI supplementary files. I match the trade flow matrix with national production harmonized by [Fally and Sayre \(2018\)](#). This allows me to build internal trade flows, i.e. total production in value minus total exports from a country.

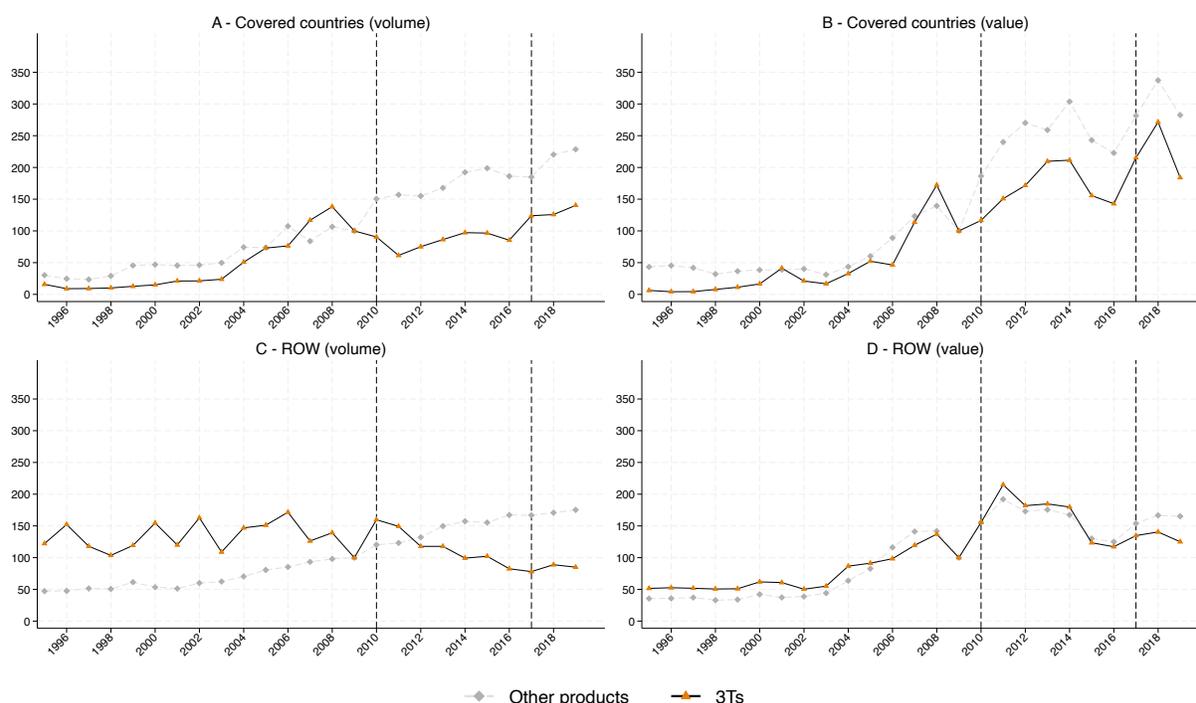
I apply two restrictions to the data. First, I exclude gold trade because it was largely dominated by Switzerland at the time of the Dodd-Frank Act, which did not fully report

¹⁴I let the reader refer herself to the method of [Gaulier and Zignago \(2010\)](#) for more details on their reconciliation process. In [Figure A9](#) in [Online Appendix](#), I plot the difference in mirror flows following [Fisman and Wei \(2004\)](#): $MissImports_{ijt} = \ln(RepExports_{ijt}) - \ln(RepImports_{jit})$. There is no change in missing imports at the same time as the Dodd-Frank Act from the entire area, eventhough there could be reshuffling between covered countries.

¹⁵Tantalum, Tin, Tungsten, Aluminium, Chromium, Cobalt, Copper, Diamonds, Iron, Manganese, Molybdenum, Nickel, Titanium, Uranium, Zinc.

its transactions before 2012, and because gold is harder to trace than other minerals.¹⁶ Second, I drop South Sudan, which became independent in 2011 and has no trade data prior to 2012.

Figure 4 – Metal export series (Index base 2009)



Reading: In 2011, exports of 3T from covered countries to the rest of the world were 60% of their 2009 export volume.

Data: Trade flows from BACI.

Note: Covered countries - Democratic Republic of the Congo, Rwanda, Burundi, Angola, the Republic of the Congo, the Central African Republic, Tanzania, Uganda, and Zambia. ROW - Rest of the world. 3Ts - Tantalum, Tin, Tungsten. Other products - Aluminium, Chromium, Cobalt, Copper, Diamonds, Iron, Manganese, Molybdenum, Nickel, Titanium, Uranium, Zinc.

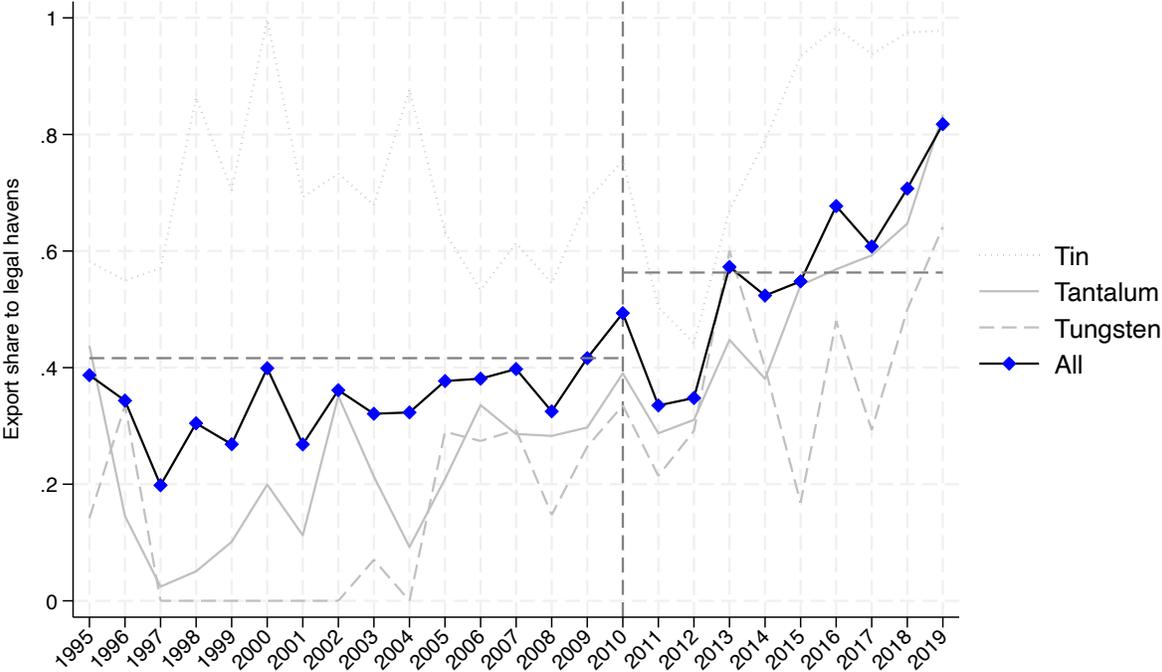
Unconditional trade series show a clear change in mineral exports following the Conflict Mineral Rule. Figure 4 plots an index (base 2009) of exports for 3T and control minerals. The left panels display export volumes, and the right panels export values, for covered countries (Panels A and B) and the rest of the world (Panels C and D). In Panel A, exports of 3T from covered countries drop sharply: volumes fall to 90% of their 2009 level in 2010 and 60% in 2011, recovering to pre-signature levels only by 2017. In contrast, exports of

¹⁶For gold imports under code 7108.12, see <https://www.ezv.admin.ch/ezv/en/home/topics/swiss-foreign-trade-statistics/daten/waren/gold.html>. See Sanchez de la Sierra (2020) for contextual evidence on gold versus 3T smuggling.

other metals increase steadily after 2010. Export values show similar pre-2010 dynamics but diverge thereafter - reflecting the global price trends shown in Figure 2. In the rest of the world, 3T export volumes rise between 2010 and 2013, and export values follow similar patterns for both mineral groups.

The aggregate decline in 3T exports from covered countries masks reallocation across destinations. Figure 5 plots export shares for each 3T product, with their average in blue. Shares are based on export volumes. Between 2000 and 2009, export shares remain stable (average at 41.6% in 2009). After the implementation of the Conflict Mineral Rule, legal havens capture a growing share of 3T exports from covered countries, with a marked increase around the implementation period. Figure 9 shows a similar pattern without Thailand as a legal haven in Appendix.

Figure 5 – Export share to legal havens, from covered countries, 3T



Reading: The Figure displays the export share of trade volume from covered countries to legal havens, i.e. trade flows of 3T, in volume, from covered countries to legal havens, normalized by trade flows to 3T, in volume, from covered countries to all non covered trade partners. In grey for each individual metal, in blue the average across 3T. In 2014, the average legal haven export share of 3T was 56%. Pre-2010 average: 41% – Post-2010 average: 56%.

Data: Trade flows from BACI.

Note: Figure 9 without Thailand as legal haven in Appendix. 3T - Tantalum, Tin, Tungsten.

Other data From the Gravity CEPII database, I use bilateral data on regional trade agreements (Head et al., 2010).

4.2 Partial equilibrium: compliance and avoidance

4.2.1 Empirical strategy

To study the effect of the Conflict Mineral Rule on 3T trade, I use the structural gravity framework which is well suited to study trade destruction and diversion effects (Viner, 1950; Carrère, 2006; Yotov et al., 2017; Fally and Sayre, 2018; Larch et al., 2022). The theoretical gravity framework described in Appendix Section B.

The Conflict Mineral rule raises the cost of exporting 3T from covered countries to all of their non-regulated trade partners. Identification of such non-discriminatory trade policies is challenging, because of the lack of control groups. From covered countries, a control group would be internal trade flows and trade flows between covered countries. But those two sets of flows are likely to be influenced in a non-conventional way by regional smuggling, they do not constitute a reliable control group.¹⁷

Instead, I make use of the dynamics plotted in Figure 4, and use other minerals as reliable control groups in a triple difference strategy. I compare the change in export of 3T from covered countries to changes in: (i) exports of non-3T products from covered countries (ii) exports of 3T products from other countries (iii) exports of non-3T products from other countries. Identification in a triple difference does not require that a parallel trend holds between each of the treated and control groups. Rather, the parallel trend assumption should hold between relative terms: in the absence of the Dodd-Frank Act, the relative change in 3T exports compared to other minerals exports in covered countries should have been the same as the relative growth of 3T exports compare to other minerals in the rest of the world (Olden and Møen, 2022). This strategy will cancel out any for product-specific shocks affecting global trade. It will also controls any local spillover effects running to other minerals in covered countries, as it identifies changes *relative* to control minerals

¹⁷See discussion in [Online Appendix](#) Subsection 3.2. As internal flows correspond to production minus the sum of exports, their measure will be affected by the smuggling of minerals. Moreover, if the Dodd-Frank Act affects the smuggling rate of covered countries heterogeneously across smuggling destinations, a change in trade costs will be indistinguishable from this effect.

between covered countries and the rest of the world. Comparing the relative changes in export values from panels B and D of Figure 4, we observe no visible pre-trend prior to the Dodd-Frank Act Conflict Mineral Rule.¹⁸

I estimate the following gravity equation:

$$Y_{ijpt} = \exp[\beta_{DFA} \cdot \text{DRC+9 to ROW}_{3T,t \geq 2010} + \text{Controls}'_{ijpt} \gamma + \lambda_{ijp} + \mu_{pt} + \mu_{it} + \eta_{jt} + \theta_{iip}] \times \zeta_{ijpt} \quad (2)$$

With Y_{ijpt} the trade flow in value between exporter i and importer j , of mineral p at time t . The coefficient of interest β_{DFA} is associated with an indicator variable for trade flows of regulated products from covered countries to the rest of the world after 2010:

$\text{DRC+9 to ROW}_{3T,t \geq 2010} = \mathbb{1}_{\{i=DFA\}} \times \mathbb{1}_{\{j \neq DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$. It captures trade flow growth differences (1) in years before and after the signature of the Dodd-Frank Act (2) in regulated and non-regulated exporting countries and (3) in regulated and non-regulated mineral products. The coefficient translate in a semi-elasticity of 3T exports from covered countries to the DFA-CMR.

Using the mineral trade matrix identifies β_{DFA} while controlling for product-time specific μ_{pt} and exporter-time specific shocks μ_{it} : orthogonal to shocks affecting all 3T exporters or shocks affecting all covered countries' minerals exports. Fixed effects λ_{ijp} , μ_{it} and η_{jt} control for invariant product trade costs and directional gravity terms (including multilateral resistance terms) constant across products.¹⁹ The term θ_{iip} excludes internal flows from the control group.

Controls variables include an indicator variable for 3T flows between covered countries after treatment and the existence of regional trade agreements between country pairs. The sample runs from 2006 to 2017 to exclude any effect of the Congo War before, and EU Conflict Mineral Rule after. The model is estimated with Poisson-pseudo maximum likelihood, and standard errors are clustered on country-products-dyads.

I further study for reallocation effects to legal havens by interacting $\text{DRC+9 to ROW}_{3T,t \geq 2010}$ with the legal haven list. The coefficient should be interpreted as a deviation from the

¹⁸Structural gravity is run on export values as to accounts for price adjustments.

¹⁹Multilateral resistance terms account for conflicts effects on the entire mineral sector.

average effect on trade partners, and a positive value captures a reallocation of 3T exports to legal havens. I control for the global change in legal havens 3T imports on the post-treatment period to make sure that I capture changes in trade flows with covered countries. For the diversion of foreign demand to other producers, I introduce new indicator variables for other exports not directly targeted, constructed in the same manner as $\mathbb{1}_{\{i\}} \times \mathbb{1}_{\{j \neq DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$. When introduced, these new treatment terms will change the composition of reference group relative to which β_{DFA} is estimated.

4.2.2 Exports from covered countries

Baseline Table 3 displays the baseline results. Column (1) estimates of Equation 2. The effect of the Conflict Mineral Rule on exports from covered countries is negative and large, but not statistically significant, due to large heterogeneity of response across trade partners.

In column (2) I decompose the effect between a legal havens premium and other partner countries. The coefficient associated with $DRC+9$ to $ROW_{3T,t \geq 2010}$ captures the total change of exports to countries that are not legal havens. It is statistically significant at the 1%. It is negative, and correspond to a 76.5% decrease in 3T average export value from the targeted area after 2010.²⁰ This effect is equivalent to an average increase in tariffs faced by covered countries to the rest of the world of 25 percents.²¹ This effect is large and comparable to the effect of trade sanctions (Felbermayr et al., 2025).

The coefficient on the interaction between $DRC+9$ to $ROW_{3T,t \geq 2010}$ and the legal haven dummy is positive and statistically significant, indicating that legal havens helped offset the trade barriers introduced by the Conflict Mineral Rule. Estimated effects represent *relative changes*, measured against the evolution of other minerals. Shipments to legal havens catch up with the growth trajectory of the control minerals (see Figure A6). It implies that while total exports from covered countries decline after 2010 (as shown in Figure 4 and column (1)), exports are redirected toward legal havens (column (2)). The next section quantifies the magnitude of this diversion using a general equilibrium framework.

²⁰ $[e^{-1.451} - 1] \times 100 = -76.5$.

²¹considering a trade elasticity of $\sigma = 5$, $[e^{-1.451/5} - 1] \times 100 = 25$.

Table 3 – Baseline results

Dep. variable:	Bilateral trade flow X_{ijpt}			
	(1)	(2)	(3)	(4)
DRC+9 to ROW $_{3T,t \geq 2010}$	-0.871 (0.553)	-1.451*** (0.501)	-1.372*** (0.502)	-1.325** (0.540)
$\times LH_{j,top25\%}$		0.970** (0.492)	0.995** (0.491)	0.992** (0.494)
$\times 3Tproducer_{j,p,t}$				-0.074 (0.291)
3T producer to ROW $_{3T,t \geq 2010}$			0.199*** (0.0654)	0.197*** (0.0654)
Between DRC+9 countries $_{3T,t \geq 2010}$	-2.446*** (0.717)	-2.524*** (0.721)	-2.427*** (0.722)	-2.418*** (0.723)
$\mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}} \times LH_{j,top25\%}$		-0.377** (0.150)	-0.394*** (0.146)	-0.394*** (0.146)
RTA	0.129** (0.0580)	0.126** (0.0581)	0.126** (0.0581)	0.126** (0.0581)
Observations	842,131	842,131	842,131	842,131
Pseudo R^2	0.967	0.967	0.967	0.967
FE	$it, jt, ijp, pt, iipt$			

Note: DRC+9 to ROW $_{3T,t \geq 2010} = \mathbb{1}_{\{i=DFA\}} \times \mathbb{1}_{\{j \neq DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$, trade flows from covered countries to non covered partners in 3T after 2010. 3T producer to ROW $_{3T,t \geq 2010} = \mathbb{1}_{\{i \neq DFA\}} \times 3Tproducer_{i,p,t} \times \mathbb{1}_{\{j \neq DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$, exports of 3T from other producers to non covered partners, after 2010. Between DRC+9 countries $_{3T,t \geq 2010} = \mathbb{1}_{\{i=DFA\}} \times \mathbb{1}_{\{j=DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$, exchanges of 3T between covered countries after 2010. $LH_{j,top25\%}$ country j is a legal haven. $3Tproducer_{j,p,t}$ country j produces 3T product p at time t . RTA: Regional trade agreement. 3T: Tantalum, Tin, Tungsten. ROW: Rest of the world. Standard errors clustered at the dyad-product level in parentheses.

In column (3), there is an increase in exports from other 3T producers who face an increased demand from the rest of the world. The coefficient is positive and precisely estimated. Exports of 3T from other producers increase on average by 22% after 2010.²² In columns (3)-(4) the coefficients on DRC+9 to ROW $_{3T,t \geq 2010}$ and their interaction, now estimated relative to trade flows of other minerals, remain close to column (2).

Across all specification, the change in trade flows between covered countries is negative and the effect is large. Note that in columns (2) to (4), the total 3T imports of legal havens

²² $[e^{0.199} - 1] \times 100 = 22$.

tend to decrease on the treated period, compared to the counterfactual groups. The effect of regional trade agreements is always positive (+13.4%).

Robustness I check for alternative channels of diversion. Covered countries could export to other producers of 3T not targeted by the Dodd-Frank Act, and mix their production with minerals from other origins. In column (4), I test for the change in 3T exports from the covered countries, to other producers of 3T. The coefficient is negative, small and not statistically different from zero.

A second alternative explanation is that exports to legal havens are actually motivated by other institutional determinants of countries, such as being a tax haven or being less resilient to corruption. In Table A9, I introduce interaction coefficients with alternative measures: the standard list of tax havens from Dharmapala and Hines (2009), and the control of corruption from the World Governance Indicators (Kaufmann et al., 2010). The coefficient for tax havens is small and not statistically significant, and fades away when I control for legal havens. The coefficient associated with good control of corruption is positive and not statistically significant. The coefficient associated with legal havens remains with all combinations of interaction coefficients. I also make sure that the definition of legal havens is not driving the results. In Table A8, I test for different definitions. Estimated coefficients remain for legal havens defined as the top 30% and 35% countries. In column (4), I use the legal havens definition based only on level of opacity before the Dodd-Frank Act signature (2000-2010). In column (5), I use a different aggregation of dimensions of legal opacity, using PCA loading. Results remain.

I also check the robustness of my results to alternative specifications. In Online Appendix Subsection 3.3, I compare covered countries' export share to legal havens in 3T, to their export share in other mineral products. The 3T export share to legal havens increases by 11.6 to 29 percentage points depending on specification. The result is robust to triple difference (using other countries), placebo products, and inclusion of leads and lags. In Table A14 I estimate the change in total 3T exports from covered countries in a simple difference-in-difference strategy at the exporter-product level. In Table A6, I estimate the structural gravity equation on trade flows of 3T only, as discussed above, with

inward and outward multilateral resistance terms for 3T products. The change in 3T exports from covered countries is now identified relative to trade flows within the regulated area: internal trade flows and exchanges between covered countries. I find that all results remain quantitatively similar when using internal flows as a control group.

Mechanisms I investigate the different phases of the Dodd-Frank Act. I interact the term DRC+9 to ROW_{3T,t≥2010} with 2-years indicator variables in the similar gravity triple-differences setting:²³

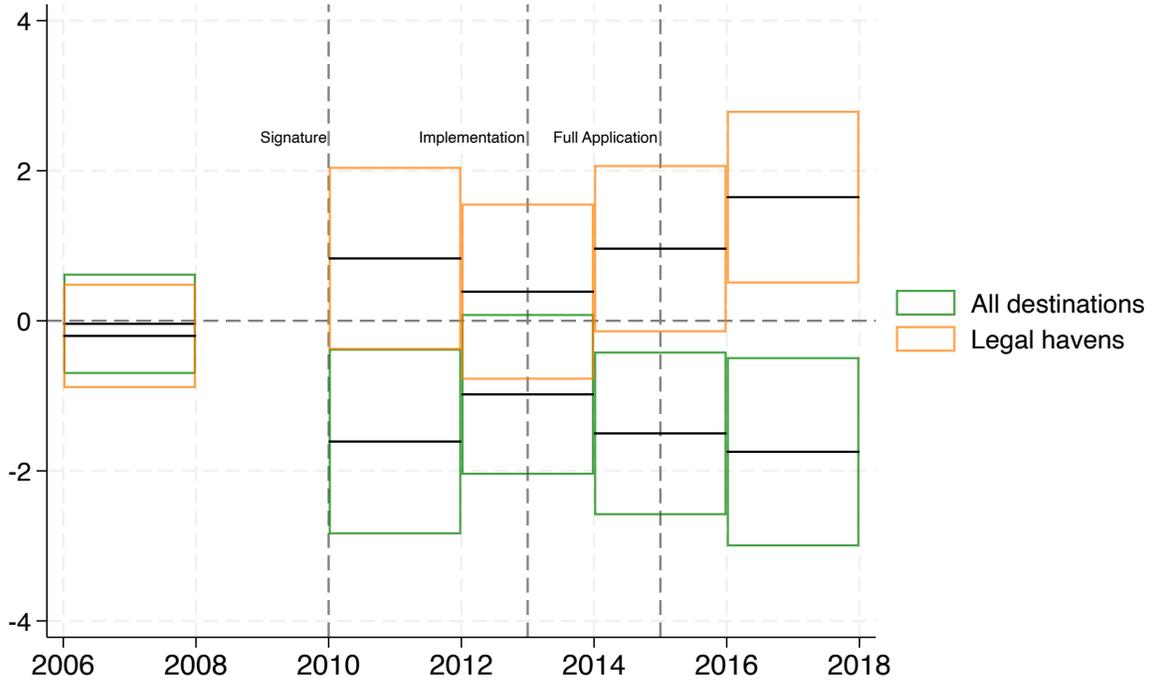
$$\begin{aligned}
Y_{ijpt} = \exp \left[\right. & \sum_{t=2006-07, t \neq 2008-09}^{2016-17} \beta_{DFA,t} \cdot \text{DRC+9 to ROW}_{3T,t \geq 2010} \\
& + \sum_{t=2006-07, t \neq 2008-09}^{2016-17} \beta_{LH,t} \cdot \text{DRC+9 to ROW}_{3T,t \geq 2010} \times \mathbb{1}_{j \in LH} \\
& + \beta_I I_{ijp} \times \mathbb{1}_{\{t \geq 2010\}} + \text{Controls}'_{ijpt} \gamma \\
& \left. + \lambda_{ijp} + \mu_{pt} + \mu_{it} + \eta_{jt} + \theta_{iip} \right] \times \zeta_{ijpt}
\end{aligned} \tag{3}$$

Each coefficient $\beta_{DFA,t}$ is capturing net shocks specific to 3T exported from covered countries to the rest of the world, for each 2-year time point, relative to the pre-signature period. The time dummy 2008-2009 is dropped as a reference. Coefficients $\beta_{DFA,t}$ are displayed in Figure 6, with 95% confidence intervals.

The lead coefficient estimated for the years 2006-2007 is close to zero indicating that 3T exports were similar to the reference period 2008-2009. The conflict mineral rule has a negative and statistically significant effect on 3T exports from the area from 2010 to 2017. Both the law's signature and its implementation massively decreased exports. This anticipation effect is not surprising, given that the salience of the conflict mineral topic likely caused collective reputation effects from signature. The coefficient of the interaction term for legal havens is always positive but starts being statistically significant and larger after the Dodd-Frank Act Conflict Mineral Rule is implemented. The full rules from the Security Exchange Commissions were only disclosed in 2012. Adaptation to these rules takes

²³Higher frequency of coefficient becomes constraining in terms of statistical power.

Figure 6 – Export change - By type of partner - Event study



Reading: Coefficient estimates from Equation 3. Each coefficient corresponds to a time period of two years, compared to reference period 2008-2009. In green, coefficients display the change of exports to regular trade partners. In orange, coefficients display the legal haven premium.

Note: 95% confidence intervals displayed. S.e. clustered at the dyad-product level.

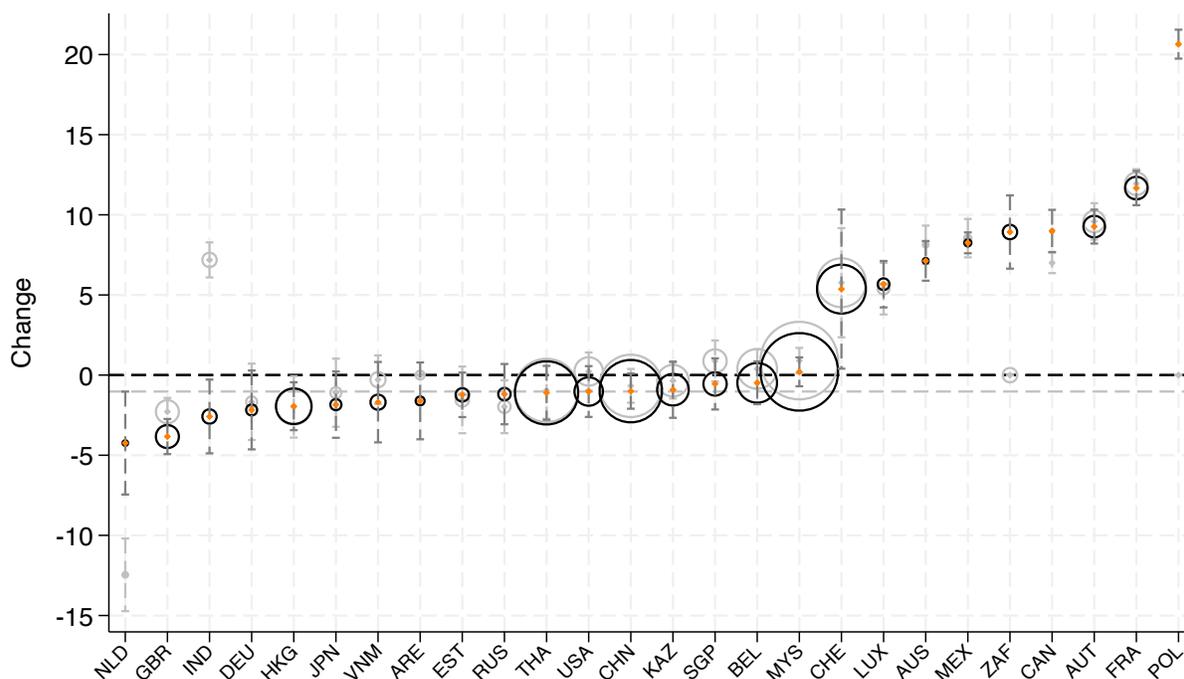
place after this time.

In Figure 7, I explore the heterogeneity in destination countries. I decompose the main effect for each partner country, estimating one coefficient per country:

$$Y_{ijpt} = \exp \left[\sum_j \beta_{DFA,j} \text{DRC+9 to ROW}_{3T,t \geq 2010} \times \mathbb{1}_j + \text{Controls}'_{ijpt} \gamma + \lambda_{ijp} + \mu_{it} + \eta_{jpt} \right] \times \zeta_{ijpt} \quad (4)$$

Each point displays a coefficient $\beta_{DFA,j}$, and the circle around it is proportional to 3T imports in value from the covered countries. The relative standard deviation of estimated coefficients is 2.68, indicating large dispersion. The grey dashed line marks the change to the United States: a drop by -64%. Many other importers display a similar drop in exports, among them countries with a large presence of US-firms metal suppliers: Japan, China and Indonesia.

Figure 7 – Export change - Net effect - Destination heterogeneity



Reading: Estimated coefficients from Equation 4. Each coefficient captures the net change in 3T flows between the regulated countries and each partner country following the Dodd-Frank Act. Light grey coefficients correspond to the same estimation considering the regulated countries as one single country. Circle size correspond to import value over the entire period.

Note: The grey dashed line correspond to the coefficient for the United States. The black dashed line correspond to zero. For readability, trade flows inferior to 500 USD are set to zero. 95% confidence intervals displayed. S.e. clustered at the dyad-product level.

The positive premium for legal havens is driven by Switzerland, Luxembourg and Liechtenstein (reported together), and Malaysia, which concentrate a large part of 3T imports. Exports from covered countries to these countries increase by 141% more than the exports of other metals (p-value: 0.047, see Table A7 column (4)). These four countries host metal transformation industries: U.S. firms declare local suppliers. Trade diversion is not driven by legal havens that are trade hubs like Hong Kong and Dubai, which display negative changes along the one of the United States.

In Table A7, I further explore the type of legal havens driving diversion. I distinguish legal havens in Subsaharan Africa through which minerals could be re-exported. I find no diversion of export to these countries. I then distinguish legal havens hosting a 3T metal transformation (13 jurisdictions). This makes legal havens more prone to import 3T from covered countries. Two potential, non-competing, mechanisms could drive this effect: (i) legal havens, through metal transformation, can successfully hide the origin of minerals;

(ii) covered countries have reduced access to international markets because of name and shame, and divert export to legal havens which are less sensitive to transparency.

We can note some other unconventional responses at the time of the Dodd-Frank Act. Exports to Mexico and Canada, two countries contiguous to the United States, increased. The extent to which this is due regulation avoidance could be concerning to policymakers, but import volumes are rather small. Second, Austria and France display a positive increase in 3T imports. France ranks low in the presence of revealed US suppliers, potentially pointing to alternative demand for 3T (see Figure 3). But the data on firms' filings reveals publicly disclosed suppliers after the Dodd-Frank Act and does not correspond to pre-act real supply chains. Without existing data on these supply chains, it is challenging to make further claims.

4.2.3 Legal havens exports: regulation avoidance

Lastly, I turn to re-exports of 3T from legal havens, following the Dodd-Frank Act Conflict Mineral Rule. I update the specification of Table 3 column (3) with a new term: LH to ROW $_{3T,t \geq 2010} = LH_{i,top25\%} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$. The coefficient captures the change in legal havens 3T exports, *relative to* exports of legal havens in other mineral products, compared to the relative change in the rest of the world. Results are presented in Table 4. The first part of the table presents the coefficients of interest, while the second part presents the coefficients associated to global change in importers' demand (level controls).

I drop observations for which the exporter legal haven data is not available, and re-estimate the specification of Table 3 column (3) in column (1). This excludes DRC, Central African Republic and Burundi, and coefficients remain and are statistically significant. In column (2), the coefficient associated with LH to ROW $_{3T,t \geq 2010}$ is the general change in legal havens 3T exports, to all their partner countries. It is negative and statistically significant: this aligns with the general decrease in Legal Havens 3T imports already noted in Table 3. In column (4), I find that the drop in Legal Havens exports is driven by importer countries with a 3T metal transformation industry.

Table 4 – Regulation avoidance: legal havens exports

Dep. variable:	Bilateral trade flow X_{ijpt}				
	(1)	(2)	(3)	(4)	(5)
DRC+9 to ROW $_{3T,t \geq 2010}$	-2.089*** (0.631)	-2.156*** (0.629)	-2.160*** (0.628)	-2.149*** (0.611)	-1.934*** (0.652)
× $LH_{j,top25\%}$	1.319*** (0.477)	1.331*** (0.473)	1.306*** (0.472)	1.277** (0.570)	1.084* (0.574)
LH to ROW $_{3T,t \geq 2010}$		-0.410*** (0.131)	-0.512*** (0.130)	0.092 (0.239)	0.104 (0.240)
× USA_j			0.689** (0.337)	0.756** (0.360)	0.637* (0.358)
× Metal industry $_{j,p}$				-0.665*** (0.245)	-0.722*** (0.255)
× US Suppliers $_{j,p}$					1.627** (0.669)
3T producer to ROW $_{3T,t \geq 2010}$	0.192*** (0.0655)	0.178*** (0.0658)	0.173*** (0.0660)	0.178*** (0.0591)	0.182*** (0.0590)
Between DRC+9 countries $_{3T,t \geq 2010}$	-1.617* (0.942)	-1.668* (0.935)	-1.689* (0.936)	-1.751* (0.998)	-1.672* (0.966)
RTA	0.124** (0.0584)	0.126** (0.0583)	0.127** (0.0583)	0.127** (0.0516)	0.126** (0.0516)
Level controls					
$\mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}} \times LH_{j,top25\%}$	-0.398*** (0.146)	-0.424*** (0.133)	-0.405*** (0.129)	-0.373*** (0.115)	-0.457*** (0.119)
$\mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}} \times US_j$			-0.030 (0.173)	-0.011 (0.148)	0.100 (0.146)
$\mathbb{1}_{\{t \geq 2010\}} \times \text{Metal industry}_{j,p}$				-0.071 (0.185)	0.052 (0.189)
$\mathbb{1}_{\{t \geq 2010\}} \times \text{US Suppliers}_{j,p}$					-2.281*** (0.418)
Observations	824,749	824,749	824,749	824,749	824,749
Pseudo R^2	0.968	0.968	0.968	0.968	0.968
FE	$it, jt, ijp, pt, iipt$				

Note: DRC+9 to ROW $_{3T,t \geq 2010} = \mathbb{1}_{\{i=DFA\}} \times \mathbb{1}_{\{j \neq DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$, trade flows from covered countries to non covered partners in 3T after 2010. 3T producer to ROW $_{3T,t \geq 2010} = \mathbb{1}_{\{i \neq DFA\}} \times 3Tproducer_{i,p,t} \times \mathbb{1}_{\{j \neq DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$, exports of 3T from other producers to non covered partners, after 2010. Between DRC+9 countries $_{3T,t \geq 2010} = \mathbb{1}_{\{i=DFA\}} \times \mathbb{1}_{\{j=DFA\}} \times \mathbb{1}_{\{p=3T\}} \times \mathbb{1}_{\{t \geq 2010\}}$, exchanges of 3T between covered countries after 2010. $LH_{j,top25\%}$ country j is a legal haven. $3Tproducer_{j,p,t}$ country j produces 3T product p at time t . RTA: Regional trade agreement. 3T: Tantalum, Tin, Tungsten. ROW: Rest of the world. Standard errors clustered at the dyad-product level in parentheses.

In columns (3) to (6), I check whether re-exports are redirected where there is a higher presence of U.S. firms supply chains. In column (3), I interact variable LH to $ROW_{3T,t \geq 2010}$ with a dummy for trade flows to the United States. The coefficient associated is positive and statistically significant at the 5% level: US 3T imports from Legal Havens double. In Table A6 in Online Appendix I find similar results. Figure A8 plots unconditional series of legal havens imports and exports to the United States. While imports of legal havens are mainly in ore, their exports to the United States are in transformed metal.

In columns (5) I test for the presence of US regulated firms metal suppliers in countries importing from legal havens, as measured in Figure 3. The share of disclosed suppliers per country is $US\ Suppliers_{j,p} = \frac{\#ReportedSmelters_{j,p}}{\sum_j \#ReportedSmelters_{j,p}}$, with $\#ReportedSmelters_{j,p}$ the number of different smelters and refiners of product p in country j revealed between 2013 and 2017. It varies over dimensions product p within 3T and importer j , and has two advantages: (i) it scales the number of suppliers either by the size of U.S. firms' supply network (ii) it is defined for $\#ReportedSmelters_{j,p} = 0$.

3T exports from Legal Havens are concentrating in countries hosting a large share of suppliers of the U.S. firms. Comparing two importer countries hosting a 3T metal processing industry, a one standard deviation increase in share U.S. firms suppliers increases 3T imports from legal havens by 12%. For China, the country hosting the highest share of US suppliers, imports of 3T from legal havens increase by 63%.²⁴

Can this additional demand be met with minerals originating outside covered countries? This would require that intermediaries in legal havens operate dual production lines: one processing minerals from covered countries for non-US demand, and another using minerals from other producers for US-bound supply chains. Such a setup would raise production costs and fails to explain why legal haven exports concentrate in destinations hosting US suppliers. Moreover, for several product–legal haven pairs, this hypothesis is empirically impossible. To test it, I compute the ratio of imports from other producers to exports from legal havens toward countries hosting an above-average number of US metal suppliers. Figure A10 reports these ratios by legal haven and metal; a ratio below one implies that exports to US suppliers cannot be entirely sourced from outside

²⁴ $0.076 \times 1.627 \times 100 = 12.36$ and $0.39 \times 1.627 \times 100 = 63.45$.

the covered countries.

4.3 General equilibrium: magnitude and real income effects

Trade reallocation generates both gains and losses across countries. To identify the distribution of these effects under the Conflict Mineral Rule, I rely on the general equilibrium framework introduced in Appendix B. Unlike partial equilibrium estimates, this quantitative approach predicts—holding post-treatment output and expenditure levels constant—what bilateral exports would have been in the absence of the trade cost changes induced by the Dodd–Frank Act. From this counterfactual, I recover adjustments in producer and consumer prices as well as in output values. I can also derive the share of the decline in 3T exports to regular partners that can be attributed to regulatory avoidance through legal havens.

4.3.1 Calibration and counterfactual scenarios

I define two counterfactual scenarios: (i) the Conflict Mineral Rule is never enforced (ii) the Conflict Mineral Rule is fully enforced and no avoidance is possible through legal havens. I then compare realized equilibrium to counterfactual ones to estimate the general equilibrium effect of the Dodd-Frank Act Conflict Mineral Rule: (i) with existing avoidance via legal havens, and (ii) under full global compliance.

I use the general equilibrium model of Appendix B, and follow the procedure of [Yotov et al. \(2017\)](#). Each country's total output and expenditure is calibrated as the sum of exports, imports, and internal trade flows, restricting the sample to countries with at least one strictly positive export and import of 3T minerals. Bilateral trade costs are inferred from estimated time-varying variables coefficients and bilateral fixed effects. In counterfactual scenarios, trade costs are adjusted by changing the Dodd-Frank Act cost accordingly. The last parameter to calibrate is the one governing trade elasticity σ which I set to 5 ([Fally and Sayre, 2018](#)). Except for trade flows, equilibrium terms can be solved only up to a scalar: changes will be normalized relative to change in the price index of Japan. Section 4 of the [Online Appendix](#) provides additional methodological details, and results

are reported in Table 5.

4.3.2 Trade diversion: magnitude

Panel A reports changes in 3T exports from covered countries. The first row shows results when regulatory avoidance through legal havens is possible, and the second when all trade partners comply with the regulation. The first column presents the total change in exports to the rest of the world, while the next two report changes to legal havens and to other importers. The final column indicates the share of exports diverted from regular partners to legal havens. On average, total exports from covered countries to the rest of the world decline by 12.5%.²⁵ Exports to regular partners fall by 21.27%, whereas exports to legal havens rise by 71.48%. Conditional on constant total exports after 2010, the model predicts that 36.77% of exports are diverted from regular partners to legal havens.

Reconciling these results with the aggregate decline in exports estimated above, let X_{NODFA}^{NLH} , $X_{DFA,NODIV}^{NLH}$, and $X_{DFA,DIV}^{NLH}$ denote, respectively, exports to regular trade partners (i) in the absence of the Dodd–Frank Act, (ii) with the Act but no trade diversion, and (iii) with the Act and diversion through legal havens. The estimates imply that:

$$X_{DFA,DIV}^{NLH} = (1 - 0.3677)X_{DFA,NODIV}^{NLH} = (1 - 0.765)X_{NODFA}^{NLH}.$$

The contribution of diversion to legal havens to the decline in exports to regular partners can then be expressed as:

$$\frac{X_{DFA,NODIV}^{NLH} - X_{DFA,DIV}^{NLH}}{X_{NODFA}^{NLH} - X_{DFA,DIV}^{NLH}} = 1 - \frac{X_{NODFA}^{NLH} - X_{DFA,NODIV}^{NLH}}{X_{NODFA}^{NLH} - X_{DFA,DIV}^{NLH}} = 0.18.$$

Hence, diversion through legal havens accounts for approximately 18% of the total decline in 3T exports from covered countries.

In the case of global compliance, diversion effects are shut down: the predicted diverted share is zero as there is no arbitrage possible across partner countries. The total drop in 3T exports from covered countries is 14.7%.

²⁵The magnitude is smaller than the partial-equilibrium estimate in Section 4, as aggregate trade volumes are held constant and the model only allows for adjustments through diversion, output, and price changes.

Table 5 – General equilibrium effects under alternative regulatory scenarios

Panel A: DRC+9 exports (% change)

State of the world	Total	To LH	To other importers	% diverted
Regulation avoidance (%)	-12.49	+71.48	-21.27	36.77
<i>Global compliance</i> (%)	-14.68	-15.20	-14.23	-0.24

Panel B: Producer prices and output (% change)

State of the world	DRC+9		ROW	
	Mine-gate prices	Output	Mine-gate prices	Output
Regulation avoidance ($\Delta\%$)	-16.45	-14.13	0.04	0.04
<i>Global compliance</i>	-18.90	-15.89	-0.00	-0.00

Panel C: Consumer price indexes in ROW (% change)

State of the world	Regular partners	Legal havens
Regulation avoidance ($\Delta\%$)	0.17	-1.04
<i>Global compliance</i>	0.06	-0.03

Note: Results from general equilibrium simulations using model from Appendix B. State of the world refers to counterfactual scenario. Export changes are computed holding total exports and imports constant for each country. Producer price, output and consumer price index changes are relative to the consumer price change of a reference country (Japan). Parameter $\sigma = 5$.

4.3.3 Real income and price effects

For targeted countries Panel B of Table 5 reports changes in mine-gate prices and output for covered countries and other exporters. All figures are expressed relative to changes in the reference country's consumer price index. When the Conflict Mineral Rule can be circumvented, mine-gate prices in covered countries fall by 16.45%, and the value of output declines by 14.13%. By contrast, mine-gate prices and output values among other exporters remain largely unchanged.

Regulatory avoidance through legal havens mitigates the negative trade shock induced by the Dodd-Frank Act in covered countries. In the absence of such avoidance, the declines in mine-gate prices and output are amplified, as covered countries face higher bilateral trade costs with all partners. Prices must fall further to restore access to international markets: mine-gate prices decline by 18.90%, and output by 15.89%.

The welfare implications of this mitigation are ambiguous and depend on how income shocks are distributed between armed groups and local populations. If diversion to legal havens primarily channels conflict minerals, the decline in trade revenues from global compliance would reduce the income of rebel groups and artisanal miners operating in conflict areas. For miners, welfare will depend on whether the benefits from reduced violence outweigh the loss in income. If conflict-free producers fail to comply with due diligence requirements—due to certification costs or reputational spillovers—and have no choice but to export to legal havens, global compliance could harm artisanal miners without necessarily curbing rebel financing. Finally, negative income shocks to local households could lower the opportunity cost of joining armed groups, potentially offsetting the gains from reduced conflict intensity. Overall, the welfare impact of legal haven mitigation depends on how the redistributed trade income affects each of these channels.

Finally, dynamic gains should also be considered. Legal havens blur the distinction between conflict and conflict-free minerals that the Act seeks to clarify, by sustaining market access for conflict minerals. As such, their existence could sustain collective reportation effects and prevent conflict-free mines from gaining market shares.

For legal havens Panel C of Table 5 reports changes in consumer price indexes, relative to the reference country (any global increase in 3T prices is canceled out). Consumer price indexes corresponds to the price index of the world economy faced by importers in j , and are retrieved from inward multilateral resistance P_j . The first column displays the relative change for regular trade partners, and the second for legal havens.

When they offer regulation avoidance, legal havens benefit from the drop in covered countries mine-gate prices, and do not support the cost of the Conflict Mineral Rule, which decreases their general price index by 1.04% on average. The rest of the world faces a small average increase of 0.17% due to the change in trade costs with covered countries. In case of global compliance, the difference in price index between legal havens and the rest of the world becomes marginal.

The wedge in price change rationalizes the supply of regulation avoidance for legal havens. Importers benefit from lower mine-gate prices in covered countries without pay-

ing the cost of due diligence. Legal havens derive a rent from offering regulation avoidance.

For US importers I finally check for the transmission of the Dodd-Frank Act costs to downstream products incorporating 3T imported in the United States, which cannot be studied in the model. In [Online Appendix Section 3.1.2](#), I compare the price of products incorporating 3T to products incorporating other metals imported in the United States after 2010. I use unit values of imports at the border to measure import prices. I find that there is an increase in input prices after the implementation of the law for products incorporating tantalum. Unit values of products incorporating tantalum increases by 9.2%. Interestingly, this product heterogeneity could explain part of why the input cost of firms in [Section 3](#) does not react to the Dodd-Frank Act.

5 Conclusion

The extractive sector provides essential inputs for industries driving global growth, and technological change. Downstream supply chains operate along many countries, sourcing from a limited number of countries potentially affected by violence around extraction sites. Due diligence policies seek to prevent downstream industries from sustaining harmful production practices. This paper evaluates whether such policies can be effectively enforced and how they reshape global trade, focusing on the Dodd-Frank Act's Conflict Mineral Rule (CMR), which regulates the sourcing of tin, tungsten, and tantalum from the Democratic Republic of Congo (DRC) and adjoining countries.

In this paper, I show that there is great compliance potential for due diligence policies, despite their extraterritorial nature and relatively limited constraints. Directly regulated firms in the United States incur manageable compliance costs that rise with exposure to conflict minerals. Reporting requirements also enable policymakers to map previously uncharted mineral supply chains. At the global level, the Conflict Mineral Rule significantly altered sourcing patterns: exports from the DRC and neighboring countries fell sharply, while demand shifted toward alternative suppliers.

However, regulatory circumvention through legal havens poses a major challenge to policy effectiveness. Trade from Democratic Republic of the Congo and adjoining countries concentrated in most opaque parts of the world. These jurisdictions provide legal and institutional opacity that conceals the origin and destination of conflict minerals, undermining transparency. Following the implementation of the CMR, legal havens increased imports from covered countries and re-exported more to destinations hosting U.S. suppliers. The design of future extraterritorial regulations must account for such avoidance channels. In the context of due diligence policies—whose enforcement relies on transparency—effective monitoring requires identifying critical nodes in supply chains and limiting the use of intermediaries that obscure sourcing.

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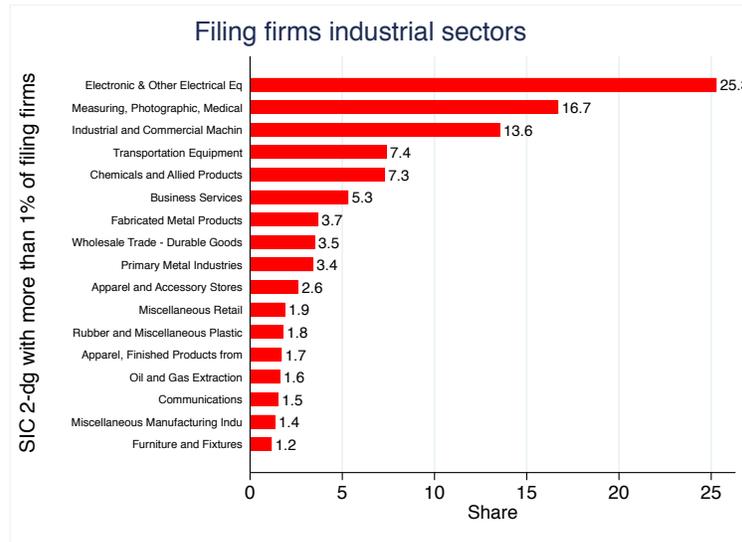
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Appendix

A Facts

Figure 8 – Filing firms sectoral distribution

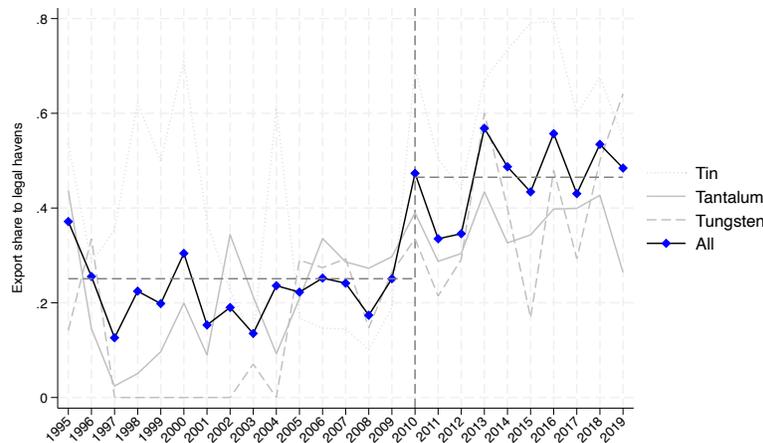


Reading: 25.3% of firms filing to the Security Exchange Commission are in the Electronic & other electrical equipment sector.

Data: Collected data from Conflict Mineral Reports filings by firms to the SEC (Forms SD).

Note: Sectors with more than 1% of filing firms.

Figure 9 – Export share to legal havens, from covered countries, 3T



Reading: The Figure displays the export share of trade volume from covered countries to legal havens, i.e. trade flows of 3T, in volume, from covered countries to legal havens, normalized by trade flows to 3T, in volume, from covered countries to all non covered trade partners. In grey for each individual metal, in blue the average across 3T. In 2014, the average legal haven export share of 3T was 25%. Pre-2010 average: 46% – Post-2010 average: 56%.

Data: Trade flows from BACI.

Note: Thailand is excluded from the list of legal havens and treated as a normal trade partner. Figure 5 with Thailand as legal haven. 3T - Tantalum, Tin, Tungsten.

B General Equilibrium Structural Gravity

The general equilibrium gravity system of the mineral industry is characterized by the following system (see [Anderson and Van Wincoop 2003](#); [Yotov et al. 2017](#)):

$$X_{ijt} = \frac{Y_{it}E_{jt}}{Y_t} \left(\frac{t_{ijt}}{\Pi_{it}P_{jt}} \right)^{1-\sigma} \quad (5)$$

$$\begin{aligned} \Pi_{it}^{1-\sigma} &= \sum_j \left(\frac{t_{ijt}}{P_{jt}} \right)^{1-\sigma} \frac{E_{jt}}{Y} \\ P_{jt}^{1-\sigma} &= \sum_i \left(\frac{t_{ijt}}{\Pi_{it}} \right)^{1-\sigma} \frac{Y_{it}}{Y} \end{aligned} \quad (6)$$

Equation 5 is the trade gravity relationship, stating that trade X_{ijt} between from exporter i to importer j at time t , is a function of exporter output Y_{it} , importer total expenditures E_{jt} . Trade is also a function of trade frictions made of t_{ijt} bilateral trade costs, and Π_{it} and P_{jt} the multilateral resistance terms of importing and exporting countries, defined by the relationships in Equations 6.

Expenditure shares, imports from partner country i , and price index in j follow from CES preferences:

$$P_j = \left[\sum_i (\alpha_i p_i t_{ij})^{1-\sigma} \right]^{\frac{1}{1-\sigma}}$$

With P_j the price index faced by importer j on the world market. Imposing that the sum of expenditures in all goods for a country i must equalise the value of output Y_i up to a trade imbalance of an exogenous ϕ_i , the "mine-gate" prices in i is:

$$p_i = \left(\frac{Y_i}{Y} \right)^{\frac{1}{1-\sigma}} \frac{1}{\alpha_i \Pi_i} \quad (7)$$

This is the price paid to mineral producers, at the exit point of the mine, in country i .

To complete the characterization of the economy, we consider that output in country i is determined by a fixed endowment Q_i :

$$E_i = \phi_i Y_i = p_i Q_i \quad (8)$$