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Assessing the Impact of Tax Regulation Changes on Cross-Border E-Commerce: A Difference-In-Difference Approach

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ABSTRACT

Policy analysis is essential for evaluating and measuring the achievement of policy objectives. This study employs a differences-in-differences method to assess the impact of the implementation of Ministry of Finance Regulation No. 199/PMK.04/2019, which introduced a new tax policy on cross-border e-commerce. Using cross-border e-commerce data (consignment note documents) from 2017 to 2022 provided by the Directorate General of Customs and Excise, the study measures the policy's effect on import values and the number of transactions (declared documents). The results show that the implementation of the new tax regulation in cross-border e-commerce has reduced importation values and the number of transactions. Furthermore, the tariff increases on fashion commodities, such as bag, shoes, clothes, resulted in a more significant reduction. These findings indicate that the implementation of this policy has succeeded in fulfilling its objectives of controlling importation, thereby providing greater protection to domestic producers through fair tax treatment and creating a level playing field.

Keywords: e-commerce, import value, tariff, difference-in-differences, tax treatment

1. INTRODUCTION

Globally, the policy of increasing import tariffs has been implemented in various countries as an effort to protect national producers and suppliers (Hillman, 1982; Xu, 2006; Melitz, 2005), shift demand from imported to domestic products (Krugman, 1994; Bhagwati, 1988; Johnson, 1965), and reduce unemployment (Hillman, 1982; Choi, 2001; Magee, 2002). Several studies have indicated that higher import tariffs can lead to a decline in import volumes and an increase in the prices of imported goods in domestic markets (Panagariya and Gupta, 1998; Brenton, 2001; Cheng and Wong, 2011). Moreover, this policy can encourage local producers to improve the quality and competitiveness of their products in international markets (Milner and Yoffie, 1989; Brander, 1995; Magee, 2002). However, in the context of cross-border e-commerce (CBEC), increasing import tariffs can negatively impact consumers and retailers accustomed to purchasing goods from abroad due to better accessibility and competitive pricing (Li, 2019; Mukherjee and Kapoor, 2018), especially in the fashion items (clothing and apparel, shoes, accessories and bags, jewelry, and luxury goods), which is one of the most significant revenue contributors for retailers globally (Figure

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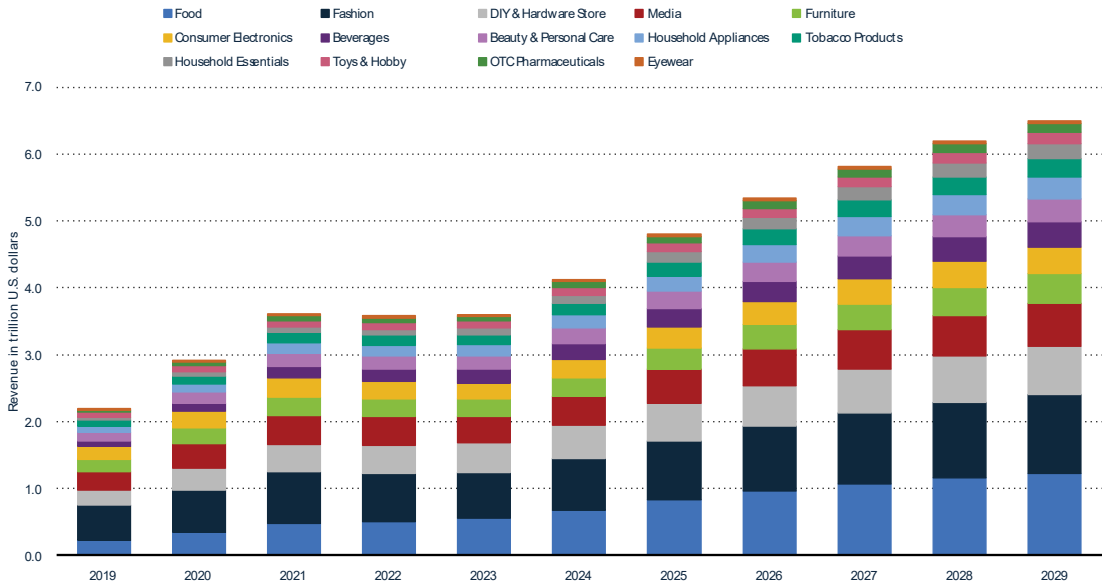
Figure 1

Retail E-Commerce Revenue Worldwide from 2019 to 2029

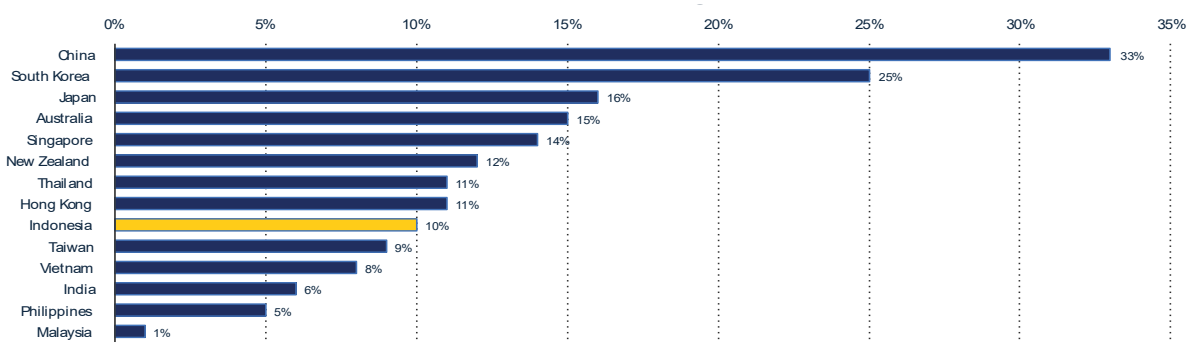


Note. Source: Statista, 2024

1). Some studies also note that this policy can trigger illicit trade and tax evasion (Cockfield et al., 2019; Betz, 2019; Yu, 2018). Overall, the impact of import tariff policies largely depends on market structure and the responses of consumers and producers. In 2022, Indonesia emerged as the largest retail fashion e-commerce market in the Asia-Pacific region, generating a staggering revenue of 7,391.9 billion USD. This is supported by the dominant market share of Indonesia's fashion e-commerce segment, which stands at 31%, followed by electronics and media at 23% (Figure 2). This phenomenon began a few years before the COVID-19 pandemic, when there was a significant increase in the number of import consignment notes in 2019, reaching 57.9 million, a 216% increase from the initial number in 2017, which was 18.3 million. In response, the government introduced a new policy of CBEC, Ministry of Finance Regulation No. 199/PMK.04/2019, which lowered the de minimis value (the threshold for import duty exemption on cross-border e-commerce) to 3 USD and increased import tariffs on footwear (15-20%), bags (15-20%), and textiles (25-30%) (DGCE, 2019). This strategic initiative aims to establish fair tax treatment, create a level playing

Figure 2

E-commerce shares of total retail in the Asia-Pacific region



Note. Source: PPRO, 2023

field, control imports and trade balance deficits, and protect domestic producers, especially small and medium-sized enterprises (SMEs). Ultimately, this can enhance societal welfare through the revenue generated from import duties (Qotimah et al., 2019). However, the long-term impact of this policy on consumption patterns, e-commerce development, and the competitiveness of Indonesia's fashion industry remains a topic of debate. It is uncertain whether this policy will definitively reduce the import value of fashion products and provide local producers with more opportunities to thrive.

Several studies have been conducted to investigate the impact of trade protection policies, such as increasing import tariffs. For instance, Torres et al. (2022) found that tariff increases significantly affect trade volumes, import prices, and the potential diversion of trade to other parts of the world, using an Ordinary Least Squares (OLS) regression approach. Cigna et al. (2021) also conducted a study similar to Torres et al. (2022) but employed a difference-in-differences estimation framework. Kreuter and Riccaboni (2023) explored the relationship between import tariffs, GDP, and consumer welfare using a production network model, while Amiti et al. (2019) analysed the impact of tariffs on prices and welfare through conventional economic models. Niu et al. (2022) examined the effect of tariffs on the profitability of two e-tailers (electronic retailers in e-commerce) and the government's utility, which they measured as "social welfare + tariff revenue," using a domestic production network model.

Additionally, research by Cole and Eckel (2018) indicated that price changes due to tariffs can be offset or even dominated by adjustments in retail markups, thereby mitigat ing the benefits of a protectionist tariff.

Based on the studies mentioned above and published literature, a gap appears in analysing the impact of import tariffs on import values within the context of cross-border e-commerce, particularly using a quasi-experimental approach with the difference-in-differences method. In Indonesia, there is a lack of research concerning the impact of policies on cross-border e-commerce. The previous study analysed the impact of de minimis threshold in cross-border e-commerce on import tax avoidance. Thus, this study seeks to answer: How do changes in tax regulation impact cross-border e-commerce import values and transaction volumes in Indonesia? Unlike the previous research by Deyanputri (2020), which measures the impac of CBEC policy using trend analysis, this study provides empirical evidence by employing a difference-in-differences (DID) analysis to evaluate the effect of reducing the de minimis threshold and increasing tariffs on fashion products. It specifically assesses their effects on the value and volume of e-commerce import transactions—a major contributor to Indonesia's retail revenue.

2. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

The rapid development of technology and digitalisation has significantly transformed global economic landscapes, particularly in the context of e-commerce. In recent years, Indonesia has witnessed remarkable growth in e-commerce transactions, with no exception for cross-border e-commerce. DCGE recorded a sharp increase in cross-border e-commerce transactions since 1990. To address this phenomenon, the government has regulated cross-border e-commerce and made several revisions, primarily concerning taxation provisions.

2.1 Cross-Border E-commerce

According to Giuffrida et al. (2017), cross-border e-commerce (CBEC) refers to the sale of goods to consumers in foreign countries through online platforms, such as company’s website, online retailers or marketplaces. World Customs Organization (WCO) stated the Essential elements to consider in the definition of e-Commerce are online initiation, cross-border transaction/shipment, physical goods, and destined to a customer. Cross-border e-commerce provides barrier elimination between countries and a borderless trading environment that promotes a higher global economy and trade (Li, 2020). Despite offering economic integration and

supporting global trade globalisation (Jiang and Ma, 2021), CBEC can lead to tax avoidance due to tax treatment differences. Harbolt (2019) found that consumers in the USA substituted e-commerce purchases with cross-border shopping to avoid sales taxes.

2.2 Taxation of Cross-Border E-commerce

To regulate cross-border e-commerce transactions, Indonesia has issued regulations and continuously revises them in response to on-the-ground conditions. The first regulation was implemented in 1982 through Minister of Finance Decree No. 37.KMK.05/1982, subsequently last amended by Minister of Finance Regulation No. 199/PMK.04/2019. The most significant revision of the latest regulation concerns the taxation treatment of cross-border e-commerce.

Under the previous regulation, Minister of Finance Regulation No. 112/PMK.04/2018 established a de minimis value of 75 USD per consignee for each shipment. This served as the threshold for import duty exemption on cross-border e-commerce transactions. Transactions valued below 75 USD were exempt from import duty, VAT, income tax, and sales tax on luxury goods. However, transactions exceeding 75 USD were subject to taxes, including a single tariff import duty tax of 7.5%.

In 2019, the government introduced a new regulation through the implementation of Minister of Finance Regulation No. 199/PMK.04/2019. This latest revision was prompted by several reasons, including widespread tax avoidance through shipment splitting due to the de minimis regulation, demands to establish fair tax treatment, and protection for domestic producers. The most significant revision related to the tax treatment for cross-border e-commerce was a substantial decrease in the de minimis value from 75 USD to 3 USD. This change means that only e-commerce transactions valued under USD 3 are exempt from import duty and income tax. However, these transactions are still subject to Value-Added Tax (VAT) and sales tax on luxury goods. This revision marks a notable shift in policy, aimed at tightening tax regulations on cross-border e-commerce. The dramatic reduction in the de minimis value significantly lowers the threshold for tax exemptions, thereby expanding the taxable base for import duties and income taxes. Moreover, even though transactions under USD 3 are exempt from import duty and income tax, they are still liable for VAT and sales tax on luxury goods. This implies that while the government seeks to ensure revenue generation from high-value transactions, it also aims to capture tax revenue from lower-value transactions through VAT and sales tax, reflecting a comprehensive approach to tax policy. Additionally, fashion items such as shoes, bags, and textile products were subjected to higher tariffs, ranging from 15% to 30%, treating them equally as regular importations.

Previous research on cross-border e-commerce (CBEC) in Indonesia has focused on analysing the impact of new regulations on the economy. Silitonga (2020) highlighted the necessity for implementing new CBEC policies to reduce imports that could harm local industries, ensure fair tax treatment, and counter tax avoidance practices. Wibisono (2022) found that lowering the de minimis value in new regulations significantly decreased import tax evasion. Additionally, Deyanputri (2020) examined how the decrease in de minimis value affected the import volume of Indonesian consignments, concluding that it suppressed import values. However, as this study only covered data from 2019 to 2020, the long-term effects of these regulations remain debated.

2.3 Tariffs and Trade Volume

Boer and Rieth (2024) demonstrated that protectionist tariff surprises have a significant and negative impact on US foreign trade and domestic investment. Additionally, the study by Kinzius et al. (2018) provides valuable insights into the effects of trade protection measures, including both additional tariffs and non-tariff barriers, on importation volume. The findings suggest that both protectionist schemes have a significant impact on reducing imports. This aligns with the broader understanding that trade barriers,

whether in the form of tariffs or non-tariff measures, can hinder international trade flows by increasing the cost of imported goods or imposing regulatory burdens. The further study by Egger and Erhardt (2024) explored the effect of tariff changes on trade, depending on the level of policy barriers and tariff rate. This study documented that the impact of tariff changes is strongest for low policy barriers and medium tariff levels but decreases with higher levels of both non-tariff and tariff barriers. In the context of cross-border e-commerce, the effect of tariff increases may vary depending on the type of goods and buyers. Fu (2023) discovered that consumers of luxury goods are less price-sensitive due to loyalty and social status, indicating more tolerance for pricing.

Considering these studies, this study suspects that tariff increases will decrease the importation value for fashion items, although there will be nonsignificant changes due to the characteristics of luxury goods. However, given that many CBEC customers in Indonesia are opportunistic businesses sensitive to price changes due to tax increases, the actual impact may differ. Susanto et al. (2023) found that mobile-commerce users in Indonesia become more sensitive to price changes, especially those who are satisfied with transactions made using m-commerce and have a higher intention of continued use.

2.4 Difference-in-Difference (DID)

Difference-in-Difference is one of the most widely used approaches for assessing the causal impact of hypothetical policy intervention (Park and Tchetgen, 2022) . Khandker et al (2010) stated that the Difference-in-Difference method can estimate the policy impact by comparing participants and non-participants before and after the intervention. Difference-in-difference considers groups of data based on time and treatment. The data is divided based on theraphy into a treatment group and control group, where the treatment group is exposed to the policy.

The difference-in-difference approach assesses the impact of the policy by comparing the effect of policy intervention in the treatment group and the control group. The relationship was further illustrated in the table below.

Table 1

Difference-in-difference model

Group	t0 = before intervention	t1 = after intervention	DID
Treatment	B	A	(B-A)
Control	D	C	(D-C)
DID	(B-D)	(A-C)	(B-A)-(D-C)

Note. Source: Impact Evaluation in Practice (Gertler dkk. 2011)

3. RESEARCH METHODOLOGY

3.1 Research Coverage

This research focuses on the impact of the Ministry of Finance regulation No. 199/PMK.04/2019 on cross-border e-commerce importation in Indonesia from 2017 to 2022, utilising a difference-in-difference (DID) method. The analysis covers two years before and two years after the policy implementation. The study examines all import commodities, with fashion items as the treatment group and other commodities as the control group.

3.2 Data Sources

The study uses importation data from cross-border e-commerce sourced from customs declaration documents for e-commerce (Consignment Note/CN) from January 2017 to January 2022. The consignment note data was obtained from the Directorate General of Customs and Excise through a formal data request letter. The Ministry of Finance Regulation No. 199/PMK.04/2019 was implemented in February 2020. Therefore, the data period chosen represents the before-and-after period of the regulation, taking into account data availability. CN documents provide information including HS Code, importation value (CIF value in USD), and net weight (netto).

3.3 Data Processing

The process begins with selecting commodities that have been imported using CN documents. After that, the commodities are divided into two groups, namely the treatment and control groups. The treatment group is a fashion commodity that has experienced an increase in tariffs, while the control group is another commodity that has not experienced a change in tariffs. The fashion commodities subjected to increased tariffs include footwear (Chapter 64 of the HS code), bags (Heading 4202 of the HS code), and textile or garment products (Chapters 61, 62, and 63 of the HS code). For each commodity selected in the treatment and control groups, the import value is calculated each month from January 2017 to January 2022. According to the Ministry of Finance Regulation No. 199/PMK.04/2019, e-commerce transactions utilising consignment notes (CN) are restricted to values under USD 1500. Transactions exceeding this amount must adhere to the general importation scheme. Consequently, this study aims to exclude e-commerce transactions exceeding USD 1500 in value.

3.4 Model Specification

This study employs the DID method to measure the cause-and-effect of the policy changes, as this method combines insights from cross-sectional treatment-control comparisons and before-and-after studies for a more robust identification (Fredriksson and Oliveira, 2019).

We control for the difference between the control and treatment groups before the policy change with the difference-in-difference regressions. The following equation gives the model:

$$m_{i,t} = \alpha tariff_t + \beta prot_i + \delta(tariff_t \times prot_i) + \theta X_{it} + \sigma month_{it} + \Phi commodity_i + \varepsilon_{it} \quad (1)$$

Where i = 1,2, ..., N is an index denoting the N commodities (8-digit HS) and t = 1,2 is an index indicating the two time periods, Jan 2017- Jan 2020 and Feb 2020-Jan 2022, respectively. The dependent variable $m_{i,t}$ represents the value of imports for commodity i during time period t, measured in US$. The time-invariant explanatory variable $prot_i$ is a dummy variable set equal to unity if commodity i was protected by a higher tariff rate, and zero otherwise. The $tariff_t$ variable is a time dummy variable set equal to unity for observations in the second period, Feb 2020-Jan 2022, and zero otherwise.

Given these definitions, the parameters in the above equation have the following meaning. The coefficient α captures the average additional monthly import value in the second period, Feb 2020-Jan 2022 in excess of their Jan 2017-Jan 2020 import value for the controlled group. β captures the difference in import value between the treatment and control groups over the first period.

The difference-in-difference coefficient δ is of principal interest, measuring the average increase in import value from the first to the second period for the treatment group, on the change in increase for the control group. The inclusion of the time dummy $tariff_t$ controls for time fixed effects – factors that are constant across commodities, such as macroeconomic environment- and the inclusion of the dummy $prot_i$ accounts for commodity-group fixed effects -factors that are constant over time, but specific to each group of commodities. Therefore, the difference-in-difference estimator captures the treatment effect of the tariff on protected commodities once the average increase of non-protected commodities over the same period has been accounted for.

θ represents the coefficient of the control variable, σ represents the coefficient of the month dummy variable, and Φ represents the coefficient of the commodity (8-digit HS) dummy variable, where ε represents the conditional expectations operator.

4. RESULTS AND DISCUSSIONS

4.1 Findings

Cross-border e-commerce transactions have thrived due to the advancements in digitalisation, which have provided buyers with more efficient access to sellers. The development of digital

platforms and technologies has facilitated seamless interactions and transactions between buyers and sellers across different countries. This digital transformation has not only expanded the reach of businesses but also enhanced the convenience and speed of international trade.

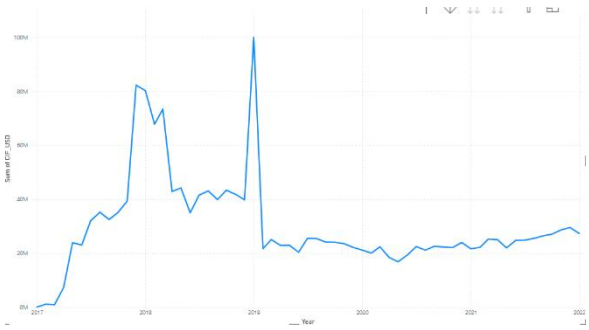
Figure 3 delineates the data on the trends in cross-border e-commerce between 2017 and 2022. The data illustrates significant growth in cross-border e-commerce transactions up until 2017, reflecting the impact of digitalisation on global trade. However, a downward trend is observed after 2017, representing the impact of new tax regulations on cross-border e-commerce and other factors such as the COVID-19 pandemic.

Examining the data closely, it is evident that there was a shift in the trend of commodities in cross-border e-commerce. Figure 4 elucidates the comparison of the top 10 commodities in cross-border e-commerce before and after the tariff increase as per Ministry of Finance Regulation No. 199/PMK.04/2019.

Before the implementation of this regulation, textile products, bags, and footwear were prominently featured in the top 10 list of cross-border e-commerce commodities. However, after the implementation of the new regulation, noticeable changes were observed in the rankings and importation values of these commodities. Moreover, textile products managed to retain their

Figure 3

Cross-border e-commerce trends



Note. Source: DCGE, 2024

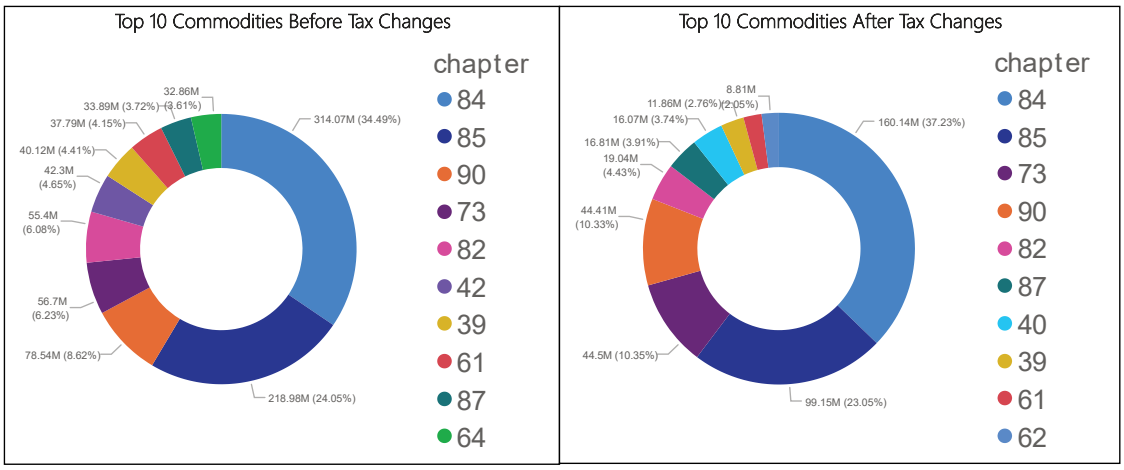
position in the top 10 list. Still, they experienced a significant shortfall in the importation value.

This study classified the data into two groups: the treatment group and the control group. The treatment group comprises commodities in Chapters 61, 62, 63, and 64, as well as Heading 4202, whereas the control group encompasses all other commodities. The number of observation units, based on importation value, is presented in Figure 5, and the corresponding numbers are provided in Table 2.

Based on Figure 5 and Table 2, the total number of observation units is 298,804, with non-fashion items being the most dominant commodities. There was no significant difference in the number of observations before and after the implementation of tax regulation changes, given that we used the same observation period.

Figure 4

The comparison of top 10 commodities in cross-border e-commerce before and after the tariff increase



Note. Source: Author's calculation

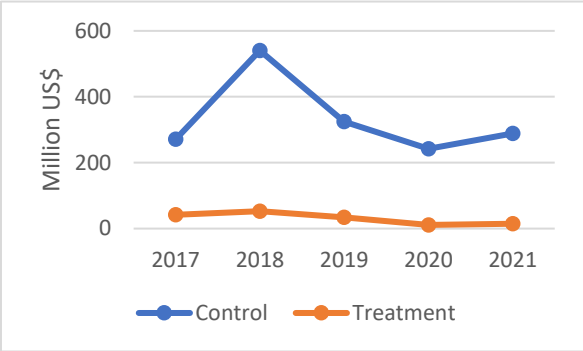
Similarly, for the number of observations measured by importation value, the most dominant transactions in value are non-fashion commodities, covering all chapters of the HS Code except for chapters 61, 62, 63, 64, and partly 42.

Table 2
The number of observation units

Data	t1	t2	Total
Control Group	162.074	114.935	277.009
Treatment Group	12.923	8.872	21.795
Total	174.997	123.807	298.804

Note. Source: Author's calculation

Figure 5
Import value by group of observation



Note. Source: Author's calculation

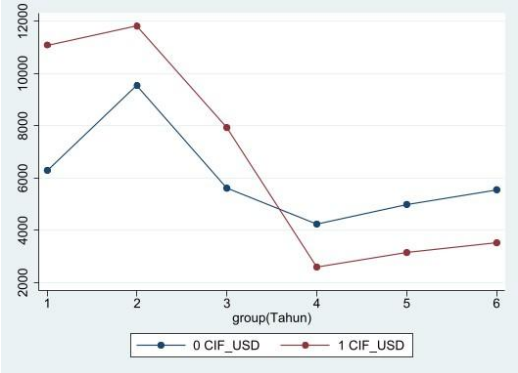
Robustness Test

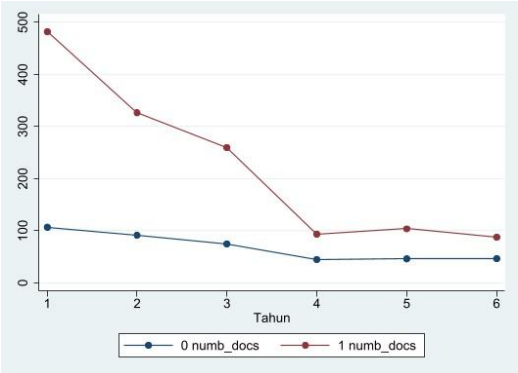
To ensure the validity of the Difference-in-Differences (DiD) estimation, we conducted a robustness check by examining the parallel trends assumption. The underlying assumption in the DID model is the existence of parallel trends of the outcome variable. This assumption states that the trends in the control group and the treatment group before the intervention occur are the same or parallel. To substantiate this assumption, we visually analyse the trends in the outcome variable, specifically import values and the number of documents.

Figure 6 shows that, in the first to third year (2017-2019), both groups exhibited a similar trend, but in the fourth year (2020), when the intervention took place, the treatment group experienced a more pronounced decline than the control group.

Notably, the tariff differences between e-commerce and general importation are substantial before the implementation of the new regulation, with e-commerce tariffs set at a single rate of 7.5%, compared to general importation tariffs ranging from 15% to 30%. This disparity likely incentivises businesses to utilise the e-commerce scheme for importing fashion commodities, thereby minimising tax liabilities and maximising profit margins. Through this scheme, companies can engage in forms of tax avoidance by structuring their imports as numerous small, low-value shipments, which often qualify for de minimis exemptions or reduced tariff treatments. By splitting large consignments into multiple smaller packages that individually fall below the taxable threshold, businesses legally reduce or altogether eliminate import duties and value-added taxes that would otherwise apply to regular commercial shipments. This practice allows them to exploit regulatory thresholds designed for personal use imports, ultimately lowering their overall tax burden while maintaining or increasing their profit margins.

Figure 6
Trend in import value and number of documents





Note. Source: STATA

Following the approach of Llyod and Solomon (2019), we estimated the effect of tariff increases using a differences-in-differences model. Our study categorised commodities into two groups and analysed two distinct time periods (2017-2019 and 2020-2022). We estimate the impact of tariff increases on import values and the number of documents declared, measured per HS code and monthly. Table 3 presents the results of our analysis, focusing on the effects of the tariff increase following the implementation of Ministry of Finance Regulation No. 199/PMK.04/2019 on importation values. To further assess the regulatory impact, we applied a similar model to measure its effect on the number of declared documents.

Table 3

The impact of tariffs increases on import values and number of documents

Variable	Import Value	Number of Documents
	(1)	(2)
$tariff_t \times prot_i$	-2147.205***	-75.19784***
	(220.1601)	(9.713691)
Observation	297460	29.460
R-square	0.5879	0.4242
Month FE	Yes	Yes
HS FE	Yes	Yes

Note. Source: STATA output

Description: the number in parentheses indicate robust standard errors.

*** significant at 1% level

Table 3 reports the impact of the implementation of the new regulation on importation values and the number of documents declared. It is essential to note that all regressions include month-level and year-level fixed effects. Due to the COVID-19 outbreak during the research period, we also included a COVID-19 dummy with a value of 1 from March 2020 to January 2022. However, *prot*, *tariff*, and COVID-19 variables are omitted from the model due to collinearity. We also dropped 1.344 singleton observations, so the total number of remaining observations is 297.460.

Column (1) shows the impact of the new regulation on importation values. It would be expected to observe a negative and statistically significant estimate of δ. The estimated coefficient is 2147.205, statistically significant at the 1% level. According to these results, the average importation values of fashion commodities decreased by USD 2147.205 compared to other commodities. This finding suggests that the implementation of the new regulation, by increasing tariffs on fashion commodities, effectively reduces import values. This is an effective protection strategy designed to achieving fairer tax treatment, creat a level playing field, and safeguard domestic producers. The results also highlight the impact of Ministry of Finance Regulation No. 199/PMK.04/2019 on importation values.

To strengthen our findings, we also measured the effect of the new regulation on the number of documents declared. Similar to the previous findings, the implementation of the new regulation resulted in a reduction in the number of cross-border e-commerce documents. In Column (2), it is evident that the impact of the new regulation led to the average number of documents of fashion commodities decreasing by USD 75.19784 compared to other commodities.

In summary, the implementation of the new regulation, which revised the tax treatment, resulted in a reduction of both the importation value and the number of documents declared in cross-border e-commerce. This indicates that government intervention can effectively influence economic outcomes through regulatory measures.

4.2 Discussion

This study relies on data from the self-assessment declarations made by importers. To ensure the accuracy of these declarations, the government has implemented a risk management inspection process, which includes examinations conducted during the clearance process. As a result, customs officers have the authority to assign values that may differ from those declared by importers. Therefore, ensuring the accuracy of the declared data is essential for conducting a study that evaluates the policy and generates accurate results. Nevertheless, this study mitigates this risk by including data confirmed by customs officers,

even though the risk of data falsification in declared values still exists.

5. CONCLUSION

Analysing the policy impact using a differences-in-differences model generates new insights. Classifying the data into two groups enhances the analysis of the effect of tax treatment changes resulting from the implementation of Ministry of Finance Regulation No. 199/PMK.04/2019. The results reported in this study provide evidence that the implementation of this new regulation negatively affects the growth of importation values and the number of cross-border e-commerce transactions in general.

Furthermore, the differences-in-differences model found that the tax treatment, specifically the tariff increases for fashion commodities, had a higher impact on reducing importation values and the number of cross-border e-commerce transactions. This finding aligns with the government's objectives for releasing this new regulation, which include creating fairer tax treatment and protecting local industries. Additionally, this policy can serve as a tool for the government to combat tax avoidance practices utilised by importers due to the difference in tax treatment between cross-border e-commerce and general importation.

6. IMPLICATIONS AND LIMITATIONS

The findings of this study underscore significant implications regarding the impact of tax regulation changes on importation values and the number of transactions. Our analysis reveals a notable reduction in importation values following the implementation of these tax reforms. This outcome suggests a direct correlation between tax policy adjustments and economic behaviour in cross-border e-commerce markets.

These results provide several implications for the literature and policymakers and stakeholders involved in trade and fiscal policy formulation. In terms of literature implications, this study contributes by illustrating the impact of policy changes on cross-border e-commerce, specifically on transaction value and volume. This adds to the existing body of literature by providing empirical evidence on how regulatory shifts influence cross-border digital trade dynamics.

For policymakers and stakeholders, the study highlights that the observed decrease in importation values may indicate shifts in market dynamics and consumer behaviour in response to changes in taxation structures. These insights are essential for informing future fiscal policies and for anticipating and managing their economic impacts. Additionally, the decline in importation values underscores the sensitivity of import activities to tax policies. Thus, these findings suggest that future tax policies should consider e-commerce trends and consumer responses to tariff changes.

Moreover, the findings prompt further investigation into the broader economic effects of tax reforms on international trade dynamics. Understanding these effects comprehensively is crucial for developing informed policy strategies that strike a balance between fiscal objectives, economic growth, and market efficiency.

This study relies on the accuracy of documents declared by importers and the effectiveness of customs officers' inspections. For a better study, we recommend that the government embrace the development of technologies to create an early warning system that can detect falsifications in declarations. By minimizing fraud or falsification, the data generated will be more accurate, leading to more reliable results in policy evaluation.

In this study, we found that the number of documents decreased following the implementation of the new regulation. However, we have not yet investigated whether this decline reduced the quantity of imports or merely resulted in a shift to other documents. Further research is needed to fully understand the impact of these regulatory changes, including the potential shift and documents and their implications for overall import volumes. Furthermore, future research should explore long-term shifts in consumer behaviour and how businesses adapt to changing tax policies.

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APPENDIX

Appendix A
Stata Output

```
. reghdfe CIF_USD protxtarif covid, absorb(month commodity) vce(robust)
(dropped 1344 singleton observations)
note: covid is probably collinear with the fixed effects (all partialled-out values are close to zero; tol = 1.0e-09)
(MWFE estimator converged in 6 iterations)
note: covid omitted because of collinearity

HDFE Linear regression                            Number of obs   =    297,460
Absorbing 2 HDFE groups                           F(   1, 287939) =      95.12
                                                  Prob > F        =     0.0000
                                                  R-squared       =     0.5879
                                                  Adj R-squared   =     0.5743
                                                  Within R-sq.    =     0.0002
                                                  Root MSE        = 19925.7759

------------------------------------------------------------------------------
             |               Robust
     CIF_USD | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
  protxtariff |  -2147.205   220.1601    -9.75   0.000    -2578.713   -1715.697
       covid |           0  (omitted)
       _cons |   6277.883   37.71581   166.45   0.000     6203.961    6351.805
------------------------------------------------------------------------------

Absorbed degrees of freedom:
-----------------------------------------------------+
 Absorbed FE | Categories  - Redundant  = Num. Coefs |
-------------+---------------------------------------|
       month |         61           0          61   |
   commodity |       9460           1        9459   |
-----------------------------------------------------+
```

```
. reghdfe JML_DOK prot tariff protxtarif covid, absorb(month commodity) vce(robust)
(dropped 1344 singleton observations)
note: prot is probably collinear with the fixed effects (all partialled-out values are clo
> se to zero; tol = 1.0e-09)
note: tariff is probably collinear with the fixed effects (all partialled-out values are c
> lose to zero; tol = 1.0e-09)
note: covid is probably collinear with the fixed effects (all partialled-out values are cl
> ose to zero; tol = 1.0e-09)
(MWFE estimator converged in 6 iterations)
note: prot omitted because of collinearity
note: tariff omitted because of collinearity
note: covid omitted because of collinearity

HDFE Linear regression                            Number of obs   =    297,460
Absorbing 2 HDFE groups                           F(   1, 287939) =      59.93
                                                  Prob > F        =     0.0000
                                                  R-squared       =     0.4242
                                                  Adj R-squared   =     0.4051
                                                  Within R-sq.    =     0.0001
                                                  Root MSE        =   781.3082

------------------------------------------------------------------------------
             |               Robust
     JML_DOK | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        prot |           0  (omitted)
      tariff |           0  (omitted)
  protxtariff |  -75.19784   9.713691    -7.74   0.000    -94.23641   -56.15928
       covid |           0  (omitted)
       _cons |   85.71933   1.508553    56.82   0.000     82.76261    88.67606
------------------------------------------------------------------------------

Absorbed degrees of freedom:
-----------------------------------------------------+
 Absorbed FE | Categories  - Redundant  = Num. Coefs |
-------------+---------------------------------------|
       month |         61           0          61   |
   commodity |       9460           1        9459   |
-----------------------------------------------------+
```

Note. Source: Stata