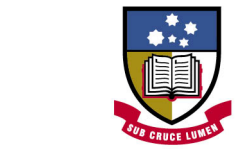

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Essays on International Trade

by

Harry Wardana

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Faculty of Professions

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Contents

List of Tables

List of Figures

Declaration

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Abstract

This thesis is a collection of three independent papers using applied microeconomics and focusing on various international trade contexts in Indonesia.

The first paper examines the impacts of import licensing procedures on imports at transaction level. Governments are increasingly imposing import licensing requirements. Our understanding of their impacts for domestic firms, both users and producers, are limited. Using Indonesian annual firm-level and monthly transaction-level data over 2006-2011, we find evidence that the licensing procedures of iron and steel imports reduced the extensive margins of imports but had no effect on the intensive margins. Domestic users import less frequently and source from less countries, but do not import less in value and quantity. Consistent with this, we also do not find long-term increase in sales for domestic producers of regulated products. This suggests that licensing comes with considerable adjustment costs.

The second paper investigates the impacts of institutional distortions on exports at transaction level. Institutional distortions are prevalent in developing countries. One form of distortions are private-sector, industry-association membership fees, which act as de facto export-tax. Little is known about how these de facto export-tax affect international trade. Using the removal of an export-licensing requirement in 2011, I identify its positive effects on the intensive margins of instant coffee exports in Indonesia. This paper calls out government of emerging economies to revisit their outdated policies that might serve as institutional distortions.

Drawing on the experience of Indonesian firms, the third paper analyses the relationship between importing and exporting activities in two years (2009 and 2015) to test whether this relationship changes following a reversal of trade liberalization. We hypothesize that reversal in trade liberalization affects the relationship between imports and exports in firms in developing countries because they experience a decreased access to market opportunities and technology that is already standard in developed countries. We validate the theoretical underpinnings of the claim that importing Indonesian firms export more, and we contribute to the literature by introducing a newly-identified underlying mechanism behind the positive relationship between imports and exports: when trade barriers are low, firms that import intermediates sourced from multiple-border-crossing foreign value added achieve significant increases in their exports. However, following a reversal of trade liberalization, value chains are disrupted and single-border-crossing foreign value added in importing becomes more relevant for firms' exports. In such circumstances, emerging market firms' participation in value chains becomes less global. Relevant policy implications can be made: in a world marked by growing scepticism surrounding globalization and openness to international trade and competition, policy makers should bear in mind that policies inhibiting access to global value chains have negative consequences for firms' exports.

Introduction

As the writing of this thesis draws to a close in November 2022, the world economy is facing a huge challenge recovering from the 2019-2020 coronavirus pandemic. The crisis has generated an unprecedented shock in global supply chains and in trade relations between countries. Following the shock, we witness policy responses emerge and propagate throughout the global economy. These responses include the application of import- and export-limiting measures, making the movement of goods and services across countries more costly. Even before the pandemic, 90% of global trade is already subject to non-tariff measures (NTMs), which are also particularly prevalent in the developing countries (UNCTAD & World Bank, 2018). The aim of this thesis is to contribute to our understanding of these barriers by investigating a number of past policies applied in one of the major developing countries: Indonesia.

Chapter 1 focuses on import licensing requirements, whereas Chapter 2 focuses on de-facto export tax. While chapters 1 and 2 share the same methodology, they apply it to two different topics. Chapter 3 studies the relationship between importing and exporting, with a global value chain perspective.

Chapter 1 examines a form of non-tariff measures: import licensing procedures, and their effects on imports at transaction level. Import licensing procedures, which consist of the steps and paperwork firms have to undergo to import goods, have been increasingly used by governments and applied to a wide range of traded products (WTO, 2021). However, our understanding of their impacts for domestic firms, both

users and producers, are still limited. This paper contributes to this literature by evaluating the effects of a change in import licensing procedures on the extensive and intensive margins of imports. Causal evidence and evaluation of policy reforms of NTMs are still lacking in the literature. Previous works did not use specific policy measures or changes, thus we still have a limited understanding about the causal link of such policy. Indonesia is a perfect case study to evaluate causal effects of import licensing procedures. In February 2009, it announced new provisions on iron and steel imports. The policy stipulates stricter registration requirements, pre-shipment import technical verification, and submission of quarterly reports on the realisation of imports. This policy represents a form of non-tariff measures (NTMs). More specifically the policy acts as an import procedural obstacle, since all costs associated with the new procedures, including the the fees for an independent state-appointed surveyor, are borne by the importers. Along with detailed product-level shipment data, this provides us with main components for a quasi-experimental research design. Using Indonesian firm-level and transaction-level data over 2006-2011, we find causal evidence that the licensing procedures of iron and steel imports reduced the extensive margins of imports. Not only that importers reduce the frequency of shipments, they also reduce the number of countries they are sourcing their products, i.e., they have less diversified suppliers. However, overall we find no significant effect of the policy on the intensive margins. Although domestic users import less frequently and source from less countries, they do not import less in value and quantity. Interestingly, we also do not find long-term increase in sales for domestic producers of regulated products. Since the policy's stated objective is to support the creation of a healthy domestic market environment and a conducive climate for business[1], our findings suggest that the policy is not effective.

[1]In the preamble of the Decree of the Minister of Trade No 08/M-DAG/PER/2/2009, the policy's stated objective is, in Bahasa, "untuk mendukung upaya terciptanya kondisi perdagangan dan pasar dalam negeri yang sehat serta iklim usaha tetap kondusif", which translates to "to support the creation of a healthy domestic market environment and a conducive climate for business". Download the policy document from an official government page (in Bahasa) here:

In addition, although the thesis does not specifically address the welfare impact of the policy, it is important to acknowledge that not only is the policy ineffective, but it also carries significant costs. As a general rule, higher costs may be passed on to consumers of the produced goods, with negative consequences for consumer welfare.

Chapter 2 examines the impacts of institutional distortions on exports. One form of these distortions are government-mandated, private-sector industry-association membership fees. Such frictions hinder firms' trade and distorts production decision. For example, a firm that faces complicated and costly licensing requirements in trading a particular product may need to source low-quality inputs or switch to a different technique or product. Collectively, these institutional distortions may shift the allocation of resources across different products. Interestingly, little is known about how they affect international trade. While distortions and misallocation have been increasingly discussed in the literature, most of them focus on a general equilibrium framework and do not allow to identify causal effect of a specific policy. A particular feature of Indonesia's institutional policy setting gives us a unique opportunity to identify a causal relationship. Following the Asian Financial Crisis, the government of Indonesia was unable to pay the country's annual membership of the International Coffee Organization (ICO), the main intergovernmental organization for coffee. The government asked the Association of Indonesian Coffee Exporters (AEKI) to help pay for this membership fee. AEKI accepted it with the condition that government had to add AEKI membership payment receipt as a requirement to be a coffee exporter. The amount of AEKI membership fee is based on the volume of coffee exported, effectively applied like an export tax for firms. In 2011, this policy was revoked due to another episode of institutional distortion, which is a governing clash between AEKI and the Ministry of Trade. Using Indonesian customs data for exports over 2008-2013 period, this paper presents evidence that removing de-facto export tax has positive and significant effects

https://peraturan.go.id/files/2009/bn228-2009.pdf

on intensive margins of outgoing shipments of instant coffee from Indonesia. More generally, these findings suggest that removing this type of institutional distortions benefit firms exports. These findings are also relevant for a broader policy dynamics. Policy making in developing countries are characterized by various institutional challenges. Failure in detecting institutional distortions that hid behind legacy policies might lead emerging economies to undermining other (global) policy initiatives in place, e.g. climate initiative.

In Chapter 3, we study how the reversal of trade liberalization affects the relationship between importing and exporting activities in emerging market firms, with an insight from a global value chain perspective. We contribute to the literature by scrutinizing the relationship between importing activities and exports, and we consider the integration of the firm in worldwide activities by accounting for the depth and scope of inward value chains. We rely on a value chain perspective that allows us to distinguish between foreign value added that only crosses the border once (single-cross FVA) and foreign value added that crosses the border twice or more (multiple-cross FVA). Then, we identify the effect of single-cross FVA versus multiple-cross FVA in importing on exports in a context in which emerging market firms experience a deterioration of their trade conditions. As our empirical research focuses on the Indonesian experience, we analyse the role of single-cross FVA versus multiple-cross FVA in importing in two years in which we observe a reversal of trade liberalization in Indonesia: 2009 and 2015. Our key assumption is that reversal of trade liberalization complicates international trade processes and disrupts existing trade networks. As a consequence, firms in trouble might "simplify" their importing strategy because some imported products might become unavailable (or very expensive) and they have to rely on alternative sources to substitute them. We show that when firms source from foreign countries, firms in that country export more. However, this positive causal effect is channelled through multiple-cross FVA in importing (that is, when firms import intermediates

that have crossed international borders several times); single-cross FVA in importing (that is, when firms import intermediates that have crossed an international border only once—in this case, the Indonesian border) does not increase firms' exports in periods of trade liberalization. Conversely, single-cross FVA in importing becomes more relevant for exports in periods of trade liberalization reversal. Our findings have relevant policy implications. From our focus on the reversal of trade liberalization in Indonesia, we learn how decreased involvement in global value chains (GVC) might shape firm performance (measured in terms of exports). Therefore, re-imposing trade controls does not seem to be the best strategy in this globalized world.

Statement of Authorship

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Principal Author

Name of Principal Author (Candidate)	Harry Wardana
Contribution to the Paper	Contributed to the planning the article and the methodology, conducted the literature review, collected the data, analysed and interpreted the results, wrote part of the manuscript.
Overall percentage (%)	80%
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.
Signature	Date 01/11/2022

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	
Contribution to the Paper	ervised the development of the work, .
Signature	Date 01/11/2022

Name of Co-Author	
Contribution to the Paper	**Contributed to the planning of the article, supervised the development of the work and helped in the interpretation of the results.**
Signature	Date **01/11/2022**

Please cut and paste additional co-author panels here as required.

Chapter 1

Import licensing procedures and firms

Abstract

Governments are increasingly imposing import licensing requirements. Our understanding of their impacts for domestic firms, both users and producers, are limited. Using Indonesian annual firm-level and monthly transaction-level data over 2006-2011, we find evidence that the licensing procedures of iron and steel imports reduced the extensive margins of imports but had no effect on the intensive margins. Domestic users import less frequently and source from less countries, but do not import less in value and quantity. Consistent with this, we also do not find long-term increase in sales for domestic producers of regulated products. This suggests that licensing comes with considerable adjustment costs.

1.1 Introduction

Import licensing procedures consist of the steps and paperwork firms have to undergo to import goods.[1] These non-tariff measures (NTMs) cause costs for importing firms which eventually lead to higher prices for consumers. Reducing the burden imposed by import licensing procedures is therefore a focus of trade liberalization efforts of governments across the world. At the same time, import procedures can be used as a protectionist policy by governments. For emerging markets, understanding the uses and implications of NTMs is essential for formulation and implementation of effective development strategies. On the one hand, NTMs can be a tool to achieve the United Nation Sustainable Development Goals in many areas, e.g., in health and environment. On the other hand, as 90% of global trade is subject to NTMs, these policy measures have a growing impact on international trade (UNCTAD & World Bank, 2018).

Import licensing procedures have become increasingly widespread and are applied to a variety of traded products (WTO, 2021). Most of previous research focusses on catch-all measures on NTMs using constructed tariff-equivalent measures. As these measures lump together several NTM policies into a single aggregate measure (for example the work on effective protection rates by Anderson (2003)), it remains hard to pinpoint to the effects of specific policies. Aggregating several policies into one measure also makes identification of the exogenous variation in the data more difficult. This study aims to address this gap in the literature by examining the impact of changes in import licensing procedures on both the extensive and intensive margins of imports. Indonesia's 2009 policy change regarding iron and steel imports serves as an ideal case study for examining the causal effects of import licensing procedures.

[1] According to the WTO Agreement on Import Licensing Procedures, import licensing is defined as "administrative procedures used for the operation of import licensing regimes requiring the submission of an application or other documentation (other than that required for customs purposes) to the relevant administrative body as a prior condition for importation into the customs territory of the importing member".

This policy represents a form of non-tariff measure that acts as an import procedural obstacle, with importers bearing all associated costs including fees for state-appointed surveyors. By analyzing detailed product-level shipment data, we can use a quasi-experimental research design to provide new, causal insights into the impact of this specific import licensing policy. To our knowledge, this is the first study to provide causal evidence from a specific import licensing policy.

In this paper, we focus on import licensing measures from importers' perspective. A large literature has evaluated the trade effects of NTMs, mostly by focusing on technical measures such as technical barriers to trade (TBT) and sanitary and phytosanitary measures (SPS). Ray (1981) provides earlier analysis using simpler data from U.S. Trade Commision. More recent works include Disdier et al. (2008); Essaji (2008); Yue & Chengyan (2009); Bao & Chen (2013); Fontagné et al. (2015); Murina & Nicita (2017). Interestingly, the literature of NTMs that are non technical, e.g. administrative requirements, is still scarce.[2] Hornok & Koren (2015a) show that administrative barriers to trade can be expressed as bilateral ad-valorem trade costs. The authors also present theoretical and empirical evidence how these costs create welfare loss due to less frequent shipments. Along the same line, Hornok & Koren (2015b) show that not only that shipments become less frequent, they also become larger in size. In other words, trade becomes more lumpy. These papers, however, both look at the trade effects of the administrative costs from exporter's perspective. As these administrative measures are applied by importing countries, analysis from an importer's perspective will not only provide a comparison with the existing findings, but also allow us to reveal novel insights, since the analytical interpretations of margins of trade might be different between imports and exports. To the best of our knowledge, Alessandria et al. (2010) is the only work that show the lumpiness of trade from importer's perspective. However, the authors focus on the the administrative costs of being an importer ver-

[2]The distinction between technical and non-technical measures, owing to the UNCTAD classification system, is documented by Nicita & Gourdon (2013).

sus non importer. We contribute to the literature by focusing on the variation among importers.

In terms of data, the literature has mostly used country- or sectoral-level data, mainly in a gravity context, for instances, Disdier & Marette (2010); Murina & Nicita (2017); Heid et al. (2021). With the growing availability of transaction-level data, recent works have investigated the trade effects of administrative barriers at product-level details. Most works in this literature are for developed countries, and again from exporter's perspective, including the US (in trade with six destination countries) by Alessandria et al. (2010), for France by Békés et al. (2017), for the US and Spain by Hornok & Koren (2015a), and by Kropf & Sauré (2014) for Switzerland. Interestingly, there is still little evidence of the impacts of such policy at product-level details for developing economies. Hayakawa et al. (2019) examined the effects of import processing time in Thailand at the firm level and found that an increase in import processing time reduces firms' import shipment frequencies but raises their imports per shipment. Our paper is different from Hayakawa et al. (2019) in terms of our identification strategy and policy evaluation approach. We contribute to this literature by utilizing shipments data from another developing economy: Indonesia. Recently, researchers have used firm-level data to investigate the trade effects of NTMs, for instances, Alessandria et al. (2010); Kropf & Sauré (2014); Baghdadi & Kheder (2019).[3] A limitation of our paper is we are unable to exploit firm heterogeneity in our analysis, as we do not have firm identifier for each shipment record.[4] However, as we mentioned earlier, our focus is different: we focus on importer's perspective and variation among those importers. Furthermore in terms of data, to measure the ease or restrictiveness of import procedures, the literature has mainly used proxies from the World Bank's Doing

[3]Recent firm-country-product level works also incorporate a balls-and-bins model of trade (Armenter & Koren, 2014; Blum et al., 2016).

[4]For a survey of Indonesian firm-level data along with the challenges in matching them with customs data, see Márquez-Ramos (2020). Few studies have been successful in merging these datasets (see for example Pane & Patunru (2022).

Business Indicators that measure the number of days or the number of forms needed to import goods, again in a gravity context to evaluate their trade effects (see for examples, Djankov et al. (2010); Hornok & Koren (2015a,b); Wagner (2016); Heid et al. (2021). These indicators have recently been criticized for a number of irregularities.[5] The data have also been criticized as it is not clear what they actually measure (see Sharafeyeva & Shepherd (2020)). Interestingly, the literature on the evaluation of a direct measure of import licensing procedures is scant. In this paper, we use a unique episode in Indonesia's change of import procedures for iron and steel. This episode allows us to identify the effect of import licensing procedures on extensive and intensive margins of imports without relying on problematic proxies.

Using Indonesian customs data over 2006-2011 period, we analyse the consequences of a new procedure for imports of iron and steel introduced in Indonesia in February 2009. We find evidence that the policy has a negative effect on extensive margins of imports. Not only that importers reduce the frequency of shipments, they also reduce the number of countries whom they are sourcing their products from, i.e., they have less diversified suppliers. This is complementary to theoretical and empirical findings from Hornok & Koren (2015a) that these administrative costs create welfare loss. However, we find no long-term effect of the policy on the intensive margins of imports.

The remainder of the paper is structured as follows. Section 1.2 provides the policy background. Section 1.3 describes the data. Section 1.4 describes our identification strategy and Section 1.5 presents the results. Finally, Section 1.6 concludes.

1.2 Policy background

The "Provisions on Iron and Steel Importation" (Decree of the Minister of Trade No 08/M-DAG/PER/2/2009), signed by then Minister of Trade Mari Pangestu on 18

[5]See the statement from the World Bank here.

February 2009, was designed to support the creation of a healthy domestic market environment and a conducive climate for business.[6] The decree states that in order to create a conducive climate in the iron and steel sectors, imports need to be regulated to ensure a discipline administration and documentation.[7] The policy introduces new procedures for the import of iron and steel as follows: (i) Registration of importers with Indonesia's Ministry of Trade: Under the decree, iron and steel imports may only be imported by Registered Importers (IT) or Producer Importers (IP) of Steel or Iron. This status is valid for 1 year and may be extended; (ii) Pre-shipment import technical verification: This must be done by an independent state-appointed surveyor at the loading port. The import technical verification shall cover the type of goods, classification of goods, quantity, and port of destination; and (iii) Submission of quarterly reports on the realisation of imports: The written reports must be submitted to Director-General of the Ministry of Trade.

All costs associated with the above requirements, including the fees for the external surveyor, are borne by the importer. Repeated failure to abide by the article will result in the revocation of the Registered Importers (IT) or Producer Importers (IP) of Steel or Iron status. The regulation applies to a number of domestically produced steel products including Hot Rolled Coil (HRC), Hot Rolled Plate (HRP), Layered Sheet Iron, Welding Pipes, Wire Rods, and Coated-Steel Products. Some items excluded from the verification and import technical tracking regulation are: steel or iron imported by licensed importers (ITs) of steel or iron in the automotive industry, electronics industry, ship dock industry and their relevant components; steel or iron imported that is already subjected to import verification based on the User Specific Duty Free

[6]Under the WTO Agreement in Import Licensing Procedures, members have to notify new licensing procedures or changes in the existing ones (Koul, 2018). The 2009 provision had been notified to WTO dated 15 May 2009. For a historical review of Indonesia's trade policy, see Pangestu et al. (2015). For recent case study of import licensing regimes by Indonesia, see Ahn & Gnutzmann-Mkrtchyan (2019).

[7]List of products, at 4-digit HS Code, that are regulated by this policy are shown in Table A.1 in the Appendix.

Scheme (USDFS/BM-DTP); and steel or iron imported for the industrial needs in Free Trade Zones, Free Ports and Bonded Zones.

Import licensing fits into Indonesia's broader trade policy. Pangestu et al. (2015) highlight two key periods post Asian Financial Crisis: the recovery period (1999-2004) and the reform period (2004-2015), in which the country struggled over the conflict between openness and protectionism. Though tariffs had been low in the period after the GFC, these low tariffs were offset by NTBs. The growing concern over Indonesia's import licensing regimes during this period were also stated in the sixth Trade Policy Review of Indonesia, conducted by the WTO in 2013.[8]

1.3 Data

We use data from the Compilation of Import Declaration Documents during 2006-2011 period that we obtained from Indonesian Central Bureau of Statistics (BPS). The import declaration documents are filled out by the importers and approved by the customs and excises regional offices, and then sent to BPS and Bank of Indonesia. Each document, administered at the shipment level, covers detailed information about the imported goods such as product classification, value (in USD), net weight (in tonnes), country of origin, port of arrival, and the time of arrival (month and year). From this raw data, we generate monthly value of total number of shipment, total number of countries of origin, total value of shipments, and total net weight of shipments, with the product level aggregated at 6-digit HS Code.[9]

Announced on 18 February 2009, the Decree of the Minister of Trade No 08/M-

[8]WTO Members urged Indonesia to "reconsider a number of trade restrictive measures – including import licensing and permit requirements, which apply to a broad range of products and cover around 20% of all tariff lines and other measures such as point of entry restrictions on imports, pre-shipment inspection requirements as well as various export taxes and prohibitions – which have the effect of disrupting trade and reducing access to Indonesian markets." (WTO, 2013).

[9]The raw data are actually at 9-digit level. We decided to aggregate the data at 6-digit level to reduce the presence of zeros in our final dataset.

DAG/PER/2/2009 introduced new procedures for the import of iron and steel. With the entire time period of our data (2006-2011), that means we have a quite balanced period leading to (37 months) and following (33 months) the policy implementation. As iron and steel are categorized as metal products, in order to minimize the noise in the data we restrict our samples to only include import data of metal products. More specifically, in our final dataset we only include observations for products of base metals and articles of base metals (e.g. copper, aluminium, zinc, nickel, lead, and tin).[10]

The policy excludes steel and iron: (i) in the automotive industry, electronics industry, ship dock industry and their relevant components; (ii) subject to import verification based on the User Specific Duty Free Scheme; and (iii) for the industrial needs in special economic zones (SEZs). Given our lack of firm-level information, we are unable to incorporate exclusions (i) and (ii) in our analyses. For exclusion (iii), the relevant SEZs for the period analysed in this research are Batam, Bintan and Karimun islands, which are all located in Riau Archipelago province (Rothenberg & Temenggung, 2019). Hence, in our final dataset we exclude shipments that come into ports in these zones. However, we will later revisit these data for our robustness tests.

Table 1.1 presents the summary statistics of our final dataset. The table reports the mean and standard deviation (in parentheses) of our variables of interest: extensive and intensive margins of imports. For our empirical analysis, we then do log transformation of the intensive margins. The balanced panel dataset counts for 43,488 product-month observations for the period 2006-2011.[11] In Table 1.1, we present the descriptive statistics for the first half of our entire time period, 2006-2008 (shown in the top panel), and the second half, 2009-2011 (shown in the bottom panel). Column (1) reports the statistics for all shipments of metal products. Column (2) reports the statistics for the shipments of iron and steel products listed in the 2009 import licens-

[10]See Table A.2 in the Appendix for a list of products (at 2-digit HS Code) that are included in our final dataset.

[11]We take into account the presence of no shipments at product-month level by generating zero values across the dependent variables when it is the case.

Table 1.1: Summary statistics of the monthly incoming shipments from 2006 to 2011.

	(1) All metal products	(2) Iron and steel products listed in the policy	(3) Products of other metals not listed in the policy
2006-2008 period			
Avg # of shipments	16.44	20.13	14.86
	(25.59)	(37.85)	(17.67)
Avg # of countries of origins	7.75	8.28	7.52
	(6.15)	(6.80)	(5.83)
Avg ln(import value)	12.08	12.93	11.72
	(2.39)	(2.12)	(2.40)
Avg ln(import net weight)	11.12	12.50	10.53
	(2.91)	(2.45)	(2.90)
2009-2011 period			
Avg # of shipments	19.06	20.99	18.22
	(35.44)	(52.34)	(24.59)
Avg # of countries of origins	8.03	7.57	8.23
	(6.71)	(7.21)	(6.48)
Avg ln(import value)	12.49	13.02	12.26
	(2.39)	(2.27)	(2.41)
Avg ln(import net weight)	11.22	12.28	10.76
	(2.97)	(2.66)	(2.98)
Number of products (6-digit HS)	604	173	431
Number of observations	43488	12456	31032

Notes: Table reports the mean and standard deviation (in parentheses) of our dependent variables. Observations are at 6-digit product level and the time period is monthly. Column (1) reports the statistics for all shipments of "Base Metals and Articles of Base Metals"; column (2) reports the statistics for the shipments of iron and steel products listed in the 2009 import licensing procedures; and column (3) reports the statistics for the shipments of products of other metals not listed in the policy. Number of observations is over the entire period, i.e. 72 months.

ing procedures. And column (3) reports the statistics for the shipments of products of other metals not listed in the policy. Number of products for our dataset counts for 604, with 173 products listed in the policy and 431 products not listed.

In the first half of the period (2006-2008), we observe substantial differences between the two groups. The mean values of our dependent variables are all higher for the listed iron and steel products compared to the non-listed products. This highlights the

importance of iron and steel sectors in the metal industry in Indonesia. In terms of extensive margins, the difference in the monthly number of shipments is more profound, with 20 shipments per month for the listed products vs only 15 shipments a month for the non-listed products.

In the second half of the period (2009-2011), we still observe differences between the two groups, but they are less substantial compared to the ones in the first half of the period. For the average number of countries of origin, the number for the listed products is now lower than the non listed. The changes in the overall extensive and intensive margins for the listed products, from the first half to the second half of the period, are at lower rates compared to the ones in non listed products. For number of countries of origin and total net weight of imports, the changes are even negative. Furthermore, importers of the listed iron and steel products seem to source from less countries compared to importers of other metal products, in this second half of the period.

1.4 Identification strategy

Under the 2009 decree, several iron and steel products may only be imported by licensed importers. Additional procedures related to technical verification and submission of reports were also introduced. We rely on this episode to gain a better understanding of the consequences of import licensing procedures in emerging markets. Specifically, our focus is on the effect of the new procedure on the incoming shipments, at a detailed product level.

Our empirical model draws from Angrist & Pischke (2009) and Cunningham (2021), who provide a practical, detailed presentation of empirical frameworks for policy evaluation. For this study, we consider the new procedures for the import of iron and steel in Indonesia as a quasi-natural experiment that provides a shock in imports. The varia-

tion in imports then allows causal inference under a difference-in-differences framework. This framework is particularly useful when the treatment varies at the group (rather than individual) level. As our unit of observation provide details at 6-digit product level and monthly period, zero shipments are present in our final dataset. We therefore use Pseudo Poisson Maximum Likelihood (PPML) approach to ensure all the observations are taken into account. PPML estimation is largely used in the literature to take into account zero trade for country-level gravity trade analyses (Silva & Tenreyro, 2006; Defever et al., 2015). We adopt this into our empirical analyses. Our baseline regression is given by:

$$Y_{pt} = \exp[\mu_p + \eta_t + \beta(\text{ImportLicensingProcedures} \times D)_{pt}] + \varepsilon_{pt} \tag{1.1}$$

where Y_{pt} is (a) number of incoming shipments of product p in month t, or (b) number of countries of origin for imports of product p in month t, or (c) total value of incoming shipments of product p in month t, or (d) total net weight of incoming shipments of product p in month t. ImportLicensingProcedures equals 1 if product p is listed in the import licensing procedures (Decree of the Minister of Trade No 08/M-DAG/PER/2/2009), and zero otherwise. D is a dummy equal to 1 if the observation is from March 2009 or after (the post-policy period). μ_p is a set of product fixed effects tha control for time-invariant product-characteric bias. η_t refers to month fixed effects that controls for time-varying factors that influence treatment and control products in a similar way. Finally, ε_{pt} represents a zero-mean error term that capture random fluctuations in our dependent variables. The parameter of primary interest, captured by β, indicates the effect of the import licensing procedures on product's extensive and intensive margins of imports. More specifically, β captures the average differential change in our dependent variables from the pre- to post-treatment period for the

treatment groups relative to the change in those variables for the control groups. Following the suggestion of Bertrand et al. (2004) and Colin Cameron et al. (2011), we cluster standard errors at the product level to allow for correlation within product as our treatment variable is defined at the product level.

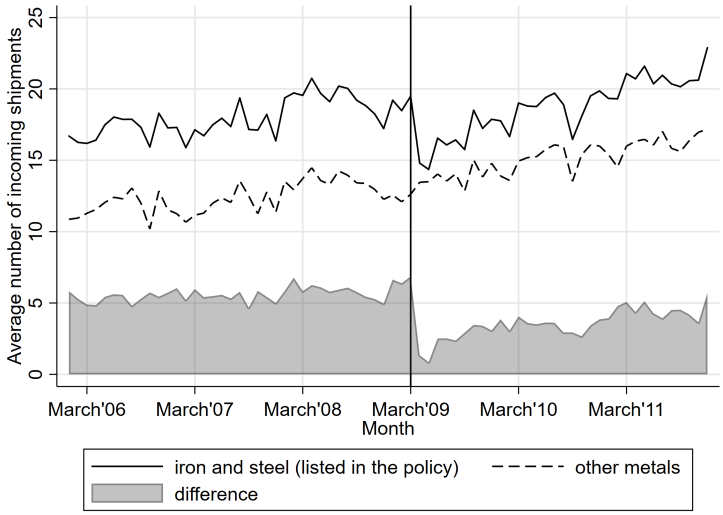
An obvious concern in policy evaluation exercise is that policy makers might have chosen specific industries to be in the treatment group, also known as selection bias or endogeneity problem (Trefler, 1993). In our case, this seems to be less of a concern. Following global financial crisis, from September 2008 to July 2009, trade measures increased, as reported by OECD (2009). India imposed import duties on a range of iron and steel products in November 2008, followed by Vietnam, Turkey, Egypt, Indonesia, Russia and U.A.E. in the following months. Similar pattern happened with non-tariff measures. In November 2008, Argentina, India and Malaysia introduced licensing requirements for imports of certain iron and steel products. Indonesia and Thailand applied similar measures in the following months. This is also the case for trade remedy measures.[12] It seems that the Indonesian government simply follow the chosen products in its 2009 import licensing requirements. Hence, for our purposes, this may leave the question of the presence of the general equilibrium fluctuations driven by the fall in demand, for example from the big iron and steel consumers (China, the U.S. and the E.U.). These fluctuations should be kept in our time fixed effects.

We later relax the assumption of constant treatment effects over time by estimating the following event study specification:

$$\mathrm{Y}_{pt} = \exp[\mu_p + \eta_t + \sum_{\tau=Feb'06}^{Dec'11} \beta_\tau(\mathrm{ImportLicensingProcedures} \times D_\tau)_{pt}] + \varepsilon_{pt} \qquad (1.2)$$

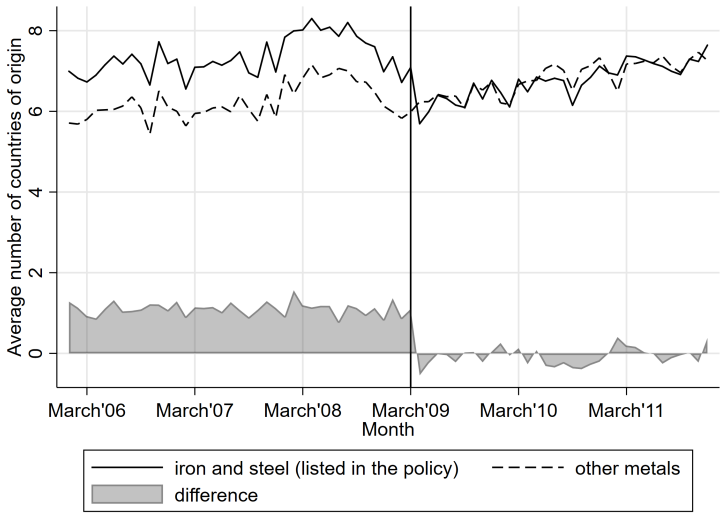
[12]Developed countries such as Australia, the E.U. and the U.S. also initiated anti-dumping and countervailing duties investigations.

Figure 1.1: Monthly average number of incoming shipments in 2006-2011.



Notes: Figure depicts the average total number of shipments per month for iron and steel products that are listed in the 2009 import licensing procedures versus those other metals that have never been regulated by import licensing procedures during our time period

Figure 1.2: Monthly average total number of country countries of origins for imports in 2006-2011.



Notes: Figure depicts the average total number of countries of origin per month for imports of iron and steel products that are listed in the 2009 import licensing procedures versus those other metals that have never been regulated by import licensing procedures during our time period.

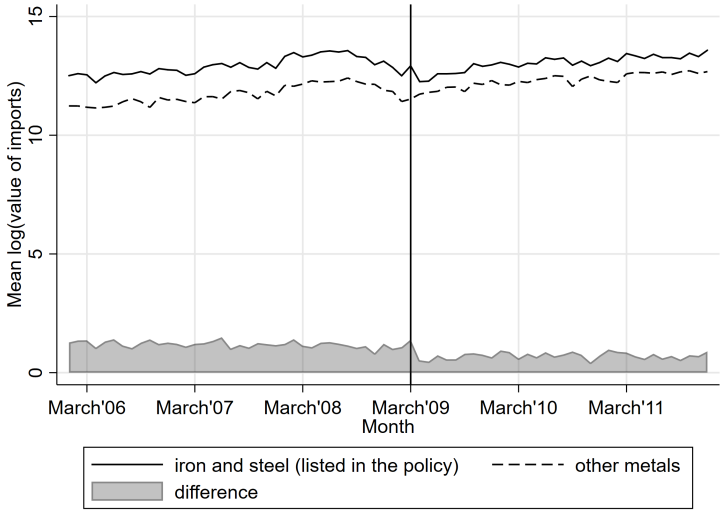
Our interest lies in estimating treatment effect β_τ on our dependent variable after the policy introduced, i.e., where $\tau >$ March 2009. We estimate leading value of the treatment (i.e., where) to test the reliability of our identification strategy. A statistical significant effect for $\tau <$ March 2009 indicates pre-exisiting differences in the trends between listed and non-listed products, which may cast doubt on the common trend assumption underlying our approach. Identification in the difference-in-differences setting relies on a parallel trends assumption, that is, the assumption that in the absence of policy intervention, the changes in extensive and internsive margins of imports for listed iron and steel products would not have been different from the changes for other products. The next four figures present the visual descriptive statistics as well as parallel trend checks for our dependent variables: imports' extensive margins (shown in Figures 1.1 and 1.2) and imports' intensive margins (show in Figures 1.3 and 1.4).

Figure 1.1 shows the evolution of the monthly number of shipments for iron and steel products that are listed in the policy and those of other metal products which are not, respectively, within our sample period. The figure shows average total number of shipments per month for these two groups. There are pre-existing differences in listed and non-listed products which we will control by the inclusion of product fixed effects. The figure also shows shaded area with the evolution of the difference in the average total number of shipments size between listed and non-listed products. This shaded area allows a coarse comparison of the relative pre-existing trends for the period before any metal products are treated, i.e, before March 2009. We see that average number of shipments seems to move on parallel trends before the policy entered into force. After March 2009, the trends start to diverge. The shipments of the listed product experience an immediate shock thus the difference between the two groups falls.

Figure 1.2 shows the evolution of the average number of countries of origin for the import of iron and steel products that are listed in the policy and those of other metal products which are not, respectively. The figure shows average total number

of countries of origin per month for these two groups along with difference between the groups, shown by the shaded area. Similar to Figure 1.1, there are pre-existing differences in listed and non-listed products. We see that after March 2009, the changes in the difference are more profound. The average total number of countries of origin become quite similar between the two groups across the post-policy period.

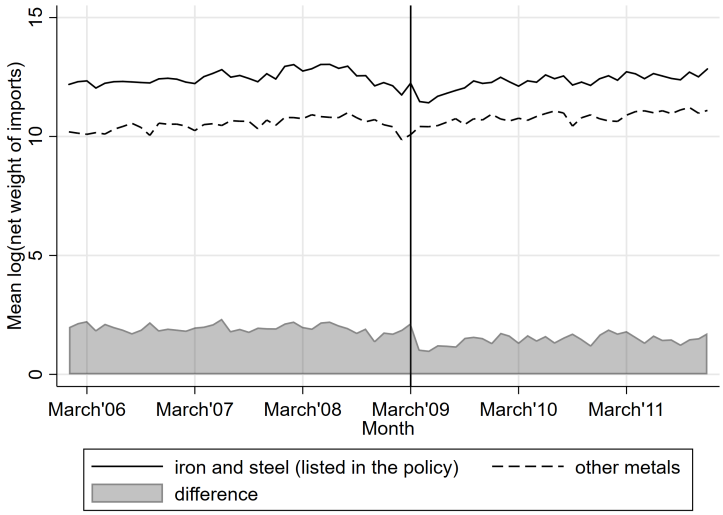
Figure 1.3: Monthly average log of total value of imports in 2006-2011.



Notes: Figure depicts the average log og total value per month for imports of iron and steel products that are listed in the 2009 import licensing procedures versus those other metals that have never been regulated by import licensing procedures during our time period.

Figures 1.3 and 1.4 follow the same format as Figures 1.1 and 1.2, but for intensive margins of imports. Figure 1.3 shows the evolution of the monthly average log of total value for the import of iron and steel products that are listed in the policy and those of other metal products which are not, respectively, along with the difference between the groups, shown by the shaded area. Figure 1.4 is in the same format as Figure 1.3, but for the monthly average of total net weight of imports. Though we notice an immediate change in the first month following the policy, we do not see that there are overall significant differences between pre-treatment and post-treatment period.

Figure 1.4: Monthly average log of net weight of imports in 2006-2011.



Notes: Figure depicts the average log of total net weight per month for imports of iron and steel products that are listed in the 2009 import licensing procedures versus those other metals that have never been regulated by import licensing procedures during our time period.

Visual evaluation of these descriptive figures gives us an intuition about what happens following the policy: less frequent and less number of source countries, but no changes in value and quantity. It seems that individual shipments are getting larger in size, but less frequent. In other words, trade lumpiness increases. This intuition, derived from eyeballing Figures 1.1 to 1.4 needs to be validated using formal statistical tests. The next section present the results.

1.5 Results

1.5.1 Effect of import licensing procedures on imports' extensive margins (number of shipments and countries of origin)

Table 1.2: Effect of import licensing procedures on imports' extensive margins.

	ln(# of shipments)	# of shipments	ln(# of countries of origin)	# of countries of origin
	(1) OLS	(2) PPML	(3) OLS	(4) PPML
Import licensing procedures	-0.302***	-0.151**	-0.258***	-0.168***
	(0.037)	(0.070)	(0.026)	(0.039)
N	36741	43488	36741	43488
adj. R^2	0.893		0.843	

Notes: Table reports regression coefficients of estimating the average treatment effects on the treated (ATT) on imports' extensive margins following the import licensing procedures announced in February 2009. Columns (1) and (2) report the estimates of our baseline specifications for our first measure of imports' extensive margin: number of shipments. Columns (3) and (4) report the estimates for our second measure of imports' extensive margin: number of countries of origin. Columns (1) and (3) are OLS estimates using log-transformed values of the dependent variables, while columns (2) and (4) are PPML estimates. All regressions include product and time fixed effects. Standard errors are robust to multi-way clustering across products. ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively.

We present results of Equation 1.1 for imports' extensive margins in Table 1.2. All regressions include product and time fixed effects and standard errors are robust to multi-way clustering across products.

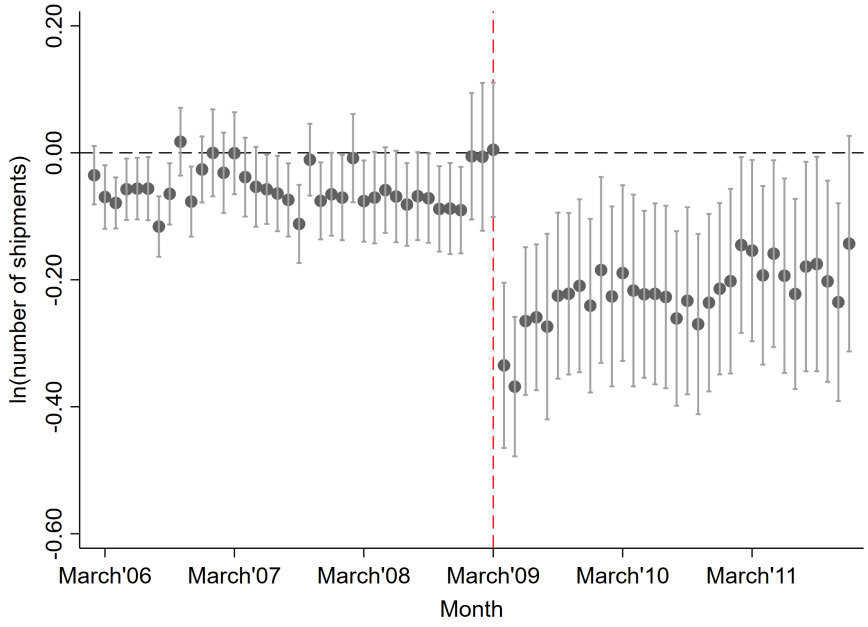
In Column (1) of Table 1.2, we present the OLS estimates on the number of shipments. We find that the product listed in the import licensing procedures has 26% less incoming shipments following the announcement of the policy. In Column (2), we repeat the exercise using PPML approach. We find that the effect is halfed in magnitude, at 14%.[13] As the log transformation sweeps away the zero values, the OLS results give us overestimated effects of the policy. For this reason, we keep PPML results as our main baseline results and continue to report PPML estimates for the rest of our analyses.

We repeat the same exercise as Columns (1) and (2) but now for our second measure of extensive margin: number of countries of origin. We show the results in Columns

[13]We calculate marginal effects of variable *ImportLicensingProcedures* as (exp(x)-1)*100.

(3) and (4). We find similar pattern and sized effects as in Columns (1) and (2). PPML estimation shows that import licensing procedures has 14% less source countries following the announcement of the policy. This estimate has also higher precision at 1% significance level, compared to 5% of the one on number of shipments. In terms of OLS, it is again overestimated at 23%.

Figure 1.5: Effect of import licensing procedures on imports' extensive margin: number of shipments.

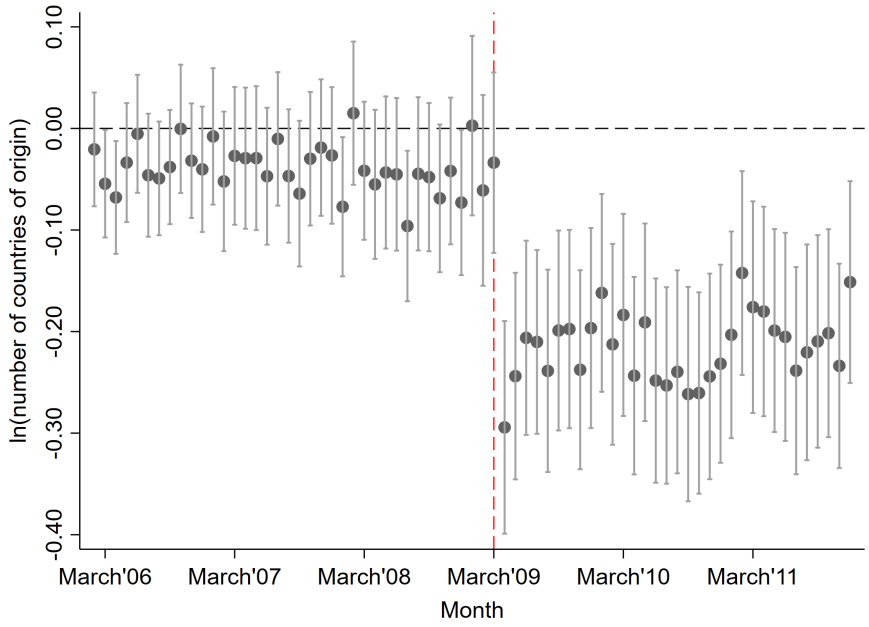


Notes: This figure shows coefficient estimates from a PPML regression of number of shipments per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,488.

We allow the treatment effect of import licensing procedures on the extensive margins of imports to vary over time in our event study specification given in Equation 1.2. We present the PPML estimates in Figures 1.5 and 1.6.[14] Results confirm that

[14]As we continue taking into account the presence of zero shipments in our unit of observation, the rest of our empirical analyses will use PPML estimates. We provide figures of the OLS estimates for

Figure 1.6: Effect of import licensing procedures on imports' extensive margin: number of countries of origins of imports.



Notes: This figure shows coefficient estimates from a PPML regression of number of countries of origins of imports per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,488.

the policy has a negative effect on imports' extensive margins, both for the number of shipments and the number of source countries. The effect also occurs immediately and sharply in terms of the magnitude. In addition, the pre-trend variables are not significant, validating the common trend assumption. The effect on the number of shipments gradually falls over time, shown in Figure 1.5. It remains significant except for the last one in the period, though the point estimate is still negative. The effect on the number of countries of origin is more steady, shown in Figure 1.6. It remains negative and significant over the entire post-treatment period.

our baseline specifications in the Appendix (see Figure A.1 for extensive margins, and Figure A.2 for intensive margins).

Overall, we find that import licensing procedures reduce imports' extensive margins, immediately and sharply. Administrative barriers force firm to adjust by reducing the frequency of shipments and the number of suppliers, which means less administrative cost for firms. This within-firm adjustment creates loss for consumers in two ways: (1) consumption less close to preferred date due to less frequent shipments; and (2) less variety due to less suppliers. The next question is how firms react in terms of the total value and quantity of these shipments. We continue the analysis in the next section.

1.5.2 Effect of import licensing procedures on imports' intensive margins (value and net weight)

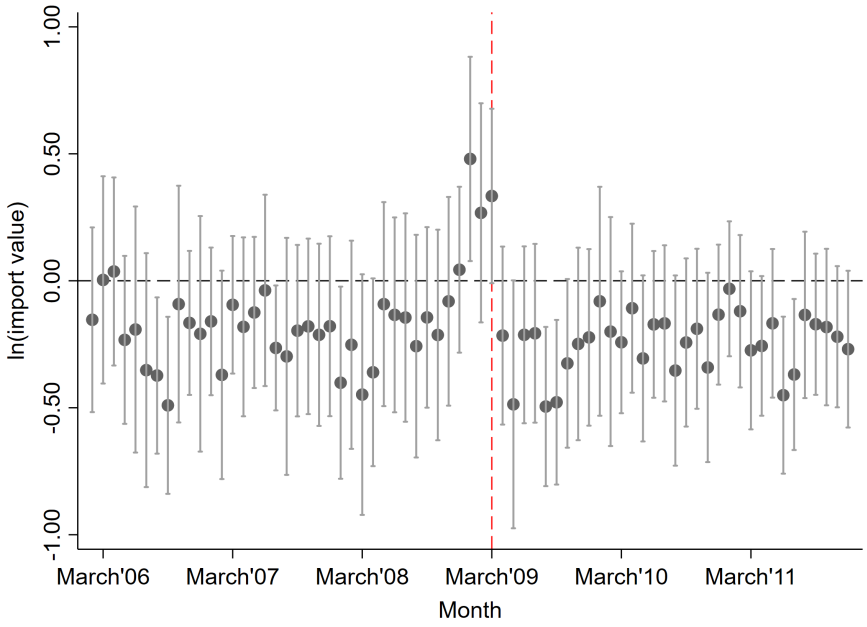
Table 1.3: Effect of import licensing procedures on imports' intensive margins.

	import value (1)	import weight (2)
Import licensing procedures	-0.035	-0.066
	(0.107)	(0.149)
N	43488	43488

Notes: Table reports PPML regression coefficients of estimating the average treatment effects on the treated (ATT) on imports' intensive margins following the import licensing procedures announced in February 2009. Column (1) reports the estimate of our baseline specifications for value of imports. Column (2) reports the estimate for net weight of imports. All regressions include product and time fixed effects. Standard errors are robust to multi-way clustering across products. ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively.

We repeat the exercise in previous section, but now for the intensive margins of imports. We present results of Equation (1) for these intensive margins in Table 1.3. Similar with Table 1.2, all regressions include product and time fixed effects and standard errors are robust to multi-way clustering across products. In Column (1) of Table 1.2, we present the PPML estimates for the value of imports as the dependent variable.

Figure 1.7: Effect of import licensing procedures on imports' intensive margin: value of imports.

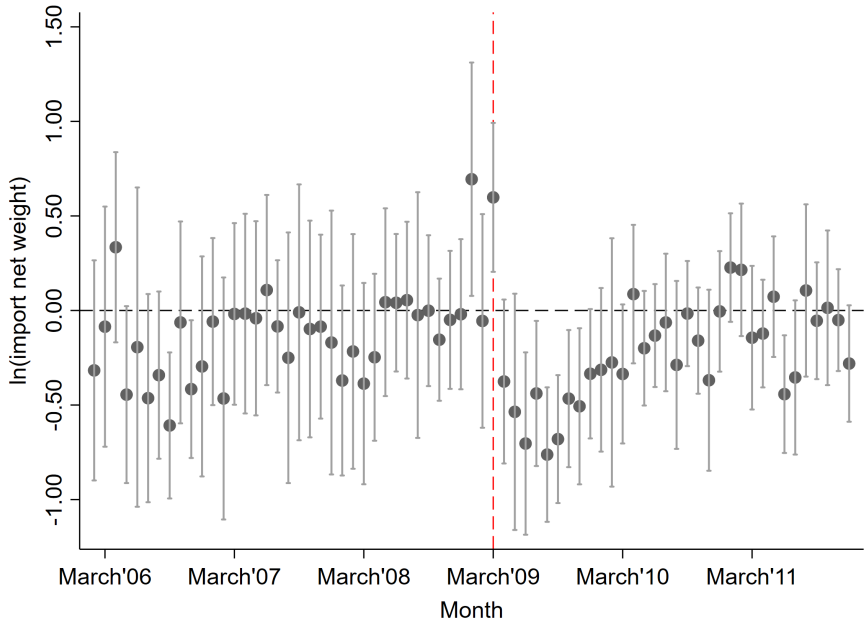


Notes: This figure shows coefficient estimates from a PPML regression total import value per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,488.

We find the estimate is not statistically significant. We repeat the same exercise as Columns (1) but now for our second measure of intensive margin: net weight of imports. We show the results in Column (2). We find a similar pattern: not significant PPML estimate.

We then allow the treatment effect of import licensing procedures on the intensive margins of imports to vary over time in our event study specification given in Equation 1.2. We present estimates for total value of imports as the dependent variable in Figure 1.7. Pre-trend variables are not significant, though there is a sudden and short-lived increase during January-March 2009, indicating a form anticipation of the incoming policy. However, we find the post-treatment coefficients mostly not significant. This

Figure 1.8: Effect of import licensing procedures on imports' intensive margin: net weight of imports.



Notes: This figure shows coefficient estimates from a PPML regression of total net weight of imports per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,488.

indicates that the import licensing procedures do not have an effect on the total value of shipments of the listed products. In Figure 1.8, we present results for net weight of imports as the dependent variable. It shows a similar pattern: there is an anticipation a few months leading to the announcement of the policy, but then post-treatment effects are mostly not significant, though we observe significant negative effects in five consecutive months after three lagging months. This indicates that the import licensing procedures have a lagging bite on the total net weight of imports but this bite is only short-lived.

Overall, we find that import licensing procedures do not have any effects on imports' intensive margins. Administrative barriers do force firms to adjust by reducing the

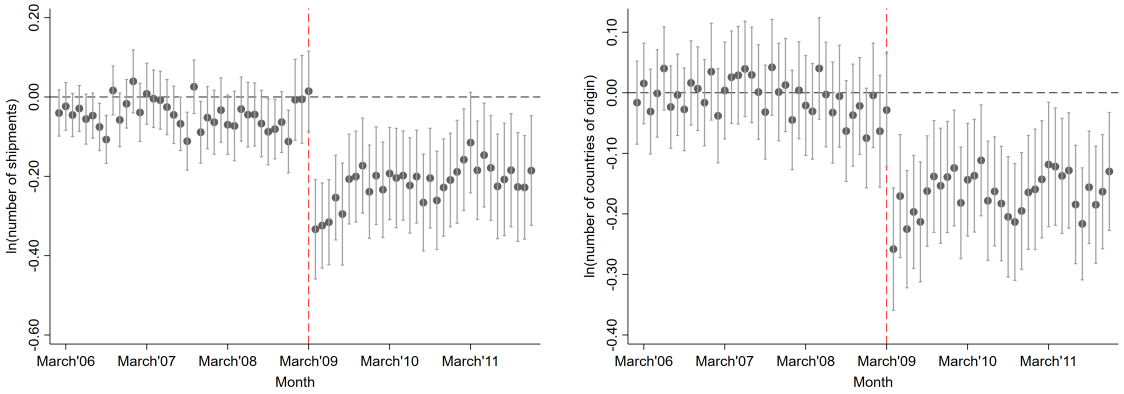
frequency of shipments and the number of suppliers, but firms also adjust the size of the individual shipments. Shipments of the listed iron and steel products are larger in the post-treatment period compared to the pre-treatment period. There is a period of time after the policy imposed where firms have to arrange this adjustment. During this time, importing firms seem to face higher price for lower quantity. We argue that this is because of the fall in the number of suppliers, shown in reduced number of source countries in the previous section. This adjustment is relatively quick though. After sorting things out with the remaining suppliers, firms seem to return values and quantities as before the introduction of the import licensing requirement..

1.5.3 Do tariffs matter?

Our results show evidence of heterogeneous treatment effects across products of import licensing procedures. We have established that product inclusion into import licensing procedures leads to a decrease in the product's extensive margins of imports but no effect on its intensive margins. However, changes in tariffs imposed by Indonesia unilaterally or bilaterally during our period of analysis might influence our results. The effect of import tariffs then are embedded in the regression coefficients from our baseline results. To isolate the effect of import licensing procedures, we then first restrict our dataset to only include shipments from countries that have free trade agreements (FTAs) with Indonesia.[15] This means that during the entire period of analysis, the changes in MFN tariffs will not matter as the FTA agreed tariffs, or even no tariffs, will apply first.

[15]The countries are China, Japan, South Korea, Australia, Singapore, Cambodia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam and Brunei Darussalam. Tables A.3 and A.4 in the Appendix show the lists of top 5 countries of origin for the import of iron and steel product listed in the policy, by number of shipments and by total value, respectively.

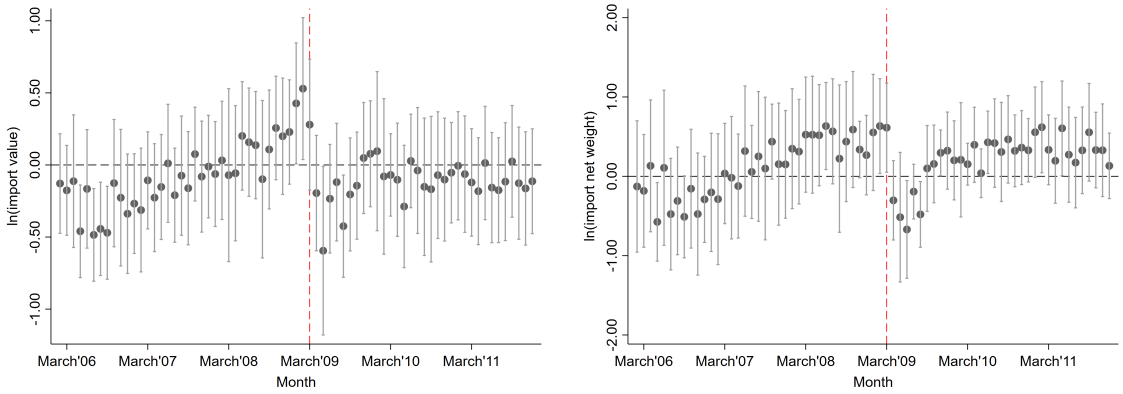
Figure 1.9: Effect of import licensing procedures on imports' extensive margins (only including countries of origin that have FTA with Indonesia).



Notes: This figure shows coefficient estimates from PPML regressions of imports' extensive margins (left: number of shipments; right: number of countries of origin) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia, along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,200.

Figure 1.9 presents the time-varying effects of the import licensing procedures on the extensive margins of imports using only source countries that have FTAs with Indonesia (left panel: number of shipments; right panel: number of countries of origin). The results remain consistent with our earlier results: the post-treatment effects are significant and negative. Pre-trend variables are not significant. The changes are also abrupt and sharp. Overall, the results confirm the effects of the policy on the extensive margins of imports. Figure 1.10 presents the same format as Figure 1.9 but for imports' intensive margins (left panel: import value; right panel: import net weight). Similarly, it remains consistent with our earlier interpretation: the post-treatment effects are not significant. Pre-trend show an increasing trend of point estimates, however the estimates remain not significant. The short-lived post-treatment effects that we find earlier in our baseline specifications disappear. For imports from FTA countries, Indonesian firms seem to be able to adjust without any disruption. Overall,

Figure 1.10: Effect of import licensing procedures on imports' intensive margins (only including countries of origin that have FTA with Indonesia).



Notes: This figure shows coefficient estimates from PPML regressions of imports' intensive margins (left: import value; right: import net weight) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia, along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,200.

the results confirm that the policy does not have any effects on the intensive margins of imports.[16]

A disadvantage of the above approach is that we throw away shipment observations from 198 countries.[17] We therefore change our unit of observation into product-month-country level and then control for country-year fixed effects (see Eq.(3) in the Appendix). These fixed effects take into account all the changes that are specific to each country of origin in any given year during 2006-2011 period. This also means

[16] As an additional robustness test, we also repeat again what we do for Figures 1.9 and 1.10 for shipments with weight is less than or equal to 1 ton, shown in Tables A.3 and A.4. This is to remove the noise from occasional exporters (Geishecker et al., 2019). The results remain consistent.

[17] We did try generate product-specific demand shocks using all the countries. Demand shocks may affect firms differently depending on how differentiated the products a firm is trading. We therefore categorize the goods as either heterogeneous or homogeneous. To take into account the changes in demand, we then control for product-specific demand shocks that we generate using monthly trade data from UN COMTRADE. Note that there are too few observations to estimate our model with the full set of fixed effects for the sample of heterogeneous goods, we therefore simply drop the observations. The results remain unchanged (see Figures A.5 and A.6 in the Appendix).

we control for import tariffs applied by Indonesia to individual countries, regardless having FTA with Indonesia or not. Due to detailed level of observation, the number of observations increase to over 1 million. We present the results in Figure A.7 for number of shipments, and Figure A.8 for total value and net weight. They are consistent with our main insight: significant negative effect on the extensive margin and no long-term effect on the intensive margins.

1.5.4 Do Special Economic Zones matter?

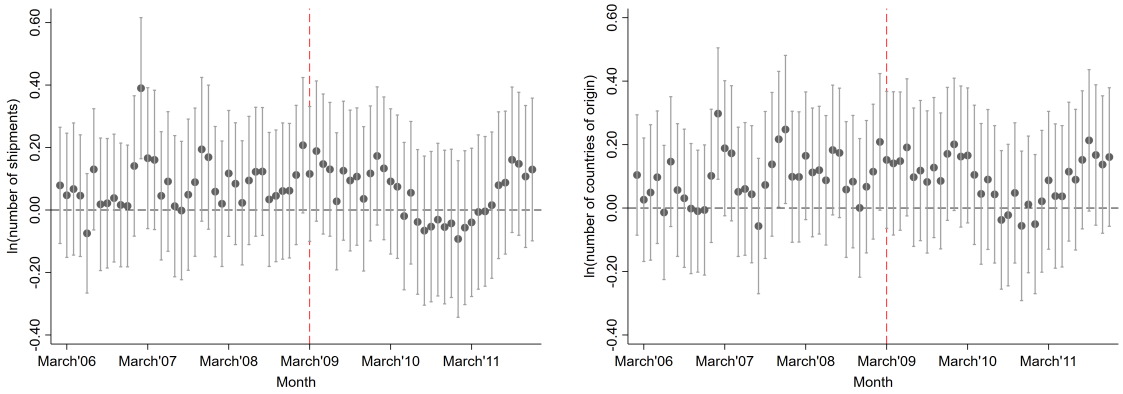
The next test to evaluate whether our estimated casual effects are credible is by conducting placebo falsification, that is, proposing an alternative hypothesis and then testing that hypothesis. If we cannot reject the null on the alternative hypothesis, then it provides some credibility to our original analysis (Cunningham, 2021). One candidate placebo falsification is simply to use data for an alternative product/location whose shipments would not be affected by the binding import licensing procedures. The presence of Special Economic Zones (SEZs) in Indonesia allows us to run this placebo falsification since our captioned policy does not apply to listed products that are shipped there. We then do the the same exercise as our baseline analyses, but now on a dataset that only includes observations from the SEZs (Batam, Bintan and Karimun).[18] Given the exemption, we expect that the February 2009 policy should not affect the extensive and intensive margins of imports of the listed products.

Figures 1.11 and 1.12 show the time-differential effects of import licensing procedures on imports' extensive and intensive margins, respectively, for our modified dataset that only includes shipments into these zones. The post-treatment effects are not significant for all the dependent variables. This is aligned with our expectation that the policy does not have any bite in the exempted products.

Another possible placebo falsification is to combine our baseline dataset with data

[18]For descriptive analysis of firms in Batam, Bintan and Karimun, see Negara & Hutchinson (2020).

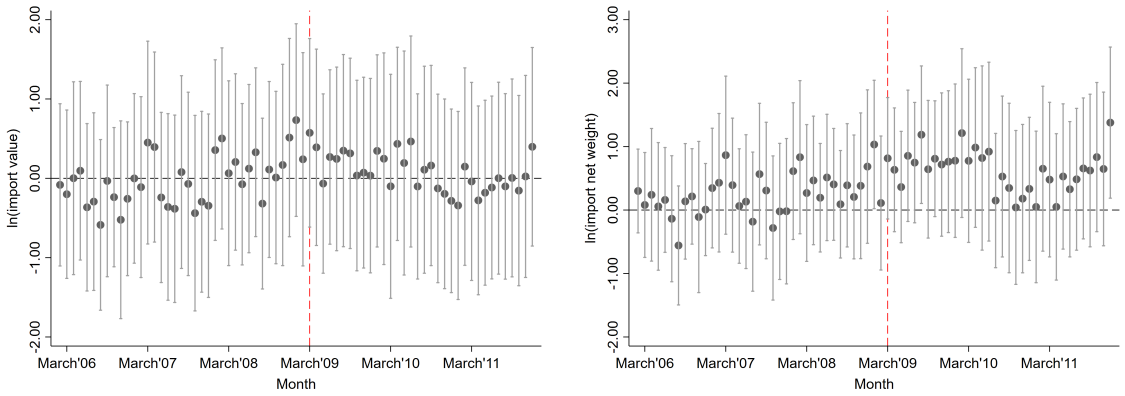
Figure 1.11: Effect of import licensing procedures on imports' extensive margins (dataset includes only all shipments into SEZs): placebo tests.



Notes: This figure shows coefficient estimates from PPML regressions of imports' extensive margins (left: number of shipments; right: number of countries of origin) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia, along with a set of product and time fixed effects. Note that the samples are restricted to only shipments arriving into ports in the Special Economic Zones, i.e., Batam-Bintan-Karimun archipelago. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 40,752.

from Special Economic Zones (SEZs) and then define the treatment group restricted to only shipments of treated products arriving into ports in the Special Economic Zones, i.e., Batam-Bintan-Karimun (BBK) archipelago. The control group still includes all shipments into all regions of other metal products. With this approach, we increase the similarity of this modified dataset with our original dataset. In late 2007, Batam was upgraded to Free Trade Zone, and Bintan and Karimun were upgraded to enclave status (Wong & Ng, 2009). Therefore we have the following expectations: (i) the status upgrade of BBK in late 2007 should affect the extensive and intensive margins of imports of listed products into BBK; and (ii) the February 2009 policy should not affect the extensive and intensive margins of imports of listed products into BBK. Figures A.7 and A.8 in the Appendix validate these expectations. Significant but small pre-treatment effects are observed leading to the 2007 SEZ status upgrade. We note this as pre-existing increasing trends embedded in the SEZs. After 2007, the jump

Figure 1.12: Effect of import licensing procedures on imports' intensive margins (dataset includes only all shipments into SEZs): placebo tests.



Notes: This figure shows coefficient estimates from PPML regressions of imports' imports' intensive margins (left: import value; right: import net weight) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia, along with a set of product and time fixed effects. Note that the samples are restricted to only shipments arriving into ports in the Special Economic Zones, i.e., Batam-Bintan-Karimun archipelago. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 40,752.

is immediate and high in magnitude.

1.5.5 Do domestic producers benefit from the import licensing requirements?

We have focused on the importing firms of iron and steel products and established that administrative barriers do force firms to adjust by reducing the frequency of shipments and the number of suppliers, but the total value and weight of imports are not significantly affected. If the import licensing policy is largely ineffective in the long run, why does the government impose it? The answer might lie in providing at least protection for domestic producers in the short run, perhaps for political gain. In our case, the import licensing procedures were announced in February 2009, just a few months before the direct presidential election in July 2009. The timing of the policy

could be potentially driven by electoral incentives, as then incumbent President Susilo Bambang Yudhoyono was campaigning to win a second term in the 2009 election. This re-election motive is similar with the one scrutinized by Conconi et al. (2017) who provide theoretical and empirical evidence of suspiciously-timed trade disputes aimed to appeal voters. Indonesia also has a larger state enterprise sector, which in certain industries increases the pressure for import protection (Hill & Menon, 2021).[19]

So far we have only discussed about the perspective of those firms who use the listed products. We have not yet discussed about the domestic producers, of those listed products, which directly compete with foreign suppliers. If the policy is protectionist, does it indeed protect or help these local producers? Answering this question is important to complete the picture, especially for policymakers who typically resort to producers perspective first, for example, for the political reason mentioned above. Hence, in this section we investigate the performance of those domestic producers.

A limitation of our paper is that we are unable to obtain the firm identifier for each shipment record, thus we are unable to exploit firms information such as domestic sales data. Therefore, in order to continue our analyses for domestic producers, we resort to census data of Indonesian manufacturing plants. More specifically, we use a firm-level data set, Statistik Industri, that provides a census of all Indonesian manufacturing plants with 20 or more employees over the period 2006-2011. It comes from an annual survey conducted by the Indonesian Bureau of Statistics (BPS). The questionnaire, administered at the national level, is anonymous and detailed and covers the establishments' characteristics including their sales.

As we focus on evaluating iron and steel producers, in our analyses we limit our samples to base metal sectors, as iron and steel manufacturers fall under this category. Our final data set counts 22,716 firm-year observations for the period 2006-2011: 4,003 observations for the iron and steel manufacturers and 18,713 observations for manu-

[19]Based on our shipment data during 2006-2011 period, the import value of iron and steel products listed in the policy represents 42.3% of the total import value in the Indonesian metal sectors.

facturers of other metal products. We then modify our event study specification from Equation 1.2 into the following:

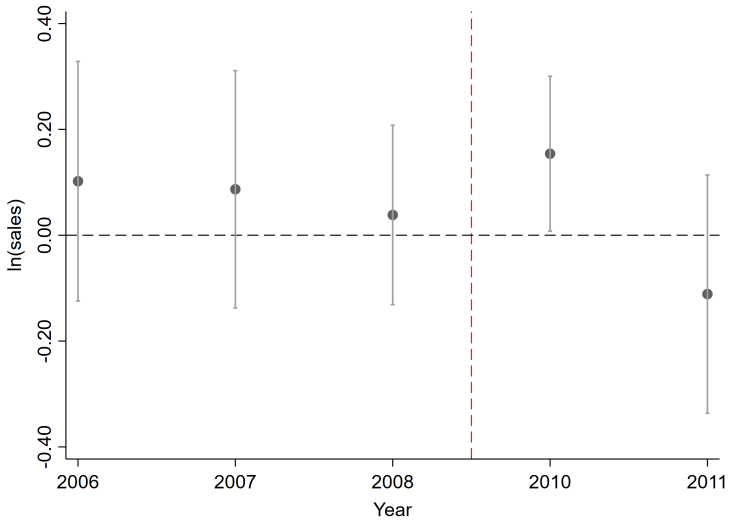
$$\ln(Z_{ft}) = \mu_f + \eta_t + \sum_{\tau=2006}^{2011} \beta_\tau(\text{ImportLicensingProcedures} \times D_\tau)_{ft} + \varepsilon_{ft} \tag{1.3}$$

where dependent variable $\ln(Z_{ft})$ is the natural log of total sales of firm f in year t. ImportLicensingProcedures equals 1 if firm f is selling product listed in the import licensing procedures (Decree of the Minister of Trade No 08/M-DAG/PER/2/2009), and zero otherwise. D is a dummy equal to 1 if the observation is in 2009 or after (the post-policy period). μ_f is a set of firm fixed effects that control for time-invariant firm-characteristic bias. η_t refers to year fixed effects that controls for time-varying factors that influence treatment and control firms in a similar way. Finally, ε_{ft} represents a zero-mean error term that capture random fluctuations in our dependent variables. Our interest lies in estimating treatment effect β_τ on producing firms' sales after the policy introduced, i.e., where $\tau > 2009$. In line with our specifications for shipment data, we cluster standard errors at the product level to allow for correlation within product as our treatment variable is defined at the product level.

We present results of Equation 1.3 in Figures 1.13 and 1.14. In Figure 1.13, we take into account time-variant unobserved heterogeneity in our samples by controlling for product-specific trends. As we now have firm identifier, we then also repeat this exercise but now controlling for firm-specific trends, in line with the literature of firm heterogeneity. The event study results are shown in Figure 1.14. Table A.6 in the Appendix presents the results in more details along with some alternative specifications.[20]

[20]In Table A.6, all specifications include firm and year fixed effects. In columns (1), (3) and (5), we control for product-specific trends. In columns(2), (4) and (6), we control for firm-specific trends. Columns (1) and (2) show the estimates for simple diiference-in-difference approach. Columns (3) and (4) show the estimates of the average treatment effects for individual years from 2006 to 2011. To take into account the differences in firms' size, we then control for the natural log of number of

Figure 1.13: Effect of import licensing procedures on sales of the producers of the listed products: taking into account product-specific trends.



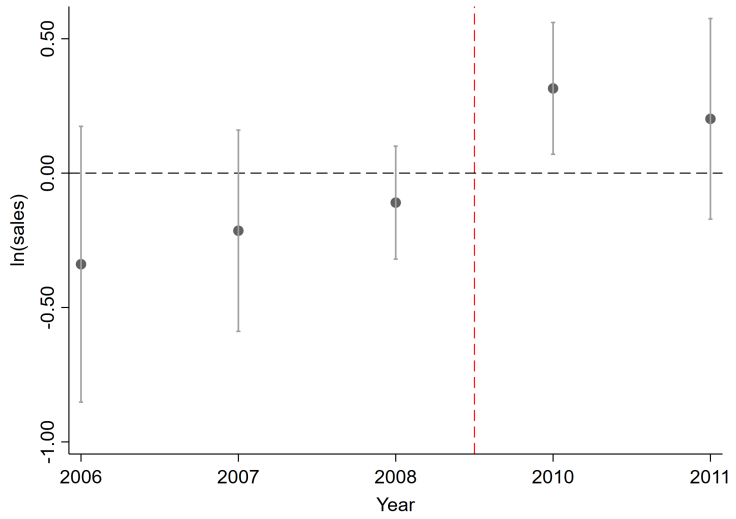
Notes: This figure shows coefficient estimates from a OLS regression (using `reghdfe`) of the natural log of firm's sales on a set of dummy variables indicating the interaction between time variable (year) and treatment status (whether or not listed in the policy in February 2009), along with a set of firm and time fixed effects and product-specific trends. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (based on classification from the census, mapped with HS Code listed in the policy). Number of observations: 22,480.

If producers benefit from protection, their sales should go up. From the results, overall we observe that the import licensing policy does not seem to affect the sales of the domestic producers. When we look at the event study, we observe that there is an immediate impact on firms' sales but this effect fades out over time. The positive effect is only significant in the following year after the policy was imposed.

These results give us an additional perspective: the import licensing policy is not proven to be benefiting the domestic producers. If the policy is intentionally protectionist, our findings show that creating barriers to foreign suppliers to enter domestic market does not translate to larger output from the protected firms. Though the notion of NTM is non favorable for trade is already quite extensive in the literature,

workers. The estimates are shown in Columns (5) and (6).

Figure 1.14: Effect of import licensing procedures on sales of the producers of the listed products: taking into account firm-specific trends.



Notes: This figure shows coefficient estimates from a OLS regression (using `reghdfe`) of the natural log of firm's sales on a set of dummy variables indicating the interaction between time variable (year) and treatment status (whether or not listed in the policy in February 2009), along with a set of firm and time fixed effects and firm-specific trends. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (based on classification from the census, mapped with HS Code listed in the policy). Number of observations: 22,480.

our insights are novel –we focus on scrutinizing a specific administrative barrier and investigating it from users and producers perspective.

1.6 Conclusion

Import licensing procedures consist of the steps and paperwork firms have to undergo to import goods. Governments around the world are increasingly imposing these procedures. Our understanding of their impacts for domestic firms, both consumers and producers, are still limited. Using Indonesian firm-level and transaction-level data over 2006-2011, we find causal evidence that the licensing procedures of iron and steel imports reduced the extensive margins of imports. Not only that importers reduce the frequency of shipments, they also reduce the number of countries they are sourcing their products from, i.e., they have less diversified set of suppliers. This is complementary to theoretical and empirical findings from Hornok & Koren (2015a) that these administrative costs create a welfare loss. However, overall we find no significant effect of the policy on the intensive margins. Although domestic users import less frequently and source from less countries, they do not import less in value and quantity. Interestingly, we also do not find a long-term increase in sales for domestic producers of regulated products. In the light of these results, we interpret the lack of an increase in sales of producers purportedly protected by the policy to indicate that it failed to meet its stated objective of the creation of healthy domestic market environment and a conducive climate for business, i.e. the policy was ineffective. In addition, given that it carries significant costs, one could consider the policy to even be counterproductive.

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ii. permission is granted for the candidate in include the publication in the thesis; and

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Signature		Date	

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Chapter 2

Institutional distortions and exports: Evidence from Indonesia

Abstract

Institutional distortions are prevalent in developing countries. One form of distortions are private-sector, industry-association membership fees, which act as de facto export tax. Little is known about how these de facto export taxes affect international trade. Using the removal of an export-licensing requirement in Indonesia in 2011 as a natural experiment, we identify the positive effects of removal of non-tariff barriers on the intensive margins of exports. The results present a rationale for governments of emerging and middle-income economies to consider reforms that reduce implicit barriers to export, such as those arising from export-licensing requirements.

2.1 Introduction

Institutional distortions are prevalent in developing countries. According to the Worldwide Governance Indicators (World Bank, 2020), the regulatory quality in lower-middle-income and upper-middle-income countries is substantially lower than those

of high-income-non-OECD and high-income-OECD countries: respectively at 34.1% and 49.1% for the former groups versus 75.4% and 87.5% for the latter.[1] One form of distortions are government-mandated, private-sector industry-association membership fees. They are often justified on the basis that they facilitate value chain upgrading outcomes. For example, the claim that coffee exports from a country must meet a minimum quality grade in order for that country to achieve higher sales value is often used as the justification to impose quality-based licensing regimes and fees to support that for exported coffee beans.[2]

The fees and conditions associated with private-sector industry-association memberships can involve substantial limitations on exporting firm behaviour. Firstly, joining fees act as a fixed cost of participating in exporting activities and thus act as a barrier to trade. Variable costs, such as fees per unit exported, are similar but reduce the margins of exporting firms limiting competition in export markets. Secondly, conditions imposed by private-sector industry-association memberships on product attributes or production practices, for example minimum quality targets or particular processing needs, increase production costs that can limit competition in export markets and reduce the potential earning capacity of national exports (Baltzer, 2011). Collectively, these export licensing regimes are likely to act as trade distortions and so may shift the allocation of resources across different products and reduce the economic benefits available to middle income countries from trade. These restrictions may imply that firms have to produce a too high quality for their level of development. From a welfare perspective, consumers may be better off if firms could sell lower quality (Rodriguez, 1979).[3]

[1]The indicator for regulatory quality reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector. Details on the underlying data sources, the aggregation method, and the interpretation of the indicators, can be found in the WGI methodology paper by Kaufmann et al. (2010).

[2]see for example Wilson & Wilson (2014) on the economics of quality in the specialty coffee industry.

[3]The literature on quality restrictions and minimum standards largely focuses on an importing country imposing these policies, but in this paper we have an exporting country imposing the policy.

Trade distortions have been a widely researched topic in the economic and trade policy literature. Traditional approaches have outlined the detrimental effect of explicit trade distortions such as the role of export taxes in substantially undermining trade competitiveness. While distortions and misallocations have been widely discussed in the literature several aspects associated with research on export licensing regimes are indicative of limitations in the current literature. Firstly, most current studies focus on a general equilibrium framework but do not focus on identifying the causal effect of a specific policy.[4] This causal identification problem is also common in the broader literature of export barriers as there could be a reverse causality between trade policies and trade indicators. Secondly, export-licensing regimes are neither purely export taxes nor purely non-tariff barriers – they often contain elements of both involving qualitative licensing conditions (non-tariff barriers) in addition to fee-based programs that can act in similar ways to export taxation regimes. This, and differences in their characteristics across countries and value chains mean that there is a greater need to go beyond theoretical or ex-ante analyses that tend to focus on either clean export taxes or non-tariff barriers, and to consider, where possible, the impacts of these hybrid policies empirically. Thirdly, export-licensing regimes remain common policy mechanisms among emerging and middle-income countries. This aspect indicates a continuing belief among governments that export-licensing regimes are qualitatively different from other trade restrictions in ways that generate net benefits to the countries they are applied in. Additionally, empirical evidence on such policies is still very limited. This highlights the need to develop descriptive and causal insights into the role of export licensing regimes on export competitiveness and benefits from trade for countries applying these regimes.

In this paper, we empirically analyse how a change in a hybrid export-licensing requirement cum export tax regime affects exports. Treating the removal of a government-

[4]see for examples Chang-Tai Hsieh & Klenow (2009); Święcki (2017); Bai et al. (2019); Boehm & Oberfield (2020); Peters (2020)

mandated export-licensing fee in 2011 as a quasi-natural experiment we seek to identify the effects of the existence, and subsequent removal, of coffee export licensing on the margins of coffee exports in Indonesia. In 2011, Indonesia revoked the decree that required coffee exporters to deposit a membership fee based on the volume of exported coffee, to Association of Indonesian Coffee Exporters (AEKI). Interestingly, the announcement of this policy was documented as not motivated by industry pressure or government economic plans, but rather driven by a dispute between the industry association and the government. In describing this institutional dispute we present a case that this policy change can be considered exogeneous and thus allows treatment of its removal as a natural experiment in the removal of export licensing regimes as barriers to trade.

Following the 1997 Asian Financial Crisis, the government of Indonesia was unable to pay the country's annual membership of the International Coffee Organization (ICO), the main intergovernmental organization for coffee. The government asked AEKI to help pay for this membership fee. AEKI accepted it with the condition that government had to add AEKI membership payment receipt as a requirement to be a coffee exporter. The amount of AEKI membership fee is based on the volume of coffee exported, effectively applied like an export tax for firms.[5] Recent empirical work have emphasized the the relationship between export barriers and exports (see for examples Bouët et al. (2014); An et al. (2017)). However, there is an inherent empirical challenge to establish the the causal effect of export barrier on exports ; that is, there could be reverse causality from exporting to export policies. Policy distortions can be introduced to serve other purposes.[6] In our case, in 2011 Indonesia revoked the decree that

[5]Export restrictions are commonly present worldwide. In 2010, the Organization for Economic Cooperation and Development (OECD) concluded that from 2003 to 2009, 65 out of 128 World Trade Organization (WTO) members implemented some type of export restriction, particularly on raw commodities (OECD 2010). Piermartini (2004) noted that approximately one-third of World Trade Organisation (WTO) members impose export duties.

[6]Justifications of using them include terms-of-trade improvement, public revenue increases, the consumer price (i.e. food security) or intermediate input price (industrial policy in favour of processed

required coffee exporters to deposit a membership fee, based on the volume of exported coffee, to AEKI. Interestingly, the announcement of this policy was documented as not motivated by industry pressure or government economic plans, but rather driven by an institutional dispute between industry association and the government. In other words, the announcement of this policy is exogenous, which allows us to tackle identification problem commonly faced in this literature and policy evaluation in general.

A key contribution of this paper is to examine the effects of the removal of a form of export tax using data at the shipment level. Shipment-level data allows us to present new insights on the extensive margins of exports, i.e., the shipments and export destination countries. While there is a growing empirical literature on export taxes, most of them use sectoral data (see for examples Warr (2001) on Thai rice, Rifin (2010) on Indonesian palm oil, Devadoss et al. (2019) on Argentinian soy and beef). Furthermore, the effects of an export tax are complex and are not limited to the market of the taxed commodity (Piermartini, 2004). Import tariff studies have sought to use shipment-level data to allow greater insights into the emergence of changes in competitiveness and value from policy changes, but use of higher resolution data such as used here remains limited for the case of export taxes and other export barriers, partly due to greater focus of the WTO on import tariffs and export subsidies rather than export taxes and import subsidies.[7] Using Indonesian customs data and manufacturing firms survey over 2008-2013 period, we analyse the consequences of the removal of de-facto export taxes for intensive and extensive margins of exports of instant coffee.

We find that exports increase after the removal of the export tax. Volume-based membership fee for AEKI works as an indirect export tax for coffee-exporting firms. As coffee is a primary commodity for Indonesia, this indirect export tax then serves

goods) (Piermartini, 2004; Laborde et al., 2013)

[7]The original Lerner Symmetry Theorem Lerner (1936) establishes that import tariff and export tax are equally protectionist. Recent work have shown the robustness of the theories, but Costinot & Werning (2019) suggests that moving from an export tax to an import tariff tends to incentivize firms to expand domestic activities. Hence, there might be asymmetry.

as an indirect subsidy for (coffee) processing industries, as noted by Just et al. (1979). Interestingly, in terms of exports extensive margins, we observe significant negative coefficients prior to the policy, indicating that these margins might be contaminated by other factors. We present a number of possible explanations: firms behavioral difference with respect to intensive and extensive margins, and the anticipation of the policy.

We contribute to several literatures. The seminal paper by Bhagwati & Ramaswami (1963) provides early theoretical foundations of distortions. Restuccia & Rogerson (2008) and Chang-Tai Hsieh & Klenow (2009) showed that misallocation of resources across firms can have important effects on aggregate efficiency. More recent works incorporate firm heterogeneity (Bai et al., 2019) and contracting frictions (Boehm & Oberfield, 2020). These papers, however, focus on general equilibrium analysis limiting insights to ex-ante expectations, calibrated against data. In contrast, our analysis provides an empirical analysis on export licensing regimes providing a test of whether the general expectations of these earlier ex-ante models are matched by real-world outcomes.

For Indonesia, Peters (2020) provides theoretical and empirical evidence of an important role for frictions that prevent existing firms from entering markets across Indonesia, i.e. domestically. However, the paper does not discuss international trade. We contribute to this literature by scrutinizing an episode of a change in institutional distortions in the Indonesian coffee industry in 2011 and its effects on trade. Our paper also relates to Campolmi et al. (2014) and Campolmi et al. (2018), that highlights the relationship between deep trade agreements, including domestic as well as international trade policies, and allocative efficiency. Aligned with the insight from these papers, we argue that the AEKI export licensing regime generated inefficient allocation of production and associated export value losses for the Indonesian coffee industry.

Our paper is also closely related to the literature on export taxes. Earlier work

focuses on indirect subsidy and profit-shifting arguments (Just et al., 1979; Eaton & Grossman, 1986; Rodrik, 1989), while Piermartini (2004) and Kim (2010) provide theoretical and empirical review on export taxes. Recent empirical work covers: global perspective, such as Laborde et al. (2013), who provide a global assessment of the economic effects of export taxes using a computable general equilibrium (CGE) model; and country/industry-specific perspectives, e.g. Warr (2001) on Thai rice, Rifin (2010) on Indonesian palm oil, Devadoss et al. (2019) on Argentinian soy and beef. Using a partial equilibrium analysis on differential export taxes in Argentina and Indonesia, Bouët et al. (2014) show that a tax on exports of a raw agricultural commodity in a country that exports seeds and vegetable oils increases the sum of final consumers' surplus, processing sector profits, farmers' surplus, and public revenues. These papers typically use industry-level data and do not focus on the causal effects of a specific export tax. Our work extends the recent firm-level study by An et al. (2017), who investigate the impacts of export tax rebates on the firms' intensive margins of exports, along three key dimensions. First, our policy of interest is not a de jure export tax but practically acts as a de facto export tax, which allows us to give a novel insight on how different forms of tariff-like barriers in exports might be present. Second, aligned with our point in the previous paragraph, we utilize the exogenous change in de facto export tax to identify its causal effects on exports. Third, with our firm-level and transaction-level data, we provide insights into the extensive margins of exports.

Our paper also relates to the literature of industry associations. Most of the research on industry associations is contained in political science discipline publications (see for examples Hansen (1985); Shah & Rivera (2013); Watkins et al. (2015)) and business management (see for examples Dalziel (2006); Athreye & Chaturvedi (2007); Reveley & Ville (2010); Rajwani et al. (2015); Marques (2017)). Little is known in the modern economic literature about business or industry association and their activities. Our paper contributes to this literature by providing empirical evidence of the effects of the

removal of industry association membership fees as a requirement for exports.

The remainder of the paper is structured as follows. Section 2.2 provides policy background. Section 2.3 describes identification strategy and the data. Section 2.4 presents the results and Section 2.5 presents possible explanations of the results. Finally, Section 2.6 concludes.

2.2 Policy background

Indonesia is ranked third in the world in terms of robusta coffee production. Coffee export is regulated in Indonesia according to the Indonesian Customs Tariff Book HS Number 09.01 and 21.01. Provisions regarding coffee exports are regulated by Regulation of the Minister of Trade of the Republic of Indonesia.[8] The 2011 decree, on which this study focuses as a quasi-natural experiment, effectively removed indirect export tax of coffee from May 2011 forward to now.

Exports of coffee can, even today, only be carried out by companies that have been recognized as Registered Coffee Exporters (EKT) and Temporary Coffee Exporters (EKS) by the Director General of Foreign Trade of the Ministry of Trade. Each coffee export must also be accompanied by a Coffee Export Approval Letter (SPEK).[9]

Before the 2011 decree was announced, exporters had to deposit a membership fee (in Bahasa, "iuran anggota") of the Association of Indonesian Coffee Exporters (AEKI) to get the SPEK. Following the 1997-1998 Asian Financial Crisis, the government of

[8]The order is the following: regulation Number 26/M-DAG/PER/12/2005, replaced by Number 27/M-DAG/PER/7/2008 and lastly Number 41/M- DAG/PER/9/2009 Regarding Coffee Export Provisions, which was last changed by Regulation of the Minister of Trade Number 10/M-DAG/PER/5/2011.

[9]SPEK is a letter of approval for the implementation of coffee exports to all destination countries issued by the Service responsible for trade in the province/regency/city. SPEK can also be used for shipments from export ports throughout Indonesia. In addition, the exported coffee must comply with the quality standards set by the Minister of Trade and must be accompanied by an ICO certificate-of-origin form, namely a certificate used as accompanying documents for coffee exported from all over Indonesia, which proves that the coffee are produced and/or processed in Indonesia.

Indonesia was unable to pay the country's annual membership of the International Coffee Organization (ICO), the main intergovernmental organization for coffee. The government asked AEKI to help pay for this membership fee. With the condition that the government had to add the AEKI membership payment receipt as a requirement for coffee exporters, AEKI implemented a fee of Rp. 30 per kilogram of coffee exported, essentially functioning like an export tax. This 'membership fee' is an accurate term used to describe this form of fee which is based on the volume of exports made by a business or organization. In the Regulation of Ministry of Trade 41/M- DAG/PER/9/2009 (prior to the removal in the 2011 policy) the weight of soluble coffee and liquid coffee needs to be adjusted accordingly in the calculation of AEKI membership fee. More precisely, the weight needs to multiplied by 2.6, which means a higher membership fee applies for the amount instant coffee being exported. Therefore, in this paper we focus on the product group that covers instant coffee.

In 2011, this policy was revoked due to another episode of institutional challenge.[10] It started with the efforts of the then General Chairperson of the AEKI who gathered a number of agricultural sector associations and wrote to then Indonesian President Susilo Bambang Yudhoyono to revoke the imposition of income tax on collecting traders. This AEKI request, which was not coordinated with the Minister of Trade, was considered by many relevant stakeholders to be a 'presumptuous step'. The reason is, in the organizational structure of AEKI, the Minister of Trade together with the Minister of Agriculture and the Minister of Industry are lined up as a board of advisers. There are also a number of articles in the AEKI Articles of Association which were rejected by the Ministry of Trade because they were deemed to deviate from the organization's vision and mission.

After the call for repeal of coffee collection taxes in mid 2011, the Minister of Trade

[10]The following account of the dispute on pages 49 to 50 is a summary of the following media articles: https://www.sucofindo.co.id/id/read/2011/05/300/pemerintah-memberi-kelonggaran-persyaratan-ekspor-kopi and http://www.perizinanindonesia.com/news.php?idn=1 (both in Bahasa).

reprimanded the AEKI management. They were also asked to hold a repeat of the annual general meeting with a single agenda: electing new management for AEKI. Clearly, the Indonesian government viewed calls for the repeal of coffee collection taxes as being outside the remit of AEKI. Instead of complying with the government's request for new elections of AEKI management, then elected general chairman of AEKI stated that the Minister of Trade was not authorized to determine AEKI policy. Since then, the Ministry of Trade no longer recognizes the management of AEKI.

Finally, the Minister of Trade on 3 May 2011, through the Regulation 10/M-DAG/PER/5/2011, revoked the decree that required AEKI members to deposit a fee of Rp. 30 per kg of coffee exported to the organization. Effectively, this policy removes the export-tax-like payment burdened by the coffee exporters. AEKI, however, continued to require its members to pay a membership fee. This case clearly epitomizes how de facto forms of export tax can be put into practice even if distinct from de jure export duties. Exporting members were still required to pay an annual membership fee until May 2012 when this mandatory requirement from the association was finally lifted.

Crucially, for our empirical analysis, the way how the barrier first came into place in early 2000s and the way how it had been revoked in 2011 represent forms of external shocks that are exogenous and that help us form our empirical approach. The period between May 2011 and May 2012 might also indicate a transition period for the policy to generate cumulative impacts. We discuss this further in the next section.

2.3 Empirical methods

2.3.1 Identification strategy

For this study, we consider the removal of de-facto export tax for coffee products in Indonesia as a quasi-natural experiment that provides a shock to exports. The variation

in exports then allows causal inference under a difference-in-differences framework. This framework is particularly useful when the treatment varies at the group (rather than individual) level. At detailed level of the unit of observation, zero shipments might be present. We therefore use Pseudo Poisson Maximum Likelihood (PPML) approach to ensure all the observations are taken into account. PPML estimation is largely used in the literature to take into account zero trade for country-level gravity trade analyses and to avoid inconsistency due to heteroscedasticity (Silva & Tenreyro, 2006; Defever et al., 2015). We adopt this into our empirical analyses.[11] Our baseline regression is given by:

$$Y_{pt} = \exp[\mu_p + \eta_t + \beta(\text{RemovalofDeFactoExportTax} \times D)_{pt}] + \varepsilon_{pt} \tag{2.1}$$

where Y_{pt} is (a) number of outgoing shipments of product p in month t, or (b) number of destination countries for exports of product p in month t, or (c) total value of outgoing shipments of product p in month t, or (d) total net weight of outgoing shipments of product p in month t. RemovalofDeFactoExportTax equals 1 if product p is listed in the export licensing procedures (Regulation of the Minister of Trade Number 10/M-DAG/PER/5/2011), and zero otherwise. D is a dummy equal to 1 if the observation is from June 2011 or after (the post-policy period). μ_p is a set of product fixed effects that control for time-invariant product-characteristics. η_t refers to month fixed effects that controls for time-varying factors associated with seasonality that influence treatment and control products in a similar way. Finally, ε_{pt} represents a zero-mean error term that capture random fluctuations in our dependent variables. The parameter of primary interest, captured by β, indicates the effect of the removal of de-facto export tax on

[11] Our empirical design is similar with our approach in Chapter 1. While the two papers have some similarities in terms of methodology and the broader context of NTMs, they analyze different data and offer distinct recommendations to policy makers.

the target products extensive and intensive margins of exports. More specifically, β captures the average differential change in our dependent variables from the pre- to post-treatment period for the treatment groups relative to the change in those variables for the control groups. Following the suggestion of Bertrand et al. (2004) and Colin Cameron et al. (2011), we cluster standard errors at the product level to allow for correlation within product as our treatment variable is defined at the product level.

As mentioned in the previous sections, we have two key dates related to our treatment: May 2011 when the government of Indonesia announced the removal of the membership fee receipt as the requirement to become a coffee exporter; and May 2012 when it was reported in the media that AEKI finally stopped mandating its members to pay membership fees. Given this institutional background, we later relax the assumption of constant treatment effects over time by estimating the following event study specification:

$$\mathrm{Y}_{pt} = \exp[\mu_p + \eta_t + \sum_{\tau=Feb'08}^{Dec'13} \beta_\tau(\mathrm{RemovalofDeFactoExportTax} \times D_\tau)_{pt}] + \varepsilon_{pt} \qquad (2.2)$$

Our interest lies in estimating treatment effect β_τ on our dependent variable after the policy was removed, i.e., where $\tau >$ May 2011. Our event study estimations based on Equation 2.2 allow for lagged effects, i.e. the effects to take place at any time after May 2011. As such, we maintain May 2011 as the benchmark period for our event study while still utilizing a lagged May 2012 as the second period. We estimate leading values of the treatment (i.e., where) to test the reliability of our identification strategy. A statistically significant effect for $\tau <$ May 2011 indicates pre-existing differences in the trends between listed and non-listed products, which may cast doubt on the common trend assumption underlying our approach. Identification in the difference-in-differences setting relies on a parallel trends assumption, that is, the assumption

that in the absence of the policy change, the evolution of the extensive and intensive margins of exports for coffee extracts, essences and concentrates (e.g. instant coffee) would not have been different from the evolution of other products not affected by the policy change.

The utilization of two-way fixed-effects difference-in-differences as an estimation approach for making causal inference has been increasingly popular. Baker et al. (2022) conclude that the staggered versions of this estimation are susceptible to biases introduced by treatment effect heterogeneity. As we only have a single treatment period, the concern on the staggered version of the estimation does not apply to our case. However, the parameter estimates might not be constant over time. We address this in our robustness checks. The next subsection discusses the data.

2.3.2 Data

We use data from the Compilation of Export Declaration Documents during 2008-2013 period that we obtained from Indonesian Central Bureau of Statistics (BPS). The export declaration documents are filled out by the exporters and approved by the customs and excises regional offices, and then sent to BPS and Bank of Indonesia. Each document, administered at the shipment level, covers detailed information about the exported goods such as product classification, value (in USD), net weight (in tonnes), country of destination, port of departure, and the time of departure (month and year). From this raw data, we generate monthly value of total number of shipment, total number of countries of destination, total value of shipments, and total net weight of shipments, with the product level aggregated at 6-digit HS Code.[12]

Announced on 3 May 2011, the Regulation of the Minister of Trade No 10/M-DAG/PER/5/2011 remove the mandatory membership of coffee exporters association

[12]The raw data are actually at 9-digit level. We decided to aggregate the data at 6-digit level to reduce the presence of zeros in our final dataset.

(AEKI) as requirement to get license to export coffee products. With the entire time period of our data (2008-2013), that means we have 40 months as the period leading to the announcement of the policy, and 32 months following the announcement. In our final dataset, for our treatment group we only include observations for products of HS 210111 (Coffee extracts, essences and concentrates) as the product group of our interest.[13] As coffee and coffee-related products fall under HS09 (Coffee, tea, mate and spices) and HS21 (Miscellaneous edible preparations), in order to minimize the noise in the data we restrict our control groups to only include export data of these products. We focus on these two groups (treatment: HS 210111, control: other HS 09 and 21) because they provide two homogeneous groups that we can compare.

Table 2.1 presents the summary statistics of our final dataset. The table reports the mean and standard deviation (in parentheses) of our variables of interest: extensive and intensive margins of exports. For our empirical analysis, we then do log transformation of the intensive margins. The balanced panel dataset consists of 4,608 product-month observations for the period 2008-2013.[14] In Table 2.1, we present the descriptive statistics for the first part of our entire time period, 2008-2011 (shown in the top panel), and the second part, 2012-2013 (shown in the bottom panel). Column (1) reports the statistics for the shipments of HS210111 products, which are coffee extracts, essences and concentrates, including instant coffee. Column (2) reports the statistics for the shipments of products of other products under HS09 and HS21 not listed in the policy. Number of products for our dataset counts for 64, with 1 product listed in the policy and 63 products not listed.

In the first part of the period (2008-2011), we observe substantial differences between the two groups. The mean values of our dependent variables are all higher for the listed coffee extracts, essences and concentrates, including instant coffee products,

[13]There are seven products that are listed in the policy at 6-digit HS Codes. Please see Table B.2 in Appendix B. In this paper, we focus on the product group that covers instant cofffee.

[14]We take into account the presence of no shipments at product-month level by generating zero values across the dependent variables when it is the case.

Table 2.1: Summary statistics of the monthly outgoing shipments from 2008 to 2013.

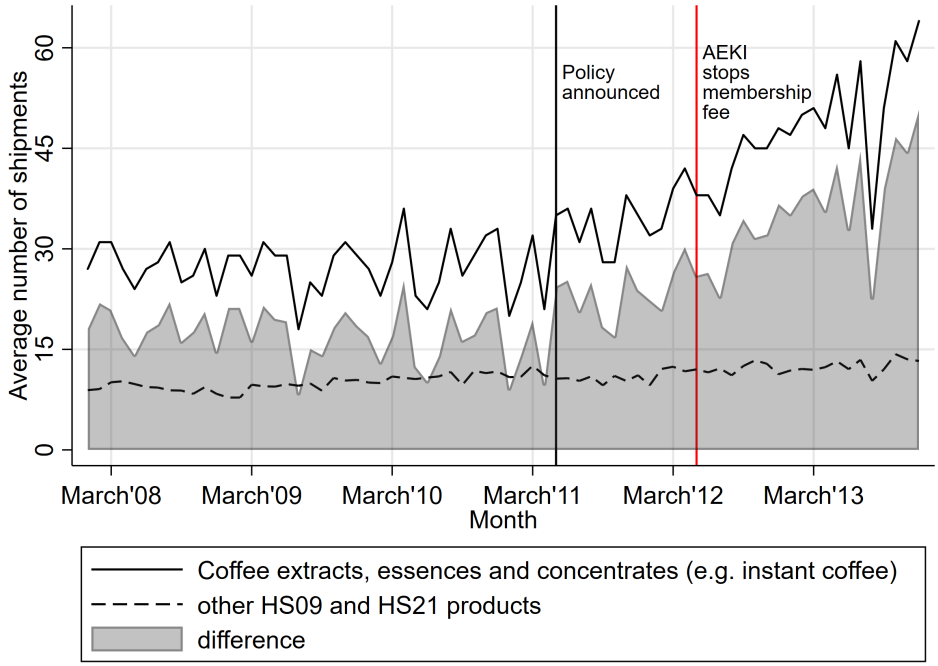
	(1) Coffee extracts, essences and concentrates	(2) Products of other HS09 & HS21 not listed in the policy
2008-2011 period		
Avg # of shipments	28.31	18.22
	(4.525)	(21.59)
Avg # of destination countries	18.19	10.68
	(3.064)	(9.354)
Avg ln(export value)	15.11	12.11
	(0.299)	(2.834)
Avg ln(export net weight)	13.34	11.32
	(0.212)	(2.791)
2012-2013 period		
Avg # of shipments	46.08	18.92
	(9.041)	(27.16)
Avg # of destination countries	25.58	10.66
	(5.141)	(9.990)
Avg ln(export value)	16.91	12.17
	(0.306)	(3.103)
Avg ln(export net weight)	15.59	10.98
	(0.368)	(3.063)
Number of products (6-digit HS)	1	63
Number of observations	72	4536

Notes: Table reports the mean and standard deviation (in parentheses) of our dependent variables. Observations are at 6-digit product level and the time period is monthly. Column (1) reports the statistics for all shipments of HS210111 products "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" and column (2) reports the statistics for the shipments of other products under HS09 and HS21 not listed in the policy. Number of observations is over the entire period, i.e. 72 months.

compared to the non-listed products under HS09 and HS21. This highlights the importance of instant coffee industry in Indonesia. In terms of extensive margins, the difference in the monthly number of shipments is larger, with 28 shipments per month for the listed products vs only 18 shipments a month for the non-listed products.

In the second part of the period (2012-2013), we observe larger differences between the two groups compared to the ones in the first part of the period. The extensive

Figure 2.1: Monthly average number of outgoing shipments in 2008-2013 for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".

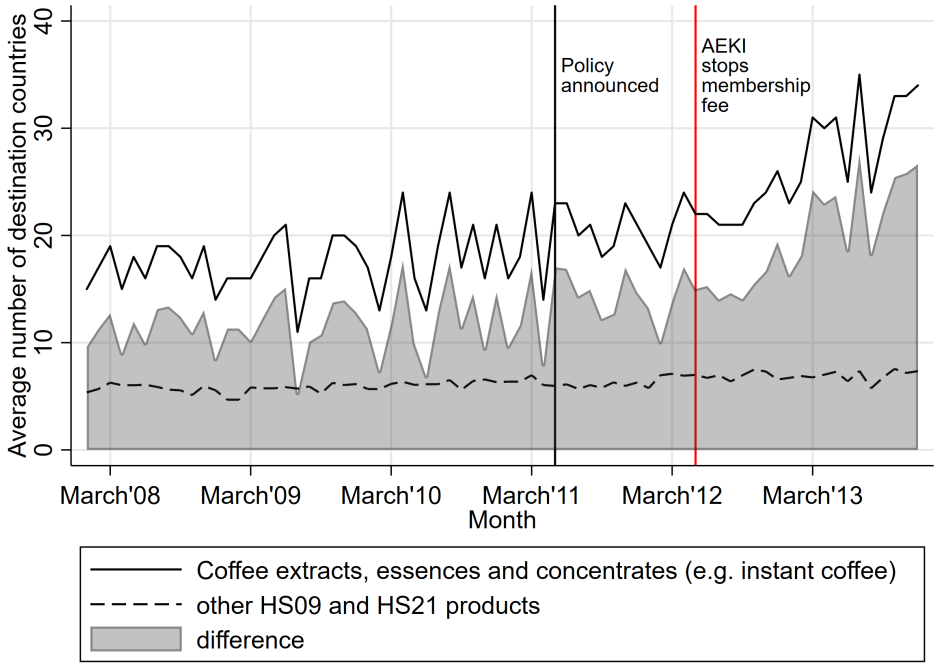


Notes: Figure depicts the average total number of shipments per month for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" versus those others that have never been regulated by export licensing procedures during our time period.

and intensive margins for the listed products increase from the first part to the second part of the period, while the ones of the non listed products remain steady. The average number of shipments of the coffee extracts, essences and concentrates increased substantially following the announcement of the policy, from 28 shipments in the first part of the period, to 46 shipments in the second part. This is also the case for the average number of destination countries. We observe an increase from 18 to 25 destinations for exports of the listed product. The substantial changes are also present for the intensive margins of exports.

The next four figures present the visual descriptive statistics as well as parallel trend checks for our dependent variables: exports' extensive margins (shown in Figures 2.1

Figure 2.2: Monthly average total number of destination countries for exports in 2008-2013 for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".

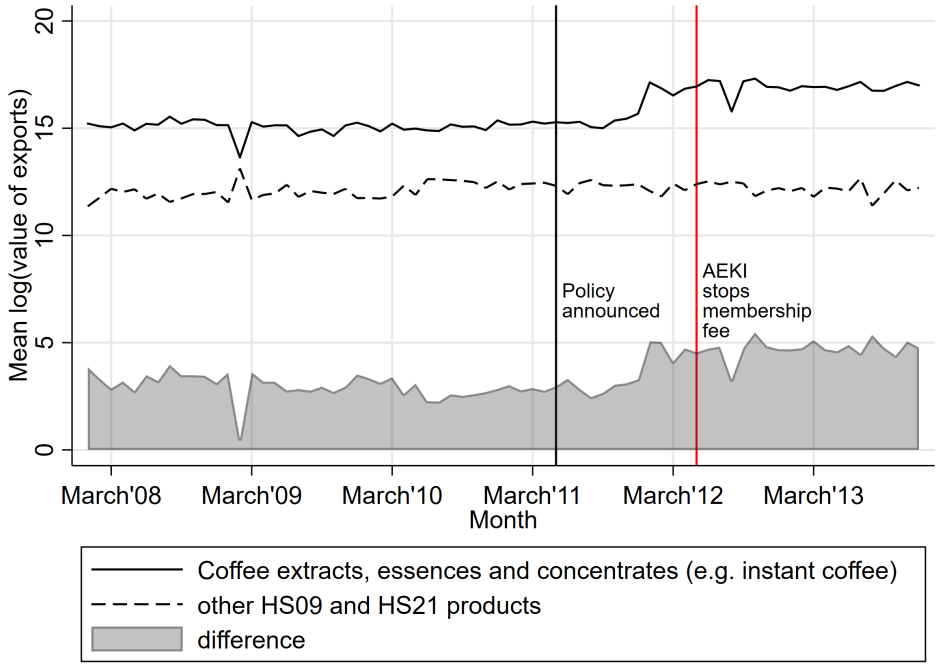


Notes: Figure depicts the average total number of destination countries per month for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" those others that have never been regulated by export licensing procedures during our time period.

and 2.2) and exports' intensive margins (show in Figures 2.3 and 2.4).

Figure 2.1 shows the evolution of the monthly number of shipments for coffee extracts, essences and concentrates products that are listed in the policy and those of other products which are not (of HS09 and HS21 products), respectively, within our sample period. The figure shows the average total number of shipments per month for these two groups. There are pre-existing differences in listed and non-listed products which we will control by the inclusion of product fixed effects. The shaded area shows the difference in the average total number of shipments size between listed and non-listed products. This shaded area allows a coarse comparison of the relative pre-existing trends for the period before any products are treated, i.e, before May 2011,

Figure 2.3: Monthly average log of total value of exports in 2008-2013 for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".



Notes: Figure depicts the average log of total value per month for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" versus those others that have never been regulated by export licensing procedures during our time period.

during the transition period (until May 2012 when AEKI stops mandating membership fee to its members), and post-transition. We see that average number of shipments seems to move on parallel trends before the policy entered into force, though for the treated product it fluctuates heavily across the period. After May 2011, the trends start to diverge. The shipments of the listed product experience an immediate shock thus the difference between the two groups increases.

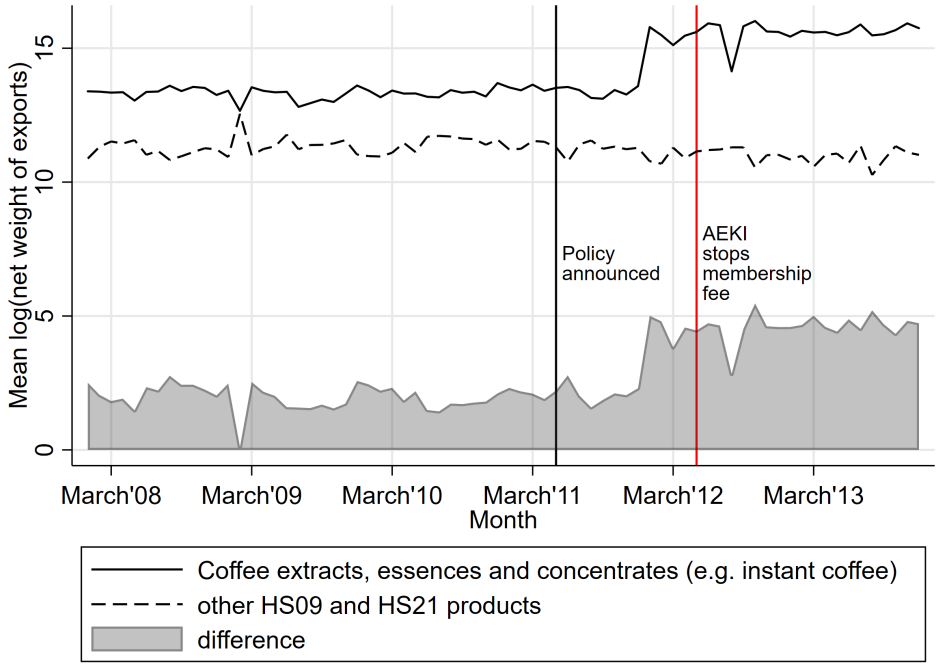
Figure 2.2 shows the evolution of the average number of destination countries for the export of coffee extracts, essences and concentrates products that are listed in the policy and those of other HS 09 and 21 products which are not, respectively. The figure shows average total number of destination countries per month for these two

groups along with difference between the groups, shown by the shaded area. Similar to Figure 2.1, there are pre-existing differences in listed and non-listed products. We see that after May 2011, there is a slight increase in the difference. The difference becomes quite substantial between the two groups following the termination of mandatory membership fee by AEKI.

Figures 2.3 and 2.4 follow the same format as Figures 2.1 and 2.2, but for intensive margins of exports. Figure 2.3 shows the evolution of the monthly average log of total value for the export of coffee extracts, essences and concentrates products that are listed in the policy and those of other HS 09 and 21 products that are not, respectively, along with the difference between the groups, shown by the shaded area. Figure 2.4 is in the same format as Figure 2.3, but for the monthly average of total net weight of exports. The parallel trends seem more noticeable, with the expected pre-existing differences as like in the extensive margins. Though we notice a change, it only happens in the beginning of 2012, in other words, in the middle of the transition period (between the announcement of the policy and the termination of AEKI membership fee by AEKI itself).

Visual evaluation of these descriptive figures gives us an intuition about what happens following the policy: more frequent and more destination countries for outgoing shipments, with consistently substantial increases in value and quantity. It seems that the removal of de-facto export tax has a positive impact on both extensive and intensive margins of exports. This intuition, derived from eyeballing Figures 2.1 to 2.4 needs to be validated using formal statistical tests. The next section present the results.

Figure 2.4: Monthly average log of net weight of exports in 2008-2013 for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".



Notes: Figure depicts the average log of total net weight per month for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" versus those others that have never been regulated by export licensing procedures during our time period.

2.4 Results

2.4.1 Effect of the removal of de-facto export tax on exports' extensive margins (number of shipments and destination countries)

We present results of Equation 2.1 for exports' extensive margins in Table 2.2. All regressions include product and time fixed effects and standard errors are robust to multi-way clustering across products.

In Column (1) of Table 2.2, we present the PPML estimates on the number of

Table 2.2: Effect of the removal of de-facto export tax on exports' extensive margins.

	Number of shipments (1)	Number of destination countries (2)
Removal of De-Facto Export Tax	0.287***	0.206**
	(0.096)	(0.097)
N	4608	4608

Notes: Table reports PPML regression coefficients of estimating the average treatment effects on the treated (ATT) on exports' extensive margins following the removal of de-facto export tax announced in May 2011. Column (1) reports the estimate of our baseline specifications for number of outgoing shipments. Column (2) reports the estimate for number of destination countries. All regressions include product and time fixed effects. Standard errors are robust to multi-way clustering across products. ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively.

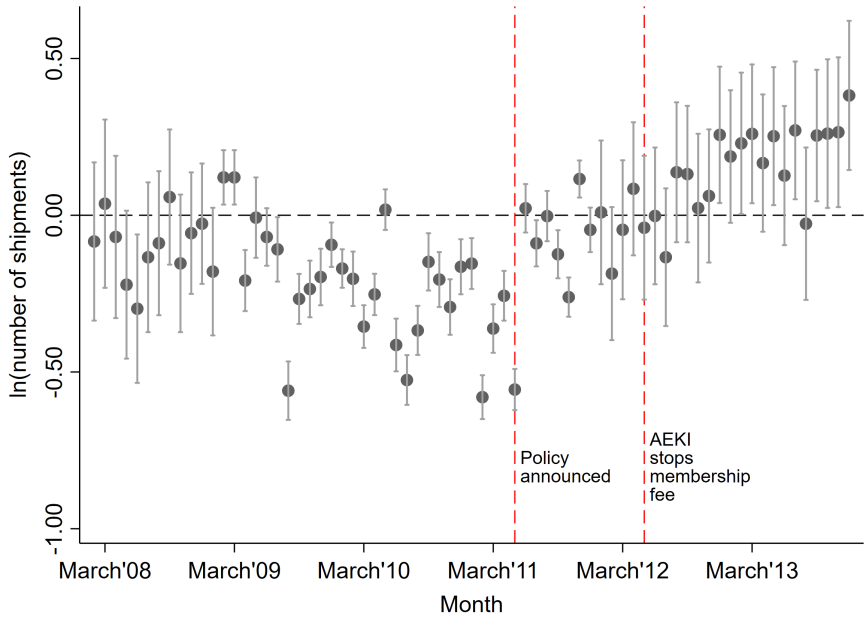
shipments. We find that coffee extracts, essences and concentrates products has 33% more outgoing shipments following the removal of de-facto export tax.[15] We repeat the same exercise as Column (1) but now for our second measure of extensive margin: number of destination countries. We show the results in Column (2). We find similar pattern and sized effects as in Column (1). PPML estimation shows that removal of de-facto export tax has 23% more destination countries following the announcement of the policy. The estimate on number of shipments has higher precision at 1% significance level, compared to 5% of the one on number of destination countries.

We allow the treatment effect of removing de-facto export tax on the extensive margins of exports to vary over time in our event study specification given in Equation 2.2. We present the PPML estimates in Figures 2.5 and 2.6. The estimates for pre-May 2011 do not show consistent non-significant values for both number of shipments and number of destination countries. This indicates that there might be something else happening prior to the policy that affects the extensive margins of exports of coffee extracts, essences and concentrates. In terms of number of shipments, the effect following the policy does not occur immediately. From early 2012 it shows an increasing

[15]We calculate marginal effects of variable *ImportLicensingProcedures* as (exp(x)-1)*100.

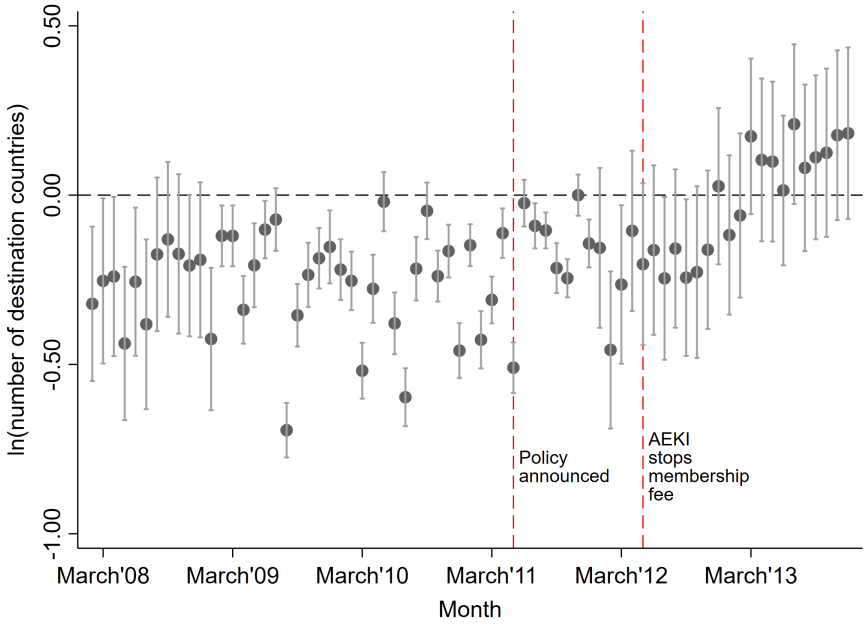
trend, with low precision, and only later in the end of 2012 that the effects become statistically significant. In terms of number of destination countries, though it shows an increasing trend from early 2012, the precision across the post-treatment period is low, i.e. the coefficients are not statistically significant. The next question is how firms react in terms of the total value and quantity of these shipments. We continue the analysis in the next subsection.

Figure 2.5: Effect of the removal of de-facto export tax on exports' number of shipments for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".



Notes: This figure shows coefficient estimates from a PPML regression of number of shipments per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in May 2011), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 4,608.

Figure 2.6: Effect of the removal of de-facto export tax on exports' number of destination countries for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".



Notes: This figure shows coefficient estimates from a PPML regression of number of destination countries per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in May 2011), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 4,608.

2.4.2 Effect of the removal of de-facto export tax on exports' intensive margins (export value and net weight)

We repeat the exercise from the previous section, but now for the intensive margins of exports. We present results of Equation 2.1 for these intensive margins in Table 2.3. Similar with Table 2.2, all regressions include product and time fixed effects and standard errors are robust to multi-way clustering across products.

From Table 2.3, the estimates demonstrate that removing de-facto export taxes has statistically significant and large effects on the intensive margins of outgoing shipments

Table 2.3: Effect of the removal of de-facto export tax on exports' intensive margins.

	Export value (1)	Export weight (2)
Removal of De-Facto Export Tax	1.166***	1.956***
	(0.138)	(0.153)
N	4608	4608

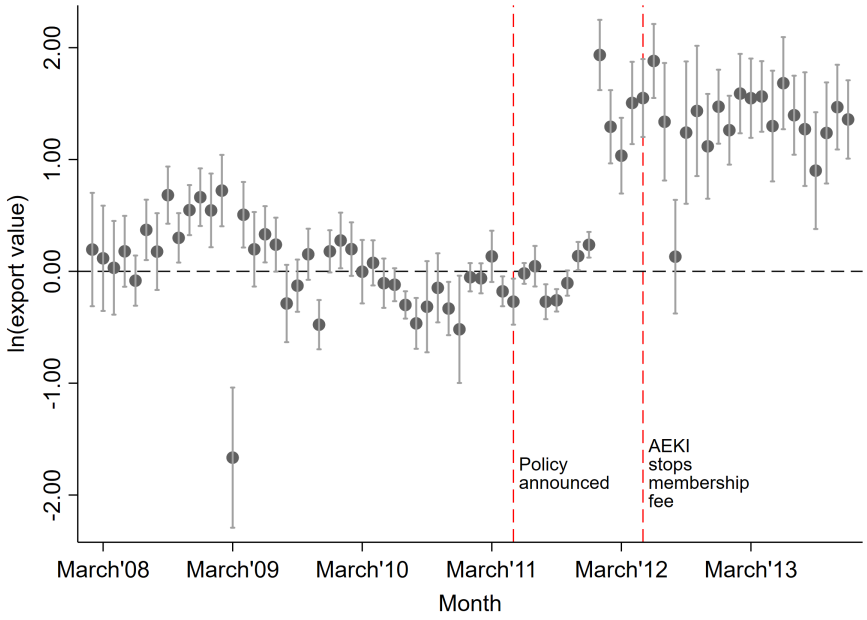
Notes: Table reports PPML regression coefficients of estimating the average treatment effects on the treated (ATT) on exports' intensive margins following the removal of de-facto export tax announced in May 2011. Column (1) reports the estimate of our baseline specifications for value of exports. Column (2) reports the estimate for net weight of exports. All regressions include product and time fixed effects. Standard errors are robust to multi-way clustering across products. ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively.

of instant coffee from Indonesia. We find that coffee extracts, essences and concentrates products has 220% increase in export value following the removal of de-facto export tax. We repeat the same exercise as Column (1) but now for our second measure of intensive margin: export weight. We show the results in Column (2). We find similar pattern and sized effects as in Column (1). PPML estimation shows that removal of de-facto export tax has 607% increase in export weight following the announcement of the policy. These results suggest that the prohibitively high variable costs imposed by these taxes had an overwhelmingly negative impact on firms. A distinction can be made between the effects observed on intensive and extensive margins. The difference in magnitude reflects the considerable burden placed on firms by such institutional distortion.

We then allow the treatment effect of the removal of de-facto export tax on the intensive margins of exports to vary over time in our event study specification given in Equation 2.2. We present estimates for total value of exports as the dependent variable in Figure 2.7. Pre-trend variables are mostly not significant, though there are a few noticeable periods of statistical significance that might be to seasonal activities. We

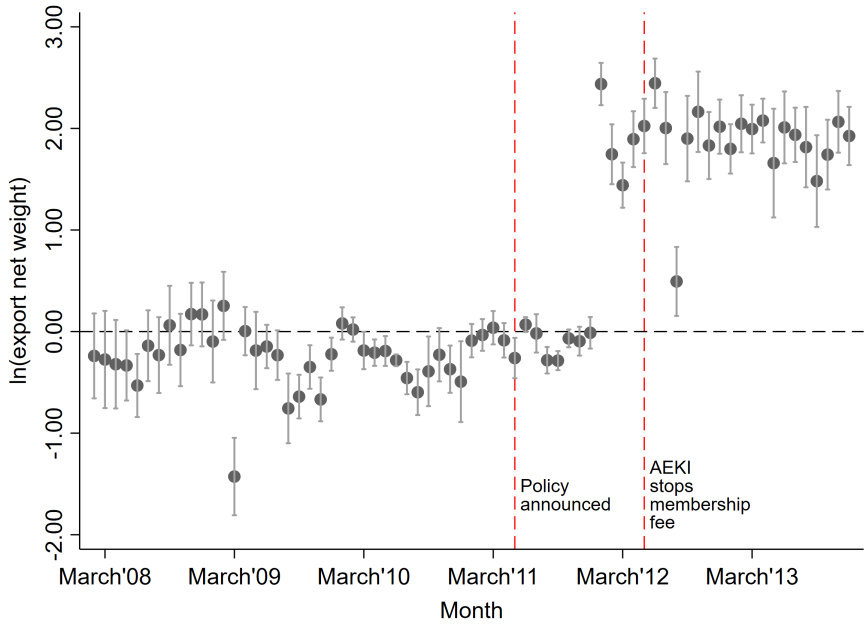
find the post-treatment coefficients mostly significant, but only from the beginning of 2012. This indicates that firms already paid their membership fee in 2011, thus the effects are lagged. In Figure 2.8, we present results for net weight of exports as the dependent variable. It shows a similar pattern: there is no immediate impact following the announcement of the policy, but then post-treatment effects are mostly significant. Overall these results indicate that the removal of de-facto export tax have a lagging bite on the total net weight and value of imports but this might be due to adjustment period.

Figure 2.7: Effect of the removal of de-facto export tax on export value for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".



Notes: This figure shows coefficient estimates from a PPML regression total export value per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in May 2011), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 4,608.

Figure 2.8: Effect of the removal of de-facto export tax on export net weight for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)".



Notes: This figure shows coefficient estimates from a PPML regression total export net weight per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in May 2011), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 4,608.

2.4.3 Robustness Checks

To evaluate whether our results are robust to slight changes in the estimation strategy, we use two other estimators used in the literature: (1) traditional OLS; and (2) the difference-in-differences estimator robust to heterogeneous treatment effects by de Chaisemartin & D'Haultfœuille (2020). OLS results are presented in Appendix B: Figure B.1 for extensive margins and Figure B.2 for intensive margins. The parameter estimates are similar to those of PPML. For DID estimators with heterogeneous treatment effects, the command only allows us to have a balance lead and lag period. In our case, we choose 30 months leading and 30 months following the policy being imposed.

We still observe similar insights. The results are presented in Appendix B: Figure B.3 for extensive margins and Figure B.4 for intensive margins.

2.5 Discussion

At first glance, our baseline results using the assumption of constant treatment effects show positive and statistically significant effects of removing the de-facto export tax on both extensive and intensive margins of exports. When we relax the constant treatment effect assumption, we still find positive effects of the policy on the intensive margins of exports, i.e. an increase in value and net weight. However, for the extensive margins, the number of shipments and the number of destination countries, our parameter estimates have low precision. This section attempts to discuss possible explanations of these results.

General differences in results. There might be behavioral differences in how firms react with respect to their extensive and intensive margins. In our case, we are unable to observe the behavior of each firm, since there is no firm identifier in our dataset, i.e., we cannot track the behavior of individual firms over time, even though we have transaction level trade data. However, it is well documented in the firm heterogeneity literature that the majority of exporting firms only export to one or two markets–only the most productive exporting firms are able to capture many diverse markets (see for examples Eaton et al. (2011); Freund & Pierola (2015); Bernard et al. (2018)). Entering a new market or adding a new shipment is associated with fixed costs specific to each margin. Our measures for the extensive margins might embed more noise in the data relative to ones for the intensive margins. This noise is related to the survival of the firm in the export market, i.e., the number of entry and exit to the new market or new shipment. On the contrary, there is more variation in a continuous variable. For instance, firms that are already exporting tend to continue

exporting, whether it's an increase or decrease in value and/or volume, regardless the marginal changes in extensive margins. In the data, we see a clear increasing trend of our measures for exports extensive margins following the policy, but measured with low precision. Furthermore, between the two measures of extensive margins, the number of shipments and the number of destination countries, we also find differences in the post-treatment statistical significance. Though lagged to late 2012 onward, some of the post-treatment coefficients for the number of shipments are significant, unlike those of the number of destinations. This hints a different level of magnitude as well between the sunk costs of entering a new market and the fixed costs of adding a new shipment (see seminal papers on sunk costs of entering the export market, Das et al. (2007); Roberts & Tybout (1997)). For example, it is less costly for an already exporting firm to do a repeat shipment to the same market, than to enable an initial shipment to a new market.

Differences in pre-treatment effects. We approach this issue from a causal policy evaluation perspective, which put emphasis on generating counterfactuals. Our results, in terms of extensive margins indicate pre-existing differences in the trends between listed and non-listed products, which cast doubt on the common trend assumption underlying our approach. More specifically, the number of outgoing shipments and the number of export destination countries of the product, for which the policy was imposed, behaved differently in the months leading up to the policy. There might be the case that there is something else going on, unrelated to the policy, that affects exporting behavior of firms in the listed industry. For example, it is possible that a change in the world market price for coffee could affect the export margins. But then the question is why we only see significant pre-treatment effects on the extensive margins and not in the intensive margins? Indonesia is a major producer and exporter of Robusta coffee, which is dominantly used to produce instant coffee and other forms of soluble coffee (ITC, 2021). The prices of Robustas are indeed showing a decreasing

rate in some periods (January 2008 - January 2010) before the implementation of the policy (ITC, 2021).[16]

Another potential explanation for the differences in pre-treatment effects is firms might be anticipating the policy to begin with. For example, if a firm knows that there will be an elimination of cost in the coming months, this firm might delay its exports. However, profit-maximizing firms would only do so if the marginal benefit of delaying is higher than the marginal cost. This explanation relates to our previous point about the how firms react differently in terms of their extensive and intensive margins of exports. Firms are more likely to exit a market or a cancel a shipment in anticipation of our policy of interest, than to reduce its exports value and volume. Aligned with our previous point, this is because extensive margins trigger sunk and fixed costs (embedded to additional market/shipment), than intensive margins with their per unit costs (embedded in additional quantity). Increasing at the extensive margins is more challenging for an average firm than improving at the intensive margins. Our policy of interest also differs from a typical export licensing policy that acts as a barrier to entry, i.e. an extensive margin, to the export market. The 2011 coffee export licensing regulation is more fundamentally related to the intensive margins as the policy acts as de-facto export tax –with higher volume comes higher fees.

On balance, the evidence that we provided is somewhat mixed. We cannot rule out if there is something else going on prior to the announcement of the policy or whether firms anticipate the announcement. Our data do not allow us to decisively conclude one way or another. We therefore cannot make a final call whether the removal of the

[16]According to monthly composite price of coffee data from the ICO, in the months leading to the policy, the price is increasing. It is therefore against our intuition that the extensive margins would fall, as a higher price should make it more attractive to enter the export market. Though we cannot fully rule out the role of prices, we argue that their role might be small due to Indonesia-specific characteristics as a coffee-exporting country. The price of coffee from the origins typically change, but rarely more than five or ten cents at a time, in response to global standard coffee exchange price (the 'C market') in which the world's Arabica coffee is bought and sold. However, that is not the case for Indonesia. Its differentials can move over fifty cents over a few days and can rise and fall regardless of the C market price.

policy helps reduce the de-facto hindrance faced by firms to export at the extensive margin but our results document an increase of the intensive margins of exports after the policy has been removed.

2.6 Concluding remarks

Institutional distortions are prevalent in developing countries. One form of distortions are private-sector, industry-association membership fees, which act as de-facto export taxes. Little is known about how these de-facto export-tax affect international trade. This paper presents evidence that removing de-facto export tax has positive and significant effects on intensive margins of outgoing shipments of instant coffee from Indonesia. More generally, these findings suggest that removing this type of institutional distortions benefit firms' intensive margins of exports.

These findings are relevant more broadly. Policy making in developing countries is characterized by various institutional challenges. Failure in detecting institutional distortions that hide behind legacy policies, i.e., policies that have been introduced at some point in a country's history and that are carried along even though their original reason why they were introduced no longer applies, might lead emerging economies to undermining other (global) policy initiatives in place, e.g. climate initiatives that aim to tackle deforestation. In the case of Indonesia, we show evidence of missed opportunity in coffee industry for farmers and relevant stakeholders by showing the significant increase in exports after the removal of a long-sitting institutional barrier. When prices are low, a lot of producers switch to these other crops to increase their profits, and they do not go back to coffee. As Indonesia has a comparative advantage in palm oil, these farmers might switch their land utilization from less emission-intensive coffee farm to more emission-intensive oil palm plantation. It is therefore crucial to revisit developing economies' outdated policies because they might, not only serve as

institutional distortion for trade, but also might pose unintended climate consequences.

The main limitation of this paper is that the administrative data to which we have access do not contain a firm identifier. For further research, we recommend linking these firm- and transaction-level data using a firm identifier (see e.g. Pane & Patunru (2022) who use the same data as we do but whose dataset evidently contains a firm identifier). Making firm identifiers that allow linking data sets available to a wider set of researchers in the future will allow to present further evidence on how firms specifically react to such policies thus give more insights of possible mechanism of the relationship between institutional distortions and trade.

Statement of Authorship

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Contribution to the Paper	Contributed to the planning the article and the methodology, conducted the literature review, collected the data, analysed and interpreted the results, wrote part of the manuscript.		
Overall percentage (%)	75%		
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	01/11/2022

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Laura Márquez Ramos		
Contribution to the Paper	Contributed to the planning of the article, supervised the development of the work, helped in the interpretation of the results, wrote part of the manuscript.		
Signature		Date	01/11/2022

Name of Co-Author			
Contribution to the Paper			
Signature		Date	

Please cut and paste additional co-author panels here as required.

Chapter 3

Value chains, firms' imports and exports: Evidence from Indonesia

Abstract

Drawing on the experience of Indonesian firms, we analyse the relationship between importing and exporting activities in two years (2009 and 2015) to test whether this relationship changes following a reversal of trade liberalization. We hypothesize that reversal in trade liberalization affects the relationship between imports and exports in firms in developing countries because they experience a decreased access to market opportunities and technology that is already standard in developed countries. We validate the theoretical underpinnings of the claim that importing Indonesian firms export more, and we contribute to the literature by introducing a newly-identified underlying mechanism behind the positive relationship between imports and exports: when trade barriers are low, firms that import intermediates sourced from multiple-border-crossing foreign value added achieve significant increases in their exports. However, following a reversal of trade liberalization, value chains are disrupted and single-border-crossing foreign value added in importing becomes more relevant for firms' exports. In such cir-

cumstances, emerging market firms' participation in value chains becomes less global. Relevant policy implications can be made: in a world marked by growing scepticism surrounding globalization and openness to international trade and competition, policy makers should bear in mind that policies inhibiting access to global value chains have negative consequences for firms' exports.

3.1 Introduction

In this paper, we aim to study how the reversal of trade liberalization affects the relationship between importing and exporting activities in emerging market firms. We hypothesize that reversal in trade liberalization affects particularly firms in developing countries because they experience a decreased access to market opportunities and technology that is already standard in developed countries.

Our focus is on Indonesia because it is a large emerging market that underwent a deep trade liberalization process starting at the end of the 1980s,[1] but later experienced a reversal of trade liberalization over the post- global financial crisis (GFC) period, 2009-2016.[2] It is worth mentioning that tariff increases are not the only evidence of reversal of trade liberalization in Indonesia. Importantly, increasing protectionism is reflected in non-tariff measures, as tariffs are already very low (Patunru & Rahardja, 2015). According to the Global Trade Alert database, the number of newly implemented import-related non-tariff measures (NTMs) by country between 2009 and

[1]The tariff rate (applied, weighted mean, all products) was 14.54% in 1989 and decreased to 1.71% in 2009 (data extracted from World Development Indicators, The World Bank).

[2]Although weighted average tariffs in Indonesia are considerably below the average in the group of low-income countries, Indonesia experienced a reversal in trade liberalization over the period 2009-2016. Specifically, the applied tariff rate (weighted average for all products) in Indonesia in 2009 was 1.71% and increased to 2.64% in 2016. The data in Figure C.1, located in the Appendix, indicates that Indonesia experienced an increase in tariff rates between 2009 and 2016. In contrast, average tariff rates for the world, low income, and high income countries have been decreasing over time, indicating a trend towards greater liberalization. As such, Indonesia has taken a different direction from these other countries by moving towards more protectionist policies.

2015 was led by the United States, which implemented by far the most NTMs (2,275). During the same period, Indonesia implemented 214 NTMs, which was the highest among ASEAN countries, followed by Vietnam and Thailand, with 72 and 42 NTMs respectively.[3]

The case of Indonesia is instructive: it is a big, fast-growing country located in a dynamic emerging region. However, this research can be generalized beyond Indonesian firms, as Indonesia is not the only nation whose participation in the global economy has weakened during what some researchers have described as a great trade collapse (Bems et al., 2013). Indeed, the GFC marked the start of a dramatic reversal of the rising trend in so-called global import intensity (Timmer et al., 2016), with value chains becoming less global and more fragmented. Therefore, we see the Indonesian experience as a harbinger of future events in other emerging countries.

We contribute to the literature by scrutinizing the causal effect of importing activities on exports, and we consider the integration of the firm in worldwide activities by accounting for the depth and scope of inward value chains. We rely on a value chain perspective that allows us to distinguish between foreign value added that only crosses the border once (we call it "simple" importing) and foreign value added that crosses the border twice or more (we call it "complex" importing). Then, we identify the effect of "simple" versus "complex" importing on exports in a context in which emerging market firms experience a deterioration of their trade conditions. As our empirical research focuses on the Indonesian experience, we analyse the role of "simple" versus "complex" importing in two years in which we observe a reversal of trade liberalization in Indonesia: 2009 and 2015.

Our key assumption is that reversal of trade liberalization complicates international trade processes and disrupts existing trade networks. As a consequence, firms into

[3]Also, see, e.g., Patunru et al. (2018) and Patunru & Rahardja (2015), for a list of protectionist trade laws, nontariff barriers imposed, local content requirements, and export measures taken by Indonesia since 2009.

trouble might "simplify" their importing strategy because some imported products might become unavailable (or very expensive) and they have to rely on alternative sources to substitute them. In this vein, the Economist (2009) found that protectionism is a relevant cause for supply chain disruption.

Crucially, we should consider different stages of the Indonesian value chains and move beyond the gross value of exports to consider the intersection with its domestic economy. The simple value of exports would tell us only about the last stage of the value chain as it leaves Indonesia. However, we want to know the composition of imports of inputs used in the production process; we can then gain fresh insights into Indonesia's global engagement by using the World Input-Output Database (WIOD).[4] In addition, we use data from the World Bank Enterprise Survey (WBES) conducted in Indonesia in 2009 and 2015.[5]

We show that when firms source from foreign countries, firms in that country export more. However, this positive causal effect is channelled through "complex" importing (that is, when firms import intermediates that have crossed international borders several times); "simple" importing (that is, when firms import intermediates that have crossed an international border only once—in this case, the Indonesian border) does not increase firms' exports in periods of trade liberalization. Conversely, "simple" importing becomes more relevant for exports in periods of trade liberalization reversal.

Our findings have relevant policy implications. From our focus on the reversal of trade liberalization in Indonesia, we learn how decreased involvement in global value chains (GVCs) might shape firm performance (measured in terms of exports). Therefore, re-imposing trade controls does not seem to be the best strategy in this globalized

[4]Specifically, we use the UIBE GVC Index, which is a database derived from the original WIOD. See RIGVC UIBE, 2016, UIBE GVC Index, available at: http://rigvc.uibe.edu.cn/english/D$_E$/$database_d atabase/index.htm$

[5]The WBES for Indonesia covers a representative sample of firms in terms of firm size and includes exporters and non-exporters, as well as importers and non-importers from a broad range of sectors. In particular, these years were chosen as they are the latest available data points from WBES.

world.

To explain the increasingly prevalent concept of GVCs over the past few decades it is essential to provide an all-encompassing definition of GVCs and participation within them. Antràs (2020) provides a broad definition:

> *A global value chain or GVC consists of a series of stages involved in producing a product or service that is sold to consumers, with each stage adding value, and with at least two stages being produced in different countries. A firm participates in a GVC if it produces at least one stage in a GVC. (on page 3)*

From the above definition, GVC is understood to be an internationally extended production process that involves the addition of value from a minimum of two countries (Antràs & de Gortari, 2020). This concept links to the growing international dependence on external sources for value added in manufacturing, especially for products intended for export. GVCs enable a finer international allocation of labour and increased advantages from specialization (Hummels et al., 2001). They allow resources to be directed towards the most advantageous use, not just within countries or industries, but also between different stages of production within an industry (Koopman et al., 2014). Taking a firm-level approach to GVCs presents a richer picture of their implications. Participation in these networks can generate higher incomes due to the increased efficiency of companies taking part (Amiti & Konings, 2007; Goldberg et al., 2010; De Loecker et al., 2016).

Athukorala et al. (2017) labels this cross-border dispersion of production processes as "global production sharing". Alternative terms include "international production fragmentation" (e.g. Fort (2017)), "vertical specialisation" (e.g. Hummels et al. (2001)), and "offshoring" (e.g. Grossman & Rossi-Hansberg (2008); Amiti & Wei (2009); Hummels et al. (2018)). New opportunities for specialization within global production networks arise due to the finely-sliced production processes in various in-

dustries. In our paper, we break down the level of participation in this network from a firm's importing side. More specifically, we distinguish between foreign value added that only crosses the border once (which reflects firm's simple importing as it is sourcing from suppliers that are less integrated in a GVC) and foreign value added that crosses the border twice or more (which reflects firm's complex importing as it is sourcing from suppliers that are more integrated in the GVCs). Our main reason for this dichotomy is to simplify the degree of involvement in global production sharing.[6] There is an extensive body of literature on the topic of consequences of GVC participation: enhanced firm-level productivity (e.g. Amiti & Konings (2007); Goldberg et al. (2010); De Loecker et al. (2016), technology transfer (see World Bank (2020)), scale and rise of superstar firms (e.g. Antras et al. (2017); Autor et al. (2020)), and the benefits of network and relations (e.g. Gereffi (1999); Macchiavello & Morjaria (2015); Athukorala (2017); Macchiavello & Morjaria (2019)). Hence, sourcing inputs from a more integrated GVC firm can generate higher profit to the producers.

Our work contributes to this growing literature of GVCs. Previous related literature focuses on the impact of imported intermediate inputs on employment and inequality (see, e.g., Feenstra & Hanson (1996)) and on the country-level benefits from offshoring (Amiti & Wei, 2009; Winkler, 2010). At the microeconomic level, foreign inputs have been associated with firm productivity improvements (Topalova & Khandelwal, 2011), and with an increase in the number of varieties of goods produced by the firm (Goldberg et al., 2010). There is extensive empirical research that supports the theoretical predictions linking foreign intermediates to productivity, but the role of foreign inputs in shaping exports in emerging market firms is not yet fully understood. A study that is closely related to our research used firm-level data from emerging markets and found that firms' importing activities increase the probability of exporting, while serv-

[6] Our usage of the labels "simple" and "complex" importing do not necessarily reflect the complexity of the imports. They are our admittedly crude proxy to measure the complexity of GVCs and the degree of involvement in the global production network, that later we use in our empirics. To be clear, this simplicity mainly stems from the fact that we can implement it with the data we have available.

ing foreign markets does not affect the probability to source foreign inputs (Aristei et al., 2013). Related literature provides analyses that use firm-level data to examine the consequences of offshoring and value chains (Bernard et al., 2018; Hummels et al., 2018). Recent research in international trade provides insights into the effects of offshoring and value chains on labour markets (Hummels et al., 2018), and examines the concept of "global firms" (Bernard et al., 2018). Concerning firms in emerging markets, previous literature offers four relevant observations. First, the average firm is very small. Second, firms often do not grow significantly as they age. Third, firms in emerging markets appear to have low productivity on average and, fourth, there is significant productivity dispersion across firms. Therefore, they mostly buy locally (see Jensen & Miller (2018)). These observations reinforce the importance of further analysing the role of firms' integration in worldwide activities (value chains) in the relationship between imports and exports in emerging market firms, particularly when they are affected by trade liberalization reversals.

For emerging market firms, Aristei et al. (2013) found that being an importer has a positive effect on the probability to be a two-way trader, while being an exporter has not such an effect. However, to the best of our knowledge, there are not previous studies focusing on how the relationship between firm's exports and imports changes under a deterioration of trade conditions. To fill this this gap in the literature, we test how participation in value chains has shaped the positive relationship between imports and exports in Indonesia before and after a deterioration of trade conditions for importers has occurred.

The rest of the paper is organized as follows. Section 3.2 presents the data and measures. Section 3.3 details the methods and results. Section 3.4 provides a discussion of our research findings, and Section 3.5 concludes.

3.2 Data and measures

Data on Indonesian firms are obtained from the WBES dataset. WBES is a firm-level survey of a representative sample of an economy's private sector. The surveys cover a broad range of business environment topics including international trade engagement, innovation, ownership structure, and performance measures. The sample for Indonesia was selected using stratified random sampling and three levels of stratification were used: industry, establishment size, and region.[7] The enterprise surveys for Indonesia contain responses from a sample of 1,444 firms in the year 2009 and 1,320 firms in 2015. Due to missing data, the pooled sample was composed of 2,230 firms, as shown in Table 1.[8] Table 1 shows that in 2009 most Indonesian firms (72.8%) were not engaged in international trade. Although the proportion of export-only firms has increased over time (from 8.7% to 9.5%), the overall engagement in internationalization has declined over time, as reflected in the decrease in the number of importers and in the number of firms that participate in both exporting and importing activities. Likewise, the last two columns of Table 1 show a significant reduction over time in the mean foreign inputs of the importing firms. Specifically, for two-way traders this figure drops from an average of 48.4% in 2009 to an average of 37.1% in 2015.[9]

[7] In a simple random sample, all members of the population have the same probability of being selected and no weighting of the observations is necessary. In a stratified random sample, all population units are grouped within homogeneous groups and simple random samples are selected within each group.

[8] Fewer observations are used later in the empirical analysis due to missing data.

[9] This descriptive analysis should be taken with caution, as we are relying on a limited sample of Indonesian firms.

Table 3.1: Sample composition.

Year	Number of Firms	Percentage Values					Mean of Imported Inputs	
		Export-only	Import-only	Export and Import	Domestic	Total	Import-only	Export and Import
2009	1,165	8.7	7.1	11.4	72.8	100	45.3	48.4
2015	1,065	9.5	6.6	9.7	74.3	100	36	37.1
Pooled	2,230	9.1	6.9	10.6	73.5	100	41.5	43.4

Source: Author's calculations using data from the World Bank Enterprise Survey.

WBES is an important tool that allows researchers and policy makers to gain insights into the business environment across countries. Through its comprehensive framework, WBES provides valuable data for analyzing trends across markets, measuring performance against metrics and benchmarking standards. Despite its wide reach, the World Bank Enterprise Surveys have some limitations. These surveys rely on responses from company representatives and thus may not reflect factual information. While the surveys provide insights into the performance of businesses in various countries, they do not take into account non-economic factors such as corruption or culture which can also play a role in determining economic outcomes. However, this limitation also applies for other sources for Indonesian data such as Statistik Industri and Customs data. Unlike firm-level data from Statistik Industri which only capture the manufacturing industry, the survey captures responses from diverse industries in the country, giving researchers access to wider perspective. As such, it can provide insights into differential trends across sectors that may be otherwise difficult to capture through solely manufacturing industries. In this paper, we utilise sectoral information beyond just manufacturing sectors, therefore we resort to WBES for our firm-level data.[10] The survey also captures a number of measures that reflect technological advancement of the firms, e.g. number of certification and proportion of foreign technology, which we

[10]At the time of writing this chapter, I did not have access to customs data, and the customs data I have access to did not allow me to analyze firm-level outcome because the data provided to me by Statistics Indonesia did not contain a firm identifier.

deploy as control variables.

Although WBES provides us information about the import of intermediate goods, i.e., foreign input, using this (firm-level) dataset solely, we are unable to identify the production-sharing activities of these foreign inputs. This happens because supply chains increasingly blur the concept of "country of origin" (WTO & IDE-JETRO, 2011). Trade is becoming more complicated, with more interconnections, and traditional international statistics fail to distinguish between trade flows of intermediate and final goods, thus overstating the actual level of global engagement (Grossman & Rossi-Hansberg, 2008). Therefore, we complement our firm-level analysis with another set of (sectoral-level) data, which we use to gain insights into value-chain activities. Specifically, our primary dataset is from the UIBE GVC Index, which is developed by the research team for GVC at the University of International Business and Economics (UIBE). The UIBE GVC Index is a derived database, which is constructed using publicly-released inter-country input-output tables such as WIOD.[11] The decomposition of production activities that underpins the UIBE GVC Index is adopted from Wang et al. (2017b) and is of central interest in our research.[12]

Johnson (2018) has recently reviewed both the macro-approach and the micro-approach to measuring GVC activities. While the macro-approach uses global input-

[11]The November 2016 Release from the WIOD consists of a series of databases and covers 43 countries and a model for the rest of the world for the period 2000-2014. WIOD covers multiple countries and sectors, providing an important resource for economic analysis. However, it also has several limitations. First, the data is only updated annually, meaning certain changes may not be captured in real time. Second, since many of the countries have limited input-output data sets due to lack of availability or quality of information, WIOD toolbox must rely on extrapolation and interpolation for these countries which may introduce error into the analysis. This is also the case for Indonesia. The benchmark input-output tables for Indonesia are only those of the years 2005 and 2010. Value added following those years is backdated using industry trends from Statistics Indonesia (BPS) for 2000-2010 Timmer et al. (2016). Timmer et al. (2012) explain how this database was constructed. A series of GVC accounting methods have been developed since then. Important related work includes Koopman et al. (2014); Wang et al. (2017b,a).

[12]The decomposition of production activities has a number of important implications for the analysis. It enables researchers to determine the domestic and foreign content at each stage of the supply chains, overcome issues of double counting and improve previously proposed measures of engagement (Koopman et al., 2014).

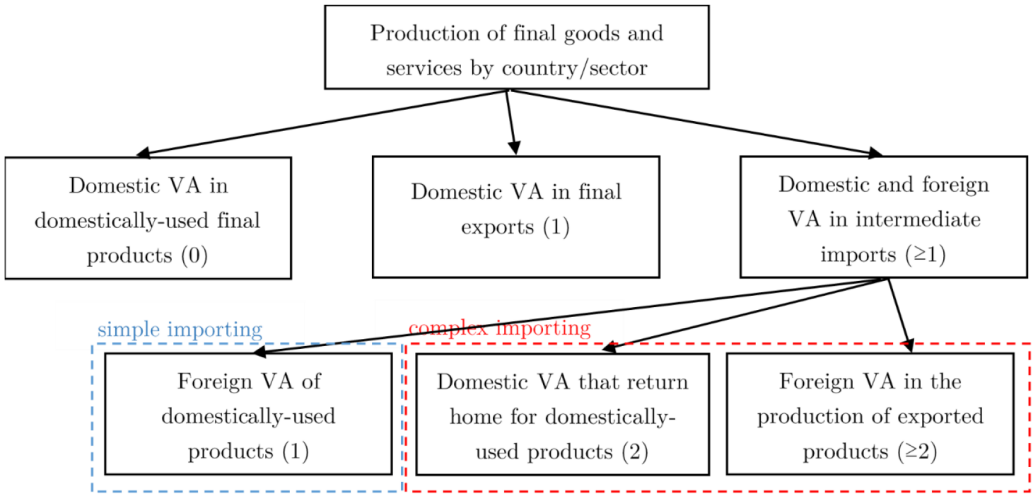
output tables to measure trade in value added as well as the complexity of value chains, the micro-approach relies on firm-level data to document firms' input sourcing decisions and how import and export participation are linked.

In line with previous studies that apply the micro-approach to measure GVC, our final dataset includes firm-level foreign input sourcing, as well as other firm-level measures that are relevant in our analysis; namely, labour productivity, exports, foreign ownership, number of employees, adoption of foreign technology and international certification. The first part of Table C.1 (Appendix C) presents the firm-level variables obtained from WBES.

One shortcoming in the micro-approach to measuring GVC is that input sourcing is only a narrow slice of the firm's overall GVC strategy (see Johnson (2018)). Therefore, in our dataset we include two additional constructed (firm-level) variables that are generated using the UIBE GVC Index. The second part of Table C.1 (Appendix C) presents the variables used to construct these measures. As the two sources of data differ in the unit of analysis (firms versus sectors), we merge the sectors in which firms available in the WBES operate with the corresponding sectors in the WIOD (see correspondence in Table C.2, Appendix C). This allows us to construct, firstly, a variable that measures the share of foreign inputs that cross a border only once (our "simple" importing measure, foreign_inp_once) and, secondly, a variable that measures the share of foreign inputs that cross a border twice or more (our "complex" importing measure, foreign_inp_twice_or_more).[13]

[13]Note that we focus on the decomposition of intermediate imports: foreign value added directly used in the production of domestically consumed products (crossing a border once), domestic value added that returns and is consumed at home (crossing a border twice), and foreign value added used in the production of exported product (crossing a border twice or more). These values are available from the UIBE GVC Index at sectoral level. By using these values, we estimate two additional firm-level variables: share of the firm's foreign input that crosses a border only once and share of the firm's foreign input that crosses a border twice or more. The former is equivalent to the share of foreign value added that crosses a border only once. The latter is the share of domestic value added that returns to Indonesia and foreign value added that crosses a border twice or more (i.e., a more complex GVC activity, or "complex" importing). Table C.3 in the Appendix C summarises the construction of the two variables of interest.

Figure 3.1: The decomposition of final goods production based on backward linkages.



Source: author's own elaboration from UIBE GVC Index and Wang et al. (2017a). *Note*: VA stands for value added; numbers in parentheses denote number of border crossings.

Figure 3.1 depicts the decomposition of final goods production based on backward linkages. According to this decomposition, country-sector pairs' participation in GVC activities is viewed from the user's perspective (i.e., tracing which types of final goods production belong to GVC).

3.3 Empirical analysis

3.3.1 Methods

In order to isolate as far as possible the effect of importing on exporting, it is essential to control for firm characteristics that are likely to affect whether or not a firm imports. In a conventional regression framework, in order to analyse the causal effect of imports on exports, researchers could consider multiple stages that enable them to isolate the correlation between imports and exports. However, the complexity of the components of the relationship between imports and exports, as well as the non-randomness of our

sample, makes it very difficult to use regression analysis to isolate an unbiased causal effect of imports on exports. Therefore, in this paper, we resort to a flexible/non-parametric method: matching.

We match each importing firm with a control group of non-importing firms that, in terms of their labour productivity, employment and other characteristics, are equally likely to import. By matching firms, we control for the import determinants commonly suggested by previous literature. Specifically, we control for the following confounders: (labour) productivity, foreign ownership, number of employees, foreign technology and international certification (see first part of Table C.1, Appendix C, for definition of the variables used).

Table 3.2: Mean values of firms' characteristics: comparison between importers and non-importers (before matching).

Before Matching	**2009**			**2015**		
	Importers	Non-importers	smd	Importers	Non-importers	smd
	(2)	(3)	(4)	(5)	(6)	(7)
Log (Labour Productivity)	18.69 (2.09)	17.01 (1.63)	0.896	20.47 (2.94)	18.16 (1.74)	0.960
Foreign ownership (%)	22.96 (39.80)	2.58 (15.48)	0.675	19.58 (27.38)	0.840 (11.46)	
Number of employees	420.70 (764.84)	50.97 (163.60)	0.669	415.48 (566.45)	108.50 (341.77)	0.656
Foreign Technology	0.40 (0.49)	0.07 (0.25)	0.842	0.66 (0.48)	0.21 (0.41)	1.017
International Certification	0.41 (0.49)	0.04 (0.19)	0.985	0.59 (0.49)	0.16 (0.36)	1.012
Number of firms	186	710		172	869	

Note: standard deviations are in parentheses; smd: standardized mean difference. Source: Author's calculations using data from the World Bank Enterprise Survey

We restrict the sample to those firms with sufficient information across all variables of interest after cleaning the data for missing values. Our final sample of Indonesian firms contains 896 firms in 2009 and 1,041 firms in 2015. Table 3.2 shows the selection bias into importing; specifically, we observe that importing firms are, on average,

foreign-owned, more productive, larger and adopt better technological innovations, compared to the group of non-importing firms. For example, in 2009 importing firms have, on average, 23% foreign ownership (i.e., they are FDI firms). On the contrary, non-importing firms tend to be local firms, with average foreign ownership at only 2.6% (see Table 3.2 for other variables). The standardized mean differences (smd) from Table 3.2 highlight that the two groups are imbalanced in terms of firms' characteristics that explain importing activities. This reinforces our choice of a matching method to isolate the causal effect of importing on exporting. The practical objective of the matching method is to reduce the existing imbalance, or more precisely, to minimize the standardized mean differences between the two groups.[14]

By matching on the propensity score, researchers can recover the causal parameter of interest and thus approximate a randomized field experiment (see Antonakis et al. (2010); R. & Rubin (1983)). However, the use of PSM techniques to analyse causal effects of firms' internationalization decisions is a fairly recent development in the related research. For example, Dalgıç et al. (2015) investigated firms' productivity improvements through trade and find that importing has a greater impact on firms' productivity than exporting. More recently, Boddin et al. (2017) studied the extent to which foreign ownership helps manufacturing firms in developing countries to export and import.

In this paper, we use PSM as our baseline model. However, as a robustness test, we provide an alternative specification using another commonly-used matching method: multivariate distance matching (MDM). In each method, we complete our analyses by calculating the average treatment effect on the treated (ATT), i.e., the effect of importing (treatment) on exporting (potential outcomes).[15]

[14]We apply the 10% criterion (see, e.g., Boddin et al. (2017)).
[15]For the seminal works on potential outcomes framework, see Neyman (1923); Rubin (1974, 1990).

Table 3.3: Mean values of firms' characteristics: comparison between importers and non-importers (after matching with PSM).

Before Matching	**2009**			**2015**		
	Importers	Non-importers	smd	Importers	Non-importers	smd
	(2)	(3)	(4)	(5)	(6)	(7)
Log (Labour Productivity)	17.99 (1.79)	18.14 (1.46)	0.095	18.95 (2.78)	19.10 (2.46)	0.057
Foreign ownership (%)	12.25 (31.16)	11.14 (30.28)	0.036	9.84 (21.42)	12.22 (29.84)	0.091
Number of employees	238.41 (576.96)	168.15 (349.48)	0.147	273.65 (435.12)	271.51 (799.32)	0.003
Foreign Technology	0.22 (0.41)	0.24 (0.43)	0.051	0.39 (0.49)	0.35 (0.48)	0.098
International Certification	0.22 (0.42)	0.23 (0.42)	0.026	0.34 (0.47)	0.26 (0.44)	0.164
Number of firms	369	369		360	360	

Note: standard deviations are in parentheses; smd: standardized mean difference; *unweighted. Source: Author's calculations using data from the World Bank Enterprise Survey.

3.3.2 Baseline results

In our basic set-up, we apply PSM to reduce the imbalance between the two groups of firms (importers vs. non-importers). Firms' characteristics are distilled into a single scalar (propensity score) reflecting the probability of a firm being an importer. Specifically, we use propensity scores to match each importing firm to one or more non-importing firms that have a similar predicted probability of being an importer based on the covariates. We opt for this n-to-1 matching with replacement (that is, potentially using each unit in the control group as a match more than once) due to the relatively moderate ratio between the number of firms in the control group (non-importers) and those in the treatment group (importers).[16] We estimate the propensity score using the logit model.

Table 3.3 shows the mean values of firms' characteristics after we apply PSM. We

[16]We tried the 1-to-1 matching without replacement and found the quality of the matching was very low (standardized mean differences were mostly greater than 0.3).

Table 3.4: Average treatment effect (PSM) of Importing Status on Export Share.

Dependent variable: export share (in %)			
(1)	(2)	(3)	(4)
Year	**Importing**	**Simple importing**	**Complex importing**
2009	9.815*	8.510	14.706***
2015	11.049**	10.842**	10.827**

Note: ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively. The dependent variable is the share of export revenue in total firm revenue.

observe that PSM successfully reduces the imbalance between the two groups, as shown by the smaller standardized mean differences (see column "smd" in Table 3.3). With the groups balanced, the conditional independence assumption holds and therefore our estimates of the effect of importing on exports (ATTs) will be unbiased.

Table 3.4 shows our results for the average treatment (importing) effect on the treated after we apply PSM to balance the groups. Column (2) in Table 3.4 displays the ATTs based on the matching results of Table 3.3. The results validate the claim that importing activities are key for Indonesian firms' exporting activities. When a firm imported, it increased exports by 9.8% in 2009 and by 11% in 2015.

Columns (3) and (4) in Table 3.4 display the results obtained when the two (firm-sectoral) constructed variables are utilized ("foreign_inp_once" and "foreign_inp_twice _or_more"). We use these values to classify firms as "simple" importers or "complex" importers. If the percentage of foreign input in final goods production that crosses a border only once is greater than 10, then we categorize this firm as a "simple" importer, i.e., we set the dummy variable simple_importing to 1 (otherwise, 0).[17] We follow the same rule for "complex" importing. If the percentage of foreign input in final goods production that crosses a border twice or more is greater than 10, then we categorize this firm as a "complex" importer, i.e., we set the dummy variable complex_importing to 1 (otherwise, 0). We then repeat the same steps as we did for the aggregate importers:

[17]We use 10% as the cut-off point as we observe that the mean values of foreign_inp_once and foreign_inp_twice_or_more from the treatment group in 2009 are only 25.3% and 23.2%, respectively. In 2015, the means are 18.4% and 18.2%, respectively.

matching (based on propensity scores) and analysing the ATT separately for simple and complex importing as the treatment status, i.e., we have to separate treatments, one is a firm being a complex importer, and one is a firm being simple importer. Accordingly, we estimate a propensity score for P(simple=1), and a separate propensity score for P(complex=1).

Table 3.4 not only validates previous results about the importance of imports in explaining exports (in both 2009 and 2015, importing leads to a significant increase in firms' exports), but also confirms that the reversal of trade liberalization in Indonesia has had an effect on firms' internationalization process. In other words, the results from the two years under study show the increasing importance of "simple" importing (foreign inputs that cross a border only once) in explaining exports from Indonesian firms. In 2009, "simple" importing was not statistically significant in explaining firms' exports. On the contrary, "complex" importing increased firms' exports by 14.7%. In 2015, however, "simple" importing became statistically significant and increased exports by 10.8%. "Complex" importing remained statistically significant following the reversal of trade liberalization. Our results show a decrease in the magnitude of the effect; that is, in 2015, the effect of "complex" importing on firms' exports (10.8%) was similar in magnitude to that found for "simple" importing.

3.3.3 Robustness

A shortcoming of our analysis is that the validity of our findings depends on the quality of the matching. Although our PSM approach has reduced the imbalance, the results of the matching have to be interpreted with caution. One of the disadvantages of our baseline PSM is the fact that it transforms multi-dimensional values of covariates into a single value of probability. Thus, the possible match becomes less restrictive, especially with our approach of n:1 matching with replacement. Consequently, we observe that the mean values of importing firms' characteristics after matching (see Table 3.3) are

Table 3.5: Mean values of firms' characteristics: comparison between importers and non-importers (after matching with MDM).

Before Matching	**2009**			**2015**		
	Importers	Non-importers	smd	Importers	Non-importers	smd
	(2)	(3)	(4)	(5)	(6)	(7)
Log (Labour Productivity)	18.59 (2.05)	18.51 (1.59)	0.040	20.43 (2.94)	20.25 (2.76)	0.062
Foreign ownership (%)	23.36 (40.17)	22.13 (40.63)	0.030	19.25 (27.27)	17.10 (25.93)	0.081
Number of employees	386.45 (729.54)	243.53 (370.54)	0.247	408.82 (563.82)	355.55 (553.00)	0.095
Foreign Technology	0.38 (0.49)	0.40 (0.49)	0.029	0.65 (0.48)	0.63 (0.48)	0.024
International Certification	0.36 (0.48)	0.36 (0.48)	0.010	0.58 (0.49)	0.58 (0.49)	< 0.001
Number of firms	211	211		175	175	

Note: standard deviations are in parentheses; smd: standardized mean difference; *unweighted.
Source: Author's calculations using data from the World Bank Enterprise Survey.

quite different from their original values before matching (see Table 3.2). To deal with this one-dimensional issue, we provide an alternative specification using multivariate distance matching (MDM). Instead of using the probability, we match each importing firm based on the distance measure of the variances in the covariate values between units (see Imbens (2004); Abadie & Imbens (2011)).

Then, we repeat the matching exercise using MDM. Table 3.5 shows the mean values of firms' characteristics after we apply MDM. We observe that MDM is mostly able to reduce the imbalance between the two groups, except for one covariate (number of employees) in 2009. Given the nature of the variable number of employees, along with its standard deviation, we conclude that the matching quality is still good and will not substantially affect the interpretation of the results. More importantly, MDM leaves the mean values of the firms' characteristics unchanged (or largely unchanged) for the treated group (importers).[18]

[18]For a comparison of the effectiveness of matching methods for causal inference, see, e.g., King et al. (2011).

Table 3.6: Average treatment effect (MDM) of Importing Status on Export Share .

	Dependent variable: export share (in %)		
(1)	(2)	(3)	(4)
Year	**Importing**	**Simple importing**	**Complex importing**
2009	10.484***	5.755	10.809***
2015	9.820***	13.712***	11.190**

Note: ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively. The dependent variable is the share of export revenue in total firm revenue.

The ATT results from Table 3.6 are consistent with results obtained by using PSM. They validate the claim that importing activities are important for Indonesian firms' exports in both years, 2009 and 2015. Column (2) of Table 3.6 shows that when a firm imports, it increases its exports by 10.5% in 2009 and by 9.8% in 2015. The results shown in columns (3) and (4) of Table 3.6 are also consistent with our PSM findings. In 2009, "simple" importing is not statistically significant in explaining firms' exports. On the contrary, "complex" importing increases firms' exports by 10.8%. As we found in our baseline model, in 2015, "simple" importing becomes an important factor, leading to a significant rise in exports; in addition, "complex" importing retains its positive sign and statistical significance. The results are thus highly robust to the choice of the matching technique.

3.4 Discussion

In this paper, we identify and test a mechanism that we hypothesize to be relevant in the relationship between firms' imports and exports: firms' integration in worldwide activities (that is, value chains). Specifically, we go backwards and consider the depth and scope of importing activities. The reversal in trade liberalization experienced in Indonesia during the period under study provides us with a suitable analysis that allows us to test how exports react to a firm's reduced integration in worldwide activities. This effect is expected to be relevant for firms in emerging markets because a reversal of trade

liberalization means firms have less access to market opportunities and technology that is already standard in developed countries.[19]

We measure the involvement of Indonesian firms in value chains and consider the depth and scope of importing. To analyse the scope and depth of importing, we distinguish between being an importer and "complexity" of importing activities. In a first step, we test the causal effect of imports on exports. The multiple confounding factors and subsequent endogeneity concerns warrant a more detailed discussion of possible models of causality.[20] Although this direction of causality is validated by Aristei et al. (2013) for emerging market firms, it is still likely that the main causality between imports and exports runs in the opposite direction; e.g., that firms subjected to the discipline of international markets need to import intermediates to achieve sufficient end product quality; or that exporting firms are more often integrated into global production networks where overseas buyers and value chain participants actively support the quality upgrade of the exporting firm; or, with respect to the correlation between imports and productivity (confounding factor), that higher productivity is a factor that enables firms to embed more imports in their products. Other models of causality are, of course, conceivable. We use the propensity score method (PSM) and, more specifically, our analysis relies on comparing the firms selected for the treatment group (importing firms) with statistically similar controls, using a matching algorithm.

[19]Firms in emerging economies take advantage of the higher technological content of imported inputs from developed countries. For example, the relationship between the origins of imported inputs and total factor productivity (TFP) has been studied by comparing the effects of imports from OECD countries and those from low-wage countries: both categories of imports were found to have a positive effect on productivity, but the impact of imports from OECD countries was more pronounced (Smeets & Warzynski, 2010). In this vein, Bas & Strauss-Kahn (2014) find that importing more varieties of inputs raises TFP, and this positive effect is magnified for imported inputs from developed countries thanks to the diffusion of modern technologies embodied in imported intermediate inputs. In a country-level study, Florensa et al. (2015) found that Latin American countries exported more when they imported more intermediates of capital goods from the European Union than from developing regions.

[20]Endogeneity, which includes omitted variables, omitted selection, simultaneity, common-method variance, and measurement error, renders estimates causally uninterpretable (see Antonakis et al. (2010)).

Next, we examine the importance of two different levels of importing. Specifically, we distinguish between "simple" importing (when imported goods crossed an international border only once) and "complex" importing (when imported goods crossed borders twice or more). Our expectation is that, for firms in emerging markets with low trade barriers, "complex" importing is more relevant for exports than "simple" importing. As access to market opportunities and technology is crucial for firms' performance in emerging economies, a reversal of trade liberalization is expected to have an adverse effect on the relationship between importing and exporting activities. Therefore, we expect that a reversal of trade liberalization in these emerging markets increases the importance of "simple" importing in explaining exports. This would be indicative of decreased access to and participation in GVC; as a consequence, firms might be missing out on important market opportunities. In our research, the key difference between "simple" and "complex" importing is the number of borders that goods have crossed before they enter the country.

Firms that use imported inputs in their production process are more productive. This is a key finding in a large body of research in the literature on firms' decision-making about engaging in international trade.[21] The effect of imports on productivity is just the first step. As a secondary effect, importing can have such a great impact on productivity that these firms subsequently become successful exporters. In other words, exporters are importers.

In a framework that accounts for value chains, a number of relevant research questions can be studied. For example, do firms export more final or intermediate goods as a result of their increasing involvement in GVC? Do exporting firms benefit from the use of foreign inputs? Are exported goods consumed at destination, sold to a third nation, or re-exported back to the country of origin? In the present research, we have contributed to shedding some light to these questions by providing a novel method that

[21] For a survey, see, e.g., Wagner (2012).

allows us to validate the claim that importing activities significantly increase exports in emerging market firms. The results are in line with those of previous studies that analyse the two-way relationship between imports and exports in firms in emerging economies (Aristei et al., 2013).

We go one step further: distinguishing between "simple" and "complex" importing, we find that "simple" importing does not cause higher exports, but "complex" importing does. Therefore, the positive effect of imports on exports is channelled through "complex" importing; in other words, when firms import more complex, sophisticated inputs, they export more. However, after a reversal of trade liberalization, "simple" importing becomes more relevant for explaining emerging market firms' exporting activities . Such circumstances weaken firms' participation in the global economy.

The main implication that can be derived from these results is that, when an emerging country facilitates sourcing from foreign countries, firms in that country export more. However, the trend towards increasing globalization and openness to international competition seems to have begun a global reverse and there is growing scepticism surrounding globalization. As a consequence, a number of countries have re-imposed controls on trade and investment, including Indonesia. Indeed, given the potential for an international reversal of trade liberalization (in both developed and developing countries), we see the Indonesian experience as a harbinger of future events in other emerging countries.

There are two main limitations in this study. First, we have relied on a two-year survey for Indonesian firms. Therefore, the magnitudes estimated have to be interpreted with caution. For example, PSM results are more conservative than MDM results because, following the reversal of trade liberalization (in 2015), "complex" importing and "simple" importing seem to play an equally important role in increasing firms' exports (a firm with either "simple" or "complex" importing exports around 10.8% more). Conversely, MDM results show that "simple" importing seems to lead

to a greater increase in exports (13.7%) than "complex" importing (around 11.2%) in 2015. Due to data availability, we have only been able to analyse firms in 2009 and 2015. Administrative data for Indonesian firms would allow researchers to analyse a full panel of firms over time, and further study the relevant characteristics that affect their internationalization process. The second limitation of this study is that our measures of "simple" and "complex" importing have been constructed by relying on a combination of micro- and macro- measures of value chains. That is, our variables of interest proxying for "simple" and complex" importing (foreign_inp_once and foreign_inp_twice_or_more, respectively) are an interaction of industry-level indicators and firm-level information about importing activity. Complementing administrative data for firms in Indonesia with transaction-level data would allow researchers to build improved measures of firms' access to and participation in GVC,[22] as well as of the scope and depth of existing value chains.

3.5 Conclusion

We explore the role of value chains in the relationship between importing and exporting activities following a deterioration of trade conditions in emerging markets. Methodologically speaking, we introduce a novel method to trace foreign value added of imports (according to whether they cross an international border once versus twice or more) that allows us to consider the importance and degree of value chains (we thus distinguish between "simple" and "complex" importing).

This paper not only validates the idea that importing activities are key for emerging market firms exporting activities, but also that firms importing goods that crossed the Indonesian border only once ("simple" importing) did not export more in a period of trade liberalization. Conversely, firms that were involved in "complex" importing

[22]See Wagner (2016) for a survey of empirical studies that use transaction level data on exports or imports of firms.

(importing goods that had crossed a border at least twice) exported more. Following a reversal of trade liberalization, we observe the increased importance of "simple" importing in explaining the relationship between imports and exports. Therefore, following a reversal of trade liberalization, value chains become less global. One potential explanation for this result is that a reversal of trade liberalization makes it increasingly difficult for firms to avoid poor home country conditions and to exploit existing resources abroad. In addition, such a reversal triggers changes in firms' internationalization process, as "simple" importing becomes more important in explaining the increase in firms' exports.

Our results help shed some light on emerging market firms' internationalization processes and our analysis is relevant because the internationalization trajectory of emerging market firms might change with a reversal of trade liberalization, as we have proven that a deterioration of trade conditions affects firms' participation in global value chains. This research also has important policy implications. Given the interdependencies and complementarities of importing and exporting activities, governments should bear on mind that policies which inhibit imports of intermediates have negative consequences for exports.

*Laura Márquez-Ramos is a co-author of this paper. Márquez-Ramos gratefully acknowledges financial support from the Australian Research Council (DP190103524).

Conclusions

Globalisation is at risk. In the last decade, we have been witnessing policy responses emerge and propagate throughout the global economy. These responses include the application of import- and export-limiting measures, making the movement of goods and services across countries more costly. This thesis aims to contribute to our understanding of these barriers by investigating a number of past policies applied in one of the major developing countries: Indonesia.

This thesis presents three independent papers using applied microeconomics and focusing on various international trade contexts in Indonesia. The first paper presents causal evidence that the licensing procedures of iron and steel imports reduced the extensive margins of imports. Although domestic users import less frequently and source from less countries, they do not import less in value and quantity. These findings suggest that the policy is not effective. The second paper presents evidence that removing de-facto export tax has positive and significant effects on intensive margins of outgoing shipments of instant coffee from Indonesia. More generally, these findings suggest that removing this type of institutional distortions benefit firms' intensive margins of exports. The third paper validates the idea that importing activities are key for emerging market firms exporting activities. Firms that import goods that crossed the Indonesian border only once did not export more in a period of trade liberalization. Conversely, firms that import goods that had crossed a border at least twice, exported more. Following a reversal of trade liberalization, value chains become

less global.

Policy making in developing countries are characterized by various institutional challenges. Export barriers, for example, might not necessarily be imposed due to the mainstream justifications (e.g. terms-of-trade improvement, public revenue increases, the consumer price or intermediate input price), but rather because of the institutional challenges within the country. And when they are not in a form of government tax or tariffs, they tend to be overlooked and become legacy policies, which continue to act as silent institutional distortions.

This begs the question: is there an existing mechanism to proactively detect these institutional distortions? In our case for example, if there were no clashes between the government of Indonesia and the coffee exporters' association, would the removal of the de-facto export tax have had happened? This type of distortions risks undermining multilateral trade cooperation and may isolate some members or industries of the global community.

Coffee is currently Indonesia's fourth largest agricultural commodity behind palm oil, rubber and cocoa however it only contributes to around 0.13% of Indonesian GDP. In 2021, the total free on board (FOB) value of Indonesian coffee export, mainly to the US, Egypt and Japan, was more than 800 million US dollars, declining from the peak in 2012 of slightly more than 1,200 million US dollars. The issue is that coffee productivity in Indonesia has only reached 817 kg/ha which has not yet reached potential maximum productivity at 1,300 kg/ha for robusta coffee and 1,000 kg/ha for arabica coffee. The effort to prepare coffee development areas with high productivity targets cannot rely solely on the state budget. It is encouraged that coffee agribusiness to partner with their plantation, farmers, and find alternative funding from other sources such as banks and other investments. The findings from the second paper call for improved coordination and collaboration between the government and the private sector and other relevant stakeholders to develop and accelerate the coffee movement.

The Ministry of Agriculture has initiated GERTAK (coffee planting movement) as their effort to prepare coffee development areas with high productivity targets. In addition, the Ministry of Cooperatives and Small-to-Medium Enterprises has suggested to make cooperatives a business centre for coffee commodities. Thus, individual coffee farmers will be consolidated into cooperative institutions to overcome various obstacles faced by farmers. This way of partnership allows farmers to focus on growing coffee and all business processes are carried out by cooperatives, including to maintain quality by providing assistance. This momentum can be used as a positive step in setting the agenda for a complete revisit of the institutional landscape of the coffee sector. This paper argues that failures to detect institutional distortions might undermine these targeted initiatives by both ministries.

Environmental, social and economic challenges are putting coffee farmers and the coffee sector at risk where demand globally has always been increasing. Coffee is a growth market with a healthy annual rate of 2.2%. There are 12.5 million coffee farms globally and about 95% of these are smallholder farmers which almost half of the farms are in Ethiopia (2.2 million), Uganda (1.8 million) and Indonesia (1.3 million). These small producers contribute significantly to the global coffee industry where demand increased significantly by 65% over the past two decades, however, 5.5 million live below the international poverty line . In Indonesia, 99% of the coffee producers are smallholder farmers. These farmers reap only a few of the benefits of the entire coffee industry profit margins. As an archipelago, Indonesia's supply chain is long and complex. It is therefore crucial to eliminate unnecessary costs along the supply chain, including tackling institutional distortions in these developing economies.

Failure to detect and eliminate unhelpful legacy policies might also undermine our climate efforts. In the case of Indonesia, we show evidence of missed opportunity in coffee industry for farmers and relevant stakeholders by showing the significant increase in exports after the removal of a long-sitting institutional barrier. When prices are low,

a lot of producers switch to these other crops to increase their profits, and they do not go back to coffee. As Indonesia has a strong comparative advantage in palm oil, these farmers might as well switch their land utilization from coffee farm to carbon-intensive oil palm plantations.

Given these potential impacts at the global stage, then the next question is whether there is a multilateral initiative that specifically looks into these silent distortions. As things stand at present, it is hard to imagine that our particular case could be detected by any WTO initiatives or platforms. To the best of our knowledge, there are no published articles or reports (e.g. Trade Policy Review) from WTO that cited this particular circumstance. Understandably, as WTO is a member-driven organization, it is difficult enough for members to scrutinize fellow members' trade policies, let alone under-the-water legacy policies. This thesis calls out governments, private sector and relevant stakeholders to act on improving cooperation and collaboration in continuously evaluating the surrounding policies.

Exporters are importers. An increase in firm productivity is the key underlying mechanism that can explain the relationship between imports and exports. Firms that are more productive find it financially worthwhile to incur the costs associated with both importing and exporting (Bernard et al., 2018). Importing firms are also more likely to get the intermediate input that best fits their needs. Importing may help firms to extract the technology embodied in imported intermediates and capital goods. Imported inputs may also be of better quality and cheaper than domestic inputs. All of these factors help drive productivity growth.

There are interdependencies in importing decisions across source countries. In addition, importing (exporting) can facilitate exporting (importing), and exporting to one market can promote exporting to another market. The processes behind these interdependencies and complementarities are complex and associated with the fixed costs that firms face in order to participate in international markets.

An important limitation of this thesis is that the administrative data that we obtained from Indonesian agency (for the first and the second paper) do not allow us to do further analyses at firm level. For further research, we recommend linking these firm- and transaction-level data. This linkage will allow researcher to present further evidence on how firms specifically react to such policies thus give more insights of possible mechanism of the relationship between non-tariff barriers and trade.

Appendix A

Appendices from Chapter 1

Table A.1: List of products at 4-digit HS Code that are regulated by the 2009 import licensing procedures (Regulation of the Minister of Trade No. 08/M-DAG/Per/2/2009 dated 18 February 2009 on Provisions on the Import of Iron or Steel).

No.	4-digit HS Code	Product Name
1	7208	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, hot-rolled, not clad, plated or coated
2	7209	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, cold-rolled cold-reduced, not clad, plated or coated
3	7210	Flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, clad, plated or coated
4	7211	Flat-rolled products of iron or non-alloy steel, of a width of less than 600 mm, not clad, plated or coated
5	7213	Bars and Rods, hot-rolled, in irregularly wound coils, of iron or non-alloy steel
6	7214	Other bars and rods of iron or non-alloy steel, not further worked than forged, hot-rolled, hot-drawn or hot-extruded, but including those twisted after rolling
7	7215	Other bars and Rods of iron or non-alloy steel
8	7216	Angles, shapes and sections of iron or non-alloy steel
9	7217	Wire of iron or non-alloy steel
10	7219	Flat-rolled products of stainless steel, of a width of 600 mm or more
11	7229	Wire of other alloy steel
12	7301	Sheet piling of iron or steel, whether or not drilled, punched or made from assembled elements, welded angles, shapes and sections, of iron or steel
13	7304	Tubes, pipes and hollow profiles, seamless, of iron other than cast iron or steel
14	7305	Other tubes and pipes for example, welded, riveted or similarly closed, having circular cross-sections, the external diameter of which exceeds 4064 mm, of iron or steel
15	7306	Other tubes, pipes and hollow profiles for example, open seam or welded, riveted or similarly closed, of iron or steel
16	7307	Tube or pipe fittings for example, couplings, elbows, sleeves, of iron or steel
17	7308	Structures excluding prefabricated buildings of heading 9406 and parts of structures for example, bridges and bridge-sections, lock-gates, towers, lattice masts, roofs, roofing frameworks, doors and windows and their frames and thresholds for doors, sh
18	7311	Containers for compressed or liquefied gas, of iron or steel
19	7312	Stranded wire, ropes, cables, plaited bands, slings and the like, of iron or steel, not electrically insulated
20	7314	Cloth including endless bands, Grill, Netting and Fencing, of iron or steel wire, expanded metal of iron or steel
21	7317	Nails, tacks, drawing pins, corrugated nails, staples other than those of heading 8305 and similar articles, of iron or steel, whether or not with heads of other material, but excluding such articles with heads of copper
22	7318	Screws, bolts, nuts, coach-screws, screw hooks, rivets, cotters, cotter-pins, washers including spring washers and similar articles, of iron or steel
23	7321	Stoves, ranges, grates, cookers including those with subsidiary boilers for central heating, barbecues, braziers, gas-rings, plate warmers and similar non-electric domestic appliances, and parts thereof, of iron or steel

Table A.2: List of products at 2-digit HS Code included in the dataset: Base Metals and Articles of Base Metal (HS Classification Section XV).

2-digit HS Code	Product Name
72	Iron and steel
73	Articles of iron or steel
74	Copper and articles thereof
75	Nickel and articles thereof
76	Aluminium and articles thereof
78	Lead and articles thereof
79	Zinc and articles thereof
80	Tin and articles thereof
81	Other base metals, cermets, articles thereof
82	Tools, implements, cutlery, spoons and forks, of base metal, parts thereof of base metal
83	Miscellaneous articles of base metal

Table A.3: Top 5 Countries of Origin for Iron and Steel Imports by Number of Shipments.

Year	Top 5 Origins	# of shipments	ln(import weight)	ln(import value)
2006	CHINA	4059	20.42	19.80
	JAPAN	4007	20.18	20.20
	SINGAPORE	3803	17.43	18.15
	UNITED STATES	3696	16.34	17.90
	TAIWAN	2340	19.38	18.90
2007	CHINA	4849	20.92	20.40
	JAPAN	3843	20.45	20.41
	UNITED STATES	3600	17.69	18.17
	SINGAPORE	3466	17.55	18.25
	TAIWAN	2379	19.55	19.20
2008	CHINA	5271	20.97	20.94
	SINGAPORE	4148	18.16	18.97
	JAPAN	4137	20.93	21.10
	UNITED STATES	3648	16.95	18.44
	TAIWAN	2586	19.72	19.73
2009	CHINA	4514	20.22	20.27
	JAPAN	3997	20.29	20.54
	UNITED STATES	3322	16.25	17.84
	SINGAPORE	3250	17.45	18.36
	TAIWAN	2452	19.59	19.38
2010	CHINA	5274	20.53	20.60
	JAPAN	4285	20.96	21.19
	UNITED STATES	3369	16.28	18.27
	SINGAPORE	3359	17.30	18.64
	TAIWAN	2770	19.87	19.88
2011	CHINA	5721	20.49	20.69
	JAPAN	4618	21.06	21.35
	UNITED STATES	3595	16.66	18.37
	SINGAPORE	3487	17.44	18.50
	TAIWAN	3092	20.10	20.12

Table A.4: Top 5 Countries of Origin for Iron and Steel Imports by Value.

Year	Top 5 Origins	# of shipments	ln(import weight)	ln(import value)
	JAPAN	4007	20.18	20.20
	CHINA	4059	20.42	19.80
2006	KOREA, REPUBLIC OF	1824	19.25	19.17
	INDIA	491	19.18	19.04
	TAIWAN	2340	19.38	18.90
	JAPAN	3843	20.45	20.41
	CHINA	4849	20.92	20.41
2007	KOREA, REPUBLIC OF	1860	19.56	19.52
	TAIWAN	2379	19.55	19.20
	INDIA	594	18.62	18.86
	JAPAN	4137	20.93	21.10
	CHINA	5271	20.97	20.94
2008	KOREA, REPUBLIC OF	2132	20.03	20.19
	TAIWAN	2586	19.72	19.73
	MALAYSIA	1790	19.43	19.30
	JAPAN	3997	20.29	20.54
	CHINA	4514	20.22	20.27
2009	KOREA, REPUBLIC OF	2208	19.90	19.97
	TAIWAN	2452	19.59	19.38
	MALAYSIA	1463	19.07	18.79
	JAPAN	4285	20.96	21.19
	CHINA	5274	20.53	20.60
2010	KOREA, REPUBLIC OF	2494	20.12	20.12
	TAIWAN	2770	19.87	19.88
	MALAYSIA	1523	19.18	19.04
	JAPAN	4618	21.06	21.35
	CHINA	5721	20.49	20.69
2011	KOREA, REPUBLIC OF	2771	20.73	20.65
	TAIWAN	3092	20.09	20.12
	MALAYSIA	1645	19.13	19.23

Table A.5: Effect of import licensing procedures: alternative specifications and placebo tests.

	(1) Baseline	(2) Only FTA countries	(3) Placebo tests
Dep. variable: # of shipments			
Import licensing procedures	-0.151**	-0.159***	-0.022
	(0.070)	(0.058)	(0.066)
Dep. variable: # of countries of origin			
Import licensing procedures	-0.168***	-0.154***	0.002
	(0.039)	(0.033)	(0.055)
Dep. variable: value of imports			
Import licensing procedures	-0.035	-0.051	-0.071
	(0.107)	(0.121)	(0.221)
Dep. variable: net weight of imports			
Import licensing procedures	-0.066	0.117	0.217
	(0.149)	(0.198)	(0.262)
N	43488	43200	40752

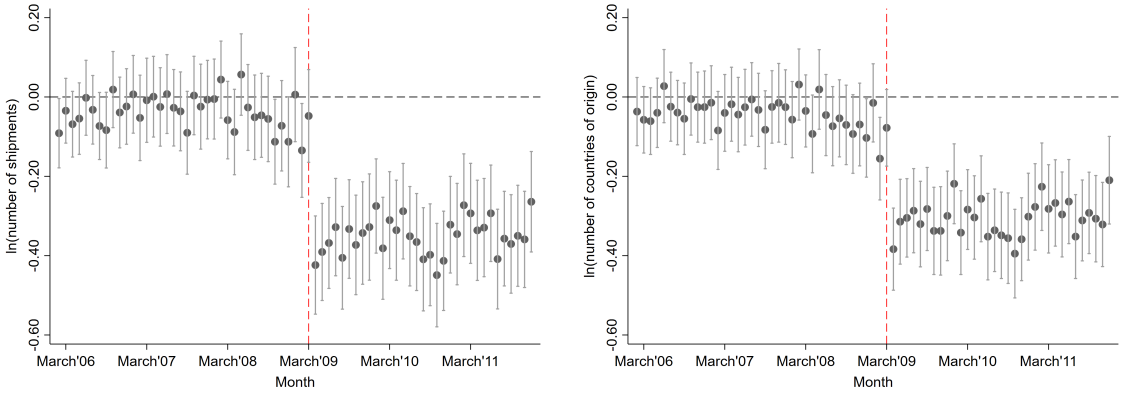
Notes: Table reports regression coefficients of estimating the average treatment effects on the treated (ATT) on imports' extensive and intensive margins following the import licensing procedures announced in February 2009.. All regressions include product and time fixed effects. Standard errors are robust to multi-way clustering across products. ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively. Column (1) reports the estimates of our baseline specifications from Equation (1). Column (2) reports estimates when we restrict our dataset to only include countries of origin that have FTA with Indonesia. As placebo tests, column (3) reports the estimates of our baseline specifications over restricted samples: only shipments arriving into ports in the Special Economic Zones, i.e., Batam-Bintan-Karimun archipelago.

Table A.6: The effects of imports licensing procedures on firms' sales

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: ln(total sales)					
treatpost	0.0179	0.0643				
	(0.0956)	(0.122)				
treat2006			0.0985	-0.351	0.0161	-0.279
			(0.114)	(0.257)	(0.126)	(0.253)
treat2007			0.0939	-0.214	0.0329	-0.171
			(0.113)	(0.188)	(0.120)	(0.184)
treat2008			0.0454	-0.109	0.00672	-0.0956
			(0.0867)	(0.106)	(0.0939)	(0.105)
treat2010			0.165**	0.324***	0.195***	0.300**
			(0.0726)	(0.123)	(0.0700)	(0.123)
treat2011			-0.102	0.211	-0.0573	0.152
			(0.115)	(0.188)	(0.108)	(0.187)
ln_size					0.795***	0.726***
					(0.0246)	(0.0328)
Firm FE	X	X	X	X	X	X
Year FE	X	X	X	X	X	X
Product-specific trends	X		X		X	
Firm-specific trends		X		X		X
N	22042	22042	22042	22042	22042	22042
adj. R^2	0.854	0.878	0.854	0.878	0.869	0.887

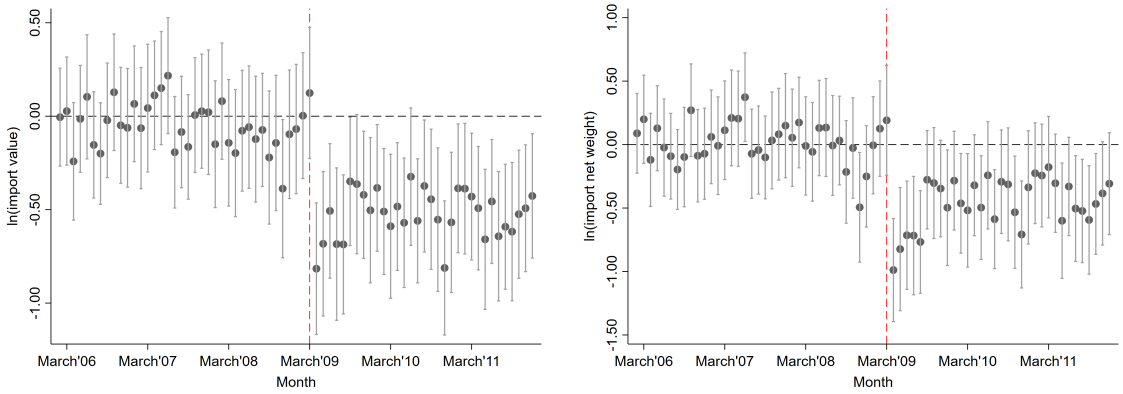
Notes: Table reports regression coefficients of estimating the average treatment effects on the treated (ATT) using `reghdfe`. Note that in columns (1), (3), and (5), we present the estimates when controlling for product-specific trends. And in columns (2), (4), and (6), we control for firm-specific trends. All regressions include firm and year fixed effects. Standard errors are robust to multiway clustering across products. ***, **, * denotes significance at the 1%, 5%, 10% levels, respectively.

Figure A.1: Effect of import licensing procedures on imports' extensive margins: using `reghdfe`.



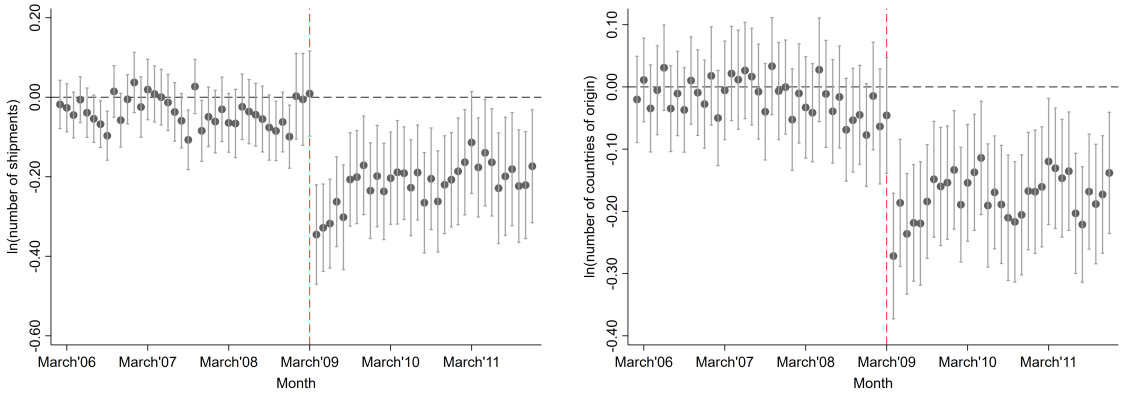
Notes: This figure shows coefficient estimates from panel regressions using `reghdfe` of imports' extensive margins (left: log of number of shipments; right: log of number of countries of origin) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 36,741.

Figure A.2: Effect of import licensing procedures on imports' intensive margins: using `reghdfe`.



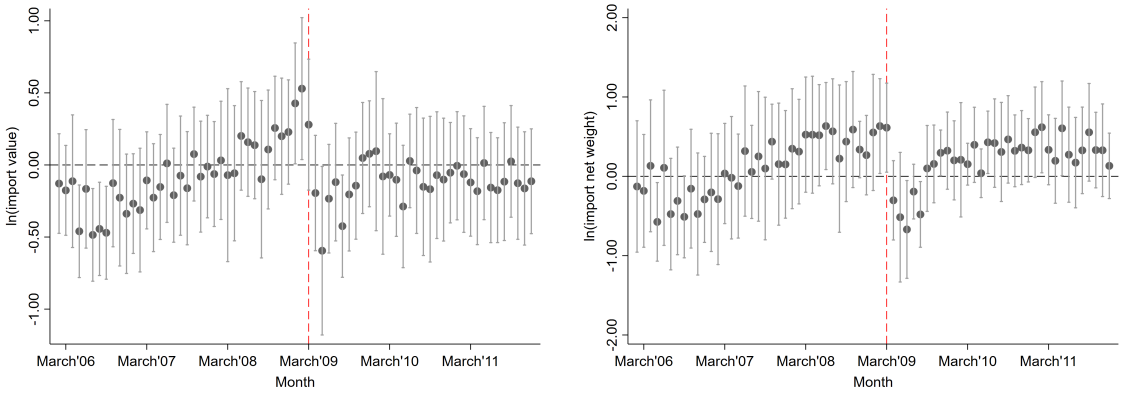
Notes: This figure shows coefficient estimates from panel regressions using `reghdfe` of imports' intensive margins (left: log of importvalue; right: log of import net weight) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 36,741.

Figure A.3: Effect of import licensing procedures on imports' extensive margins (excluding shipments with net weight is $\leq$ 1 ton).



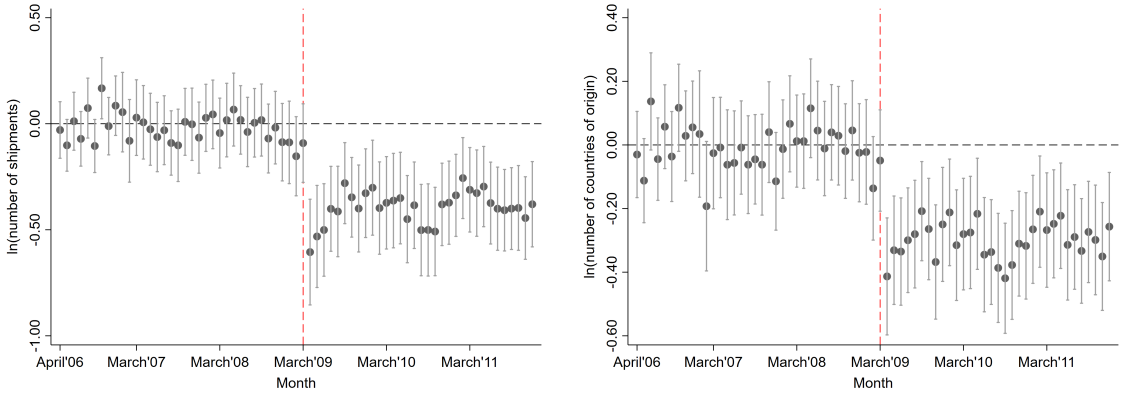
Notes: This figure shows coefficient estimates from PPML regressions of imports' extensive margins (left: number of shipments; right: number of countries of origin) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia and removing shipments whose net weight is $\leq$ 1 ton, along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,200.

Figure A.4: Effect of import licensing procedures on imports' intensive margins (excluding shipments with net weight is $\leq$ 1 ton).



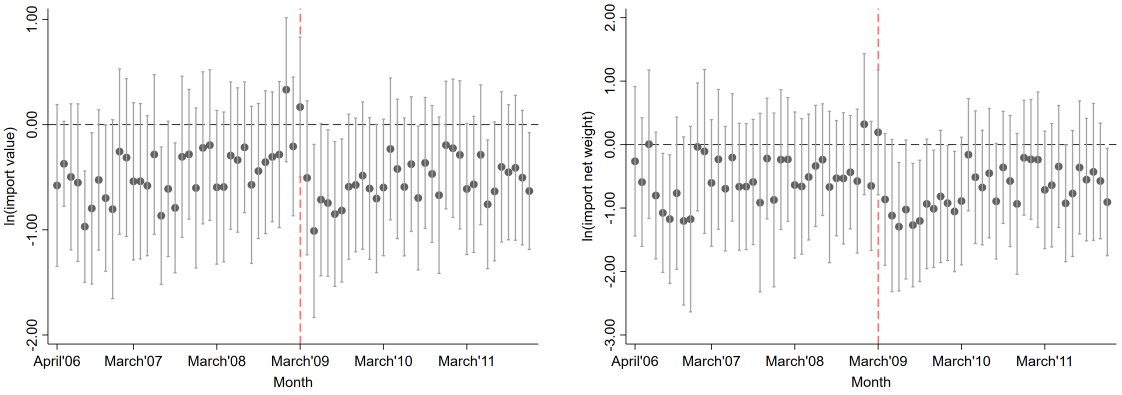
Notes: This figure shows coefficient estimates from PPML regressions of imports' intensive margins (left: import value; right: import net weight) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia and removing shipments whose net weight is $\leq$ 1 ton, along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,200.

Figure A.5: Effect of import licensing procedures on imports' extensive margins (excluding shipments of heterogeneous goods, and taking into account product-specific demand shocks).



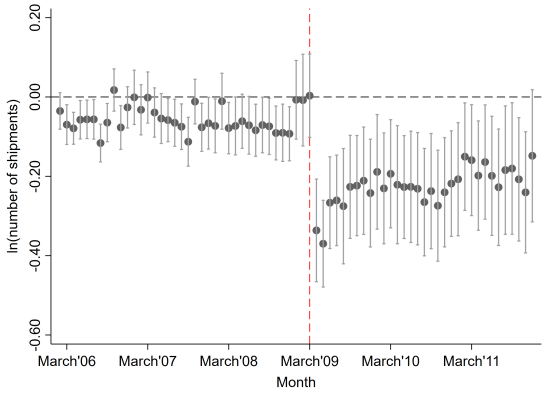
Notes: This figure shows coefficient estimates from PPML regressions of imports' extensive margins (left: number of shipments; right: number of countries of origin) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including shipments of homogeneous goods, along with a set of product and time fixed effects and product-specific demand shocks. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 16,137.

Figure A.6: Effect of import licensing procedures on imports' intensive margins (excluding shipments of heterogeneous goods, and taking into account product-specific demand shocks).



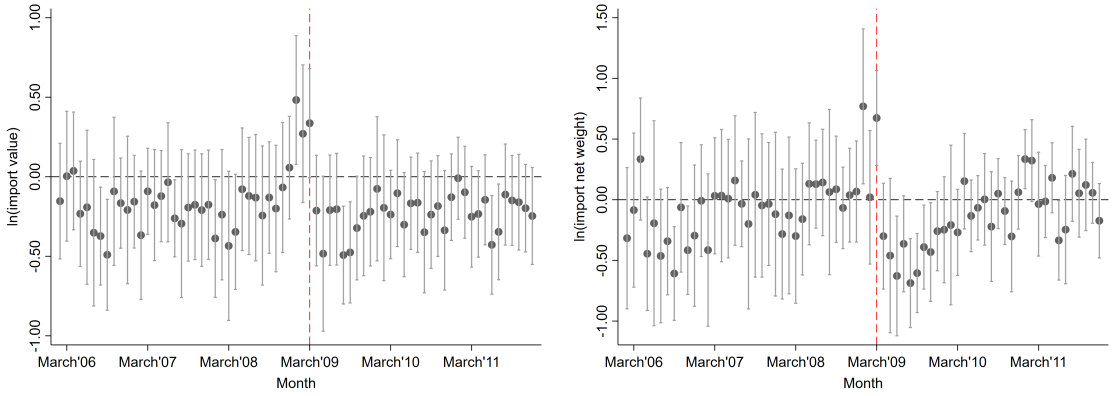
Notes: This figure shows coefficient estimates from PPML regressions of imports' intensive margins (left: import value; right: import net weight) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including shipments of homogeneous goods, along with a set of product and time fixed effects and product-specific demand shocks. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 16,137.

Figure A.7: Effect of import licensing procedures on imports' extensive margin: number of shipments (at product-country-month observation, including country-year fixed effects).



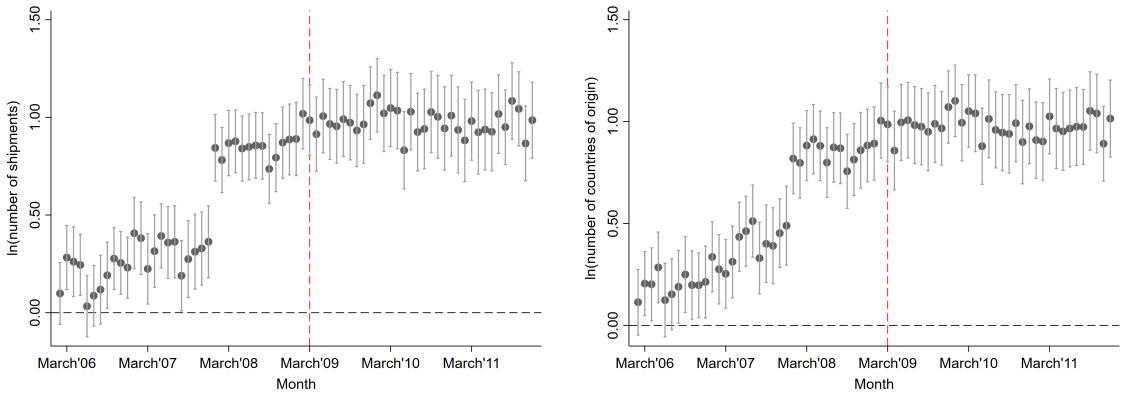
Notes: This figure shows coefficient estimates from PPML regressions of number of shipments per product and country of origin on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product, country-year and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 1,085,832.

Figure A.8: Effect of import licensing procedures on imports' intensive margin (at product-country-month observation, including country-year fixed effects).



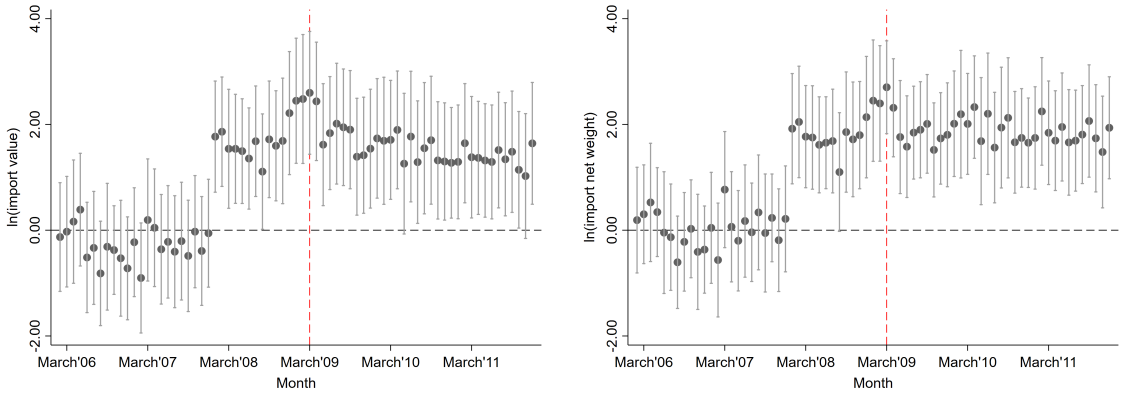
Notes: This figure shows coefficient estimates from PPML regressions of imports' intensive margins (left: import value; right: import net weight) per product and country of origin on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), along with a set of product, country-year and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 1,085,832.

Figure A.9: Effect of import licensing procedures on imports' extensive margins (treatment group includes only shipments of treated products into SEZs; control group includes all regions): alternative placebo tests.



Notes: This figure shows coefficient estimates from PPML regressions of imports' extensive margins (left: number of shipments; right: number of countries of origin) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia, along with a set of product and time fixed effects. Note that the treatment group is restricted to only shipments of treated products arriving into ports in the Special Economic Zones, i.e., Batam-Bintan-Karimun archipelago; the control group still includes all shipments into all regions of other metal products. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,272.

Figure A.10: Effect of import licensing procedures on imports' intensive margins (treatment group includes only shipments of treated products into SEZs; control group includes all regions): alternative placebo tests.



Notes: This figure shows coefficient estimates from PPML regressions of imports' intensive margins (left: import value; right: import net weight) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in February 2009), only including countries of origin that have FTA with Indonesia, along with a set of product and time fixed effects. Note that the treatment group is restricted to only shipments of treated products arriving into ports in the Special Economic Zones, i.e., Batam-Bintan-Karimun archipelago; the control group still includes all shipments into all regions of other metal products Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 43,272.

Appendix B

Appendices from Chapter 2

Table B.1: Summary statistics of the monthly outgoing shipments from 2008 to 2013.

	(1) All HS09 & HS21 products	(2) Coffee-related products listed in the policy	(3) Products of other HS09 & HS21 not listed in the policy
2008-2011 period			
Avg # of shipments	19.32	25.67	18.22
	(24.75)	(37.61)	(21.59)
Avg # of destination countries	10.98	12.67	10.68
	(10.23)	(14.18)	(9.354)
Avg ln(export value)	12.25	13.03	12.11
	(3.012)	(3.798)	(2.834)
Avg ln(export net weight)	11.41	11.88	11.32
	(2.970)	(3.814)	(2.791)
2012-2013 period			
Avg # of shipments	20.37	30.60	18.92
	(28.93)	(37.78)	(27.16)
Avg # of destination countries	11.23	15.30	10.66
	(10.84)	(14.99)	(9.990)
Avg ln(export value)	12.33	13.43	12.17
	(3.269)	(4.110)	(3.103)
Avg ln(export net weight)	11.11	12.10	10.98
	(3.274)	(4.382)	(3.063)
Number of products (6-digit HS)	70	7	63
Number of observations	5040	504	4536

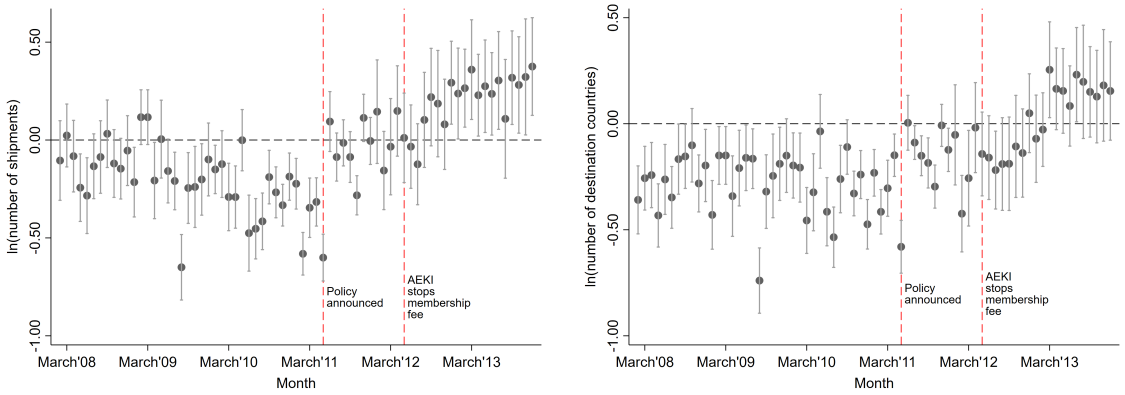
Notes: Table reports the mean and standard deviation (in parentheses) of our dependent variables. Observations are at 6-digit product level and the time period is monthly. Column (1) reports the statistics for all shipments of HS09 products "Coffee, tea, mate and spices" and HS21 products "Miscellaneous edible preparations"; column (2) reports the statistics for the shipments of products listed in the 2011 coffee export licensing procedures; and column (3) reports the statistics for the shipments of other products under HS09 and HS21 not listed in the policy. Number of observations is over the entire period, i.e. 72 months.

Table B.2: Summary statistics of the monthly (from 2008 to 2013) outgoing shipments of products listed in the policy.

	(1) Coffee Not Roasted Not Decaf	(2) Coffee Not Roasted Decaf	(3) Coffee Roasted Not Decaf	(4) Coffee Roasted Decaf	(5) Coffee substitutes Husks & skins	(6) Coffee extracts Essences Concentrates	(7) Preparations with basis of extracts etc
2008-2011 period							
Avg # of shipments	106.3	1.500	6.417	1.500	1.240	28.31	11.60
	(15.00)	(0.910)	(2.102)	(0.762)	(0.523)	(4.525)	(3.009)
Avg # of destination countries	41.42	1.472	5.396	1.447	1.240	18.19	8.896
	(3.093)	(0.810)	(1.526)	(0.724)	(0.523)	(3.064)	(2.815)
Avg ln(export value)	18.08	9.518	11.29	9.905	7.514	15.11	15.62
	(0.370)	(2.071)	(0.989)	(1.852)	(3.711)	(0.299)	(0.963)
Avg ln(export net weight)	17.33	8.510	9.839	8.271	7.572	13.34	14.62
	(0.401)	(2.073)	(1.429)	(2.160)	(3.532)	(0.212)	(0.858)
2012-2013 period							
Avg # of shipments	103.9	1.263	10.92	1.625	1.500	46.08	13
	(15.06)	(0.562)	(2.812)	(0.806)	(0.756)	(9.041)	(4.583)
Avg # of destination countries	41.71	1.211	7.875	1.625	1.375	25.58	10.74
	(4.278)	(0.535)	(1.752)	(0.806)	(0.518)	(5.141)	(3.621)
Avg ln(export value)	18.38	7.560	12.81	9.781	8.298	16.91	14.47
	(0.314)	(2.783)	(0.910)	(2.480)	(2.346)	(0.306)	(1.139)
Avg ln(export net weight)	17.43	6.304	11.32	8.007	6.175	15.59	13.41
	(0.465)	(2.780)	(1.095)	(3.410)	(2.283)	(0.368)	(1.175)

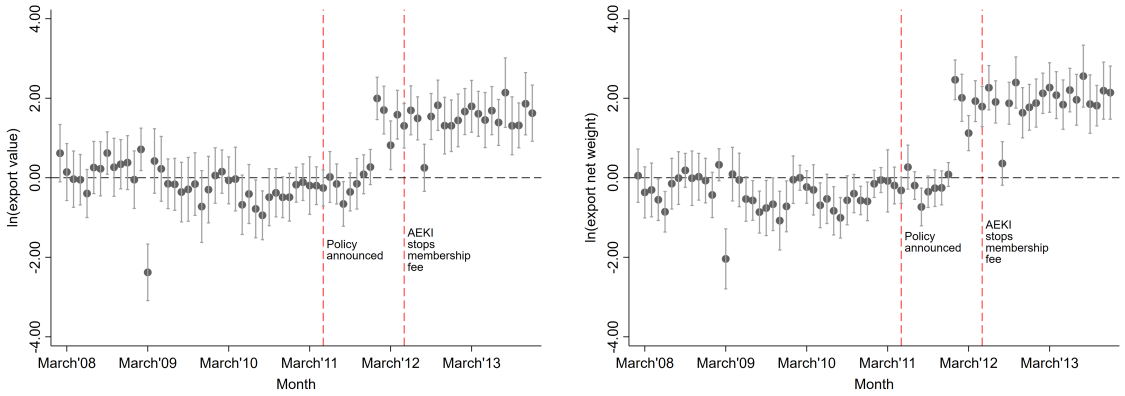
Notes: Table reports the mean and standard deviation (in parentheses) of our dependent variables. Observations are at 6-digit product level and the time period is monthly. Column (1) reports the statistics for all shipments of HS090111: "Coffee, Not Roasted, Not Decaffeinated"; column (2) reports the statistics for all shipments of HS090112: "Coffee, Not Roasted, Decaffeinated"; column (3) reports the statistics for all shipments of HS090121: "Coffee, Roasted, Not Decaffeinated"; column (4) reports the statistics for all shipments of HS090122: "Coffee, Roasted, Decaffeinated"; column (5) reports the statistics for all shipments of HS090190: "Coffee Substitutes Containing Coffee; Coffee Husks And Skins"; column (6) reports the statistics for all shipments of HS210111: "Coffee Extracts, Essences And Concentrates (e.g. instant coffee)"; and column (7) reports the statistics for all shipments of HS210112: "Preparations with a basis of extracts, essences or concentrates of coffee".

Figure B.1: Effect of the removal of de-facto export tax on exports' extensive margins for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" - OLS.



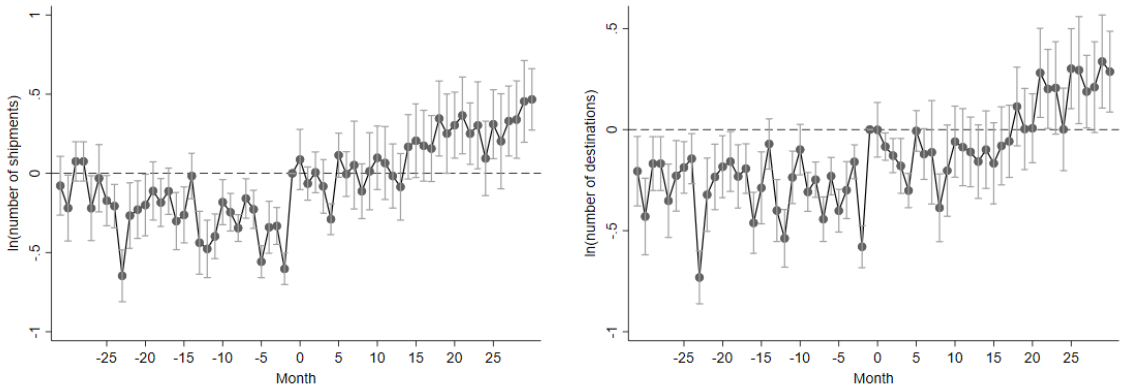
Notes: This figure shows coefficient estimates from OLS regressions of exports' extensive margins (left: number of shipments; right: number of destination countries) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in May 2011), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 2,724.

Figure B.2: Effect of the removal of de-facto export tax on exports' intensive margins for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" - OLS.



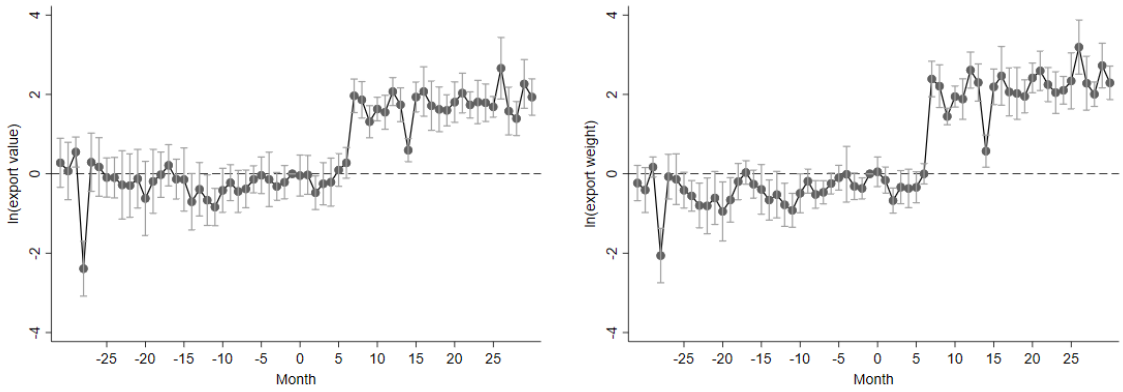
Notes: This figure shows coefficient estimates from OLS regressions of exports' intensive margins (left: import value; right: import net weight) per product on a set of dummy variables indicating the interaction between time variable (month) and treatment status (whether or not listed in the policy in May 2011), along with a set of product and time fixed effects. 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code). Number of observations: 2,724.

Figure B.3: Effect of the removal of de-facto export tax on exports' extensive margins for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" - using `did_multiplegt`.



Notes: This figure shows coefficient estimates from panel regressions using `did_multiplegt` on exports' extensive margins (left: number of shipments; right: number of destination countries). 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code).

Figure B.4: Effect of the removal of de-facto export tax on exports' intensive margins for "Coffee Extracts, Essences and Concentrates (e.g. instant coffee)" - using `did_multiplegt`.



Notes: This figure shows coefficient estimates from panel regressions using `did_multiplegt` on exports' intensive margins (left: import value; right: import net weight). 95% confidence intervals are displayed around each point estimate. Standard errors are clustered at the product level (6-digit HS Code).

Appendix C

Appendices from Chapter 3

Table C.1: Variables used from two separate datasets: WBES and UIBE GVC Index System.

Variables	Definition	Source
Firm-level data		
labor_prod	Labour productivity measured as sales divided by number of employees	WBES
foreign_inp_pctg	Percentage of foreign input in final goods production	WBES
exp_pctg	Export share as percentage of total sales	WBES
foreign_own_pctg	Percentage of the firm's foreign ownership	WBES
n_employees	Number of employees	WBES
foreign_tec	Dummy variable equal to one if the firm adopts any foreign technology	WBES
international_cert	Dummy variable equal to one if the firm has any international certification	WBES
Decomposition of Intermediate Goods Import at Industry level		
FVA_once	Foreign value-added directly used in production of domestically consumed products	UIBE GVC Index System
DVA_return	Domestic value-added returned to and consumed in home country	UIBE GVC Index System
FVA_twice_or_more	Foreign value-added used in production of final goods that has crossed a border twice or more	UIBE GVC Index System

Table C.2: Sectoral match between WBES and WIOD.

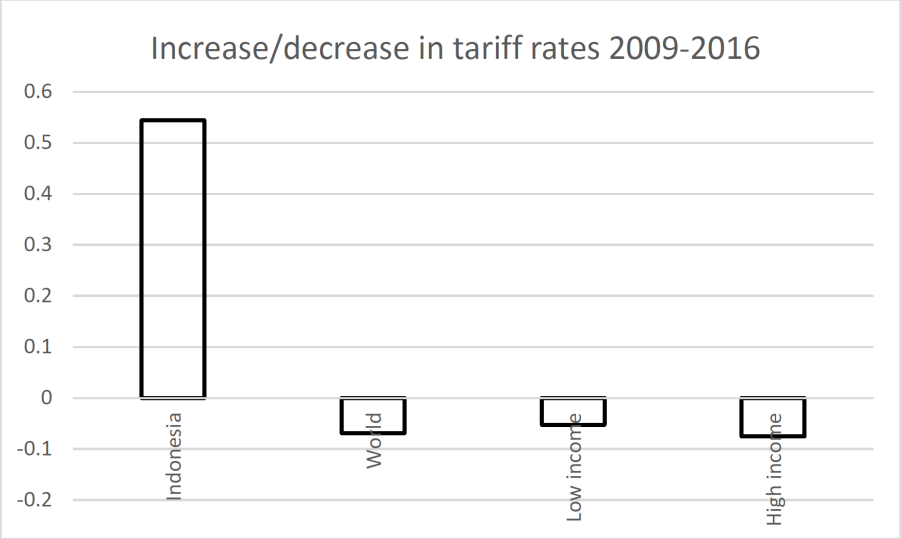
Industry ID and name in WBES	Industry ID and name in WIOD
(15) Food, (16) Tobacco	(05) Manufacture of food products, beverages and tobacco products
(17) Textiles, (18) Garments, (19) Leather	(06) Manufacture of textiles, wearing apparel and leather products
(20) Wood	(07) Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
(21) Paper	(08) Manufacture of paper and paper products
(22) Publishing, printing and recorded media	(09) Printing and reproduction of recorded media
(23) Refined petroleum products	(10) Manufacture of coke and refined petroleum products
(24) Chemicals	(11) Manufacture of chemicals and chemical products
(25) Plastics and rubber	(13) Manufacture of rubber and plastic products
(26) Non-metallic mineral products	(14) Manufacture of other non-metallic mineral products
(27) Basic metals	(15) Manufacture of basic metals
(28) Fabricated metal products	(16) Manufacture of fabricated metal products, except machinery and equipment
(29 & 30) Machinery and equipment	(19) Manufacture of machinery and equipment n.e.c.
(31 & 32) Electronics	(17) Manufacture of computer, electronic and optical products
(34 & 35) Transport machines	(20) Manufacture of motor vehicles, trailers and semitrailers, (21) Manufacture of other transport equipment
(36) Furniture	(22) Manufacture of furniture; other manufacturing
(45) Construction	(27) Construction
(50) Services of motor vehicles	(28) Wholesale and retail trade and repair of motor vehicles and motorcycles
(51) Wholesale	(29) Wholesale trade, except of motor vehicles andmotorcycles
(52) Retail	(30) Retail trade, except of motor vehicles and motorcycles
(55) Hotel and restaurants	(36) Accommodation and food service activities
(60, 61, 62, 63 & 64) Transport	(31) Land transport and transport via pipelines, (32) Water transport, (33) Air transport, (34) Warehousing and support activities for transportation, (35) Postal and courier activities
(72) IT	(40) Computer programming, consultancy and related activities; information service activities

Note: Two sectors (Precision instrument and Recycling) are excluded as no match could be found in WIOD.

Table C.3: Constructed firm-level foreign input variables.

Variables	Definition
foreign_inp_once	Percentage of foreign input in final goods production that crosses a border only once. The values are calculated using the equation:WBES.foreign_inp * UIBE.FVA_once / 100
foreign_inp_twice_or_more	Percentage of foreign input in final goods production that crosses a border twice or more. The values are calculated using the equation: WBES.foreign_inp * (UIBE.DVA_return + UIBE.FVA_twice_or_more) / 100

Figure C.1: Reversed trade liberalization in Indonesia (comparison with average values for theb world, low-income and high-income countries).



Source: Own elaboration with data from the World Bank (World Development Indicators, extraction date 26 March 2019). Indicator used: "Tariff rate, applied, weighted mean, all products (%)".

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