Costly Imports: Exchange Rate shocks and Trade Misreporting by Firms*

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Abstract

This study examines the magnitude and persistence of misdeclaration of imports by firms in the wake of unexpected currency movements. Based on a unique feature of administrative data encompassing the universe of import transactions for Pakistan, we hypothesize that the incentive to under-invoice imports to evade tariffs changes significantly as a result of an appreciation of the local currency. We exploit the sizeable depreciation of the British pound following the unanticipated passing of the Brexit referendum as a quasi-natural experiment to demonstrate that there is a statistically significant decline in misreporting of imports sourced from the United Kingdom, relative to imports from the rest of the world, in response to the exchange rate shock. Our findings are corroborated by several robustness checks, and help shed light on the key underlying mechanisms at play.

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1 Introduction

Misdeclaration of economic and business activities is a widespread practice. There has been a growing interest in understanding misreporting practices by firms engaged in international trade. Firms face a wide range of incentives to forge trade transactions in official documents, such as, a financial gain in the form of reduced duty payments or the receipt of export subsidies, which makes it particularly challenging to empirically assess the prevalence and scale of misinvoicing. Despite a growing significance of international trade for economic growth in many countries, the existing empirical literature has made modest progress in identifying the micro-foundations of trade misreporting. The results obtained from aggregate data and mirror trade statistics are highly sensitive to the methodological approach used (Nitsch 2016; Yang 2008). Consequently, understanding the responsiveness of misreporting behaviour to exogenous shocks, such as, a change in trade costs or policy actions introduced to reduce fraudulent reporting, has remained largely unexplored.

This study attempts to fill this crucial gap in the literature. We use a comprehensive database encompassing the universe of import transactions for Pakistan to investigate the dynamics of misinvoicing practices of importers in response to unanticipated changes in trade costs. Our customs records are characterized by a unique feature generally missing from comparable administrative data. By observing the import price declared by the firm at the port of entry, and the corresponding price *assessed* by the customs officer, for a narrowly defined product category, we can estimate the precise degree of attempted under-invoicing and tax evasion by firms.[1] Using this measure of attempted misreporting, we then investigate whether misdeclaration incentives adapt to changes in import costs arising due to sudden and unexpected exchange rate movements.

In particular, we exploit the unforeseeable nature of the Brexit referendum result, and the subsequent depreciation of the British pound to characterize misreporting patterns of Pak-

[1]Tariff evasion can take place in the form of misdeclaring the unit value of imported products, under-counting import quantity, and/or misclassification of products (Fisman and Wei 2004; Khan et al. 2024). Our data permits us to investigate only the first type of misdeclaration.

istani firms sourcing imports from the United Kingdom relative to imports originating from other countries. The referendum results of June 23, 2016, when a small majority of 51.9 percent of voters in the United Kingdom voted in favor of Brexit, came as a big surprise. The resulting depreciation of the pound serves as a quasi-natural experiment that brought about a drastic reduction in the price of British goods in other countries (see Figure 1). By employing a difference-in-differences estimation methodology, we document that there is a significant decline in misinvoicing of UK imports in response to the transmission of the exchange rate shock associated with Brexit, compared to imports sourced from other countries. The estimates obtained correspond to an approximately 35 percent decline in unit value gaps after June 23, 2016. We hypothesize that the cost-savings arising due to an appreciation of the Pakistani rupee against the pound prompted importers to more accurate reporting of British imports. Furthermore, following Javorcik and Narciso (2017), we formally test whether tariff evasion serves as the primary mechanism for under-reporting of imports by estimating the semi-elasticity of unit value gaps with respect to duties charged on imported goods. Our estimates suggest that the exchange rate change prompted by Brexit had a stronger impact on products with higher tariff burdens when the British Pound (GBP) was used as the mode of payment. Thus, there is a strong evidence of the displacement of tariff evasion driven by the depreciation of the pound, in line with the expectation that a stronger domestic currency lowers the financial gain associated with under-invoicing of imports. Our findings are supported by numerous robustness checks, and we address concerns regarding potential measurement issues in relation to the misreporting measure used.

We aim to address key questions in the current literature, and make several contributions. First, this study is one of the first to unlock customs database to identify the dynamics of misinvoicing behaviour of firms. An empirical examination of misdeclaration has proved to be challenging due to the difficulties in quantifying evasion (Zitzewitz 2012). Earlier studies have used discrepancies in trade statistics reported by the exporting and importing countries as indirect measures of tariff evasion (Kellenberg and Levinson 2019), to demonstrate how tax evasion varies with duty rates (Stoyanov 2012; Mishra et al. 2008), product attributes (Javorcik and Narciso 2008), enforcement levels (Kellenberg and Levinson 2019), or import-

ing country characteristics (Jean and Mitaritonna 2010). This study, on the other hand, sheds light on the micro-foundations of evasion elasticities by directly observing transaction-level trade data. To our knowledge, this is a novel feature of our customs data, unexplored in existing studies, and despite the limitations discussed below, offers a major breakthrough in the tax evasion literature. Perhaps closest to us is the study by Chalendard et al. (2023) that uses customs data from Madagascar to study systemic corruption and tax evasion practices in the form of manipulation of assignment of import declarations to inspectors.

Second, given the unexpected nature of the Brexit vote assumed to be systematically unrelated to the outcome variable, and that the 'treatment' is adopted at a given time only for a single country, our approach can be used to provide a causal interpretation (Goodman-Bacon 2021). Our identification strategy compares outcomes before and after the Brexit vote across firms importing from the UK as opposed to other countries to causally establish whether under-invoicing incentives adapt to exogenously driven currency movements. We present evidence supporting the parallel-trends assumption, i.e., misreporting patterns would have evolved similarly in the absence of Brexit, regardless of the country of origin of imports. A high-dimensional fixed effects specification controls for time-invariant differences across products and geographic characteristics, as well as changes that affect all imports similarly. Thus, our study makes a methodological contribution to the existing literature evaluating trade misreporting.

Third, owing to the detailed nature of our dataset, we exploit additional sources of variation to isolate the effect of trade costs on attempted tariff evasion compared to those highlighted in the literature. This approach offers an additional advantage if the propensity to under-invoice is systematically correlated with other aspects of the transaction that may potentially affect evasion, such as, import volumes, effective duty rate, product characteristics, or frequency of importing (Khan et al. 2024). The literature is divided on whether higher tariff rates foster incentives for tax evasion, or if lower tariffs raise private agents' ability to pay more bribes via an income effect (Sequeira 2016). The relationship has been shown to depend on the modeling assumptions about risk aversion and the punishment for evasion. We document that the estimated deviation of declared value from assessed value of imports is systematically and

positively linked with the import duty charged. Our paper also examines the heterogeneity in estimates across product types (for example, standardized versus differentiated goods) and mode of entry (for example, manual as opposed to electronic), and obtains several interesting results.

Finally, our paper contributes to the strand of literature examining the economic effects of Brexit (Bloom et al. 2019; Dhingra et al. 2016; Hobijn et al. 2021). Brexit acted as a large domestic disturbance which triggered the sterling to depreciate unilaterally against all major foreign currencies. Corsetti et al. (2022) analyze the dynamics of exchange rate pass-through and pricing to market by British exporting firms following Brexit, and document that the aggregate shares of invoicing currency remain remarkably stable over time. We observe a similar trend in Pakistan's customs data, and build on this observation to inspect the responsiveness to the currency shock by firms *importing* from the UK.

Although a substantial amount of false reporting also takes place in advanced economies, the problem is particularly relevant for developing countries due to their weaker tax collection capacity and reliance on customs revenues (Slemrod and Yitzhaki 2002; Johannesen et al. 2020; Wier 2020).[2] Many developing and transition economies depend on revenues from border taxes since the collection of import duties appears to be relatively easier to enforce compared to other forms of taxation. Pakistan offers an interesting case to examine tariff evasion. The country has become increasingly reliant on imports over the past two decades, and revenues from customs capture a significant share of the overall state revenue from taxation.[3] In addition to the loss of revenue, tariff evasion results in unduly favoring politically well-connected firms, whilst penalizing importers that report honestly (Rijkers et al. 2017). Thus, we offer broader insights about policy actions that can be used to discourage fraudulent reporting of cross-border transactions, such as, lower tariff rates and currency stabilization.

[2]According to Kar and Spanjers (2014), the total volume of trade misinvoicing in developing countries in 2013 was approximately $1.1 trillion, and the total over 2004-13 for 55 developing countries was estimated to be roughly $7.8 trillion.

[3]Regulatory and customs duties in Pakistan accounted for approximately 16 percent of total tax revenue in 2019.

The remainder of the paper is organized as follows. Section 2 provides an overview of Pakistan's customs trade data. Section 3 describes our empirical methodology. The results are discussed in Section 4, and the final section concludes.

2 The FBRP Data

We use data collected by the Federal Board of Revenue Pakistan (FBRP) from January 1st, 2016, to December 31st, 2016, which records transactional data for all export and import activities in Pakistan. It contains comprehensive information about the date of the transaction, product imported (8-digit standard industrial classification system, SITC), origin country, total imports, and the unit value of imports (Liaqat et al. 2021). For each transaction, we also observe an identification code for the importing firm which allows us to track imports by the firm overtime. Table 1 reports the descriptive statistics. Out of a total of 27600 Pakistani importers, approximately 3749 firms sourced imports from the United Kingdom in 2016. For each transaction, we observe two measures of unit values. First, the data provides the unit value declared by the firm. Next to the unit value declared, we also observe the unit value assessed and recorded by the customs officer for the same transaction at the port of entry. Additional information available at the transaction level includes a brief product description, as explained below, as well as the currency denomination of the imported shipment, such as, the Pakistani rupee (PKR), US dollar (USD), British pound (GBP), and so forth. For the purpose of our analysis, all import values are converted into Pakistani rupees. The dataset also reports the total amount of customs duties and taxes paid for each transaction, that are used to calculate an effective duty rate associated with each import transaction, governed by the Statutory Regulatory Orders (SROs) issued by the FBR regarding specific rules, duties, or exemptions for certain imports.

To understand the process of recording imports by FBRP, let us consider a typical import transaction. When a shipment arrives at a Pakistani port, the importing firm must declare the unit price of the product for the calculation of duties due to the customs office. At the same time, the quantity of shipment is also recorded and can be verified at the port. The

legal framework, procedures, and guidelines for valuation are rooted in the Customs Act, 1969, and related SROs and valuation rulings. There may be a disagreement about the unit value of the product which affects the total amount of import duties charged. If the customs officer does not agree with the value declared by the firm, further documentary evidence is requested to gauge the price of the product. The customs officer may also use recent data available from FBRP to assess the true value of the product by checking recorded valuations of the same (or similar) narrowly defined product category imported recently from the same foreign country. Furthermore, customs records include a brief product description that can assist with more accurate assessment. For example, SITC-8 64039900 product descriptions include detail about the type of leather footwear imported, such as, men's leather shoes with rubber sole, infant baby booties, joggershoes made of artificial leather, ladies shoes freckle ice silver leather, and so forth.

After a thorough evaluation of the declared versus recently assessed values available in past customs records and consistency with market data on international prices, the customs officer has the final authority to appraise the unit value for the shipment, and the value assessed is then used for the calculation of customs duties and applicable taxes. In case a disagreement arises, the firm possesses the right to appeal to the customs directorate and claim a refund for the extra duties paid at the time of clearance of the shipment. As illustrated in the Appendix, the data reveals significant variation in assessed unit values for most imported products sourced from the same country of origin within a specific duration of time.[4] Table 1 indicates that the mean declared value for import shipments is less than the average value assessed by customs officials.

Our data also records the mode of transactional entry used for each observation, i.e., elec-

[4]See Figure A.1. It illustrates the distribution of assessed unit values for four different narrowly defined SITC-8 product categories imported from a given country within the same month. Each graph indicates the product code, product description, country of origin, and the time period considered. For example, the top-right plot shows the variation in the assessed unit import values of rubber ring imported from the United Kingdom in January 2016. The figure depicts distributions for other product groups as well as source countries, and for different time windows. This pattern generally holds for a large number of product categories and is indicative of a significant assessed unit price difference within a product-country pair (Khan et al. 2024).

tronic as opposed to the conventionally used manual recording. We make use of this information in our empirical analysis. In 2011, the FBRP introduced an electronic system of recording import transactions, known as Web-Based One Customs (WeBOC), for clearance of shipments arriving at various ports of entry. The revised clearance system involved digitization of customs procedures and records for businesses, clearing agents, and regulatory agencies, whereby customs valuation, examination, tax/duty payments, and release orders were to be electronically managed. The primary motivation for its implementation was to lower clearance time and paperwork, as well as to improve transparency and tax compliance. Furthermore, the Risk Management System of inspections included classification of shipments through various channels ('Green', 'Yellow' or 'Red' channel) based on past compliance by the firm, but also depending on other factors, such as, the nature and origin of goods, valuation history, and HS codes. Both the Yellow and Red channels, for instance, indicate medium to high levels of risk, respectively, and require either physical inspection or document verification, or both, before issuing clearance. The customs officers are directed to conduct a thorough review of documents (Goods Declaration (GD) including a commercial invoice, packing list, certificate of origin, import permit, and sales tax registration), ask clarifying questions regarding potential discrepancies, and complete a full physical examination in the case of high-risk Red channel assignments. The Red channel is typically assigned to firms with a record of past violations, high-valued or restricted import transactions (such as, pharmaceuticals or luxury items), or other suspicious consignments. Finally, the customs office may also conduct audits after clearance to check compliance and valuation accuracy.

3 Methodology

For each import transaction, we compute the divergence, if any, between the value of import shipment declared by the firm and its value assessed by customs officials:

$$y_{ipkt} = \log(\frac{\text{Assessed value}_{ipkt}}{\text{Declared value}_{ipkt}}) \tag{1}$$

where y_{ipkt} represents the wedge between assessed and declared values of product p imported by firm i from country k on the date of the transaction t. Ideally, one would expect the ratio to be equal to one, i.e., the firm declares the actual import value, and no misdeclaration takes place. If under-invoicing does indeed take place, y_{ipkt} becomes positive.

As indicated in Table 1, the average value of y_{ipkt} is 0.41 over the sample period. Nonetheless, for approximately 70 percent of the transactions, there is no divergence in assessed and declared import prices. In the context of our study, we focus on the incidence of under-reporting, and exclude observations for which the declared value is greater than assessed value (i.e., $y_{ipkt} < 0$). This amounts to less than 2.9% of the transactions, but may be indicative of other motives for misreporting foreign trade transactions rather than attempting to circumvent tariffs. Although the existence of capital and currency exchange controls, especially in the context of developing countries, is believed to be an important reason for misreporting cross-border transactions, the goal of this study is to understand tariff evasion as a motive for *under*-declaration of import prices.[5] It is, nevertheless, reassuring that there were no major exchange rate or capital controls policy changes during the time period under consideration, and we observe no drastic shifts in the relatively small fraction of observations with negative unit value gaps after the Brexit vote results were announced.

Our goal is to identify the consequences of a sudden depreciation of the pound on the variation in misreporting incentives faced by Pakistani importers. We compare the extent of misdeclaration before and after the exchange rate shock, for import transactions with UK versus other countries, by estimating the following model:

$$y_{ipkt} = \alpha(\text{UK}_k \times \text{Post-Brexit}_t) + \beta X_{ipkt} + \gamma_p + \gamma_k + \delta_m + \varepsilon_{ipkt} \tag{2}$$

where the outcome variable is misreporting defined in Eq. 1. UK_k is an indicator for imports sourced from the United Kingdom. Post-Brexit_t assumes the value of one for transactions dated after the announcement of the referendum result, and zero otherwise. We also control

[5]Figure A.2 depicts the distribution of y_{ipkt}, and illustrates that instances of unit value gaps are predominantly cases of under- rather than over-invoicing.

for product, country, and month fixed effects, given by γ_p, γ_k, and δ_m, respectively. As a robustness check, we also estimate Eq. 2 after replacing δ_m by δ_t, i.e., using daily instead of monthly fixed effects. The product fixed effects (SITC-8) control for the possibility that some goods are relatively easy to monitor, or that customs officers are more conscientious about particular goods. X_{ipkt} is a vector of time-varying transactional controls, such as, import quantity and duties paid, and shipping-port location.

To test the relationship between the exchange rate shock and tax evasion by Pakistani importers, we examine whether the semi-elasticity of the unit value gap with respect to the tariff rate changes in the wake of the announcement of the referendum result. More specifically, we follow the procedure adopted by Javorcik and Narciso (2017) to offer evidence on displacement of tariff evasion driven by the Brexit vote:

$$y_{ipkt} = \beta_1(\text{UK}_k \times \text{Post-Brexit}_t) + \beta_2 \text{Duty rate}_{ipkt} + \beta_3(\text{UK}_k \times \text{Post-Brexit}_t \times \text{Duty rate}_{ipkt}) + \gamma_p + \gamma_k + \delta_m + \varepsilon_{ipkt} \quad (3)$$

where Duty rate_{ipkt} measures the effective rate of import duties charged. We interpret a positive semi-elasticity of y_{ipkt} with respect to the duty rate ($\beta_2 > 0$) as evidence of tariff evasion. The three-way interaction term, on the other hand, allows for the possibility that the referendum result affected under-invoicing incentives faced by Pakistani importers. As explained in Section 4.5, we also estimate an alternate specification, whereby UK_k is replaced with an alternative form of treatment, namely, an indicator variable for transactions denominated in the British pound, GBP_k.

Thus, while the existence of a unit value gap and its association with $\text{UK}_k \times \text{Post-Brexit}_t$ (Eq. 2) is suggestive of tariff evasion, it does not shed light on the underlying mechanisms driving a drop in under-reporting by importers due to a depreciation of the pound. A negative and statistically significant semi-elasticity of y_{ipkt} with respect to import duties in the post-Brexit period would imply a systematic relationship between attempted tariff evasion and the duty rate charged, and would thereby, offer evidence of more accurate reporting after the exchange

rate shock in line with our hypothesis.

A potential challenge associated with using multi-way fixed effects models arises when treatment effects are heterogeneous across either groups or over time. The event study design, along with the fact that our treatment is adopted at a given time only in a single country, may be sufficient to address this concern (Goodman-Bacon 2021). We allow for within-cluster autocorrelation by using a cluster-robust variance-covariance estimator to estimate standard errors. With a sufficiently large number of product clusters, the variance-covariance estimators are expected to be asymptotically valid.

If misdeclaration patterns for firms importing from the UK as opposed to other countries would follow the same trend in the absence of the Brexit vote, the coefficient α identifies the differential impact of the shock on imports from the UK relative to the rest of the world (Schmidheiny and Siegloch 2019; Borusyak and Jaravel 2018). Figure 2 provides descriptive evidence that the 'treated' and control firms would have maintained similar differences as in the baseline period in the absence of the treatment. It previews our main results by tracking the scale of misreporting before and after the announcement of the Brexit vote results for imports originating from the UK as opposed to those sourced from other countries. To construct this graph, we follow the approach used by Korovkin and Makarin (2023). We first regress y_{ipkt} on firm fixed effects, and then calculate median residuals for the two subsets of import transactions by firms based on the country of origin. Subsequently, we residualize out time fixed effects measured by the date of the transaction, and exclude outliers defined as values of y_{ipkt} above the 99th percentile.

Before June 23, 2016, the two groups of firms behaved very similarly. However, after the Brexit vote, there is a substantial drop in misinvoicing by firms importing British products relative to imports from the rest of the world. Furthermore, the gap between the two subsets of firms is always of the same sign and increasing over time.[6] To study the dynamic path of

[6]One may worry that the differences in misreporting patterns may be due to some omitted firm-level characteristics that themselves cause a heterogeneous response by firms. To assuage this concern, we construct an alternative figure that excludes firms that never misreport. There are approximately 7300 distinct firms with no reported misinvoicing in 2016. The resulting figure

treatment effects and as an additional test for pretrends, we also conduct an alternative estimation by including a full set of date-month dummy variables, along with several extensions to the baseline methodology.

4 Estimation Results

4.1 Misreporting and the exchange rate shock

The baseline results are presented in Table 2. Column (1) shows the estimates obtained when only the treatment variable is included in estimating Eq. 2, and the remaining specifications also include additional transaction-specific controls, such as, the volume of imports and duty paid. Columns (1) and (2) control for seasonal effects, while the remaining estimates also include product, origin country, and shipping port fixed effects. Assuming that there were no simultaneous shocks of similar magnitude, and the fixed-effects model describes the data-generating process correctly, we observe a significant reduction in the level of misreporting of imports shipped from the United Kingdom after June 23, 2016, relative to imports sourced from other countries. The estimates correspond to an approximately 35 percent decline in our measure of import price under-reporting.

To present a visual exploration of these results, we estimate a date-by-date form of the specification used. That is, instead of an interaction with the post-Brexit indicator, we interact UK_k with a full set of day-month dummy variables. The regression equation takes the following form:

$$y_{ipkt} = \beta \times \sum_{s \neq \text{June 22}} \mathbb{1}[s = t] \times \text{UK}_k + \gamma_p + \gamma_k + \delta_t + \varepsilon_{ipkt}$$

where t indicates the recorded date, and δ_t controls for daily fixed effects. We include event study coefficients indicated by date, relative to one day before the announcement of the result. The coefficient plot displays the results (see Figure 3).

provided in the Appendix (Figure A.3) produces patterns that are similar to Figure 2, and further corroborate the absence of pretrends.

First, there is no evidence of pretrends, reinforcing the pattern observed in Figure 2. Due to a highly disaggregated nature of the data, i.e., daily observations of import transactions, there is a substantial degree of variation in pre-Brexit event study coefficients, displaying no consistent pattern, with a large number of coefficients statistically not different from zero. Second, the differential impact of Brexit on misinvoicing of imports originating from the UK as opposed to other countries stayed negative and significant until the end of our time period. This lasting effect is consistent with the fact that the rate of exchange of the British pound in terms of Pakistani rupee remained below 2016 pre-Brexit average at the end of the year (see Figure 1). Overall, the estimates point to a sizeable differential decline in under-invoicing across firms depending on the source of imports. Table 2 also depicts that the extent of under-reporting is smaller for larger imports, and higher tariff rates are associated with greater under-invoicing. We return to this discussion in Section 4.5.

It is possible that the observed import price changes after Brexit and the subsequent depreciation of the pound simply reflect decisions by British exporters to offset the effect of the exchange rate shock through price adjustments. As explained by Breinlich et al. (2019), economic theory suggests that the extent of exchange rate pass-through varies across countries and over time depending on a country's openness to imports, the source of exchange rate movements, and whether mark-ups adjust in response to exchange rate variation. They show that the increase in consumer prices after the Brexit referendum was driven by both the direct consumption of imported goods and the use of imported inputs in domestic production. In the context of our study, it is important to check whether the depreciation of the British pound prompted substantial export price adjustments by British exporters. Costa et al. (2024) find no evidence of a significant before/after differential change in export prices (in sterling) in industries with a higher export destination weighted depreciation. Corsetti et al. (2022) show that over six quarters after the shock, exchange rate pass-through was low for British sales invoiced either in a vehicle or in the destination market currency, and do not detect significant changes in the relative shares of invoicing currencies in response to the Brexit shock.

We argue that concerns about possible exchange rate pass-through are mitigated by the

identification strategy used in this study. In addition to focusing on the short-term consequences of the vote over roughly six months after shock, our empirical specification relies on computing the wedge between declared versus assessed import values, and does not attempt to predict the impact of the vote on price adjustments of British goods. The short-term nature of our analysis also rules out the possibility of drastic shifts in import demand towards better quality, branded goods. While the depreciation of the pound would have made higher quality British products more affordable for Pakistani buyers, it is well-known that global transactions are dictated by contracts that often last for several months. Owing to the rigorous customs procedures outlined above, any price amendments by British exporters in the wake of the depreciation of the pound are expected to be reflected in both the declared as well as assessed import unit values, and thereby, are unlikely to affect the scale of divergence between the two measures of import prices. Moreover, as explained below, replacing transactional assessed import value by weekly or monthly averages for a given product-country pair, serves as an additional proxy for the true import price which is expected to incorporate any price revisions by British exporters.

The unit values gaps observed in the immediate aftermath of the announcement of the voting result may be attributable to the time lag between issuance of trade invoices and the actual shipping and delivery of imported goods at a Pakistani port. Therefore, the results obtained might not reflect firms' active adjustments in tax evasion strategies but rather discrepancies due to the timing of transactions and shipments, which causes misalignment between the exchange rate at the time of invoicing and that at the time of customs declaration. If this time lag were the primary driver of a change in misreporting behaviour, one would observe a drop in the scale of misreporting overtime with the fulfillment of previously written trade contracts. As indicated earlier, nonetheless, the differential impact of Brexit on misinvoicing of imports originating from the UK as opposed to other countries remained negative until the end of our sample period, and the magnitude continued to grow overtime. This persistence in the overall effect is in line with the observation that exchange rate remained below 2016 pre-Brexit average by December 2016. Furthermore, as explained above, due to the customs procedures implemented at the time of shipment delivery, including the availability of import

invoices, unit value and quantity information, and currency used, such pricing discrepancies are likely to be captured by both the declared and assessed values, and hence, reflected in the misdeclaration indicator given by Eq. 1.

4.2 Assessed valuation of imports

In order to correctly quantify the scale of attempted tariff evasion using Eq. 1, note that there are two moving pieces in our measure of under-reporting, namely, how well the assessed price reflects the true price of the imported good, and secondly, how close the price declared by the importer is to its true value. Due to the nature of the data collection process, the FBRP data is subject to much less measurement error compared to what is typically the case for a developing country. Nonetheless, there may be concerns regarding the reliability of import values assessed by customs officials. Naturally, this raises the possibility of imprecise assessment of imports that may be subject to erroneous recording or variation in assessments across shipping locations or individual officers.

We check the credibility of using assessments by customs officers by first estimating Eq. 2 for restricted samples of products for which there is arguably limited variation or possible disagreement on reported prices. For example, referenced-priced goods or products traded on an organized exchange, are assumed to be 'homogeneous' and expected to be similarly priced. These products are the non-differentiated goods, such as, crude oil, grains, or natural gas, that are typically not customized to buyers' needs, and subject to limited discretion of customs officials. In Table 2 (column (4)), we use Rauch (1999) classification to restrict our sample to standardized goods based on the conservative classification, but also later repeat the estimation using the liberal definition for these categories. There are no major qualitative differences in the coefficients obtained relative to the estimates derived from the complete sample. Next, we repeat the analysis after excluding finished consumer goods, and limiting the sample to intermediate inputs and capital goods used in production processes (columns (5) and (6)), and demonstrate that the misreporting patterns are significant for all product types and categories, including the ones with relatively little predicted variation in assessments. We observe that firms under-report the value of import shipment even when

disagreements about product valuation are unlikely to exist.

Finally, as an additional check and to account for unobserved differences across ports of entry and/or individual customs officer's diligence in recording transactions, we compute an alternative proxy for assessed unit value by taking the average of assessed values for a given product-country pair within a given month. The average import value assessed for an 8-digit SITC product sourced from a given country within a specific month can then be used to estimate the extent of misdeclaration by the importer. The purpose of this exercise is to control for differences in the precision of record keeping across customs officers by using mean import value assessments for the same narrowly defined product type originating from the same country within a specified period of time. Similarly, this average can also be computed at the SITC-8 product-country-port level to allow for price (and cost) differences across shipping locations. We repeat the analysis using weekly, instead of monthly, averages. The estimation results reported in Table 3 confirm that the patterns of misdeclaration observed in the benchmark estimation continue to hold after replacing import price assessed by the customs officer by the mean assessment of its value for given product-country and product-country-port groups. Note that all estimations control for shipping-port fixed effects.

Therefore, the evidence reported in this section is suggestive of the reliability of using assessed values by government officials to quantify misinvoicing. In the subsequent analysis, we discuss the use of computerization to record import transactions which may serve as an additional check and help lower customs officer's discretion by possibly detecting corrupt behaviour.

4.3 Asymmetry in response?

The FBRP introduced an electronic system of recording import transactions in 2011, the Web-Based One Customs (WeBOC), for clearance of imported goods arriving at various ports of entry. The revised and improved clearance system involved a more thorough inspection of goods and computerization of customs procedure, including classification of shipments through either a 'Green', 'Yellow' or 'Red' channel, based on the detection of past misinvoicing attempts by the firm. For instance, companies with a past record of repeated

misreporting attempts are required to go through more rigorous checks that caused delays and the imposition of more stringent penalties. Thus, there is a strong incentive for firms to report accurately if an import transaction is digitally recorded at the port of entry, and especially for firms receiving larger numbers of imported shipments, in order to circumvent the risk of being flagged by customs officials for future transactions. Interestingly, Khan et al. (2024) suggest that the processing mechanism does influence firm behaviour, and provide evidence for more honest reporting by firms if imports are processed electronically compared to a manual entry of imports. They also illustrate that the magnitude of under-reporting is much higher for firms with fewer import transactions; a higher frequency of imports and more encounters with customs officials increases the risk associated with misreporting and lowers the inclination to under-invoice. While they observe that firms with higher importing frequencies tend to report prices closer to those assessed by officials, implying lower misreporting, Chalendard et al. (2023) find that frequent interaction between customs officers and importers could relax scrutiny, thereby reducing the observed gap. The contrasting results presented in earlier studies is noteworthy, and is reflective of possible heterogeneity in the context and background of customs procedures across the two countries examined, namely, Pakistan and Madagascar.

Are the results discussed so far driven by specific importers and/or modes of processing employed at the port of entry? We carry out two exercises to address this possibility by restricting the observations to: (i) electronically recorded transactions, and (ii) transactions carried out by the most frequent importers. Column (7) in Table 2 reports estimates only for transactions processed through WeBOC. In addition, based on the frequency of transactions conducted by the firm, we estimate Eq. 2 by restricting observations to the highest frequency quartile of importers (column (8)). Under both cases where there is a greater likelihood of accurate reporting, the coefficient of $\text{UK}_k \times \text{Post-Brexit}_t$ continues to remain negative, indicating that under-invoicing patterns observed earlier are not specific to manually recorded imports or less frequent buyers of foreign inputs.

4.4 Robustness

The estimation results reported so far are based on transaction-level data, where the unit of time is measured by the date of the transaction. On the other hand, all benchmark estimation results as well as extensions are carried out after controlling for *monthly* fixed effects to account for seasonal patterns in import data. In this section, we provide additional robustness by replacing month-level time controls by daily fixed effects. As indicated in Table 4, we observe no major differences in the estimates obtained, and all findings are consistent with the regression results reported above.

Next, we explore the response of misreporting imports invoiced in pounds as an alternative treatment, where the counterfactual would be imports invoiced in currencies other than the British pound. The estimates reported in column (4) lend further support to our earlier result, i.e., the observed decline in misdeclaration of UK-specific imports post-Brexit is expected to be linked with the sharp exchange rate adjustment in the value of the British pound. Interestingly, the FBRP data reveals that there were no notable changes in the shares of different currencies used after Brexit referendum. For import transactions originating from the United Kingdom, similar to Corsetti et al. (2022), we can group all observations into three major currency schemes: (1) invoicing in the currency of the country in which production occurs (GBP); (2) invoicing in the currency of the destination country (Pakistani Rs.); and (3) vehicle currency invoicing, i.e. using a third-country currency (USD). We find that the shares of UK transactions denominated in GBP, Rs., and USD remain largely unchanged at approximately 25%, 40%, and 30%, respectively, after Brexit. This observation is similar to the one highlighted in Corsetti et al. (2022), whereby no significant changes in the relative shares of invoicing currencies are detected in the aftermath of the Brexit referendum, at both the aggregate and granular levels. They find that although there is a slow-moving trend of invoicing British exports in sterling being replaced by invoicing in a vehicle currency, the shares are largely stable over time.

We carry out several additional robustness checks to test whether our results are sensitive to the exclusion of outliers or the choice of standard errors clustering. Columns (5) and (6)

report the estimates obtained after clustering standard errors by the country of origin and importer, respectively. We also re-estimate Eq. 2 after removing outliers from the sample (column (7)) by following a common practice in the literature to identify outliers as values of y_{ipkt} above the 99th percentile. All results are consistent with our baseline findings.

4.5 Exploring the mechanism: Duty rates and evasion elasticity

A key motive faced by firms to misreport imports is to lower the amount of duty payments. An appreciation of the rupee has an analogous effect on the incentive to under-invoice imports; due to a stronger local currency, the financial gain associated with misdeclaration of imports is expected to be smaller. In other words, a depreciation of the pound is linked with lowering import bills of British goods for Pakistani importers, which in turn, can possibly discourage under-reporting practices motivated by savings on tariffs and regulatory payments. This interpretation is consistent with the positive and statistically significant coefficient of duty rate (see Table 2), which implies that the estimated deviation of declared value from assessed value of imports is systematically linked with the import duty rate charged to the importer. We interpret this result as strong evidence of firms engaging in tax evasion practices, in line with the findings obtained by Khan et al. (2024). They show that a percentage point increase in duty rates, on average, is linked with 0.4 percent increase in under-invoicing of import values by Pakistani firms.

Table 5 formally presents the relationship between tariff evasion and the passing of the Brexit vote, and illustrates the key channel driving the results discussed so far. By examining how the *elasticity* of evasion with respect to the tariff rate changes after Brexit, this approach also helps mitigate any remaining concerns about the measurement of y_{ipkt} which assumes accurate assessment by customs officers (Javorcik and Narciso 2017). The estimates obtained with the inclusion of a three-way interaction term, $\text{UK}_k \times \text{Post-Brexit}_t \times \text{Duty rate}_{ipkt}$, and the corresponding significance tests check whether the semi-elasticity of misreporting with respect to the tariff rate changes in the wake of the announcement of the referendum result.

The test statistics (p-value and t-statistic) reported in columns (1) and (2) appear to be

significant, showing that in the wake of the policy shock, import duties continue to affect the scale of under-reporting. However, the estimates for the three-way interaction term are statistically insignificant when UK_k is used as the treatment indicator. The interaction coefficient turns out to be negative and highly significant, on the other hand, when the alternative treatment, namely, an indicator for transactions denominated in the British pound (GBP_k), is used instead. These estimates are presented in columns (3)-(5), whereby we also allow for alternative forms of clustering as well as the exclusion of outliers. This result suggests that exchange rate fluctuations impacted the semi-elasticity of misreporting with respect to tariff changes. Not surprisingly, the effect is significant and economically meaningful only for import transactions that use the British pound as the payment currency, and not necessarily for all imports sourced from the United Kingdom; the exchange rate change prompted by Brexit had a stronger impact on products with higher tariff burdens where GBP was used as the mode of payment. In other words, there is a strong evidence of the displacement of tariff evasion driven by the depreciation of the pound, in line with the expectation that a stronger domestic currency lowers the financial gain associated with under-invoicing of imports. These results further clarify the mechanism behind exchange rate fluctuations and firms' adjustments of their misreporting strategies.

Lastly, it would be interesting to check whether evasion practices vary by industry and if our results are driven by certain sectors. In particular, the insignificant coefficients of $\text{UK}_k \times \text{Post-Brexit}_t \times \text{Duty rate}_{ipkt}$ reported in Table 5 based on using UK_k as the treatment indicator may be hiding heterogeneity across sectors, especially due to the existence of a large variation in numbers of observations and sector sizes. The estimates obtained for 2-digit SITC product groups reported in Tables 6 and 7 suggest that the coefficients of duty rates are significant for six out of eighteen industries, including, instruments, electronic and electric equipment, metal products, and textiles. At the same time, a majority of industrial sectors with larger numbers of import transactions (such as, Textile and Clothing, Rubber & Plastics, and Computing Equipment) do demonstrate robust evidence for the displacement of tariff evasion driven by the depreciation of the pound even in the case whereby UK-sourced imports, instead of GBP-denominated transactions, is used as the

treatment indicator, consistent with the baseline methodological approach used. In short, the noticeable reduction in the semi-elasticity of misreporting with respect to the tariff rate changes in the wake of the announcement of the referendum result seems to be driven by some of the key importing sectors in Pakistan.

5 Conclusion & Way Forward

The existing literature has made modest progress in quantifying the scale of misreporting in cross-border transactions due to data limitations, and in understanding the dynamic response of false reporting to policy changes and economic shocks. This paper attempts to address this gap in the literature. Based on highly detailed data from Pakistan, we document that firms systematically adjust their under-invoicing patterns as a result of exogenously driven changes in import costs. We use the unexpected passing of the Brexit vote and subsequent depreciation of the pound as a quasi-natural experiment to shed light on the transmission of a sizeable common marginal benefit shock to foreign importers of British goods. Our results indicate that firms shift toward more accurate reporting of British imports, relative to imports from other countries, as a result of an appreciation of the local currency that makes imports less costly. We attend to aggregate distortions that result from possibly large numbers of micro-level adjustments, and offer critical insights into policy actions that can be used to discourage fraudulent reporting of cross-border transactions. This includes rationalizing and lowering import duties combined with stronger enforcement and digital monitoring. A key policy implication of our results is that currency stabilization serves as an important complement to tax compliance and customs enforcement, and can play a crucial role in minimizing incentives for under-invoicing and false declarations.

Nonetheless, our study does not address two key elements of misreporting international trade transactions. First, as explained above, we investigate a single (albeit most important) reason for imports misdeclaration, namely, tax evasion, and abstract away from other potential motives for fraudulent reporting. Although it holds for a relatively small proportion of customs data, over-invoicing of imports is perceived to be widespread in the presence of controls

on cross-border financial flows. Second, tariff evasion can take place in the form of one or more of the following three ways: misdeclaring the unit value, under-counting quantities of imports, and misclassification of high tariff commodities as a lower tariff product. Our data permits us to investigate only the first type of misdeclaration. It is possible that closing one avenue of tariff evasion encourages importers to explore alternative means of tax evasion (Javorcik and Narciso 2017). These are subjects for future research.

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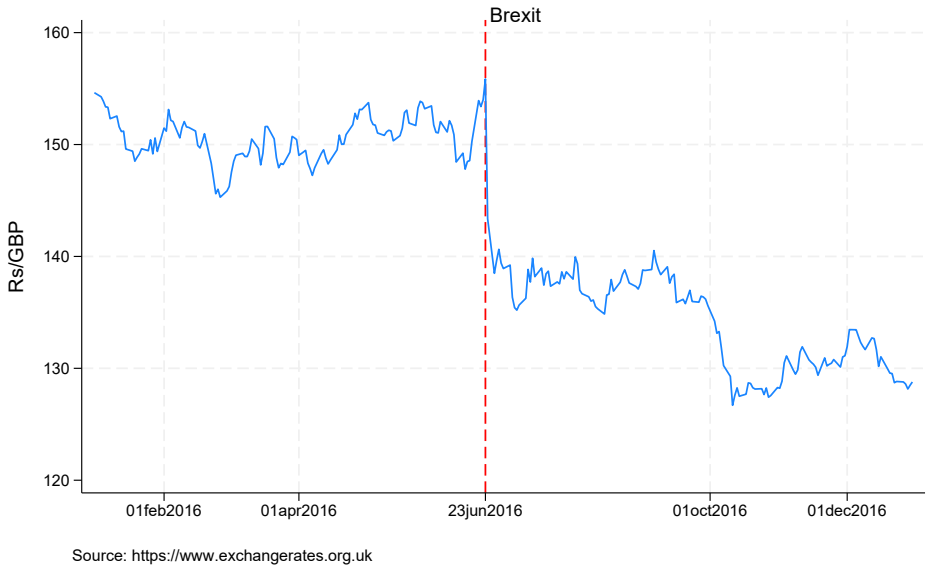
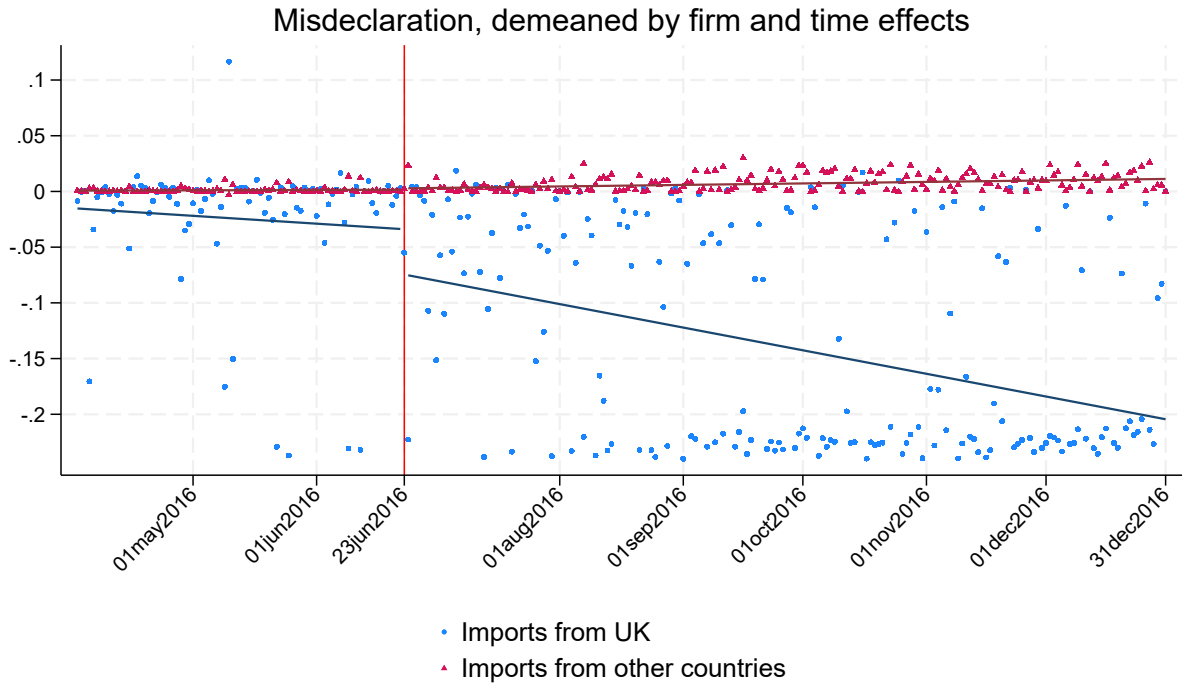
Figure 1: Daily exchange rate (Rs/£)



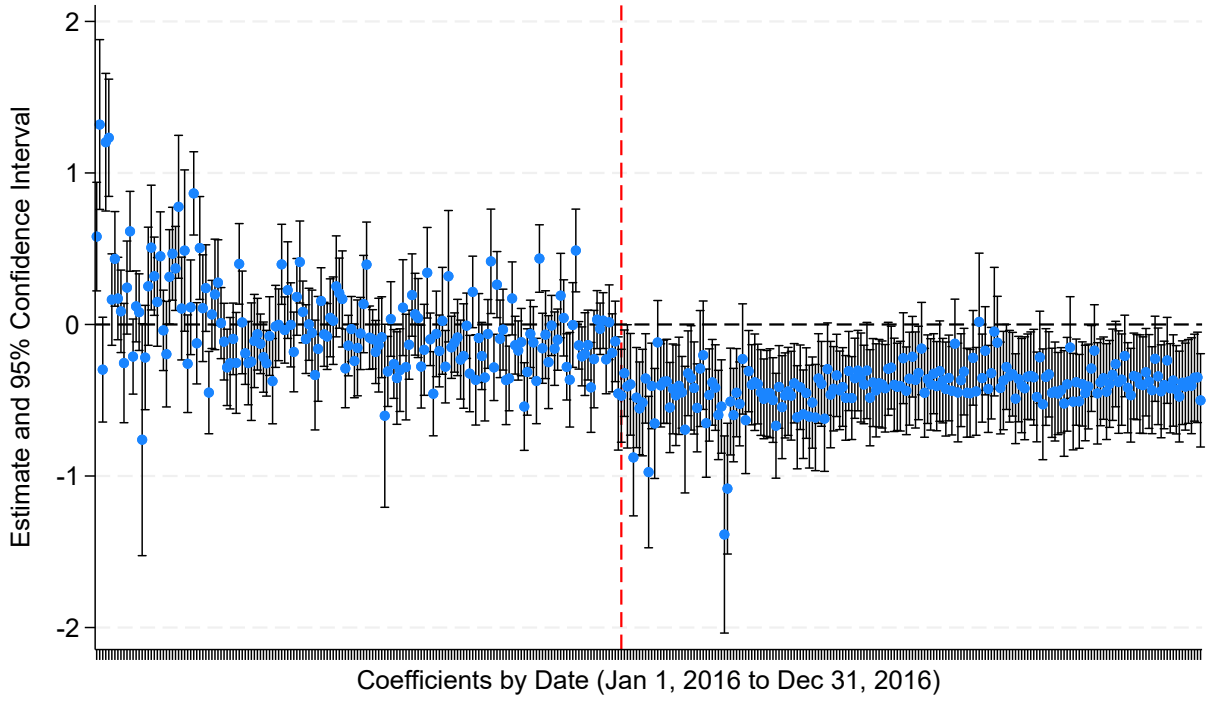
Source: https://www.exchangerates.org.uk

Figure 2: Misreporting by Pakistani importers



Notes: The data plotted are median residuals from a firm-level regression of y_{ipkt} on firm fixed-effects, for UK versus non-UK import transactions, and cleaned of time trends using daily fixed effects. Lines represent linear fit to scatterplots, using the month before the official referendum campaign started, as the reference period. The red vertical line represents the timing of Brexit vote.

Figure 3: Coefficient plot – Event study specification



Notes: Based on authors' calculations using transaction-level import data obtained from the Federal Board of Revenue Pakistan (FBRP). The red vertical line represents the timing of passing of the Brexit vote, June 23, 2016. The figure plots regression coefficients obtained for the event-study specification.

Table 1: Summary Statistics

	Mean	Standard deviation
Log (Declared value)	2.854	2.706
Log (Assessed value)	3.137	2.759
Misdeclaration (y_{ipkt})	0.407	1.166
# Importing firms	27600	-
# UK importers	3749	-
# SITC-8 products	6061	-
# Import origins	249	-
No misdeclaration (%)	71.2	-

Notes: Based on authors' calculations using FBRP data.

Table 2: Misdeclaration by importing firms

				Restricted Samples				
				Standardized goods	Intermediate goods	Capital goods	Electronic entry	Frequency of imports
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
UK x Post-Brexit	-0.154***	-0.318***	-0.348***	-0.259*	-0.342***	-0.141***	-0.024*	-0.589***
	(0.028)	(0.061)	(0.069)	(0.144)	(0.079)	(0.038)	(0.012)	(0.104)
Log (Imports)		-0.100***	-0.011***	-0.012***	-0.009***	-0.024***	-0.007***	-0.012
		(0.019)	(0.003)	(0.003)	(0.003)	(0.005)	(0.002)	(0.008)
Duty rate		-0.000	0.004***	0.003***	0.004***	0.005***	0.003***	0.007***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
# Observations	2417911	2417911	2417551	561241	1522268	339925	1934705	617739
R^2	.0129	.0701	.465	.678	.49	.225	.227	.626
Adjusted R^2	.0129	.0701	.463	.676	.489	.223	.224	.624
# Clusters	6052	6052	5710	2032	3564	853	5508	3009
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Product fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Shipping-port effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The outcome variable is misdeclaration defined by Eq.(1), i.e. y_{ipkt}. All estimates are obtained at the transaction level. Robust standard errors are given in parentheses, clustered by SITC-8 product category. Columns (4)-(8) provide estimates for restricted samples of homogeneous goods, intermediate goods, capital goods, WEBOC digital transaction, and firms with the highest importing frequency, respectively. Asterisks denote significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Misdeclaration by Pakistani firms – Average assessed unit import prices

	(1)	(2)	(3)	(4)
UK × Post-Brexit	-0.336***	-0.275***	-0.358***	-0.304***
	(0.057)	(0.090)	(0.059)	(0.091)
Log (Imports)	-0.140***	-0.162***	-0.126***	-0.149***
	(0.008)	(0.009)	(0.007)	(0.009)
Duty rate	-0.001	0.001	-0.001	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Observations	1,755,743	1,849,555	1,755,743	1,849,555
R-squared	0.416	0.416	0.406	0.375
Adjusted R-squared	0.414	0.415	0.404	0.373
Number of products	5540	5541	5540	5541
Monthly fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Product fixed effects	Yes	Yes	Yes	Yes
Shipping-port effects	Yes	Yes	Yes	Yes

Notes: The outcome variable is misdeclaration defined by Eq. (1) computed using average assessed values. Columns (1) and (2) use monthly averages, while columns (3) and (4) used weekly averages. In columns (1) and (3), the average is computed for a given SITC8 product-country-shipping port group, whereas columns (2) and (4) report estimates for averages obtained for a given SITC8 product-country pair. All estimates are obtained at the transaction level. Robust standard errors are given in parentheses. Asterisks denote significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Alternative time fixed effects

				Alternative treatment	Cluster by country	Cluster by firm	Remove outliers
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
UK × Post-Brexit	-0.134***	-0.293***	-0.347***	-0.149***	-0.347***	-0.347**	-0.257***
	(0.030)	(0.060)	(0.068)	(0.031)	(0.036)	(0.171)	(0.039)
Log (Imports)		-0.102***	-0.011***	-0.011***	-0.011**	-0.011***	-0.013***
		(0.019)	(0.003)	(0.003)	(0.005)	(0.002)	(0.003)
Duty rate		-0.000	0.004***	0.004***	0.004***	0.004***	0.004***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	2,417,911	2,417,911	2,417,551	2,417,551	2,417,551	2,417,551	2,392,742
R-squared	0.018	0.076	0.466	0.465	0.466	0.466	0.439
Adjusted R-squared	0.0183	0.0759	0.464	0.463	0.464	0.464	0.438
Number of products	6052	6052	5710	5710	233	27505	5706
Daily fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country, product & shipping-port effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The outcome variable is misdeclaration defined by Eq. (1). All estimates are obtained at the transaction level. Robust standard errors are given in parentheses. Asterisks denote significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Tax evasion and exchange rate shocks

			Alternate treatment: *GBP*		
			Baseline	Cluster by firm	Remove outliers
	(1)	(2)	(3)	(4)	(5)
UK x Brexit	-0.856***	-0.383***	-0.019	-0.019	-0.036
	(0.305)	(0.121)	(0.078)	(0.072)	(0.056)
Duty rate	0.006***	0.005***	0.005***	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
UK x Brexit x Duty rate	0.006	0.001	-0.004**	-0.004***	-0.005***
	(0.006)	(0.002)	(0.002)	(0.002)	(0.001)
Test: Duty+Duty×BrexitxUK=0					
t-statistic	2.03	2.53	.246	.314	-0.699
p-value	.0424	.0113	.806	.754	.485
# Observations	2417552	2417551	2417551	2417551	2392742
R^2	.296	.464	.464	.464	.437
Adjusted R^2	.295	.463	.462	.462	.436
# Clusters	5710	5710	5710	27505	5706
Month fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Product fixed effects	Yes	Yes	Yes	Yes	Yes
Shipping-port effects	No	Yes	Yes	Yes	Yes

Notes: The outcome variable is misdeclaration defined by Eq.(1). All estimates are obtained at the transaction level. Robust standard errors are given in parentheses, clustered by SITC-8 product category, except in column (4). Columns (3)-(5) consider the alternative treatment, i.e., imports invoiced in pounds, where the counterfactual is imports invoiced in other currencies. Outliers are identified as values of y_{ipkt} above the 99th percentile. Asterisks denote significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6: Product-level estimation

	Food & Tobacco (1)	Chemicals (2)	Rubber & Plastics (3)	Metal products (4)	Stone, Clay, Glass (5)	Instruments (6)	Paper products (7)	Electronics (8)	Primary metal (9)
UK × Post-Brexit	-0.322*	-0.034	-0.123**	-0.720***	-0.182	-0.112***	-0.423***	-0.223**	-0.040
	(0.193)	(0.070)	(0.060)	(0.191)	(0.138)	(0.024)	(0.135)	(0.110)	(0.042)
Duty rate	-0.007**	0.002*	0.007***	0.010***	-0.003	0.005***	0.011	0.005***	0.004***
	(0.003)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.010)	(0.002)	(0.001)
UK × Post-Brexit × Duty rate	0.005	-0.001	-0.006**	-0.001	-0.002	0.001	0.005	0.001	-0.001
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)
Test: Duty+Duty×BrexitxUK=0									
t-statistic	-0.269	0.571	0.364	3.557	-1.410	5.928	1.821	2.477	2.203
p-value	0.788	0.568	0.716	0.0005	0.160	1.05e-08	0.071	0.014	0.028
Observations	179,569	279,926	200,131	46,263	57,577	104,800	50,796	279,403	198,608
R-squared	0.642	0.561	0.506	0.314	0.300	0.332	0.506	0.259	0.331
Adj. R-squared	0.640	0.559	0.505	0.310	0.295	0.329	0.503	0.257	0.328
Number of products	603	944	292	121	237	244	122	440	572
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shipping-port effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The outcome variable is misdeclaration defined by Eq. (1). All estimates are obtained at the transaction level. Robust standard errors are given in parentheses. Asterisks denote significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7: Product-level estimation - *continued*

	Miscellaneous (10)	Fuel (11)	Textile & Clothing (12)	Printing products (13)	Furniture products (14)	Footwear (15)	Transport Equipment (16)	Leather Products (17)	Computer Equipment (18)
UK × Post-Brexit	-1.395***	0.070	-0.209	-0.59***	0.455	-0.334	-0.024	-0.439	-0.016
	(0.351)	(0.080)	(0.154)	(0.159)	(0.501)	(0.663)	(0.113)	(0.402)	(0.074)
Duty rate	-0.002	0.001	0.023***	0.022***	0.000	-0.005	0.007***	0.015	0.008***
	(0.003)	(0.001)	(0.007)	(0.002)	(0.003)	(0.007)	(0.001)	(0.009)	(0.001)
UK × Post-Brexit × Duty rate	0.003	-0.003	-0.005*	-0.016	-0.013	0.002	-0.001	-0.007**	-0.005**
	(0.004)	(0.003)	(0.003)	(0.010)	(0.011)	(0.014)	(0.003)	(0.003)	(0.002)
Test: Duty+Duty×BrexitxUK=0									
t-statistic	0.276	-0.761	2.505	0.754	-1.159	-0.197	2.050	0.769	1.082
p-value	0.783	0.450	0.013	0.459	0.249	0.846	0.042	0.445	0.279
Observations	106,448	29,531	221,780	55,803	18,162	21,109	160,655	26,851	379,708
R-squared	0.316	0.425	0.624	0.442	0.327	0.652	0.219	0.509	0.375
Adj. R-squared	0.313	0.421	0.622	0.440	0.319	0.650	0.217	0.506	0.374
Number of products	216	63	727	22	99	25	187	69	725
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shipping-port effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The outcome variable is misdeclaration defined by Eq. (1). All estimates are obtained at the transaction level. Robust standard errors are given in parentheses. Asterisks denote significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%.