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Transshipment, Rules of Origin and Enforcement without Commitment

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Abstract

Tariffs on Chinese goods have led to rerouting through third countries, and importing and transit countries have answered with heavier penalties for misdeclared origin and stricter verification. This paper asks what such measures achieve when the agencies that enforce origin cannot commit to how they enforce it. In a Cournot model, a firm facing a tariff can export directly, assemble legally in a third country, or ship through it and misdeclare origin. Customs audits after firms choose and offsets heavier penalties with fewer audits. Above a tariff ceiling no penalty deters fraud. A given tightening of enforcement against fraud removes more rerouting where tariffs are low, whereas reclassifying assembly removes more where tariffs are high if assembly pays mainly there. A government that can reinterpret the rule of origin after assembly capital is sunk eliminates legal assembly, and committed audit floors remove the ceiling. In United States data, rerouting through fifteen transit countries faded after the 2022 enforcement tightening in the 7.5 percent tier of the Section 301 tariffs but persisted in the 25 percent tier. The fade survives the exclusion of products targeted by anti-circumvention and forced-labour enforcement, is concentrated in country–product pairs in which China already supplied the same product to the transit country, and is no stronger in the main assembly hubs. These patterns are consistent with enforcement against fraud.

Keywords: Transshipment · Rules of origin · Customs fraud · Trade enforcement · Section 301 tariffs
JEL Classification: F13, F14, F23, K42, L13

1 Introduction

A tariff on goods of one origin rewards changing the declared origin. After the United States raised tariffs on Chinese goods in 2018, its imports of the affected products from Southeast Asia rose while its direct imports from China fell (Fajgelbaum, Goldberg, Kennedy, Khandelwal, & Taglioni, 2024; Freund, Mattoo, Mulabdic, & Ruta, 2024; Lee & Rhee, 2026). Part of the increase was Chinese output relabelled in third countries (Freund, 2025; Iyoha, Malesky, Wen, & Wu, 2025). Part of it was genuine relocation of assembly, which acquires third-country origin legally (Luo, 2026; Stein, Giraudy, Urdinez, & Zuluaga, 2026). Policy has responded on several fronts. Vietnam adopted a programme against origin fraud in July 2019 (Vietstock, 2020), and in November 2019 Thailand placed high-risk products bound for the United States on an origin-verification watchlist (Hayakawa & Sudsawasd, 2025). In 2025 the United States imposed a 40 percent duty on goods found to have been transshipped, together with reciprocal tariffs of 19 to 20 percent on goods of Vietnamese, Thai, Malaysian and Cambodian origin (DFDL, 2025; Executive Office of the President, 2025), and the Departments of Justice and Homeland Security formed a joint trade fraud task force (Pillsbury Winthrop Shaw Pittman, 2025).

These measures assume that heavier penalties and wider coverage make circumvention unprofitable. This paper asks whether they do when the agencies that enforce origin cannot commit to how they will enforce it. An executive order or a trade agreement can fix the penalty for misdeclared origin and the value content that confers origin. How hard customs checks declarations is decided later, shipment by shipment, after firms have organised their supply chains, and an agency that has already deterred fraud has little reason to keep paying for inspections. The rule of origin is exposed in a similar way. Once a firm has built an assembly plant in a third country, the authority that interprets substantial transformation, or that opens an anti-circumvention inquiry, can tighten the rule at little cost to itself.

I study a Cournot model of an importing market served by a domestic firm, a genuine producer in a third country and a firm from the tariffed origin country. The origin-country firm can export directly and pay the tariff, assemble in the third country subject to a regional value content requirement, or ship through the third country and misdeclare origin. The importing government values consumer surplus, domestic profit and tariff revenue, and it attaches a cost to origin-country content, which stands for the security motive behind recent trade policy towards China. The government sets the penalty and the rule of origin. Customs chooses the audit probability after the firm has chosen its mode.

The central result is that penalties cannot substitute for audits once audits are discretionary. A heavier penalty lets customs reach the same expected burden with fewer audits, and customs audits less. The expected burden on a misdeclared unit therefore converges to a finite level, and above a tariff ceiling no penalty deters fraud. The ceiling is set by the enforcer's own interest in collecting duty and does not depend on the size of the fine or on the cost of audits. Across product lines that differ in how cheaply origin can be disguised, the same tightening of enforcement against fraud removes a larger share of fraud where tariffs are low than where they are high.

The model also speaks to the design of origin regimes. Under commitment, the optimal rule of origin is the strictest one that keeps the firm in legal assembly, and penalties raise it only until the burden on fraud reaches its ceiling. If the authorities can reinterpret the rule after the plant is built, they tighten it until the firm is indifferent between staying and leaving, and legal assembly survives only under commitment. A committed floor on random audits removes the ceiling at small cost. A tariff on all goods from the transit country raises the ceiling but narrows the room for legal assembly.

The evidence comes from the two tariff tiers of the US Section 301 action, 25 and 7.5 percent. The duty paid on Chinese goods rose by 20.0 percentage points in the high tier and by 5.5 points in the low tier, and direct imports from China fell by about 49 and 12 percent. Relative to the same countries' exports of the same products to other destinations, exports of fifteen transit countries to the United States rose by about 0.12 log points in both tiers in 2019–2021. After US enforcement intensified in 2022, the low-tier gain fell to almost zero while the high-tier gain stayed at 0.11. This difference in the change, about -0.10 log points, appears in a panel that starts in 2012 and in US import records that compare transit countries with other suppliers of the same tariff line. It survives few-cluster inference and the exclusion of any single transit country.

The 2022 tightening reached both forms of rerouting. Origin verification and forced-labour enforcement apply to relabelled and assembled goods alike, and anti-circumvention inquiries reclassify assembly that is already in place. I therefore extend the model to two enforcement channels. Enforcement against fraud always removes a larger share of rerouting at the low tariff. Reclassifying assembly removes a larger share at the high tariff when legal assembly pays mainly there, and a fade concentrated in the low tier then points to enforcement against fraud. The evidence supports this reading. Anti-circumvention inquiries concentrate in the high tier, where their headings cover 5.3 percent of products against 1.3 percent in the low tier. Dropping these headings, or the sectors targeted by forced-labour enforcement, leaves the contrast at -0.09 and -0.08. Relabelling requires Chinese goods of the same six-digit product to enter the transit country, whereas assembly from Chinese parts does not. The contrast is -0.12 in country–product pairs with such inflows before 2018 and 0.06 in pairs without them, and it is no stronger in the countries that received most Chinese assembly investment. These patterns are consistent with enforcement against misdeclaration removing fraud from the low tier.

For trade policy, the results imply that the credibility of origin verification limits what an origin regime can deter, and the size of penalties matters only below that limit. A higher duty on transshipped goods adds little above the ceiling unless verification is committed in advance, through random audit quotas, mandatory traceability for listed products or verification obligations written into trade agreements. Certainty about origin matters as much as its strictness. Advance rulings on origin, which the WTO Trade Facilitation Agreement requires members to issue (World Customs Organization, 2017), protect assembly investment only if they bind every agency that can reinterpret origin.

Section 2 relates the paper to the literature, and Section 3 describes the institutional background. Sections 4 and 5 present the model and its results, Section 6 the evidence, and Sections 7 and 8 discuss policy and conclude. Proofs, extensions, the data construction and additional results are in the Online Appendix.

2 Related literature

The paper relates to work on trade rerouting, on rules of origin and on customs enforcement.

A growing empirical literature documents how the US–China tariffs redirected trade through third countries. Studies of aggregate flows find that US imports from Vietnam, Mexico and other bystander economies rose most in the products that faced the largest tariff increases (Cavalcanti, Ogeda, & Ornelas, 2026; Fajgelbaum et al., 2024; Freund et al., 2024; Ma, Ning, & Xu, 2026). Benguria (2023) finds that exporters in the rest of the world substituted for Chinese exporters in the US market, Lee and Rhee (2026)

show that the gains in Vietnam's US exports were concentrated in sectors where China held a revealed comparative advantage, and Luo (2026) finds that the relocation of Chinese production capacity to third countries increasingly displaced direct exports after the tariffs became permanent. Stein et al. (2026) trace the same tariffs to Chinese direct investment in Mexico, which arrived with a lag of four to five years. Firm-level customs data from Vietnam identify relabelled Chinese goods directly (Iyoha et al., 2025), product tracing attributes part of the increase in Southeast Asian exports to transshipment (Freund, 2025), and Arora, Saharan, and Tomar (2025) model rerouting through light processing under exogenous rules. Trade statistics record declared origin, and Cotterlaz and Vicard (2025) show that differences in origin reporting across databases bias standard estimates. Rerouting also follows other duties. Shi, Zhang, and Jiang (2026) find that US exporters circumvented Chinese anti-dumping duties through third countries after final rulings, mostly in less differentiated products. I add a model in which legal relocation and illegal rerouting are alternative responses to the same tariff and enforcement determines the mix between them. The model predicts how the mix changes when enforcement tightens, and the two Section 301 tiers allow a test of this prediction.

The second strand concerns rules of origin. Content requirements distort input choices, protect upstream producers and can confer market power (Chung & Perroni, 2025; Conconi, García-Santana, Puccio, & Venturini, 2018; Duttagupta & Panagariya, 2007; Falvey & Reed, 1998; Ju & Krishna, 2005). Mukunoki and Okoshi (2021) show that a value-added criterion can act as a price floor and make a free trade agreement harmful to consumers, and Ornelas and Turner (2024) weigh such costs against the role of rules of origin in preventing trade deflection. Empirical work measures how restrictive rules of origin are and how they affect trade. Abreha and Robertson (2023) find that restrictive apparel rules lower the trade gains from regional agreements, and Ticku, Sanfilippo, Olarreaga, Lippitsch, and Hoekman (2025) estimate the content rules that would maximise domestic value added in African exports. Hayakawa (2023) shows that a relaxation of the rules of origin for apparel shifted Japan's imports from Cambodia and Myanmar across preference regimes. Ju and Krishna (2002) allow firms not to comply, Felbermayr, Teti, and Yalcin (2019) measure the profitability of trade deflection, and Head, Mayer, and Melitz (2024) show that revenue from rules of origin traces out a Laffer curve. This literature takes compliance as given or treats non-compliance as a decision to forgo preferences. I treat the rule as a security instrument that the importing country wants to make as strict as possible and characterise the strictest rule that enforcement can sustain. The revenue-maximising burden that underlies the Laffer curve reappears in my model as the ceiling of private enforcement.

The third strand studies customs fraud and its enforcement. Evasion rises with tariffs and falls with enforcement (Chalendard, Fernandes, Raballand, & Rijkers, 2023; Ferrantino, Liu, & Wang, 2012; Fisman, Moustakerski, & Wei, 2008; Fisman & Wei, 2004; Javorcik & Narciso, 2008; Kee & Nicita, 2022; Kellenberg & Levinson, 2019; Sequeira, 2016; Yang, 2008). Transaction-level data from Pakistan show that under-invoicing increases with the duty rate (Khan, Hussain, & Liaqat, 2024), and Farhad, Madsen, Jetter, and Williams (2024) document that misreporting distorts bilateral trade statistics across most countries. Studnicka (2025) estimates a structural model in which evasion responds to tariffs and to border enforcement. Che, Lin, and Zhang (2025) show that evasion of the US–China tariffs grew with tariff liabilities, and Bussy (2021) shows that evasion can fall with the tariff when enforcement responds to it. Closest to the policy questions of this paper, Hayakawa and Sudsawasd (2025) find that Thailand's origin-verification watchlist did not reduce exports of listed products to the United States.

The model explains such findings. When verification is chosen after declarations, stricter documentation requirements raise the expected burden only up to a ceiling, and above the ceiling fraud continues. The theoretical foundation is the inspection game of tax compliance (Graetz, Reinganum, & Wilde, 1986; Khalil, 1997; Reinganum & Wilde, 1985), in which an auditor who cannot commit may be ineffective however stiff the sanction (Khalil & Lawarrée, 2006). Delegation can restore commitment (Melumad & Mookherjee, 1989), and private enforcement changes the incentives of enforcers (Becker & Stigler, 1974; Landes & Posner, 1975; Polinsky & Shavell, 2000). The hold-up of sunk investment by governments goes back to Kydland and Prescott (1977) and Grout (1984), and in trade policy to Staiger and Tabellini (1989) and Çelik, Karabay, and McLaren (2020). I apply these commitment problems to origin regimes, in which one agency verifies declarations and another interprets the rule, and I relate them to the tariff-jumping literature (Blonigen, 2002; Horstmann & Markusen, 1992; Motta, 1992), which treats relocation as legal and the tariff as the only instrument.

3 Institutional background

The tariff variation used in this paper comes from the US Section 301 action against China. Lists 1 and 2 imposed an additional duty of 25 percent in July and August 2018. List 3 started at 10 percent in September 2018 and rose to 25 percent in May 2019. List 4A started at 15 percent in September 2019 and was cut to 7.5 percent in February 2020 under the Phase One agreement (Office of the United States Trade Representative, 2026; Peacock Tariff Consulting, 2026; Sandler, Travis & Rosenberg, 2026). From 2020 onward the action therefore created two stable tiers, one at 25 percent and one at 7.5 percent, defined at the eight-digit level of the US tariff schedule. Both tiers apply to goods of Chinese origin whatever the country from which they are shipped. The duty depends on the declared origin of a good, whatever its route, and misdeclaration through a third country therefore pays.

Under the non-preferential rules applied by US Customs and Border Protection, a good originates in the country where it last underwent a substantial transformation, that is, where it acquired a new name, character or use. A firm that wants certainty can request a binding ruling, which binds all Customs personnel for the transaction it describes, although Customs can modify or revoke it later (Code of Federal Regulations, 2026). Article 3 of the WTO Trade Facilitation Agreement requires members to issue such advance rulings on origin (World Customs Organization, 2017). Preferential agreements such as the USMCA replace substantial transformation with tariff-shift rules and regional value content requirements of the kind modelled below, and they allow the importing party to verify origin and to withhold preferences after a pattern of false declarations (U.S. Customs and Border Protection, 2021).

Misdeclared origin is policed mainly through post-entry verification. Customs may inspect a shipment, request supply-chain documents, and assess the duty owed together with penalties. For goods subject to anti-dumping or countervailing duty orders, the Enforce and Protect Act of 2015 created a formal procedure, with interim measures within ninety days, a determination within three hundred days and strict liability for the importer (U.S. Customs and Border Protection, 2016, 2024). The procedure targets false declarations, which correspond to the fraud mode in the model. Transit countries also police origin, since a reputation as a transshipment platform invites tariffs on their own goods. By September 2020 Vietnamese customs had detected 76 cases of origin fraud, most of them Chinese goods that had undergone only simple assembly (Vietstock, 2020).

Legal assembly in a third country is handled by a separate procedure. Under the anti-circumvention provisions of US anti-dumping law, the Department of Commerce can find that goods completed in a third country from inputs of the targeted country are covered by the original order. This holds even if the processing would confer third-country origin for ordinary customs purposes. Commerce applies its own tests, and a Customs ruling that a product originates in Vietnam does not bind Commerce (Lewis & Liu, n.d.). The European Union applies a numerical test fixed in advance: assembly in a third country circumvents a duty if parts from the targeted country make up 60 percent or more of the value of all parts, unless value added exceeds 25 percent of the manufacturing cost (European Parliament and Council, 2016). In both jurisdictions an anti-circumvention finding reclassifies assembly that is already in operation. In the model, such a finding tightens the rule of origin after the firm has sunk its investment.

Enforcement against transshipment has intensified since 2022. The Uyghur Forced Labor Prevention Act, in force from June 2022, introduced a rebuttable presumption that requires importers to trace supply chains with Xinjiang content whatever the country of shipment (DLA Piper, 2022), and Commerce opened twelve circumvention inquiries in 2022, more than in any earlier year (International Trade Administration, 2023a). Private enforcement has also grown. Under the False Claims Act, a private relator can sue over evaded duties and keep between 15 and 30 percent of the recovery (Sanford Heisler Sharp, 2026), and in December 2025 an importer of tungsten carbide products paid 54.4 million dollars to settle such a case (Export Compliance Daily, 2025; Mayer Brown, 2026). In 2025 the government formed a joint trade fraud task force with transshipment from China as a stated priority (Pillsbury Winthrop Shaw Pittman, 2025), and an executive order imposed a 40 percent duty on goods found to have been transshipped, on top of reciprocal tariffs of 19 to 20 percent on goods of Vietnamese, Thai, Malaysian and Cambodian origin (DFDL, 2025; Executive Office of the President, 2025). These measures raise the penalty, add private enforcers and tax the transit route. The model shows which of them raise the expected burden on fraud and which change only its form.

4 The model

4.1 Market and modes of entry

A home country H imports a homogeneous good with inverse demand $P = a - Q$. Three firms compete in quantities. A domestic firm D has marginal cost d, a genuine producer L located in a third country T has marginal cost l, and a firm F from an origin country O faces a specific tariff τ on its goods. Goods of T origin enter duty free. The tariff is set by trade policy, as the Section 301 tiers were, and is a parameter of the model.

Firm F produces at zero base cost and chooses one of three modes $m \in \{X, A, M\}$.

Direct export (X).

F ships from O and pays τ per unit.

Legal assembly (A).

F sets up processing in T at a sunk cost $K \geq 0$ and meets a regional value content requirement $r \in [0, 1]$. Sourcing a share r of value in T costs γr per unit, where $\gamma > 0$ measures the cost disadvantage of third-country inputs. The good then has T origin and enters duty free, and its share of O content is $1 - r$.

Origin fraud (M).

F routes the good through T and declares T origin, at a cost $t > 0$ per unit for relabelling, documents and transport. Each unit declared as of T origin is audited with probability $p \in [0,1]$. A misdeclared unit that is detected pays $\sigma \equiv \tau + s$, the duty owed plus a penalty $s \geq 0$.

Let c denote F's unit cost in the chosen mode, so that $c = \tau$ under X, $c = \gamma r$ under A and $c = t + p\sigma$ under M. Writing $B \equiv a + d + l$, the Cournot equilibrium quantities are

$$q_F(c) = \frac{B - 3c}{4}, \qquad q_D(c) = \frac{a - 3d + l + c}{4}, \qquad q_L(c) = \frac{a + d - 3l + c}{4}, \tag{1}$$

and F's operating profit is $q_F(c)^2$. An increase in F's cost raises the output of both rivals, including that of the genuine third-country producer. Third-country exports to H can therefore rise after a tariff increase even if no good is rerouted, and Section 6 therefore also compares transit countries with other suppliers of the same tariff line, which gain from the same effect.

4.2 Government and customs

Home welfare is

$$W = \tfrac{1}{2}Q^2 + q_D^2 + R - \lambda\,\theta\,q_F - \tfrac{k}{2}p^2, \tag{2}$$

the sum of consumer surplus, domestic profit and customs revenue R, net of a cost $\lambda \geq 0$ per unit of O content and of the cost of audits. Here θ is the share of O content in F's goods, which equals 1 under X and M and $1 - r$ under A. Revenue per unit of F's output is τ under X, zero under A and the expected collection $p\sigma$ under M. The parameter λ captures the security and supply-chain motive behind recent trade policy towards origin-country content. The profits of F and L, as well as payments to factors in T, accrue abroad.

Under direct export, welfare is concave in the tariff and is maximised at

$$\hat{\tau} = \frac{3a - d + 7l + 12\lambda}{21}. \tag{3}$$

I refer to $\hat{\tau}$ as the ex post preferred tariff. It increases with the security weight λ.

Customs chooses the audit probability after F has chosen its mode. It observes which mode F uses, for instance from the product-level trade statistics that analysts use to track transshipment (Freund, 2025), but it must inspect shipments one by one in order to collect. Customs maximises home welfare. Under X and A there is nothing to collect, and customs sets $p = 0$. Under M it chooses p to maximise (2).

The government first sets the penalty s, taking τ as given. Under commitment it also sets the rule of origin r at this stage. Firm F then chooses its mode and sinks K if it chooses A. Under discretion the government chooses r only at this point. Customs then chooses p, and the three firms compete in quantities.

Assumption 1. (i) $0 < t < \hat{\tau}$. (ii) $B > 3\gamma$ and $\tau < B/3$, so that F's output is positive in every mode. (iii) Audits are interior, $\bar{e} \leq 2\sqrt{\kappa}$, where $\bar{e}$ and κ are defined in Lemma 2. (iv) $\gamma < 8\lambda$.

Part (iii) keeps the audit probability below one, and part (iv) ensures that welfare under assembly is concave in r.

4.3 Mode choice

Let e denote the expected burden on a misdeclared unit, so that fraud costs $t+e$ per unit. Firm F compares modes by their unit cost, and its outside option to assembly is the cheaper of the other two modes, $c_o \equiv \min\{\tau, t+e\}$. Because the sunk cost must be covered, F chooses A only if $q_F(\gamma r)^2 - K \geq q_F(c_o)^2$. The largest assembly cost that satisfies this condition is

$$\tilde{c}(c_o) = \frac{B - 4\sqrt{q_F(c_o)^2 + K}}{3} \;\leq\; c_o, \tag{4}$$

with equality if and only if $K = 0$.

Lemma 1 (Mode choice)**.** *F chooses legal assembly if and only if $\gamma r \leq \tilde{c}(c_o)$. Otherwise, it exports directly if $\tau \leq t+e$ and commits fraud if $\tau > t+e$. Ties are broken in favour of legal assembly, and then in favour of direct export.*

Equivalently, legal assembly survives whenever the rule of origin is no stricter than

$$\bar{r}(\tau, s) \equiv \frac{\tilde{c}\big(\min\{\tau, t+e(\tau+s)\}\big)}{\gamma}, \tag{5}$$

which I call the enforceable strictness. Here $e(\sigma)$ is the equilibrium burden derived in the next section.

5 Enforcement, the fraud ceiling and the rule of origin

All proofs are in the Online Appendix, Section OA.1.

5.1 Discretionary audits and the fraud ceiling

Suppose that F commits fraud, and let $x \equiv p\sigma$ denote the expected payment per misdeclared unit. Because collected payments are revenue, home welfare depends on p only through x and through the audit cost. Welfare gross of audit costs is quadratic in x and is maximised at

$$\bar{e} \equiv \hat{\tau} - \frac{3t}{7}.$$

This is the burden that customs would impose on fraud if audits were free. It lies below $\hat{\tau}$ because the fraud cost t already raises F's price, and this part of the wedge yields no revenue.

Lemma 2 (Discretionary audit)**.** *Under M, customs sets $p = 21\bar{e}\sigma/(21\sigma^2 + 16k)$. The expected burden on a misdeclared unit is*

$$e(\sigma) = \bar{e}\,\frac{\sigma^2}{\sigma^2 + \kappa}, \qquad \kappa \equiv \frac{16k}{21}. \tag{6}$$

The burden increases with the liability σ and converges to $\bar{e}$ as $\sigma \to \infty$, whereas the audit probability converges to zero.

The audit probability first rises with the liability, because each detection is worth more, and then falls, because customs can reach almost the same burden with fewer audits. Throughout the paper I use a numerical baseline with $a = 10$, $d = l = 1$, $t = 0.3$, $\lambda = 3$, $\gamma = 2.8$ and $k = 20$. In this baseline the audit

probability peaks at 0.42 near $\sigma = 4$ and falls to 0.05 at $\sigma = 64$, while the burden approaches its limit $\bar{e} = 3.30$.

When the rule of origin is strict enough to rule out legal assembly, the relevant choice is between fraud and direct export. Firm F prefers direct export if and only if $t + e(\tau + s) \geq \tau$. The burden never reaches $\bar{e}$, and no penalty deters fraud once the tariff exceeds $t + \bar{e}$.

Proposition 1 (Fraud ceiling)**.** *Let* $\bar{\tau} \equiv t + \bar{e} = \hat{\tau} + \frac{4t}{7}$.

(i) If $\tau \leq t$*, F never commits fraud.*

(ii) If $t < \tau < \bar{\tau}$*, fraud is deterred if and only if the liability satisfies* $\tau + s \geq \sigma^*(\tau)$*, where*

$$\sigma^*(\tau) = \sqrt{\frac{\kappa(\tau - t)}{\bar{\tau} - \tau}}. \tag{7}$$

The minimal deterrent penalty is $s^*(\tau) \equiv \max\{\sigma^*(\tau) - \tau, 0\}$*. The deterrent liability* σ^* *increases with* τ *and with the audit cost k, and* s^* *diverges as* $\tau \to \bar{\tau}$*.*

(iii) If $\tau \geq \bar{\tau}$*, F prefers fraud to direct export for every penalty* $s \geq 0$*.*

The ceiling $\bar{\tau}$ *depends neither on the penalty nor on the audit cost.*

Proposition 1 separates two instruments that the economics of enforcement usually treats as substitutes. With commitment to audits, any target burden x can be reached with probability $p = x/\sigma$, and a higher penalty allows the government to cut audits without weakening deterrence (Becker, 1968; Polinsky & Shavell, 2000). Without commitment, as in the auditing model of Khalil and Lawarrée (2006), the penalty and the audit probability are chosen by different parties at different times, and customs uses a heavier penalty to save on audits instead of raising the burden. Below the ceiling penalties still deter, at a rising cost. In the baseline, the minimal deterrent penalty is 1.03 at $\tau = 1$, 2.02 at $\tau = 2$, 5.28 at $\tau = 3$ and 27.9 at $\tau = 3.55$, against a ceiling of $\bar{\tau} = 3.60$. At the Cournot price of the direct-export equilibrium, the duty at the ceiling makes up 92 percent of the duty-inclusive price, and a tariff of $\tau = 2$ makes up 57 percent. Figure 1(b) shows the equilibrium regions in the tariff–penalty plane.

The ceiling comes from the incentives of the enforcer. A cheaper audit technology, that is, a lower k, lets the burden approach the ceiling at lower liabilities but leaves the ceiling unchanged. The ceiling rises only if the ex post motive to collect becomes stronger, for example through a higher security weight λ, which raises $\hat{\tau}$ and hence $\bar{e}$, or through a lower fraud cost t.

5.2 Tariff tiers and the reach of enforcement

Tariff schedules cover thousands of product lines, and lines differ in how cheaply origin can be disguised. Homogeneous goods such as steel pipe, aluminium extrusions or chemicals are hard to trace and cheap to relabel, whereas differentiated goods carry brands, serial numbers and specifications. Suppose that each line is a separate market of the kind described above and that lines differ only in the fraud cost t, distributed according to Φ. Let $\varphi \equiv \sigma^2/(\sigma^2 + \kappa) \in (0, 1)$ measure the strength of enforcement, which increases with the liability and decreases with the audit cost.

Corollary 1 (Enforcement bites at low tariffs)**.** *Suppose that the rule of origin is strict enough that legal assembly is not chosen and that every line satisfies Assumption 1. In a line with tariff* τ *and liability* σ*, F*

commits fraud if and only if $t < t^*(\tau, \varphi)$, where

$$t^*(\tau, \varphi) = \frac{7(\tau - \varphi\hat{\tau})}{7 - 3\varphi}. \tag{8}$$

Stronger enforcement lowers the marginal fraud cost, $\partial t^*/\partial\varphi = 7(3\tau - 7\hat{\tau})/(7-3\varphi)^2 < 0$, but by less at higher tariffs, $\partial^2 t^*/\partial\varphi\,\partial\tau = 21/(7-3\varphi)^2 > 0$. The proportional reduction in the marginal fraud cost, $-\partial \ln t^*/\partial\varphi$, decreases with the tariff whenever $t^* > 0$. If Φ is uniform and t^* is interior, the same holds for the share of lines with fraud.

Corollary 1 turns the ceiling into a prediction about tariff tiers. Where the tariff is far below the ceiling, a moderate tightening of enforcement moves most fraudulent lines back to legal modes. Where the tariff is close to the ceiling, the same tightening leaves most fraud in place. Figure OA.1 in the Online Appendix illustrates this pattern with fraud costs distributed uniformly on $[0,2]$. Halving the audit cost deters all baseline fraud at $\tau = 2$, 98 percent of it at $\tau = 2.5$ and 53 percent at $\tau = 3$, and doubling the penalty from 2 to 4 yields almost the same pattern.

5.3 Two enforcement channels

Tightenings of enforcement rarely target fraud alone. Origin verification and supply-chain tracing apply to every declaration of third-country origin, and an anti-circumvention finding reclassifies assembly that is already in operation. Trade data record rerouted goods without recording the mode. To read the mode from a change in rerouting, let lines also differ in the unit cost of assembly at the prevailing rule, γr, distributed according to G independently of t, and let $K = 0$. A line is rerouted, through assembly or fraud, unless F exports directly. By Lemma 1 this happens if and only if $\gamma r \le \tau$ or $t < t^*$, and the share of rerouted lines is

$$S(\tau) = 1 - \big[1 - G(\tau)\big]\big[1 - \Phi(t^*)\big].$$

Consider two forms of tightening. Enforcement against fraud raises φ. Reclassification denies third-country origin, with probability π, to each line that assembles, and those lines fall back to the better of direct export and fraud.

Corollary 2 (Two enforcement channels)**.** *Let every line satisfy Assumption 1, let Φ be uniform, and let t^* be interior at the tariffs $\tau_L < \tau_H$.*

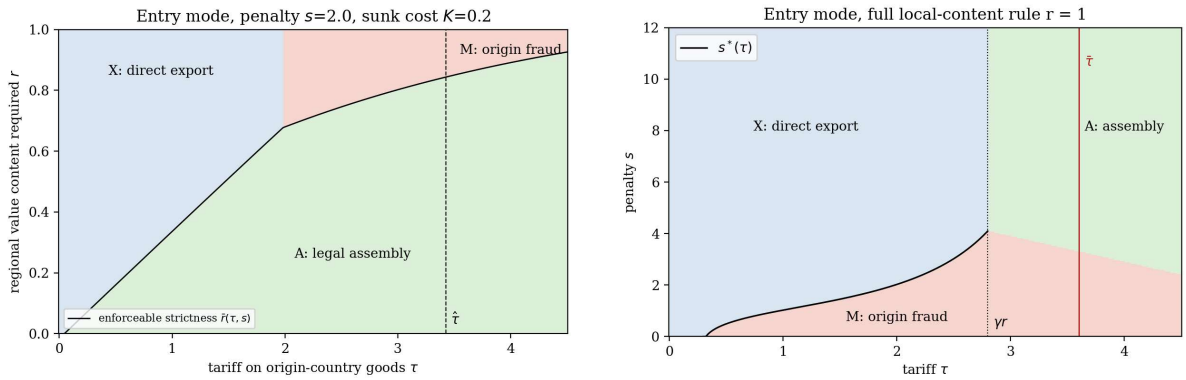
(i) Enforcement against fraud lowers $\ln S$ by more at τ_L than at τ_H, for every distribution G.

(ii) Reclassification lowers S in the proportion $\pi\,\alpha(\tau)$, where $\alpha(\tau)$ is the share of rerouted lines that assemble and would export directly without assembly, $\alpha/(1-\alpha) = G(\tau)\big[1-\Phi(t^*)\big]/\Phi(t^*)$. It lowers S proportionally more at τ_H than at τ_L if and only if

$$\frac{G(\tau_H)}{G(\tau_L)} > \frac{\Phi(t_H^*)\big[1-\Phi(t_L^*)\big]}{\Phi(t_L^*)\big[1-\Phi(t_H^*)\big]}, \tag{9}$$

which holds in particular if no line assembles at τ_L and some line assembles at τ_H.

(iii) Suppose that condition (9) holds and that both instruments change by small amounts. Then a larger fall in $\ln S$ at τ_L than at τ_H requires a rise in φ.



(a) Tariff and rule of origin

(b) Tariff and penalty, $r = 1$

Figure 1: Equilibrium mode of entry. Panel (a): penalty $s = 2$, sunk cost $K = 0.2$; the solid line is the enforceable strictness $\bar{r}(\tau, s)$. Panel (b): full local-content rule, $K = 0$; the solid line is the minimal deterrent penalty $s^*(\tau)$, and the vertical red line is the fraud ceiling $\bar{\tau}$. Baseline parameters: $a = 10$, $d = l = 1$, $t = 0.3$, $\lambda = 3$, $\gamma = 2.8$, $k = 20$. Source: author's calculations.

The two channels move rerouting in opposite directions across tiers. Enforcement against fraud bites at low tariffs, for the reason given in Corollary 1. Reclassification bites where assembly is common, and by Lemma 1 assembly pays only where its cost lies below the tariff, so the mass of assembling lines rises with the tariff. Condition (9) holds when this mass rises faster across tiers than the odds of fraud. It has testable implications. Investment in assembly and the demand for certainty about origin should concentrate in the high tier, and anti-circumvention inquiries, which follow assembly, should target high-tier products. Section 6.5 takes these implications to the data. The replication script `ts_v6_corollary.py` checks the closed forms against simulated product lines.

The two Section 301 tiers provide a test of these predictions, which I take up in Section 6.

5.4 What moves the ceiling

Two recent policy instruments act directly on the ceiling. Both results are stated and proved in the Online Appendix, Section OA.2.

A committed floor p_ℓ on random inspections turns part of the audit rate into a commitment. Because welfare is concave in p, customs then audits at rate $\max\{p_\ell, p(\sigma)\}$, the burden is at least $p_\ell\sigma$, and it grows without bound with the penalty. In the baseline, a floor of 0.1 deters fraud at $\tau = 3.9$, above the ceiling of 3.60, with a penalty of 32.1. Its cost arises only when declarations of T origin are genuine, and it amounts to less than half a percent of welfare.

A tariff τ_T on all goods of T origin, such as the reciprocal tariffs of 2025, raises the ceiling to $\bar{\tau} + 11\tau_T/21$, by about half the transit tariff. Fraud now pays τ_T at the border, but customs, which already collects this duty, wants a smaller audit burden on top of it. Legal assembly also pays τ_T, and the strictest rule of origin that any penalty can enforce falls by τ_T/γ. A transit tariff thus makes fraud easier to deter and legal assembly harder to sustain.

5.5 The optimal rule of origin

Now let the government commit to the rule of origin before F chooses its mode, while audits remain discretionary. Under assembly, the firm's unit cost is γr, there is no revenue, and the share of O content is

$1-r$. Welfare is

$$W_A(r) = G_X(\gamma r) - (\gamma - \lambda)\, r\, q_F(\gamma r), \tag{10}$$

where $G_X(c)$ is welfare under direct export at a tariff equal to c. A unit increase in r costs γ per unit of output in third-country inputs, which the home country does not collect, and it removes one unit of O content, which the home country values at λ. When $\lambda > \gamma$ the home country gains from local content even though it collects no duty. Under Assumption 1(iv), W_A is concave in r, with unconstrained maximiser

$$\gamma r_A^* = \frac{21\gamma\hat{\tau} - 4(\gamma - \lambda)B}{3(8\lambda - \gamma)}. \tag{11}$$

In the baseline, $\gamma r_A^* = 3.32$, hence $r_A^* = 1.19$, and welfare under assembly increases with r over the whole unit interval.

Proposition 2 (Optimal rule of origin)**.** *Let $\lambda > \gamma$, $K = 0$ and $\bar{r}(\tau, s) \leq 1$.*

(i) The optimal rule under commitment is $r^* = \min\{\bar{r}(\tau, s), \max\{r_A^*, 0\}\}$, and F chooses legal assembly. If $r_A^* \geq \bar{r}$, the optimal rule is the strictest enforceable one, $r^* = \bar{r}(\tau, s)$.

(ii) The enforceable strictness is non-decreasing in the penalty. It increases strictly with s while the firm's outside option is fraud, that is, for $s < s^*(\tau)$, and it is constant above $s^*(\tau)$.

(iii) The supremum of $\bar{r}$ over all penalties is $\min\{\tau, \bar{\tau}\}/\gamma$. For tariffs at or above the ceiling $\bar{\tau}$, no penalty can raise the enforceable strictness above $\bar{\tau}/\gamma$.

At equal unit cost for F, assembly beats direct export by $r(\lambda - \gamma)q_F$ and beats fraud by $q_F(\lambda r - e) + kp^2/2$. Direct export yields revenue but carries full origin content, whereas fraud yields less revenue, carries full origin content and requires costly audits. The rule of origin and the penalty are therefore complements. The rule determines how much local content assembly delivers, and the penalty determines how unattractive the fraud alternative is. Because a stricter rule is enforceable only if fraud is costly enough, the government can tighten the rule only as far as enforcement allows, and this complementarity is subject to the same ceiling as deterrence. In the baseline, the supremum of the enforceable strictness is 0.54 at $\tau = 1.5$, 0.71 at $\tau = 2$ and 0.89 at $\tau = 2.5$. At $\tau = 3$ the supremum exceeds one, and a full local-content rule becomes enforceable once the penalty is high enough. Panel (a) of Figure 1 plots the enforceable strictness against the tariff. It rises with τ/γ as long as direct export is the outside option, and above that range it rises only as fast as the burden on fraud and flattens near the ceiling. A tariff increase that is not matched by stronger enforcement makes the government's preferred rule unenforceable. With a positive sunk cost the firm must be left a rent to enter assembly. In the baseline with $K = 0.2$, assembly at the enforceable strictness remains optimal for every tariff of 1.5 or more on a grid of penalties from 0 to 8, while at lower tariffs the government prefers to collect the duty. The Online Appendix treats the case $\lambda < \gamma$.

5.6 Private enforcement and hold-up

Two features of US practice modify these results. Under the False Claims Act, a private relator who exposes customs fraud keeps a share $\rho \in (0, 1)$ of the recovery. A relator cares only about recoveries and ignores consumer surplus, domestic profit and origin content. When it chooses its detection effort after F has chosen its mode, the burden it imposes converges to the level $L \equiv (B - 3t)/6$ that maximises

recoveries from a misdeclaring firm, the peak of the Laffer curve for fraud, independently of ρ and of its effort cost. Section OA.3 of the Online Appendix states and proves the result. Delegation to relators raises the ceiling only if the security motive is weak. In the baseline, $\bar{e} = 3.30$ and $L = 1.85$, and a relator with a small effort cost imposes a heavier burden than customs only at moderate liabilities. Relators therefore complement customs at moderate tariffs and penalties without replacing it, which is the logic of delegation as a partial commitment device (Melumad & Mookherjee, 1989).

The second feature is that the rule of origin is interpreted after the plant has been built, through rulings on substantial transformation and through anti-circumvention inquiries. Suppose the government chooses r after F has sunk K. Once K is sunk, F stays in assembly as long as $\gamma r \leq c_o$, a weaker condition than the one that applies before investment.

Proposition 3 (Hold-up). *Let $\lambda > \gamma$, $K > 0$ and $c_o \equiv \min\{\tau, t + e(\tau + s)\} < \gamma$.*

(i) If $\gamma r_A^* \geq c_o$, the government's ex post rule is $r^d = c_o/\gamma$, which leaves F an operating profit equal to that of its outside option. F cannot recover K and never chooses legal assembly under discretion. Under commitment, F chooses assembly whenever $W_A(\bar{r})$ exceeds welfare in the outside mode, and on that set discretion strictly lowers welfare.

(ii) If $\gamma r_A^* < c_o$, the ex post rule is $r_A^+ \equiv \max\{r_A^*, 0\}$, and F chooses assembly under discretion if and only if $q_F(\gamma r_A^+)^2 - K \geq q_F(c_o)^2$.

(iii) Under the conditions of the proposition, welfare under commitment is at least as high as under discretion.

The mechanism is the classical hold-up of relationship-specific investment (Grout, 1984; Klein, Crawford, & Alchian, 1978), applied to a government that interprets its own rule. It differs from the time-consistency problem of tariffs (Staiger & Tabellini, 1989). Here the government is tempted to raise the local content requirement, which it values because it removes origin content, and the temptation is greatest when the security motive is strongest. In the baseline, the ex post preferred cost of assembly lies between 3.08 and 3.36 for security weights between 1 and 5, above the firm's outside cost of at most 2. Figure 2 compares the two regimes at $\tau = s = 2$. Under discretion assembly disappears altogether. The firm commits fraud when λ is below about 3 and exports directly above this value. Assembly survives only under commitment on 65.3 percent of the grid, and the largest welfare gain from commitment, attained at $\lambda = 3$ with a small sunk cost, is 9.2 percent of welfare under commitment. A binding ruling from Customs fixes origin before the firm invests, but it does not bind the Department of Commerce in circumvention inquiries. The model therefore predicts that rulings are sought most often where the tariff makes assembly attractive, and that circumvention inquiries follow assembly investment with a lag.

6 Evidence from the Section 301 tiers

The model has three predictions for US data. Direct exports respond to the tariff that the firm actually pays. Enforcement against fraud removes a larger share of rerouting in low-tariff lines than in high-tariff lines (Corollary 1), whereas reclassification of assembly acts mainly in high-tariff lines, where assembly pays (Corollary 2). Firms that invest in legal assembly seek commitment to the rule of origin. Product-level trade flows test the first two predictions, and binding origin rulings and enforcement records test the third.

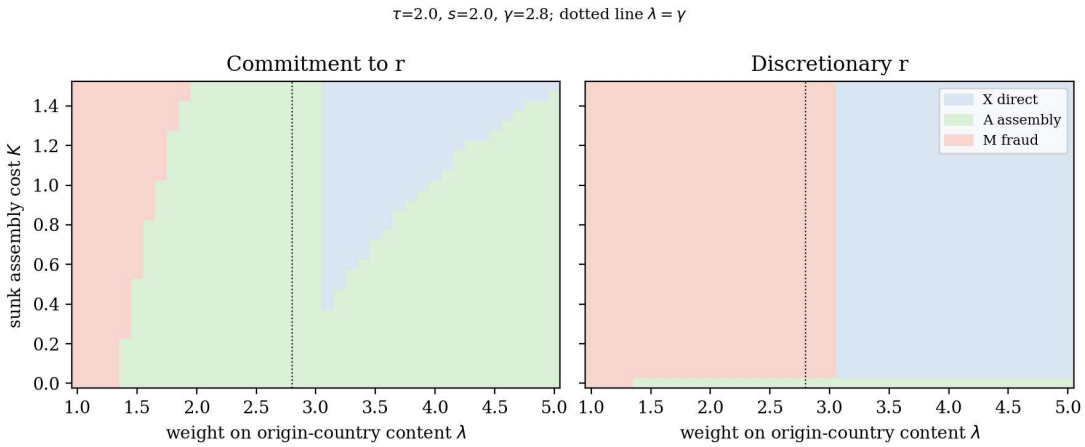


Figure 2: Equilibrium mode under commitment to the rule of origin (left) and under discretion (right). $\tau = 2$, $s = 2$, $\gamma = 2.8$, $k = 20$; blue: direct export, green: legal assembly, red: fraud. The dotted line marks $\lambda = \gamma$. Source: author's calculations.

6.1 Data

The main source for US imports is the international trade database of the Census Bureau (US Census Bureau, 2026). For each ten-digit line of the US tariff schedule and each partner country, it reports the customs value of imports for consumption and the duties actually calculated on them. I aggregate the records to eight-digit lines, keep the 9,056 lines that exist in every year from 2015 to 2025, and record imports from China, from fifteen transit countries and from the world. The transit countries are Vietnam, Thailand, Malaysia, Cambodia, Indonesia, Mexico, Taiwan, Korea, India, the Philippines, Laos, Turkey, Bangladesh, Singapore and Canada. Dividing calculated duties by customs value gives the effective duty rate, which captures exclusions and preferences that statutory rates miss. To compare a transit country's exports to the United States with its exports to other destinations, I use BACI, the CEPII reconciliation of UN Comtrade at the six-digit level (Gaulier & Zignago, 2026), in its HS 2017 vintage for 2017–2024 and its HS 2012 vintage for 2012–2024. The design uses only differences across destinations and tiers within the same exporter and product, and it therefore absorbs the reporting errors of mirror data (Farhad et al., 2024) that are common to a country's destinations.

A line belongs to the 25 percent tier if it is on Lists 1 to 3 and to the 7.5 percent tier if it is on List 4A (U.S. International Trade Commission, 2026). In BACI, a six-digit product takes the highest tier among its lines. The comparison group consists of lines that are on no list. Some of these lines carry other duties, namely Section 232 duties on steel and aluminium and Section 201 duties on solar cells and washers. I identify them as the 228 unlisted lines on which the effective rate on Chinese goods rose by more than five points between 2017 and 2021, and I drop them together with the 158 six-digit products that contain them. Section 232 duties also apply to most transit countries, and keeping these goods would depress the comparison group and inflate the estimated rerouting in both tiers. Binding origin rulings come from the Customs Rulings Online Search System (U.S. Customs and Border Protection, 2026a). The enforcement records cover 142 cases under the Enforce and Protect Act (U.S. Customs and Border Protection, 2026b) and 95 circumvention inquiries opened by the Department of Commerce (Office of the Federal Register, 2026). The Online Appendix, Section OA.5, describes the construction of all variables.

Table 1: Section 301 tiers, duties paid and direct imports from China, 2015–2024

	(1) Duty rate (pp)	(2) OLS	(3) Within HS6	(4) PPML	(5) Sun–Abraham	(6) Imputation	(7) 2SLS, per point
25% × post	20.02***	-0.674***	-0.799***	-0.578***	-0.700***	-0.674***	-0.038***
	(0.18)	(0.063)	(0.127)	(0.071)	(0.061)	(0.062)	(0.004)
7.5% × post	5.50***	-0.131**	-0.109	-0.508***	-0.181***	-0.144**	-0.029**
	(0.18)	(0.065)	(0.080)	(0.095)	(0.067)	(0.072)	(0.014)
Per-point gap							0.009 (0.012)
Pre-period test, p	0.001	0.679					
Randomisation p		0.000 / 0.015					
Observations	66,653	79,452	79,452	74,340	79,452	79,452	79,452
Fixed effects	k, t	k, t	k, HS6×t	k, t	k, t	k, t	k, t

Notes: Unit of observation: HTS8 line and year. Column (1): calculated duties over customs value of US imports for consumption from China, in percentage points. Columns (2)–(7): inverse hyperbolic sine of imports from China, in thousands of US dollars; column (4) is PPML on levels. Columns (5) and (6) report post-period averages with Lists 1–3 treated from 2019, List 4A from 2020 and never-listed lines as controls; standard errors for column (6) are from 99 cluster bootstrap draws. Column (7): 2SLS of the outcome on the change in China's effective rate since 2015–2017 interacted with each tier, instrumented by tier × post. Post is 2019–2024; 2018 is dropped; 228 unlisted lines with Section 232/201 duties are dropped. The pre-period test is the joint test that the 2015 and 2016 event-study coefficients are zero. Standard errors clustered by HS6 product in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: US Census Bureau international trade statistics; Section 301 lists from USITC; author's calculations.

6.2 Duties paid and direct imports

For line k and year t, I estimate

$$y_{kt} = \beta_{25}\,\mathbf{1}[k \in 25\%] \cdot \text{post}_t + \beta_{7.5}\,\mathbf{1}[k \in 7.5\%] \cdot \text{post}_t + \alpha_k + \delta_t + \varepsilon_{kt}, \tag{12}$$

where the post period covers 2019 to 2024. I drop 2018, when only part of the high tier was in force, and I exclude 2025 because the reciprocal tariffs changed the rates on all lines. Standard errors are clustered by six-digit product.

Table 1 reports the results. The effective rate on Chinese goods rose by 20.0 percentage points in the high tier and by 5.5 points in the low tier, close to the statutory rates. Direct imports from China fell by 0.67 log points in the high tier and by 0.13 log points in the low tier, or by 49 and 12 percent. For imports the pre-period coefficients are jointly insignificant, with $p = 0.68$. The import estimates are similar within six-digit products and with the estimators of Sun and Abraham (2021) and Borusyak, Jaravel, and Spiess (2024), which treat Lists 1–3 and List 4A as separate cohorts, and randomisation inference on the tier labels rejects a zero effect in both tiers. Column (7) instruments the change in the effective rate by the tier indicators. Each point of duty reduced direct imports by 0.038 log points in the high tier and by 0.029 in the low tier, and the two responses do not differ significantly. Direct imports respond in proportion to the duty paid.

6.3 Rerouting and the 2022 tightening

For flows from transit country T, the main specification is a triple difference that compares the exports of T to the United States with its exports of the same product to all other destinations,

$$y_{Tkdt} = \sum_{g \in \{25, 7.5\}} \beta_g \mathbf{1}[k \in g] \cdot \text{post}_t \cdot \text{US}_d + \alpha_{Tkd} + \mu_{Tkt} + \nu_{Tdt} + \varepsilon_{Tkdt}. \tag{13}$$

The country–product–year effects absorb any shock to the supply of product k in country T that is common across destinations, including relocation of production that serves all markets. The same design is used by Shi et al. (2026) to detect circumvention of Chinese anti-dumping duties. To test Corollary 1, I split the post period into 2019–2021 and 2022–2024 and ask whether the effect fell more in the low tier. The split follows the tightening of US enforcement described in Section 3, with the forced-labour presumption in force from June 2022 and a record number of circumvention inquiries opened in the same year. Both measures reached legal assembly as well as fraud, and Section 6.5 asks which of the two channels the data reflect.

Table 2 reports the BACI results. Relative to their exports to other destinations, transit-country exports to the United States rose by 0.12 log points in the high tier and by 0.07 in the low tier. In 2019–2021 the effect was 0.12 in both tiers, whereas in 2022–2024 it was 0.11 in the high tier and 0.02 in the low tier. The difference between the tiers in the change is -0.095, with a standard error of 0.018, and none of 200 random permutations of the tier labels produces a larger difference. Per point of duty, in column (5), the low-tier estimate is twice the high-tier estimate. A 7.5 percent tariff was enough to make rerouting profitable in many lines.

Table 3 collects the difference in the change across data sources and samples. The difference is -0.08 when computers and electronics, the chapters most affected by the relocation of production, are excluded, and -0.10 in the HS 2012 panel, in which the average pre-period gap between the tiers is 0.006. Panel B compares US imports from transit countries with US imports from all other suppliers except China, line by line, with line–year effects that absorb any US demand shock. In this comparison the difference in the change is -0.13 by least squares and -0.10 by Poisson pseudo-maximum likelihood, and the pre-period test does not reject. The year-by-year coefficients in Figure 3 show that the BACI gap between the tiers is close to zero through 2021 and reaches -0.20 by 2024. The Census gap opens to about -0.12 in 2020–2021 and widens to -0.30 by 2024.

The test uses the change in the tier gap, which differences out the level of rerouting in each tier. Direct imports from China mirror the fade. Between the two periods the low tier gained 0.10 log points relative to the high tier, with a standard error of 0.03, as expected when rerouted goods return to direct export. The number of new Chinese-owned subsidiaries in transit countries also rose after 2018, most strongly in wholesale and warehousing, and the Online Appendix reports this descriptive evidence.

6.4 Inference and threats to identification

Table 4 examines the clustering of errors, the date of the tightening and pre-existing trends. Following MacKinnon, Nielsen, and Webb (2023), Panel A varies the level of clustering. Clustering by heading leaves the standard error almost unchanged, whereas clustering by the fifteen transit countries raises it to 0.028, and two-way clustering by product and country (Cameron, Gelbach, & Miller, 2011) raises it

Table 2: Rerouting through transit countries, BACI HS 2017, 2017–2024

	(1) $T \to$US	(2) $T \to$US vs. RoW	(3) Split	(4) Split, full sample	(5) Per point (2SLS)
Lists 1–3 (25%) × post	0.112**	0.115***			
	(0.048)	(0.042)			
List 4A (7.5%) × post	0.045	0.069			
	(0.050)	(0.044)			
Lists 1–3 × 2019–21			0.119***	0.194***	
			(0.042)	(0.038)	
Lists 1–3 × 2022–24			0.111**	0.186***	
			(0.049)	(0.043)	
List 4A × 2019–21			0.120***	0.188***	
			(0.044)	(0.040)	
List 4A × 2022–24			0.017	0.088*	
			(0.051)	(0.046)	
$\Delta\tau^{CN}$ × Lists 1–3					0.006***
					(0.002)
$\Delta\tau^{CN}$ × List 4A					0.014
					(0.009)
Difference in change, 7.5% − 25%			-0.095***	-0.093***	
			(0.018)	(0.018)	
Per-point gap, 7.5% − 25%					0.0081
					(0.0074)
Observations	368,018	872,613	872,613	900,256	872,613
Fixed effects	Tk, Tt		Tkd, Tkt, Tdt		

Notes: Unit of observation: transit country, HS6 product, destination and year. The dependent variable is the inverse hyperbolic sine of exports of fifteen transit countries T, in thousands of US dollars. Column (1): exports to the United States. Columns (2)–(5): exports to the United States versus the rest of the world. Column (4) keeps the 158 HS6 products with Section 232/201 lines, which the other columns drop. Column (5): 2SLS with China's effective-rate change on the product, 2019–2024 average minus 2015–2017 average, interacted with each tier and instrumented by the tier indicators. Post is 2019–2024; 2018 is dropped. Standard errors clustered by HS6 product in parentheses.
Source: CEPII BACI; US Census Bureau; author's calculations.

Table 3: Enforcement and the fade of low-tier rerouting: difference in the change

	Difference in change 7.5% − 25%	p-value	Observations
A. Transit exports to the US vs. the rest of the world (BACI)			
HS 2017, 2017–2024, baseline	-0.095***	0.000	872,613
	(0.018)		
randomisation p, 200 permutations of tiers		0.000	
including Section 232/201 products	-0.093***	0.000	900,256
	(0.018)		
excluding HS chapters 84–85	-0.082***	0.000	730,590
	(0.019)		
HS 2012, 2012–2024	-0.102***	0.000	1,516,008
	(0.017)		
B. US imports from transit countries vs. other non-China suppliers (Census)			
HTS8, OLS	-0.130***	0.000	158,904
	(0.034)		
randomisation p, 200 permutations of tiers		0.000	
HTS8, PPML	-0.105**	0.042	157,577
	(0.052)		
excluding HS chapters 84–85	-0.117***	0.001	137,700
	(0.037)		
vs. Japan, Germany and the UK only	-0.081***	0.000	1,430,136
	(0.019)		
C. US imports from transit countries (Census)			
HTS8, country×line and country×year effects	-0.033***	0.001	1,191,780
	(0.010)		

Notes: Each row reports $(\beta_{7.5}^{22\text{–}24} - \beta_{7.5}^{19\text{–}21}) - (\beta_{25}^{22\text{–}24} - \beta_{25}^{19\text{–}21})$ in log points from a specification with tier × period effects. Panel A: triple difference of equation (13). Panel B: transit countries versus all other non-China suppliers of the same HTS8 line, with group × line, line × year and group × year effects; the last row of the panel uses Japan, Germany and the United Kingdom as comparison suppliers. Panel C: imports from each transit country with country × line and country × year effects. Section 232/201 lines are dropped except where stated. Randomisation p-values permute tier labels across products. Standard errors clustered by HS6 product in parentheses.
Source: CEPII BACI; US Census Bureau; author's calculations.

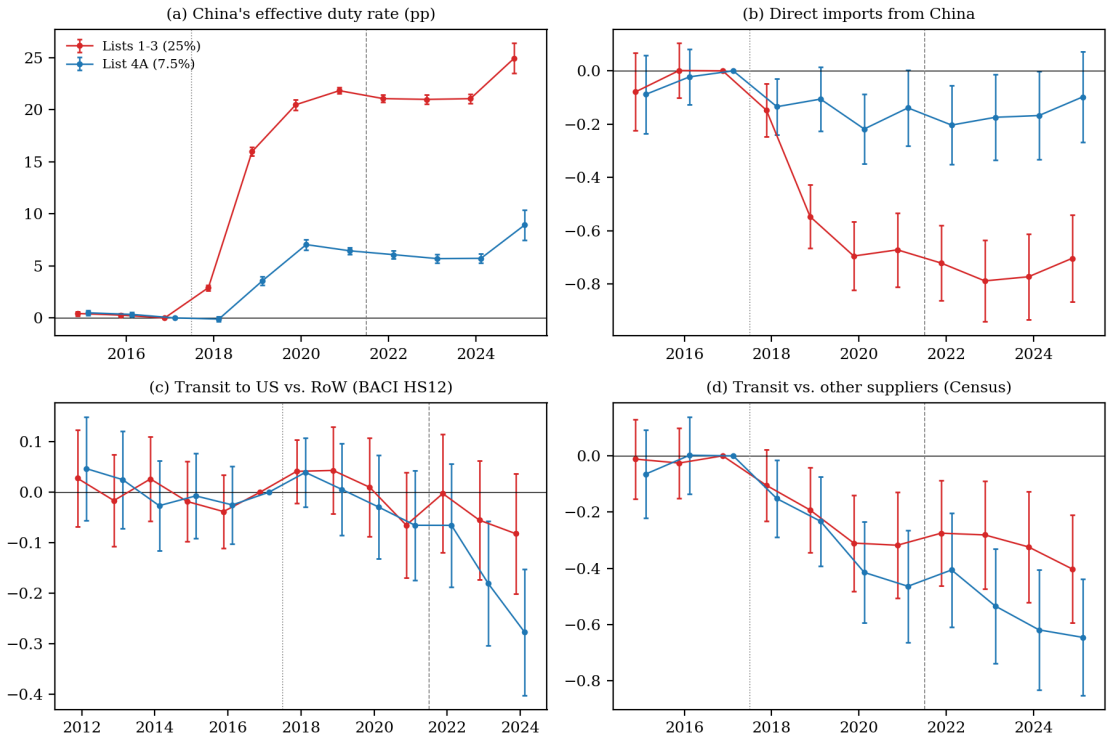


Figure 3: Event studies by Section 301 tier, base year 2017, 95 percent confidence intervals. (a) China's effective duty rate; (b) direct imports from China; (c) transit-country exports to the US versus the rest of the world, BACI HS 2012; (d) US imports from transit countries versus other non-China suppliers. Panels (a), (b) and (d) use Census HTS8 lines. The dotted line marks 2018 and the dashed line the 2022 tightening. Standard errors clustered by HS6 product. Source: US Census Bureau; CEPII BACI; author's calculations.

to 0.029. Because there are only fifteen country clusters, I also report wild cluster restricted bootstrap p-values (Cameron, Gelbach, & Miller, 2008) with the six-point weights of Webb (2023). These p-values are 0.006 with country clusters and below 0.001 with product clusters. After a Holm adjustment over the three headline tests, all three p-values remain below 0.001.

Panel B moves the start of the late period. In BACI, the contrast is -0.03 when the late period starts in 2020, -0.05 when it starts in 2021 and -0.12 when it starts in 2023. The fade thus begins in 2022 and deepens afterwards. In the Census comparison the gap opens in 2020, the first full year of List 4A, and widens after 2022. Panel C drops one transit country at a time. The contrast remains between -0.083 and -0.107 in BACI and between -0.097 and -0.147 in the Census records, and it is significant at the one percent level in every case. Panel D uses the HS 2012 panel. A placebo contrast of 2015–2016 against 2012–2014 is 0.010, with a standard error of 0.018, and the contrast is -0.092 after subtracting an extrapolated linear pre-trend in the tier gap. Under a relative-magnitudes bound in the spirit of Rambachan and Roth (2023), the contrast remains significant if the annual differential trend after 2017 is at most 0.24 times the largest pre-period change, or 0.023 log points a year.

Corollary 1 concerns the tariff, and the test uses the list. To link the fade to the tariff itself, Panel (b) of Figure OA.3 in the Online Appendix groups the listed products by the rise in China's effective rate. The fade is -0.09 where the rate rose by less than 7.5 points and -0.05 for rises of 7.5 to 15 points, and it is zero for larger rises. The first group includes 187 high-tier products on which exclusions kept the duty paid low. Their fade, -0.07, is close to the low-tier fade, whereas the rest of the high tier shows none. The fade follows the duty paid, as the corollary predicts.

6.5 Fraud or relocation?

The 2022 tightening reached both modes of rerouting. Origin verification and the forced-labour presumption apply to relabelled and assembled goods alike, and circumvention inquiries reclassify assembly that is already in place. By Corollary 2, a fade concentrated in the low tier requires enforcement against fraud when legal assembly pays mainly where the tariff is high. This subsection tests the implications of this condition and the product-level signatures that distinguish the two modes. Table 5 collects the estimates, and the Online Appendix reports further splits.

The condition implies that enforcement against assembly should fall on high-tier products. Commerce's circumvention inquiries on Chinese orders opened from 2016 to 2026 name headings that cover 193 of the 3,612 high-tier products, or 5.3 percent, and 14 of the 1,077 low-tier products, or 1.3 percent. Requests for rulings on substantial transformation also rose only in high-tier headings before 2025 (Section 6.6). Panel B drops the products most exposed to enforcement against assembly. Without the circumvention headings the difference in the change is -0.092. Without the priority sectors of the Uyghur Forced Labor Prevention Act it is -0.084, and without both it is -0.083, with standard errors of about 0.02. In each case the fade remains concentrated in the low tier.

Relabelling a Chinese good in T requires that the same six-digit product be shipped from China to T, whereas assembly from Chinese parts imports other products. Panel C calls a country–product pair feasible for relabelling if China exported the product to T in 2017, the year before the tariffs. In feasible pairs the difference in the change is -0.116. In infeasible pairs it is 0.061, and the difference between the groups is -0.177, with a standard error of 0.056. The fade is concentrated in pairs in which relabelling was possible. In infeasible pairs, where rerouting can take only the form of assembly, the high-tier effect

Table 4: Inference and identification checks for the difference in the change

	(1) BACI: transit to US vs. rest of world	(2) Census: transit vs. other suppliers
Difference in change, 7.5% − 25%	-0.095	-0.130
A. Inference: standard error [p-value]		
Clustered by HS6 product (baseline)	0.018 [<0.001]	0.034 [<0.001]
Clustered by HS4 heading	0.021 [<0.001]	0.034 [<0.001]
Clustered by transit country, 15 clusters	0.028 [<0.001]	
Two-way, HS6 and transit country	0.029 [0.001]	
Wild cluster bootstrap p, HS6 clusters	<0.001	<0.001
Wild cluster bootstrap p, country clusters	0.006	
Holm-adjusted p, three headline tests	<0.001	<0.001
B. Placebo dates for the tightening		
Late period starts in 2020	-0.033 (0.021)	-0.146*** (0.038)
Late period starts in 2021	-0.045** (0.018)	-0.134*** (0.036)
Late period starts in 2023	-0.118*** (0.019)	-0.169*** (0.035)
C. Samples		
Leave one transit country out, range	[-0.107, -0.083]	[-0.147, -0.097]
D. Pre-trends, BACI HS 2012, 2012–2024		
Difference in change	-0.102*** (0.017)	
Placebo: 2015–16 minus 2012–14	0.010 (0.018)	
Net of a linear pre-trend in the tier gap	-0.092*** (0.024)	
Breakdown $\bar{M}$, relative magnitudes	0.24	

Notes: Estimates in log points. Column (1): Table 3, Panel A, first row. Column (2): Panel B, first row. The wild cluster restricted bootstrap imposes the null of no difference in the change, with 999 draws, Rademacher weights for HS6 clusters and Webb six-point weights for country clusters. The Holm adjustment covers the 25 percent direct-import effect in Table 1 and the two contrasts. Panel B: the early period runs from 2019 to the year before the stated start, and the late period runs to 2024. Panel D: the breakdown value is the largest $\bar{M}$ for which the 95 percent confidence interval excludes zero when the post-2017 year-to-year change in the differential trend is bounded by $\bar{M}$ times the largest pre-period change, accumulated over the three years between the period midpoints. Standard errors in parentheses, p-values in brackets.
Source: CEPII BACI; US Census Bureau; author's calculations.

Table 5: Fraud or relocation: the difference in the change by product and country group

	Change, 25% tier	Change, 7.5% tier	Difference in change	HS6 products	Country–product pairs
A. Baseline (Table 3, first row)					
All products	-0.008	-0.103***	-0.095***	5,223	72,230
	(0.034)	(0.036)	(0.018)		
B. Excluding products targeted by assembly enforcement					
Circumvention-inquiry headings dropped	0.013	-0.079**	-0.092***	4,939	68,465
	(0.035)	(0.037)	(0.018)		
UFLPA priority sectors dropped	-0.005	-0.089**	-0.084***	4,545	62,887
	(0.036)	(0.039)	(0.022)		
Both dropped	0.018	-0.065	-0.083***	4,270	59,257
	(0.037)	(0.041)	(0.022)		
C. Relabelling feasibility: China exported the HS6 product to T in 2017					
Feasible pairs	0.023	-0.093***	-0.116***	4,982	56,590
	(0.032)	(0.035)	(0.019)		
Infeasible pairs	-0.105**	-0.044	0.061	2,620	10,800
	(0.046)	(0.051)	(0.053)		
Difference	0.128***	-0.049	-0.177***		
	(0.036)	(0.044)	(0.056)		
D. Transit countries					
Assembly hubs	0.079	-0.029	-0.108***	5,210	29,156
	(0.053)	(0.056)	(0.029)		
Other transit countries	-0.065*	-0.150***	-0.085***	5,222	43,074
	(0.038)	(0.040)	(0.021)		
Difference			-0.023		
			(0.034)		

Notes: Change is the rerouting coefficient of equation (13) in 2022–2024 minus that in 2019–2021, in log points; the difference in the change is the low-tier minus the high-tier change. Panel B drops the stated products. In Panels C and D the groups are estimated jointly, with group-specific tier × period coefficients and the fixed effects of equation (13), and the differences between groups are Wald contrasts. Panel B: headings of Commerce circumvention inquiries on Chinese orders, 2016–2026, and the priority sectors of the Uyghur Forced Labor Prevention Act (2022 and 2024 lists). Panel C: a pair is feasible if China exported the HS6 product to T in 2017. Panel D: assembly hubs are Vietnam, Thailand, Malaysia, Cambodia, Indonesia and Mexico. Standard errors clustered by HS6 product in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.
Source: CEPII BACI; US Department of Commerce; US Department of Homeland Security; author's calculations.

fell by 0.105 after 2022, in line with part (ii) of the corollary. Restricting the sample to pairs in which T exported at least 100,000 US dollars of the product before 2018, which removes sporadic flows, gives a gap of -0.166.

Panel D compares the six countries that received most Chinese assembly investment after 2018, Vietnam, Thailand, Malaysia, Cambodia, Indonesia and Mexico, with the other transit countries. If the fade reflected reclassified assembly, it should be stronger in these hubs. The difference in the change is -0.108 in the hubs and -0.085 elsewhere, and the gap between them, -0.023, has a standard error of 0.034. Nor does a reversal of relocation explain the timing, since Chinese investment in assembly locations such as Mexico continued to grow after 2021 (Stein et al., 2026).

The fade thus survives the exclusion of products targeted by enforcement against assembly, is concentrated in pairs in which relabelling was feasible and is no stronger where assembly investment was concentrated. These patterns are consistent with enforcement against misdeclaration removing fraud from the low tier.

Table 6: Binding origin rulings by Section 301 tier, 2013–2026

	(1) all rulings	(2) all, HS2×year FE	(3) China-linked	(4) count (levels)
Lists 1–3 × 2019–24	0.033	0.067**	0.054***	-0.010
	(0.030)	(0.028)	(0.012)	(0.105)
List 4A × 2019–24	-0.096***	0.010	0.009	-0.369**
	(0.036)	(0.040)	(0.012)	(0.164)
Lists 1–3 × 2025–26	0.057	0.097**	0.073***	0.107
	(0.035)	(0.040)	(0.024)	(0.127)
List 4A × 2025–26	0.025	0.064	0.096**	0.837*
	(0.055)	(0.056)	(0.042)	(0.480)
Mean of dependent variable	0.207	0.207	0.064	0.422
Observations	15,899	15,899	15,899	15,899
Fixed effects	HS4, year	HS4, HS2×year	HS4, year	HS4, year

Notes: Unit of observation: HS4 heading and year. Columns (1)–(3): inverse hyperbolic sine of the number of origin rulings citing the heading; column (3) counts China-linked rulings only; column (4) is the count of all rulings. 2018 is dropped. Standard errors clustered by heading in parentheses.
Source: US Customs and Border Protection, Customs Rulings Online Search System; author's calculations.

6.6 Enforcement records and the demand for commitment

The two US procedures correspond to the distinction in the model between enforcement against misdeclaration and tightening of the rule of origin. Investigations under the Enforce and Protect Act ask whether goods declared as third-country goods were in fact made in the targeted country. The procedure covers only goods subject to anti-dumping or countervailing duty orders. Of the 142 cases, 92 percent concern goods from China, and evasion was found in 87 percent of determinations. Among the cases with a coded product group, 80 percent concern homogeneous goods in the classification of Rauch (1999), compared with 35 percent of all six-digit products, in line with the finding of Shi et al. (2026) that circumvention of anti-dumping duties concentrates in less differentiated products. Circumvention inquiries instead ask whether assembly in a third country should be covered by the original order. Of the 95 initiations, 81 percent concern orders on China and 75 percent of final determinations are affirmative, and the share naming a Southeast Asian country rose from 22 percent before 2018 to 47 percent afterwards. Hardwood plywood follows the sequence of the hold-up result. After the orders on Chinese plywood, Commerce opened an inquiry into plywood completed in Vietnam in 2020 and found circumvention in July 2023 (International Trade Administration, 2020, 2023b).

If hold-up matters, requests for binding rulings should rise where the tariff makes assembly attractive. I estimate a version of equation (12) for 7,448 origin rulings issued from 2013 to 2026, at the level of four-digit headings and with separate post periods for 2019–2024 and 2025–2026. China-linked rulings are those that mention Chinese inputs, name a transit country and discuss substantial transformation. Table 6 shows that they rose by 0.054 in high-tier headings during 2019–2024, against a sample mean of 0.064, and by 0.073 in 2025–2026. In low-tier headings they rose only in 2025–2026, when the reciprocal tariffs raised the stakes for all Chinese goods, and the event study shows no trend before 2018. Customs granted third-country origin in 71 to 76 percent of China-linked rulings in every period. The ruling gives the firm commitment against Customs, although not against Commerce.

The reciprocal tariffs of 2025 raised the rate gap between Chinese and transit-country goods in every tier, and the model then predicts rerouting in all lines and no tier contrast. In the Census comparison the

2026 tier contrast is 0.005, with a standard error of 0.048, as the prediction implies. Section OA.7 of the Online Appendix reports the details.

7 Implications for trade policy

The results bear on how importing and transit countries design origin regimes.

Heavier penalties alone do not deter fraud at high tariffs. The 40 percent duty that the United States imposed in 2025 on transshipped goods sharply raises the liability on misdeclared origin. When customs selects shipments for verification case by case, it responds to a heavier liability by auditing less, and the expected burden on fraud stays below a ceiling set by the agency's own interest in collecting duty. Above that ceiling no penalty deters fraud, however large. Only verification that does not depend on the individual case removes the ceiling, such as audit quotas or random inspection rules fixed in advance, or mandatory supply-chain tracing for listed products. The rebuttable presumption of the Uyghur Forced Labor Prevention Act works in this way, and in the model a modest committed floor on random audits deters fraud above the ceiling at small cost. Trade agreements can write such commitments into their origin chapters, as the verification and withdrawal provisions of the USMCA do.

Tariff levels and enforcement should be set together. The strictest rule of origin that keeps firms in legal assembly rises with the penalty, but only until the burden on fraud reaches its ceiling. A tariff increase that is not matched by stronger verification shifts rerouting from the legal to the illegal form. The two Section 301 tiers are consistent with this pattern. After enforcement intensified in 2022, rerouting fell to almost nothing in the 7.5 percent tier and in the high-tier products on which exclusions kept the duty paid low, while rerouting in the rest of the 25 percent tier did not change. Enforcement resources are most productive where tariffs are moderate, which also offers a reading of the Thai watchlist evidence of Hayakawa and Sudsawasd (2025).

Taxing the transit country is a blunt substitute for verification. A tariff on all goods of transit-country origin, such as the reciprocal tariffs of 2025, raises the fraud ceiling by about half the transit tariff, because fraud pays the duty at the border whether or not it is detected. The same duty falls on legal assembly and on the genuine producers of the transit country. It lowers the strictest rule of origin that the importing country can enforce and narrows the margin between the tariff on the origin country and the tariff on the transit country, which is what makes legal relocation worthwhile. A transit tariff thus trades lower fraud against less legal relocation, and the trade-off is least favourable where the transit country hosts genuine producers.

Firms need commitment to the rule of origin itself. When the authority that interprets substantial transformation, or that conducts anti-circumvention inquiries, can tighten the rule after firms have built assembly capacity, firms anticipate this and do not build. They export directly or commit fraud instead. Binding rulings from US Customs give firms commitment against one agency but not against the Department of Commerce, whose circumvention findings can reach plants that Customs has treated as third-country producers. The European Union faces a milder version of the problem, because its anti-circumvention test fixes numerical thresholds for parts and value added in advance (European Parliament and Council, 2016). Aligning the origin standards of the agencies involved, or making an advance ruling under the Trade Facilitation Agreement binding for anti-circumvention purposes for a fixed period, would give firms the commitment they seek. The rise in China-linked origin rulings since 2019 indicates that

firms value such commitment. Private enforcement does not resolve these problems, because relators paid from recoveries push the burden on fraud only up to the revenue-maximising level.

8 Conclusion

This paper studies a firm that faces a tariff and can export directly, assemble legally in a third country, or ship through that country and misdeclare origin. The importing government sets the penalty and the rule of origin, but customs chooses audits after the firm has chosen its mode, and the rule can be tightened after assembly capacity has been sunk. In both cases an enforcer that acts after the firm has moved uses its discretion in ways that weaken the policy it is meant to enforce.

Discretionary audits cap the expected burden on fraud, because heavier penalties are offset by fewer audits. Above a tariff ceiling no penalty deters fraud, and stronger enforcement removes a larger share of fraud where tariffs are low. Under commitment, the optimal rule of origin is the strictest rule that keeps the firm in legal assembly, and penalties can raise this rule only up to the same ceiling. Without commitment to the rule, the government tightens it after the firm invests, and legal assembly disappears. Relators paid from recoveries help at moderate liabilities, and a tariff on the transit country raises the ceiling at the expense of legal relocation. In the numerical baseline, legal assembly survives only under commitment on 65 percent of the parameter grid, and the welfare loss from discretion reaches 9 percent.

The US evidence fits these predictions. The Section 301 tiers raised the duty paid on Chinese goods by 20 and 5.5 percentage points, and direct imports fell by 49 and 12 percent. Transit-country exports to the United States rose by about 0.12 log points in both tiers in 2019–2021. After enforcement tightened in 2022, the low-tier gain disappeared while the high-tier gain persisted. This difference of about 0.10 log points holds in mirror trade data with a long pre-period and in US import records against other suppliers, and it survives few-cluster inference and the exclusion of any single transit country. The fade is concentrated where the duty paid rose by less than 7.5 points. It survives the exclusion of products targeted by anti-circumvention and forced-labour enforcement, it is concentrated in country–product pairs in which China already shipped the same product to the transit country before 2018, and it is no stronger in the main assembly hubs. Circumvention inquiries and China-linked origin rulings concentrate in high-tier products, where legal assembly pays, and the fade is consistent with enforcement against fraud.

The credibility of origin verification, more than the size of penalties, determines how much rerouting a tariff causes and what form that rerouting takes. Committed verification rules, origin standards that bind every agency and advance rulings that protect assembly investment would each raise the share of rerouting that takes the legal form.

Two directions for future research follow. Firm-level customs records that link exporters in transit countries to their Chinese suppliers, of the kind used by Iyoha et al. (2025), would allow the tier contrast to be estimated separately for relabelling and for assembly. A joint analysis of anti-dumping orders and Section 301 tariffs could measure how the two duties interact in the choice between fraud and relocation.

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