Imported Inputs, Government Support and Performance of Manufacturing Exporters

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Abstract

Addressing raw materials constraint faced by manufacturing exporters remain key to unlocking the entry and stagnation of firms in export markets. We evaluate the effectiveness of a government incentive towards making imported intermediate inputs accessible to manufacturing exporters in Kenya. We find that firms that benefit from the programme have a significant performance premium over the non-beneficiaries in terms of real export value, product scale and destination scope. This suggests that expanding the coverage to more exporters may boost firm level exports and potentially, aggregate exports.

1.0 Introduction

Access to imported intermediate inputs has been hailed as the key to enhancing firm productivity and performance in exports. Indeed, this is perhaps the greatest gain by countries through globalization. A cut in global tariffs has promoted access to a large variety, more quality and cheaper inputs, enabling firms to lower their marginal costs and overcome the fixed costs of serving foreign markets. In addition, low income countries go a step further and grant duty relief and exemptions to exporters to encourage them to use more imported intermediate inputs in their production processes. However, empirical tests on the channels through which intermediate inputs affect firm export performance remain country specific while studies looking at the effectiveness of government support programs for access to intermediate inputs are very few.

Duty relief and exemption schemes allow certain goods to be imported duty free provided they are used in the production of goods for re-export or are in transit for re-export (see World Bank, 2009). These schemes ensure that imported intermediate goods for further manufacturing and later exported are not required to pay duty that would otherwise apply if they are imported for domestic consumption. As such, they provide manufacturing exporters with imported inputs at world prices. This is necessary to increase their competitiveness in foreign markets.

The main objective of this chapter is to examine the relationship between access to imported intermediate inputs and firm's export performance measures and to evaluate the effectiveness of government support in providing access to imported inputs through a popular fiscal incentive programme. Specifically we ask two basic questions: What is the difference in export performance measures for exporters who import intermediate inputs relative to non-importers of intermediates? and what is the effect of the government's duty remission scheme (TREO) on the beneficiary firm's export performance?

These questions are important for the manufacturing sector in Kenya for two reasons. Firstly, studies using micro level datasets have found that firms having greater access to imported intermediate inputs are, in general, the most productive (Amiti and Konings, 2007) and perform better in export markets (Feng et al.2016).There are at least three channels through which access to intermediate inputs affect exports; namely raising total factor productivity, enhancing the quality of products and increasing the variety of intermediates available for use in production. Our strategy is to test for the direct effect of imported intermediate inputs on a

firm's performance such as export value, product scale and destination scope as a consistency check in line with the literature.

Secondly, given the scarcity of resources, ascertaining the effectiveness of TREO will make a justifiable reason for the existence of this programme and potential for expansion within its legal framework. We were fortunate to come across an administrative data set that allowed us to investigate the effect of a fiscal incentive, targeted at increasing exporters' competitiveness with detailed actual expenditure on the programme. The eligibility to access this incentive provides a natural setting for the treated against non-treated sub-groups of exporters. This grants us a rare opportunity to assess the effect of a popular incentive programme within the EAC trade block.

This chapter makes a contribution to the literature examining how access to imported intermediate inputs alters a firm's export performance as a background check in line with existing literature. In addition, we test the effect of a popular fiscal incentive programme, a duty remission scheme, granted by the National Treasury in Kenya. The program is designed to assist manufacturers producing goods for export to access intermediate inputs, effectively lifting the budget constraint associated with any input tariffs.

In our previous chapter, we found that the distribution of export value per exporter for the cohort of entrants to foreign markets shifts to the right within the initial two years of activity, after which it remains somewhat stable. This suggests the presence of a number of constraining factors to growth of exporters and indeed the entire manufacturing sector in Kenya[1]. One clear constraint on this performance may be the high cost of accessing intermediate inputs. Indeed, evidence from the first census of industrial production conducted in 2011 shows that over 50% of firms cited the cost of raw materials as a cause for low capacity utilization (KNBS, 2013). This is surprising given that the Kenyan government has a fiscal incentive programme under the tax remission and export office (TREO) that waives duty on intermediate inputs for a sub-set of eligible firms. This initiative, together with a global reduction in tariffs on inputs that is currently bound at 0% and10% within the EAC common external tariff framework, are expected to ease costs on imported inputs and grant firms access to a greater variety and quality of imported intermediate inputs.

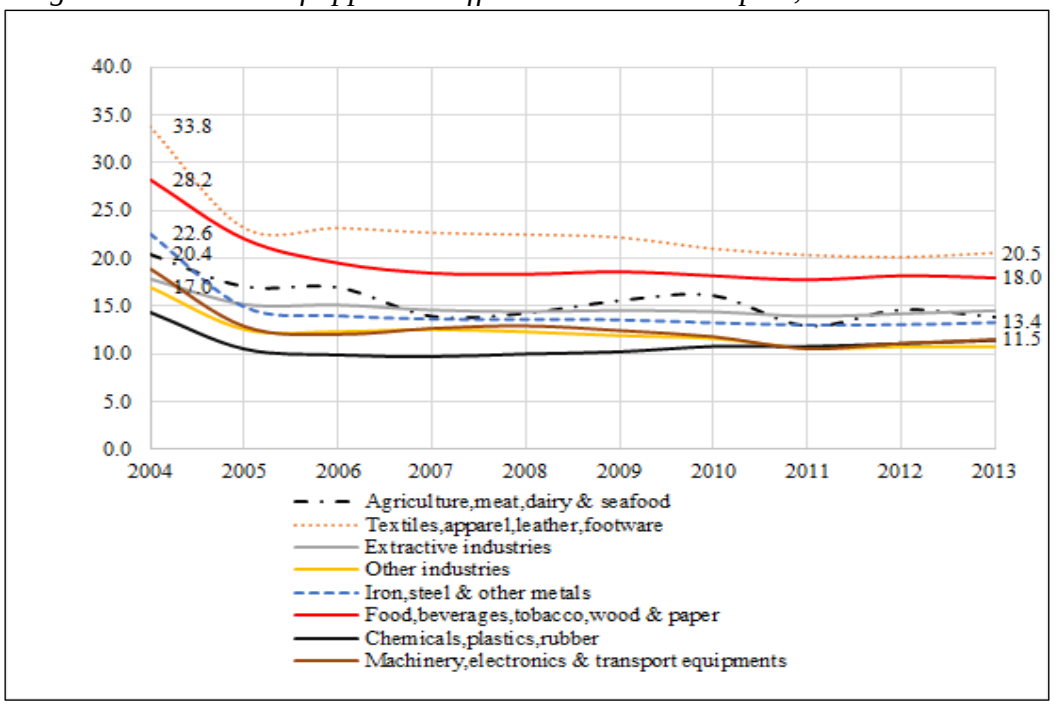
[1] The share of manufacturing value added to GDP has stagnated at 11% for the past three decades.

The rest of this chapter is organised as follows. The next section contains the background information on the evolution of Kenya's effective tariffs rate on inputs and brief details on the eligibility and usage of TREO. Section two reviews the related literature, section three presents the theoretical framework and a description of the data while section four presents empirical analysis and discusses the results. Section five concludes.

Evolution of Input Tariffs across Key Sectors

The average effective tariff rate on imported intermediate inputs has reduced over time. It is calculated as the ratio of paid duty to the value of imports per firm-product and aggregated to sector averages. The evolution of tariffs in Kenya is guided by the Common External Tariff framework put in place at the entry into force of the East African Community Customs Union in January 2005. Under this framework, the overall applied tariff on inputs has reduced from approximately 21.6% in 2004 to 15.4% in 2005, before easing gradually to 14.3% in 2013.

Figure 1: Evolution of applied tariffs on intermediate inputs, 2004-2013



Notes: Calculated as the ratio between duty paid and CIF import value per product and aggregate to firm and broad sectors. The source of the data id the customs statistics from the KRA.

Figure 1 shows that the average input tariff rate has dropped across all sectors. The tariffs on textiles and processed food sub-sectors have been higher compared to the rest of the sectors

due to the need to protect these sectors from imports[2]. In broad terms, the inputs tariff on intermediate inputs has declined, easing firm's expenses on tariffs.

Duty Remission Scheme (TREO) for manufacturer exporters

The program was introduced in July 2002 with the aim of providing remission of duties on raw-materials where such materials are to be used in the production of goods for export. It is administered by the Tax Remission for Export Office (TREO) at the National Treasury together with an Audit unit at the Customs Services Department of the Kenya Revenue Authority (KRA).

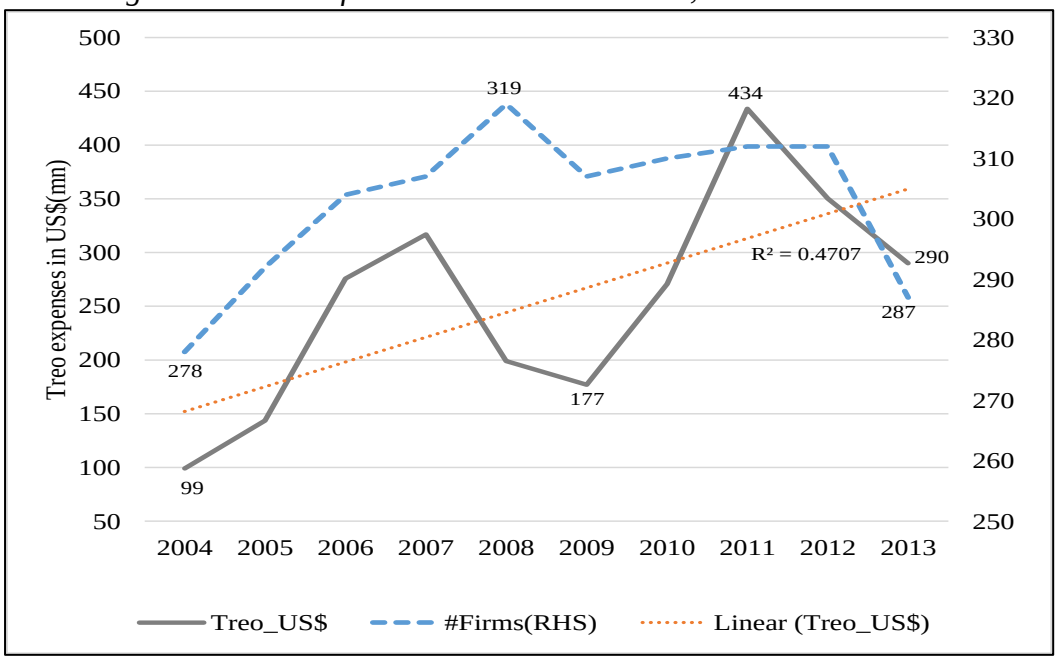
To be eligible for duty remission, a firm has to submit an application to the committee through the Kenya Association of Manufacturers (KAM). The committee is comprised of the National Treasury, Ministry of Trade and Industry, Kenya Revenue Authority, Kenya Bureau of Standards, Kenya Sugar Board, Fresh Produce Exporters Association of Kenya and Kenya Association of Manufacturers. It approves for gazettement only the applications that meet the requirements of the regulations to the Commissioner of Customs Services contained in the *Legal Notice No. 129 of 19/7/2002*. At application, firms are required to submit a detailed actual production plan, giving the input-output ratio, any wastes and by-products. They are also required to reconcile the duty exempt imports with goods produced and exported after exportation or within nine months of exemption approval or otherwise re-export, apply for a rollover or pay the applicable taxes. Exemptions are granted against a performance bond to the value of the duties exempted.

A critical attribute to this incentive is that once approved, it stays valid for at least 9 months and does not get regularly revised as the firm varies its output and export activity. In this sense we are encouraged that the issues of reverse causality may not be a concern. However, there might be selection issues that will be addressed in the empirical section of this paper. Figure 2 shows the trend and access to TREO over time. The trend in expenditure on duty remission scheme under TREO exhibits large swings over time. The number of beneficiaries increased from 278 firms in 2004 to 319 firms in 2008 before dropping to 287 in 2013. The Government expenditure on the program, has experienced large swings around the trend. Starting with a

[2] The African Growth and Opportunity Act (AGOA) textiles exporters are served in a separate scheme known as export processing zones (EPZ). They do not benefit from TREO.

value of US$ 99 million in 2004, expenses increased to US$ 317 million in 2007 before falling to US$ 177 million in 2009. They then rebounded and surged to US$ 434 million in 2011 before dropping to US$ 290 million in 2013. This large swing is, in part, a reflection of the slowdown in demand for imported intermediate inputs from manufacturers and may also be related to the recent poor performance in export value per firm.

Figure 2: Trends of access to TREO over time, 2004 to 2013



Notes: computed from TREO data obtained from the National Treasury. The amounts are in US$ million and on the left hand scale, while the number of beneficiaries are on the right hand scale.

2.0 Related Literature

Our paper is motivated by two strands of literature. The first looks at the channels through which imported intermediate inputs enhance a firm's productivity and export performance, while the second examines the effects of duty drawbacks on export performance. Our paper examines both of these literature topics for the case of a low income country and provides an empirical test of a popular fiscal incentive in both developed and developing countries.

Trade in intermediate leads to productivity improvements and firm's performance

The first strand is by far the most advanced, enhanced by theoretical frameworks showing gains obtained from imported intermediate inputs (see Ethier, 1982, Markusen, 1989, Kasahara and Lapman 2013). Ethier (1982) shows that combining differentiated imported inputs yields productivity gains that are more than the sum of the parts(or full products). This means by importing components that are then assembled into a unit of output, is more efficient in production of goods compared to trade in full products. The author demonstrates that increasing imported intermediate inputs transforms a firm's production technology due to increased division of labour. Efficiency gain is an outcome of greater division of labour and the complementarity gains resulting from imperfect substitution across intermediate inputs.

It is now a known fact that trade in intermediates provides an avenue for diffusion and adoption of new technology. This is precisely studied by Kasahara and Rodrigue, (2008) using Chilean plant level panel data in which they test whether the use of foreign intermediate goods increases plant productivity. Central to their analysis is the need to address the endogeneity concern. Does the use of foreign intermediate goods directly increase firm productivity or do inherently higher productivity plants have a tendency to use more foreign intermediate goods? Using the systems GMM and Olley and Pakes method (see Yasar et al. 2008) they find a positive impact from the use of imported intermediate inputs on plant productivity that ranges from 12.9 to 22%. This range includes a similar impact uncovered by Halpern et al. (2005) for Hungary of 14%. Other papers finding a positive impact of imported intermediate inputs on plant level productivity include Amiti and Konings (2007) for Indonesia and Muendler (2004) for Brazil.

These papers examine the impact of imported intermediate inputs on firm productivity and indirectly on firm performance such as output, size of employment and wage pay out. In our paper, we lack panel information on firm output, labour and capital to enable us to estimate

the productivity channel. Instead we pursue the direct impact of imported intermediate inputs on export performance of a firm, making use of available transaction level data. This framework could easily be extended to cover more low income countries that have accumulated rich transactional datasets.

It turns out that there is a growing body of literature pursuing this precise channel. A number of papers have argued for a direct impact of imported intermediates on firm export performance (see Kasahara and Lapman 2013, Damijan et al 2014, Bas and Strauss Kahn, 2014 and Feng et al 2016). Among these, we draw motivation from the framework developed by Kasahara and Lapman (2013). These authors show that there is significant revenue and cost complementarity between the export of final goods and the importation of intermediate goods. This suggests, policies that promote the use of intermediate inputs also bolster the export of final goods and overall firm performance. They show differences in plant performance (or export and import premia) through the use of pooled ordinary least squares method, using data from Chile from 1990 to 1996. Cost complementarity in exporting and importing was found to gain a cost saving of between 7 and 26% per period for fixed and sunk costs to exporter-importers in Chile.

Imported intermediate inputs make available high quality inputs which are also translated to production of high quality products. Kugler and Verhoogen (2012) study this channel and show that imports of high quality intermediate inputs enhance productivity of importers and result in the production and export of high quality goods that fetch a better price in the international markets. The improved quality in output may be facilitated through high embedded quality in the imported intermediates. A common way to test for this technology transfer is to control for the source country of imported intermediate inputs (see Bas and Strauss Kahn, 2014) and assess the effect of importing from an advanced economy on the firm export outcomes. A strong but common assumption in the literature is that developed countries produce goods with a high technology or quality content and are in general more expensive relative to inputs sourced from developing and low income countries.

An alternative literature argues that improvement in the quality of exported products may also stem from a firm's endogenous decision to upgrade the quality of its products. This is supported by the findings by Amiti and Khandelwal (2013) that show that increased competition in the home market results in upgrading of product quality to remain

competitive. In Verhoogen (2007), currency shocks caused Mexican firms to improve the quality of their products. In Amiti and Khandelwal (2013), quality upgrading occurred because firms faced a reduction in import tariffs at home and the rise in competition in the domestic market forced them to improve the quality of their exports. Our paper follows the first channel in which quality of inputs is controlled for using a source country dummy. High quality products are those that are sourced from the OECD countries.

Feng et al (2016) estimates the causal effect of increased imported intermediate inputs on firm export outcomes for Chinese exporters. To deal with potential endogeneity issues, they follow an IV strategy that utilises instruments for import costs connected to intermediate input tariffs and exchange rates. Their findings show that an increase in firm imports of intermediate inputs by 1% resulted in a 1.65% increase in export value per firm. The strongest effect of imported inputs on export value was observed amongst firms that were initially non-exporters (2.1%), although the effect on firms that were already exporting was equally large (1.2%) and statistical significant. They also found that a 10% real deprecation in the exchange rate allowed firms to expand their exports by 3.4%.

In another country study, Bas (2012) examined whether enhanced access to imported intermediate inputs impacted positively the probability of local firms entering the export market or expanding their existing export offerings for Argentina. The author used Argentina's firm level data on trade, productivity, investment and other firm level characteristics for 1992 and 1996. The chosen period was associated with a sudden and unexpected change in the trade regime in Argentina. After a period of protectionist trade policies in the 1980s, with a key emphasis on import substitution, a unilateral trade-liberalization process commenced toward the end of 1991 as part of an IMF program. This sudden trade-liberalization process and the associated reduction in input-tariffs presented an opportunity to access foreign intermediate inputs. The study attempted to establish if this event precipitated a positive impact on the probability to enter the export market or expand export trade shares.

The findings show that Argentine firms in industries that experienced the largest reductions in input-tariffs recorded the greatest increase in the share of participation in the export market, while also triggering entry of non-exporters to the export market. In particular, a 10%-point decrease in input tariffs is associated with a 6% and 8% increase in the probability

of exporting for the average firm and importing firm, respectively. In addition, a 10% cut in import tariffs was associated with a 3% expansion in a firm's export shares for the average exporting firm.

Trade in intermediate inputs allows access to a large variety of inputs. This has been found to be associated with an increase in new products produced and exported. Goldberg et al.(2010) examine the role of India's trade liberalization on the number of varieties produced by the firm in the domestic economy. They show that lower input tariffs led to an expansion in the firm's product scope through the availability of imported inputs. Colantone and Crino (2014) also document similar results for 25 EU countries using product level data. They found a positive and significant relationship between imported varieties of inputs and large product scope in the domestic markets.

Duty remissions and drawbacks increases access to imported intermediates

Our paper is also related to the literature examining the impact of duty relief and drawbacks on the performance of exports. Duty relief and drawbacks received great attention in the literature after they became central to the trade policies recommendation from the multilateral agencies such as the World Bank. The World Bank has published a toolkit to guide policy makers on prudent management of these schemes, drawing from experience and best practice in both the developed and developing countries (see Thomas et al, 1990; World Bank, 2009). This section reviews this literature and points out the contribution of our paper.

This paper is motivated by insights from an important paper by Panagariya (1992) in which he provides a systematic analysis of the effects of input tariffs and duty drawbacks on welfare. That paper was the first to provide a formal analysis of the effects of duty drawbacks on exports, complementing descriptive literature on country experience. The author shows that a tariff on the input unaccompanied by duty drawbacks on exports works like a production tax at different rates on goods using the input. The effect of such a tariff on welfare is ambiguous even if the tariffs on final imports are lowered so as to maintain constant revenue. Furthermore, an increase in tariffs on inputs complemented by full duty drawbacks are welfare improving up to a point, provided that final goods exhibit substitutability with respect to each other in production and consumption.

Ianchovichina (2004) argues that duty drawback schemes that entail a combination of duty rebates and exemptions are a feature of many country's trade regimes. The author presents an empirical, multi-region, general equilibrium model that can be used to analyse the effect of

trade liberalization in the presence of duty drawbacks. They apply the framework for the case of China, a country in which duty exemptions at the point of entry had been an essential part of the country's export processing system. The author finds that after accounting for duty exemptions on imports for production of China's exports, she obtained a lower, but accurate impact on China's WTO accession on export performance. For example, it is shown that failure to account for duty exemptions will lead to an overstatement of the increase in trade flows by 40%, welfare by 15% and selected sectors such as apparels by 20%. This paper hints at the magnitude of the impact of duty drawbacks in any economy and especially those with rapidly expanding exports such as China. We follow this intuition to measure the direct and indirect effects of TREO on export performance for the beneficiaries in Kenya.

China provides another context for assessing the impact of duty relief and drawbacks. Chao et al (2001) studies export duty rebates and export performance for Chinese exporters. They noted that, at a time when East Asia was undergoing a severe financial crisis in 1997, China's neighbouring countries devalued their currencies aggressively to enhance the competitiveness of their firms in international markets. China instead, raised export tax rebates for several products. This enhanced incentive helped China's products retain a competitive edge on world markets, far better than the outcomes in the neighbouring countries, such as Indonesia, Thailand, Malaysia, the Philippines and South Korea that devalued.

To examine the effect of tax rebates on China's exports, they estimated a long-run equilibrium export demand equation in which real exports were specified as a function of relative foreign income, relative goods prices, exchange rate volatility, and the amount of tax rebate. This estimation was based on annual data for the period 1985 to 1998 and used an error correction mechanism to obtain the long-run and the short-run relationships among real exports, foreign incomes and tax export rebates. Their results show that the long-run elasticity for export tax rebates and foreign incomes on china's exports were 0.344 and 2.102, respectively. The exchange rate volatility had a negative (-0.391) long-run effect on total exports. In the short-run, the export tax rebates had a significant effect of 0.140.

A problem with this study is that the analysis is done at the aggregate level, assuming that a long-run equilibrium relationship between total exports and other explanatory variables exists. This masks a lot of adjustments taking place within the firms in the short-term in terms of intensity of exporting and reorganisation of product scale and destination scope. Furthermore, although motivated to analyse the behaviour of firms in response to a financial

crisis and policy initiative taken, i.e. devaluation versus export tax rebates, the empirical test avoids these policy scenarios altogether. Our paper pursues a firm level analysis to assess the impact of duty exemptions on export performance.

3.0 Theoretical Framework

3.1 The Model

We analyse how access to imported intermediate inputs directly affects the intensity of a firm's exports performance. A reduction in import tariffs, together with duty remissions on imported intermediates, is expected to boost firm export performance. To help us grasp the framework, consider the standard profit maximization problem in which a firm seeks to maximize profits in her export market[3].

$$Max\pi_1 = r(Q_x) - c(Q_x) \quad (1.)$$

Where r and c are firm revenue and cost that are a function of the quantity Q_x, exported. The firm's production function is specified as:

$$Q_x = f(L, K, M) \quad (2.)$$

Where output produced depends on the firm's choice of labour (L), capital (K) and the level of intermediate inputs (M). M is in turn split into domestic and foreign intermediates ($M \in [m_d, m_f]$). Furthermore, there are both fixed and marginal costs for acquiring each variety of imported intermediate inputs (see Halpern, Koren and Szeidls, 2015). However, following a reduction in import tariffs, together with a duty waiver programme under TREO, the cost for obtaining intermediate inputs from each source country has dropped. This may motivate increased export volume but also an increase in the number of countries and products exported by firms.

The changes in the cost of acquiring imported intermediate inputs may affect the input mix chosen due to the possibility of substituting imported intermediate against domestic inputs (see Feng et al. 2016) as the firm seeks to minimise its total operation cost. As a result, the literature shows that increased use of imported intermediate inputs will positively alter the performance of firms in exports (see Kasahara and Rodrigue, 2008, Kasahara & Lapman, 2013, Feng et al. 2016, and Bas and Strauss Kahn, 2014). The provision of duty remission programmes plays a separate role, namely to provide imported intermediate inputs at the

[3] We assume that the domestic and export markets are separable.

world prices. This is important to enable firms to gain export price competitiveness in foreign markets. Returning exporters to their free trade prices is necessary, given the negative subsidy that may arise when the output tariff is lowered considerably following trade liberalization. To elaborate, we derive the net subsidy granted to the import competing sector and indicate the role played by TREO in reversing the negative subsidy that the exporting sector may face. We combine equation (1) and (2) and rewrite the firm's profit maximization problem using the dual of the production function as:

$$\pi_1 = pQ_x(1+\tau_Q) - [wL + mM(1+\tau_M) + (r+\delta+t_k)K(1+\tau_K)] \qquad (3.)$$

Where: $p,\ Q_x\ and\ \tau_Q$ are the world price, quantity sold and output tariff rate on the product. $w\ and\ L$ is wage expenses and labour used in production process; $m,\ M\ and\ \tau_M$ are the world price, quantity and input tariff rate on the intermediate inputs and $r,$ $\delta, t_k\ and\ K$ are the rental rate, depreciation rate, tax rate and capital value capital assets and τ_K is a tariff rate on capital goods.

In a free trade environment with no tariffs, the profit function can be re-written as:

$$\pi_0 = pQ_x - [wL + mM + (r+\delta+t_k)K)] \qquad (4.)$$

Subtracting equation (4) from equation (3) yields the net subsidy granted to the import competing sector in the form of tariff protection as:

$$S = pQ_x\tau_Q - [mM\tau_M + (r+\delta+t_k)K\tau_K)] \qquad (5.)$$

Dividing both sides of equation (5) by the product sales, the subsidy relative to total sales revenue is given as:

$$s = \tau_Q - [\propto_m \tau_M + (\propto_K + \propto_t)\tau_K)] \qquad (6.)$$

Where: $\propto_m, \propto_K\ and\ \propto_t$ are the cost shares of intermediate inputs, the net–of tax capital rental cost and capital tax. For the import competing sector, the output tariff rate is usually large than the input tariff, i.e. $\tau_Q \geq \tau_M\ and\ \tau_K$. However, if the product is exported or can be imported duty free, then the net subsidy becomes negative since $\tau_Q = 0$.

$$s = -[\propto_m \tau_M + (\propto_K + \propto_t)\tau_K)] \qquad (7.)$$

A programme such as TREO is put in place to remove the negative subsidy to the exporters by setting $\tau_M = 0$ and $\tau_K = 0$ through a duty remission scheme on imported intermediate inputs. The Kenyan programme grants full duty exemption, making it easier for us to abstract from the need for partial duty drawback and the political economy and lobbying behind the final tariff and export tax rebate rates on intermediate goods(see Cadot et al. 2003). Granting of duty remission is expected to influence the export performance of beneficiaries in the foreign market. In the following section we test for the presence of this performance premium among Kenyan exporters.

3.2 Data

This paper utilises the product level transaction data for Kenya's exporters and importers obtained from the Customs Service Department of the Kenya Revenue Authority, through the National Treasury. The data is aggregated to annual flow of exports and imports per firm and ranges between 2004 and 2013. It contains information on the product being exported (or imported) at the eight digit- HS product classification, the identity of the firm, the destination of exports (and origin for imports), the free on board (FoB) value for exports and the Cost Insurance and Freight (CIF) value for imports and the quantity being exported or imported. It also shows the duty paid on imports, which enables us to calculate the average tariff rate per product-firm in a year.

To classify imports into intermediate, capital and final goods, we follow the recent literature, namely Feng et al. (2016), Bas (21012), and Pierola et al. (2015) and use the United Nations' Broad Economic Classification (BEC)[4] to identify which imports are of intermediate nature based on their economic classification. The intermediate imports per importer is merged to the export transaction database, allowing us to obtain a subset of exporters that demand foreign intermediate inputs for the production of their products. The import data set also enables us to compute the imported input varieties, in which a variety is defined as a 6 digit HS product-country pair.

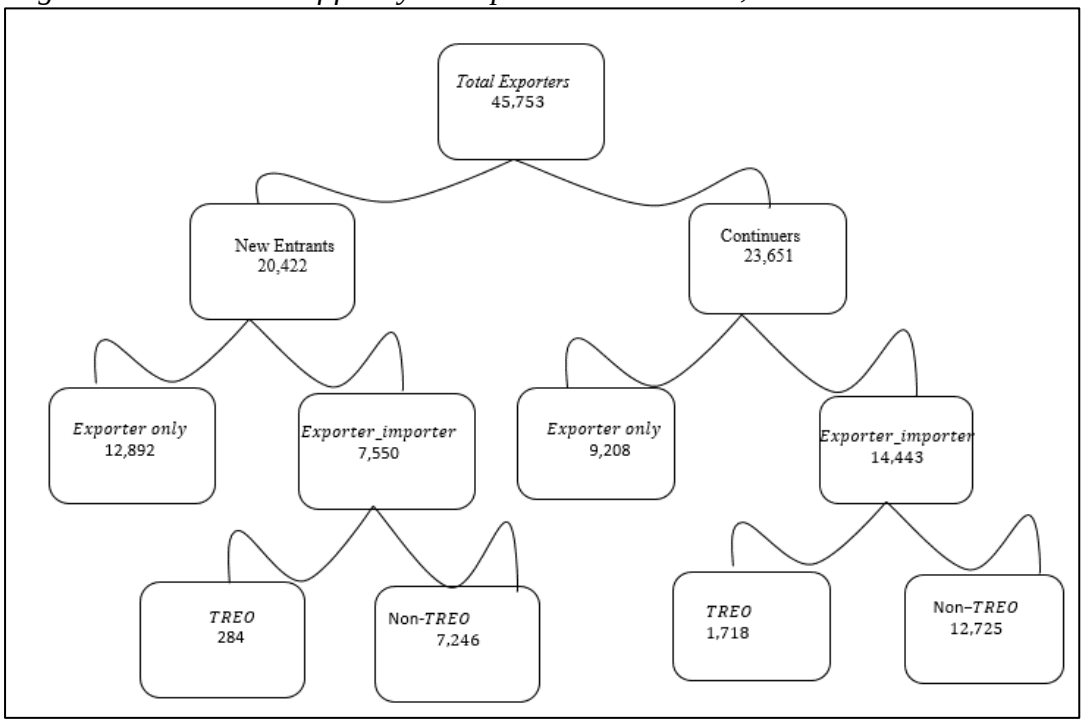
Data on access to TREO is obtained from the National Treasury, Kenya. This is a unique panel data containing information on the name of the firm, the CIF value of imports per 8 digit HS

[4] We use the BEC classification as provided by the UN (2016) and concord the BEC categories to the 6 digit HS products imported by firms. http://unstats.un.org/unsd/BEC%20classification.htm.

product, duty to be paid (and hence waived under TREO) and the date the approval was granted. Using the name, we matched beneficiaries to their export activity in the exports transaction database. Out of 657 unique beneficiaries, we were able to match 230 direct exporters. The matched firms are identified as TREO treated while the unmatched ones form the non-treated exporters. The final transaction database contains unbalanced panel data for the period 2004 to 2013 containing information on Kenya's exporters that may be grouped into new entrants and continuing exporters.

The new entrants are firms that entered in the export database any time after 2004. The continuers are exporters that were already engaged in exporting in 2004. For this group, we are blind to exactly when they began exporting. Amongst new entrants and continuing exporters, we create an indicator variable to identify exporters only and exporter-importer. The latter group imports intermediate inputs for their production processes for exports. Figure 3 provides a breakdown of the number of exporter-year combination for the period 2004 to 2013.

Figure 3: The number of firm-year exporter combination, 2004 to 2013



Amongst the exporter-importer, we can identify the sample of firms that benefit from the TREO incentive. As can be observed, out of the new entrants, only 284 firm-year combinations benefitted from TREO while 7,246 did not. Amongst the continuing exporter-importer, 1,718 firm-year combinations accessed TREO compared to 12,725 firm-year combinations that did not.

Construction of key variables from the dataset

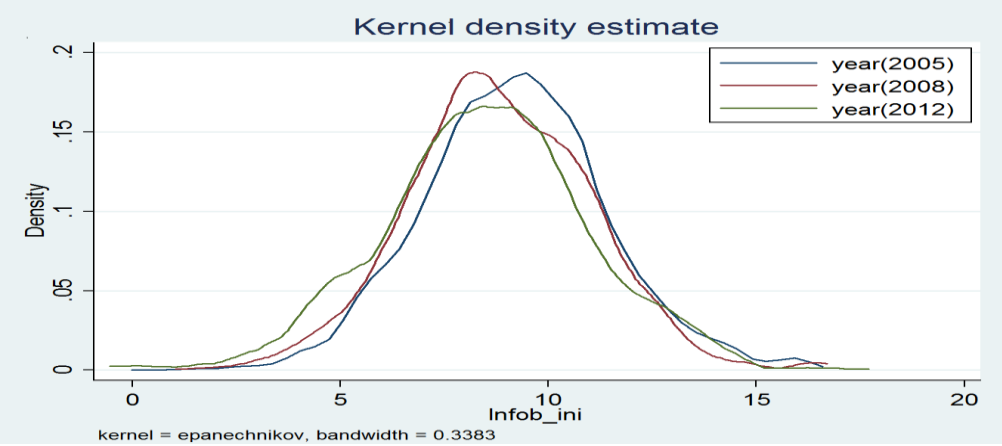
The real export value per firm in a given year (*ftotexport_TX_us*) is the key performance measure across all exporters. This variable is constructed as a summation of the annual FoB sales value for the entire 6 digit HS product sold by an exporter in a given year in US$. It is deflated using Kenya's aggregate export price index to remove the effects of export price changes.

The $exporter\_importer$ is a dummy variable equal to one if an exporter imports intermediate inputs and zero otherwise. It is used to capture the performance advantage that accrues to the exporter who imports intermediate inputs. The sign on the coefficient on this variable is expected to be positive and statistically significant in line with the findings in the literature (see Pierola et al. 2015).

The variable $treo\_treat$ is a dummy variable equal to one if the exporter-importer type of firm is a beneficiary to TREO and zero otherwise. The coefficient on this variable is expected to be positive and statistically significant, signifying an additional performance premium in lieu of access to government support.

The firm $Size$ is constructed based on the firm export value during the first year of entry to the data base. Literature underscores the positive correlation between the initial value of exports at entry and subsequent export performance (see Besedes and Prusa, 2006, Martincus and Carballo, 2010, Brenton et al 2009 and Lejour, 2014). Empirically, the distribution of firm size does not change over time (see Axtell,2001, Tybout 2000). In addition, it does not depend on how the measurement of size is obtained. Some papers use the number of employees, while others use output levels and broadly find the size distribution to be consistent. Using the initial value of exports at entry we classify firms as small, medium or large. Figure 4 shows that the distribution of initial exports value at entry.

Figure 4: The distribution of firm export value in the year of entry



A firm is small if the initial value of exports is positive but less than US$10,000; medium if the value is equal or greater than US$ 10,000 and less than US$40,000; and large if the value is equal to or greater than US$40,000[5]. Using the initial value at entry also avoids potential endogeneity issues that may occur if a firm substantially ramps up her export shipments due to some unobserved event. Bento and Restuccia (2015) show a positive relationship between firm productivity and average establishment size in the manufacturing sector for 134 countries. This variable is expected to be positively correlated with firm productivity and export shipments per exporter.

The firm's total imported intermediate inputs($impinputs\_us$) is used to capture the level of use of imported inputs. It is calculated as the sum of annual CIF value for each of the 6 digit HS intermediate goods imported by the firm in a given year in US$. This is a key variable showing the exact expenditure by firms on imported inputs. This value is equal to zero for exporters that do not import intermediate goods. Related, we also created a variable that captures the number of varieties *(variety_im)* imported, which count all the 6 digit HS product-country pair per importer. This is in line with the definition adopted by Feng et al. (2016), Broda and Weinstein (2006) and Feenstra (1994) in which a variety is defined as a product-county pair.

Firm average tariff rate(avg_tariff) is computed as the average tariff rate from the ratio of duty paid to its CIF value for every product imported in a given year. We also have the sector equivalent which is calculated as the average tariff rate based on classification of firms by their main sectors. We follow previous literature in using either sector level or firm level

[5] We also classify firms using alternative bands and results are broadly consistent.

average tariff to instrument for the expenditure on imported inputs that is considered endogenous in the literature (see Bas, 2012, Feng et al. 2016 and Bas and Strauss Kahn, 2014).

The variable source dummy *(source dummy)* contains two dummy variables each for the firm's main source of imports. If a firm's largest share of intermediates originates from high income countries (OECD and non-OECD) it gets a one or zero otherwise. The same definition is used for the second dummy in which the largest share of a firm's intermediate imports comes from a non-high income country (Middle or lower income country). Countries are classified by income group according to the latest World Bank classification of countries as either high income-OECD, high income non-OECD, middle income (upper and lower) and low income countries. This variable is used as proxy for the quality of imported intermediate goods. Table 1 provide summary statistics for the key variables constructed from the database.

Table 1: Summary statistics of the key variables

Variables	Obs	Mean	Std. Dev.	Min	Max
Firm exports (US$)	45,753	910,033.5	5,571,543	0.0	181,000,000
Export growth	25,331	0.03	1.7	-12.8	14.7
#Products	45,753	6.9	16.8	1.0	523.0
#Countries	45,753	2.7	3.7	1.0	65.0
Size at entry(exports)	45,745	1.8	0.9	1.0	3.0
Firm import intermediate(US$)	45,753	674,176.7	4,795,733	0.0	196,000,000
Exporter-Importer dummy	45,753	0.4	0.5	0	1
Treo_treat dummy	45,753	0.1	0.2	0	1
Average firm tariff rate	45,753	4.9	7.5	0.0	100.0
Average sector tariff rate	45,753	5.2	6.1	0.0	22.1
#Varieties imported	45,753	11.0	37.7	0.0	1420.0
quality of imported inputs	45,753	0.00	0.00	-0.0000005	0.0000005
Source dummy(High income)	45,753	0.23	0.42	0	1
Source dummy(non-High income)	45,753	0.21	0.41	0	1

The number of firm-year combinations over the 10 year period is 45,753, out of which, the unique number of exporters over the entire period is about 16,858 exporters. The average value of exports per firm is approximately US$910,033 but there is a lot of heterogeneity, as evidenced by the huge standard deviation around the average value. The average number of products and number of countries served per exporter is approximately 6.9 and 2.7, respectively.

Quality of merger between exporters and importers of intermediates inputs

The data dimension is firm by year in the two datasets. We merge on one to one using year and firm name. The result of the merged database is as follows:

Result	# of obs.
not matched	82,838
from master	25,545 (match==1)
from using	57,293 (match==2)
matched	20,208 (match==3)

Master: Exporters, Using: intermediate importers. Firm-year combination (2004-2013).

We make use of the two sample t-test to check the quality of merges between exporters and importers of intermediate inputs. *Table 2*-5 shows the results.

Table 2 shows the differences in the mean value spent on imported intermediates and duty paid. The two means are larger for the merged importers relative to the non-merged ones. In addition, the standard deviation for the merged importers is large which suggest that the merged exporter-importer sample might be dominated by larger firms compared to the ones not merged.

Table 2: Two-sample t test with equal variances for firm input imports and duty paid

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
non-mat	57,293	139 960	7 221	1 728 524	125 806	154 114
match2ex	20,208	1 526 386	50 125	7 125 504	1 428 137	1 624 635
combined	77,501	501 464	14 286	3 977 125	473 463	529 465
diff		-1386426	32 156		-1 449 452	-1 323 400
diff: mean(non-mat) - mean(match2ex)						t = -43.1152
Ho: diff=0						dof = 77499
Ha: diff < 0	Pr(T < t) = 0.0000					
Ha: diff != 0	Pr(|T| > |t|) = 0.0000					
Ha: diff > 0	Pr(T > t) = 1.0000					

import duty paid (fduty_pd_us$)

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
non-mat	57,293	10 767	585	140 107	9 620	11 914
match2ex	20,208	61 665	2 807	398 996	56 164	67 167
combined	77,501	24 038	854	237 738	22 365	25 712
diff		-50 898	1 936		-54 694	-47 103
diff: mean(non-mat) - mean(match2ex)						t = -26.2837
Ho: diff=0						dof = 77499
Ha: diff < 0	Pr(T < t) = 0.0000					
Ha: diff != 0	Pr(|T| > |t|) = 0.0000					
Ha: diff > 0	Pr(T > t) = 1.0000					

Table *3* shows the results for the mean differences in the export value and products for the exporter only compared to exporter-importers in the final database. The differences in the

means is larger for the exporter-importers relative to exporters only. Furthermore, the standard deviation for the exporter-importers is large than that of the comparison group. This implies, exporter-importers types are larger relative to exporters only.

Table 3: Two-sample t test with equal variances for firm export value (US$) and products

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Exporteronly	25,545	482 535	23 939	3 826 192	435 612	529 457
Exporter-Importer	20,208	1 450 436	50 362	7 159 262	1 351 722	1 549 151
Combined	45,753	910 034	26 047	5 571 543	858 980	961 087
diff		-967 901	52 258		-1 070 328	-865 475
diff: mean(exporteronly) - mean(exporter-importer)						t = -18.5216
Ho: diff=0						dof = 45751
Ha: diff < 0	Pr(T < t) = 0.0000					
Ha: diff != 0	Pr(|T| > |t|) = 0.0000					
Ha: diff > 0	Pr(T > t) = 1.0000					

Number of product (#products)

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Exporteronly	25,545	5.2	0.1	13.9	5.0	5.3
Exporter-Importer	20,208	9.2	0.1	19.7	8.9	9.5
Combined	45,753	6.9	0.1	16.8	6.8	7.1
diff		-4.0	0.2		-4.3	-3.7
diff: mean(exporteronly) - mean(exporter-importer)						t = -25.5644
Ho: diff=0						dof = 45751
Ha: diff < 0	Pr(T < t) = 0.0000					
Ha: diff != 0	Pr(|T| > |t|) = 0.0000					
Ha: diff > 0	Pr(T > t) = 1.0000					

Finally, *Table 4* shows the difference in means of the exports value for exporter-importers that benefit from TREO relative to the non-beneficiaries.

Table 4: t test with equal variances for firm export value (US$) and products

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Exporter_importer non_TREO	18,222	869 438	39 798	5 372 228	791 431	947 445
Exporter-Importer_TREO	1,981	6 797 805	337 594	15 000 000	6 135 728	7 459 881
Combined	20,203	1 450 742	50 375	7 160 120	1 352 004	1 549 480
diff		-5 928 367	164 179		-6 250 171	-5 606 564
diff: mean(exporter_importer Non_TREO) - mean(exporter-importer_TREO)						t = -36.1092
Ho: diff=0						dof = 20201
Ha: diff < 0	Pr(T < t) = 0.0000					
Ha: diff != 0	Pr(|T| > |t|) = 0.0000					
Ha: diff > 0	Pr(T > t) = 1.0000					

Number of product (#products)

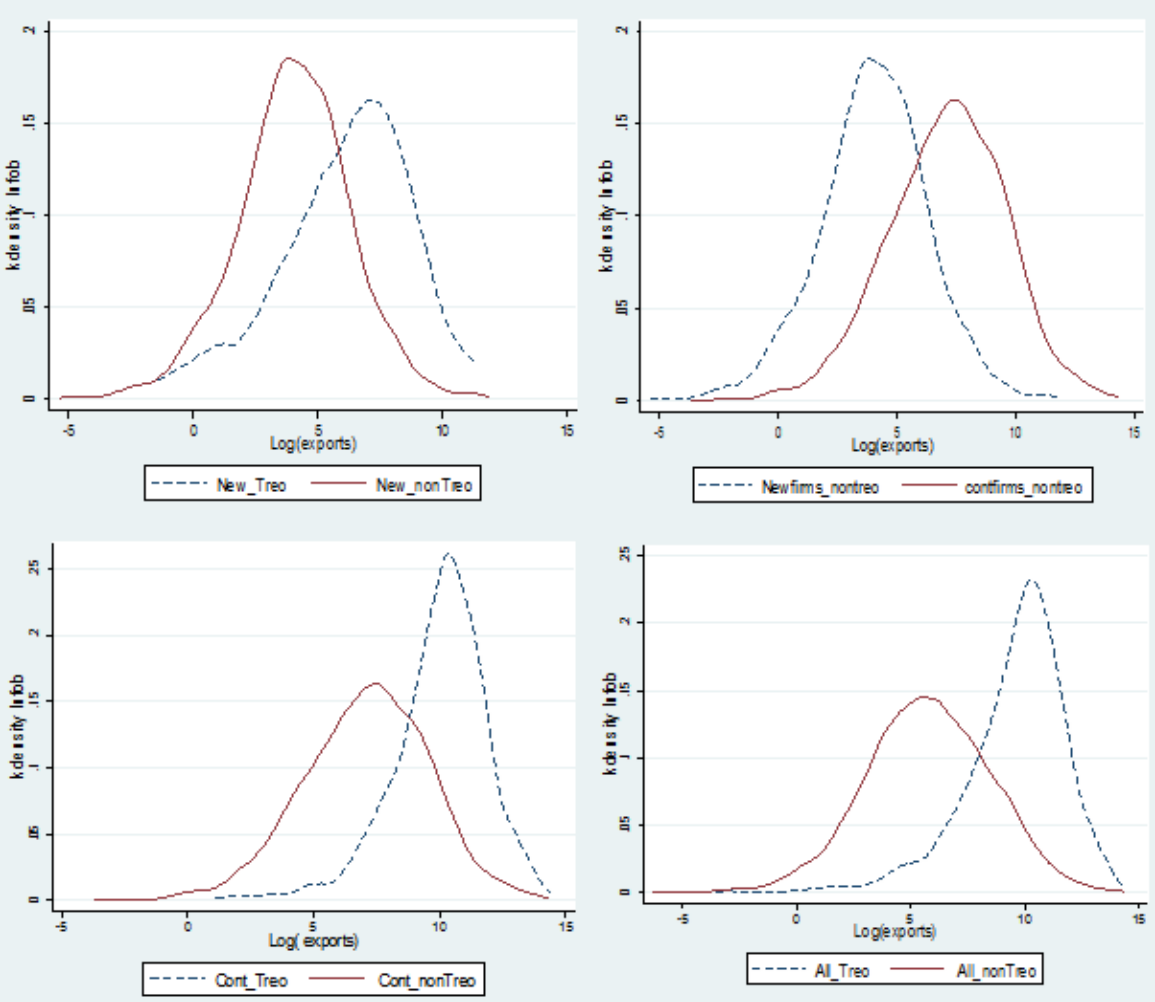
Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
Exporter_importer non_TREO	18,222	9.1	0.1	20.1	8.8	9.4
Exporter-Importer_TREO	1,981	10.3	0.3	15.4	9.6	11.0
Combined	20,203	9.2	0.1	19.7	8.9	9.5
diff		-1.3	0.5		-2.2	-0.3
diff: mean(exporter_importer Non_TREO) - mean(exporter-importer_TREO)						t = -2.6998
Ho: diff=0						dof = 20201
Ha: diff < 0	Pr(T < t) = 0.0035					
Ha: diff != 0	Pr(|T| > |t|) =0.0069					
Ha: diff > 0	Pr(T > t) = 0.9965					

It is observable that TREO beneficiaries are, on average, large in value and product scale.

Distribution of export values for the exporter-importers: TREO against Non-TREO

This section uses kernel density plots to examine the differences in export value for TREO beneficiaries against non-beneficiaries. Figure 5 shows the plots and are interpreted in clockwise.

Figure 5: The difference in export value, TREO users and non-users



The first quadrant shows that the distribution for the new exporters that use TREO is significantly different from that of new entrants who do not. It lies to the right of the latter, indicating better performance outcome among the subgroup of entrants that benefits from TREO. The second quadrant shows a kernel density distribution plot for the export value for the new-entrants and continuing firms that do not access TREO. The performance of continuing exporters is greater relative to that of new entrants among non-TREO users.

The third quadrant plots the kernel density for the continuing exporters who benefit from TREO against non-beneficiaries. The continuing exporters that uses TREO, recorded higher

export performance. Finally quadrant four plots the distribution of export sales across all exporters, comparing beneficiaries to TREO and non-beneficiaries. It can be observed that the beneficiaries under TREO perform better relative to the non-beneficiaries.

4.0 Empirical Analysis

4.1 Differences in export performance for the importers of intermediate inputs

As a background check and in line with existing literature exporters that import intermediate inputs have a performance advantage compared to those that do not (see Bas 2012, Pierola 2015). To complement information from the kernel plots, we estimate a baseline performance advantage regression below:

$$Y_{it} = \beta_0 + \beta_1 (Exp\_imp)_{it} + I_t + I_i + \varepsilon_{it} \quad (8.)$$

Where: Y_{it} is the real exports value in logarithm, product scale and country scope per firm i in time t. $(Exp\_imp)_{it}$ is a dummy variable equal to one if an exporter imports intermediate inputs and zero otherwise. The dummy variable is also replaced by the real expenditure on imported inputs$(impinputs_us)_{it}$. We also control for the year and firm fixed effects. This estimation strategy was initially proposed by Bernard and Jensen (1999) in studying the productivity advantage for exporters in the US. β_1 is expected to be positive and statistically significant. Table 5 shows the results.

Table 5: Performance premia for the importers of intermediate inputs

	(1) Ln(exports)	(2) Exp_growth	(3) #products	(4) #countries	(5) Ln(exports)	(6) Exp_growth	(7) #products	(8) #countries
Exporter_importer Dum	0.396***	0.164***	1.421***	0.600***				
	(0.0429)	(0.0582)	(0.300)	(0.0605)				
Log(imported inputs)					0.0632***	0.0268***	0.229***	0.0815***
					(0.00464)	(0.00623)	(0.0343)	(0.00653)
Constant	5.069***	-0.505***	4.237***	2.309***	5.225***	-0.451***	4.793***	2.552***
	(0.0458)	(0.0470)	(0.338)	(0.0716)	(0.0412)	(0.0353)	(0.308)	(0.0667)
Observations	45,753	25,331	45,753	45,753	45,753	25,331	45,753	45,753
R-squared	0.823	0.268	0.720	0.799	0.825	0.269	0.721	0.800
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
F	29.66	49.47	10.54	17.30	39.52	50.39	11.93	23.10

Notes: dependent variables are in column (1-8). The exporter-importer dummy equals one if an exporter imports intermediate inputs and zero otherwise. Asterisk indicates the level of significance, *** p<0.01, ** p<0.05, * p<0.1.

In particular, there is a large and statistically significant performance premium across all performance measures in favour of exporters that import intermediate inputs. Column one

indicates that, holding everything constant, exporter-importers have 39.6% higher real exports and 16.4% faster growth in their exports relative to exporters only. The exporter-importers also have greater product scale of 1.42 for every one product exported by exporters only and they do sell, on average, to one additional country (0.6) compared to exporters only. These performance premia are upheld with the use of the value of imported inputs instead of the dummy variable (see column 5-8). The results are qualitatively similar to those found in other studies. For example, Pierola et al (2015) found that, in Peru, importers of intermediate inputs reported 55% more exports and had at least one more export destination (0.7) relative to exporters only.

4.3 Export Performance Premia for Exporter-Importers and TREO beneficiaries

We estimate a variant of equation (8) restricting to exporter-importers only and replacing the explanatory variables by exporter-importer-treo dummy and the real TREO amount per exporter, respectively. Table 6 contains the results.

Table 6: Performance premia for the exporter_importers who use TREO

	(1) Ln(exports)	(2) #Products	(3) #Countries	(4) Ln(exports)	(5) #Products	(6) #Countries
Exporter_Importer_treo Dum	0.620***	1.119**	0.556***			
	(0.0686)	(0.487)	(0.164)			
Log(real TREO in Ksh)				0.0438***	0.0606*	0.0357***
				(0.00452)	(0.0320)	(0.0102)
Constant	5.790***	6.187***	3.201***	5.975***	6.472***	3.357***
	(0.0515)	(0.473)	(0.0927)	(0.0525)	(0.476)	(0.0976)
Observations	20,206	20,206	20,206	20,206	20,206	20,206
R-squared	0.821	0.744	0.825	0.821	0.744	0.825
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
F	18.73	9.043	11.23	20.41	8.976	11.47

Notes: dependent variables are in column (1-6). The exporter-importer_treo dummy equals one if an exporter imports intermediate inputs and benefits from TREO and zero otherwise. Asterisk indicates the level of significance, *** p<0.01, ** p<0.05, * p<0.1.

All the results are statistically significant at the conventional 5% level and have the correct expected sign. Columns (1-3) show that, holding everything constant, exporter-importers who use the TREO incentive have 62.0% higher real exports, have greater product scale of about 1.1 for every one product exported by exporter-importers who do not benefit from TREO. In addition, TREO beneficiaries, on average, have one additional country (0.55) relative to non-

beneficiaries. These performance premia are also maintained when we use the value of TREO instead of the dummy variable (see column 4-6). Column four shows that, holding everything else constant, a 100% increase in TREO expenditure per firm is associated with an increase in exports by 4.3%. To investigate the channel through which TREO affects a firm's export performance, we estimate the following equation.

$$Y_{it} = \beta_0 + \beta_1(impinputs\_us)_{it} + \beta_2(Exp\_imp\_TREO)_{it} + \beta_3(impinputs)_*(Exp\_imp\_TREO)_{it} + X'\beta + I_t + I_i + \varepsilon_{it} \quad (9.)$$

Where: $\beta_1 > 0,\ \beta_2 \geq 0,\ and\ \beta_3 > 0$. β_2 captures the direct effect, while β_3 capture the indirect effect of TREO on export performance. Equation (9) is an augmented performance premia estimation regression. The result captures both the direct and the indirect effects of TREO on firm export performance. The direct effects are captured by the exporter-importer-TREO dummy, while the indirect effects are captured by the interaction term. The regression results are shown in Table 7, below:

Table 7: The effects of TREO on exporter performance, all exporters

	Ln(exports)		Ln(#products)		#countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(imported inputs)	0.426***	0.142***	0.0486***	0.0469***	0.288***	0.136***
	(0.0315)	(0.0210)	(0.0145)	(0.0079)	(0.0294)	(0.0241)
Exp_imp_treo Dum	2.888***	0.0738	-0.0653	0.0193	-0.532	-0.800
	(0.319)	(0.232)	(0.143)	(0.149)	(1.072)	(0.769)
Ln(imp.inputs)*exp_imp_TREO	-0.0485	0.0530**	0.0308**	0.00718	0.416***	0.151*
	(0.0324)	(0.0250)	(0.0141)	(0.0183)	(0.112)	(0.0805)
Log(Duty paid)	-0.141***	-0.0159	0.0282***	0.00158	-0.117***	-0.0177
	(0.0200)	(0.0103)	(0.0066)	(0.0045)	(0.0238)	(0.0244)
#of varieties_imp	0.005***	0.0036***	0.0036***	0.0023***	0.0169***	0.00448**
	(0.0005)	(0.0006)	(0.0003)	(0.0004)	(0.0029)	(0.0017)
Constant	4.128***	4.929***	0.634***	0.833***	2.040***	2.454***
	(0.251)	(0.0979)	(0.114)	(0.0414)	(0.305)	(0.229)
Observations	17,639	17,639	17,639	17,639	17,639	17,639
R-squared	0.318	0.831	0.106	0.740	0.226	0.834
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES	NO	YES
Sector FE	YES	NO	YES	NO	YES	NO
Fstat	433.1	48.17	62.86	88.47	77.10	32.15

Notes: dependent variables are real exports (logs), product scale (logs) and country scope (level). The exp-imp_treo dummy equals one if an exporter imports intermediate inputs and benefits from TREO and zero otherwise. We control for firm's sector, year, and firm fixed effects. Asterisk indicates the level of significance, *** p<0.01, ** p<0.05, * p<0.1.

The regression results are for the entire population of exporter-importer exporters, some of which benefit from TREO and some who do not. Columns one, three and five include sector and year fixed effects while columns two, four and six include firm and year fixed effects. We interpret the key variables of interest using results of columns two, three and five.

Export intensity premium

The results in column two show that holding everything else constant, an increase in the use of imported intermediates inputs by 10% is on average, associated with an increase in real exports by 1.42%. If ,in addition, an exporter-importer is a beneficiary of TREO, then a 10% increase in imported intermediates is on average, associated with an increase of real exports by 1.95% (=1.42+0.53). Thus the difference in the performance of export shipment is approximately 0.53% in favour of the beneficiaries to TREO. The results show that TREO has an indirect effect on firm export intensity, through imported intermediate inputs.

Product scale premium

Column three shows that an increase in a firm's imported inputs by 10% is on average associated with an increase in a firm's product scale by 0.48%, holding everything else constant. However, if the exporter-importer is a TREO beneficiary, then this is associated with a premium of 0.31%, translating to a growth in product scale by 0.79%. This means that TREO beneficiaries, will on average, ship two products for every one product exported by the non-beneficiaries.

Destination scope premium

Column five shows that an increase in a firm's imported inputs by 100% is on average associated with an increase in a firm's destination scope by 0.29%, holding everything else constant. If in addition, the exporter-importer is a TREO beneficiary, this is associated with a premium of 0.42%, translating to a growth in in destination scope by 0.71%. Thus TREO beneficiaries, will on average, ship to two countries for every one country served by the non-beneficiaries.

All the above results are robust to controlling for additional firm characteristics and inclusion of year and firm fixed effects. We also performed regression for the continuing and new

entrants, whose results are broadly consistent with the results for all exporter-importers, reported in Table 7 above (see appendix A2).

4.4 Addressing the endogeneity concerns

A key concern in the results in Table 7 is that we have a selected samples both in the choice to use TREO and the decision to import intermediate inputs. Although TREO eligibility is properly anchored in law and access is equal for all qualifying firms that meet the legal requirements, some eligible firms may fail to take up the incentive. This could in turn be associated with unobserved factors such as inability to afford the performance bid (credit constraint) or simply a way to avoid bureaucratic procedures to access TREO. It is possible, therefore, that the firms that accept TREO are a selected group, creating a potential endogeneity problem.

To deal with a host of unobserved firm characteristics that may influence selection into the scheme but not controlled for, we included the year, sector and firm fixed effects. Use of fixed effects enables us to exclude time invariant factors that we are not able to control for, due to lack of data, reducing the endogeneity concerns.

The second selection of firm's into use of imported intermediate inputs is also a cause to worry about which firms are in the sample. A common solution in the literature is an instrumental variable (IV) strategy that makes use of the average input tariff rate as an instrument for the imported intermediate inputs. Bas (2012) and Feng et al. (2016) use industrial level average input tariffs, while Bas and Strauss Kahn (2014) use average tariff rates at the firm level. We follow Bas and Strauss Kahn (2014) and use firm level effective tariffs.

A re-estimation of equation (9) is done, in which the dependent variable is the growth in exports between 2013 and 2005 for the continuing exporters only. The continuing exporters are divided into two, the treated and untreated group. The treated continuing exporters are those that started to use TREO for the first time in 2005 and later. Untreated continuing firms are those that have never taken up TREO throughout the sample period. Continuing firms that were TREO beneficiaries in 2004 (the first sample period) are dropped to meet the un-confoundedness condition. We compute exporter performance outcomes as: $expgrowth = log(fexports)_{2013} - log(fexports)_{2005}$ where fexports is the value of exports per firm in 2013 and 2004. We also computed growth in the number of products and the number of

countries in a similar manner. Table 8 contains the results, for the OLS and the instrumental variable (IV) for exports growth.

Table 8: Effect of TREO for the cohort of new beneficiaries

	Dep var: Exports growth (2004-2013) OLS				Dep var: Exports growth (2004-2013) 2SLS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(imported inputs)	0.0650***	0.0585***	0.0581***	0.0589***	0.0571***	0.0538***	0.0514***	0.0548***
	(0.0171)	(0.0173)	(0.0175)	(0.0175)	(0.0193)	(0.0193)	(0.0196)	(0.0197)
Treo_Treat dum	--	1.062***	--	1.141**	--	1.034***	--	1.184**
	--	(0.331)	--	(0.468)	--	(0.345)	--	(0.536)
Ln(imp.inputs)*Treo_treat dum	--	--	0.0917**	-0.0123	--	--	0.0848**	-0.0234
	--	--	(0.0392)	(0.0538)	--	--	(0.0414)	(0.0641)
2.Size_ini(medium)	-1.105***	-1.201***	-1.201***	-1.196***	-1.085***	-1.200***	-1.172***	-1.193***
	(0.216)	(0.219)	(0.222)	(0.222)	(0.240)	(0.242)	(0.243)	(0.243)
3.Size_ini(large)	-0.641**	-0.636**	-0.643**	-0.636**	-0.631*	-0.659**	-0.632*	-0.663**
	(0.283)	(0.284)	(0.284)	(0.285)	(0.333)	(0.332)	(0.333)	(0.332)
#of varieties_imp	0.0027***	0.0027***	0.0027***	0.0027***	0.0030**	0.0030**	0.00297**	0.0030**
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0012)	(0.0012)	(0.00118)	(0.0012)
DimpnonHI_interm	0.254	0.244	0.251	0.244	0.234	0.218	0.224	0.219
	(0.203)	(0.201)	(0.201)	(0.201)	(0.197)	(0.195)	(0.196)	(0.195)
Constant	-0.00438	-0.0270	0.000711	-0.0293	0.0202	-0.00666	0.0250	-0.0118
	(0.122)	(0.122)	(0.122)	(0.123)	(0.116)	(0.115)	(0.116)	(0.116)
Observations	708	708	708	708	708	708	708	708
R-squared	0.090	0.102	0.097	0.102	0.084	0.095	0.089	0.095
Sector FE	YES	YES	YES	YES	YES	YES	YES	YES
Fstatistics	11.29	10.85	10.24	9.300	11.66	11.43	10.59	9.793
Cragg-Donalds Fstats (weak IV)	--	--	--	--	429.9	427.5	417.1	413.1
Stock and Yogo (cvalue at 5%)	--	--	--	--	16.85	16.85	16.85	16.85
Sargan/Hansen j test (overid) chi(3)	--	--	--	--	3.157	3.462	3.212	3.492
pvalue	--	--	--	--	0.368	0.326	0.360	0.322

Notes: dependent variable: growth in real exports between 2013 and 2005. Treo_Treat dummy equals one if a continuing exporter started using TREO in 2005 or later, and zero otherwise. Instruments for imported inputs are four the value of average effective tariff per firm in lag of two, three, and four periods and the value of imported inputs in lag of three periods. We control for sector fixed effects and other firm characteristics. Asterisk indicates the level of significance, *** p<0.01, ** p<0.05, * p<0.1.

The results from OLS are qualitatively similar to the instrumental variable approach. The sign on the instrumented imported inputs is positive and statistically significant. The TREO dummy is also positive and statistically significant. In the presence of endogeneity, OLS produces biased and inconsistent estimators. If however, one finds valid instruments, then instrumenting for the endogeneous regressor(s) will yield consistent but less efficient estimators (See Cameron and Travedi, 2010, Chap.6, pg 191).

The literature underscores the fact that firm level effective tariffs may affect the decision to import intermediate inputs. This is the basis for the clamour for protection of import competing industries in developing countries. At the same time, the increase in the firm level effective tariffs is not correlated with the firm's performance measures such as output and exports, since tariffs are exogenously determined. In this paper, we are able to compute firm level effective tariffs as the ratio of duty paid to its CIF value for every product imported by a firm in a given year. We follow previous literature in using this firm level average tariff to instrument for the expenditure on imported inputs that is considered endogenous (see Bas, 2012, Feng et al. 2016 and Bas and Strauss Kahn, 2014).

The validity of instrumental variables is dependent upon whether the instruments are not weak and that over-identification restrictions are not violated. To test for this, we made use of the IV user written command by Baum, Schaffer and Stillman (2007), which come nested with post-estimation tests for the weak instruments and over-identification restriction. We present these tests on the last four rows of Table 8.

To test for the weaker instruments, the null hypothesis is that the instruments are weak against the alternative that they are strong. The test is based on the Cragg-Donald's (1993) Wald F-statistics equal to 413, for column (8). The critical values are obtained from Stock and Yogo (2005) at the 5% level of significance. The critical values equal to 16.85, which when compared to- the calculated Wald F-statistics, the probability of failing to reject the null is extremely small, which implies the instruments are strong. In addition, the Sargan-Hansen's J test is used to test for the validity of over-identifying instruments. The null hypothesis is that the over-identification restriction is valid against the alternative that it is not valid. The test is chi-square distributed with 3 degrees of freedom. Since the p-value is greater than 0.05, we do not reject the null hypothesis and conclude that the over-identifying restriction is valid.

We now briefly interpret the results from column (8). The results show that holding everything constant, an increase in imported intermediate inputs by 1% results in an increase in the growth rate of real exports value per firm by 0.72%(=0.0548^(1/9)) per year. Thus making it easier for firms to access imported intermediate inputs is a sure way to revamp growth in real exports at the firm level but also at the aggregate level. This result is in line with similar findings in the literature.

Furthermore, the effect of TREO on the growth rate of real exports at the firm level is direct and statistically significant. As a result, the change in firm's status from non-TREO to TREO user is associated with a difference in export growth equal to 109.5%, holding everything else constant. The TREO policy, by making intermediate inputs accessible to a firm, has a direct and significant long-run impact on the growth of real exports. This makes a justifiable case to expand access to TREO to new users.

The size of an exporter is also important. Small exporters are likely to register faster growth compared to medium and large firms. This result is driven by the lower base from which small exporters are starting. For example, they are expected to grow faster than medium exporters by 109.6%, everything else being held constant. The number of varieties of intermediate inputs imported by a firm has a positive effect on the growth rate of her exports, although the magnitude is small.

5.0 Conclusion

We examined the effect of imported intermediate inputs on a firm's export performance measured broadly as the value of real exports, product scale and destination scope. We find a positive and statistically significant performance premium for the exporters who import intermediate inputs relative to exporters who never import. This result is not new and is consistent with what is already in the literature.

The interesting result in this paper is the evaluation of the effectiveness of a government duty remission and exemption scheme (TREO) in boosting exports for the sub-set of eligible exporters. We find that exporter-importers who benefit from the TREO incentive have a significant premium over non-beneficiaries on their export intensity, the product scale and geographic diversification of their exports. Furthermore, a change in a firm's status from non-TREO to TREO user is associated with a difference in export growth equal to 109.5% over the long-run.

Policy that aims to boost export performance should focus on making it easier for firms to access imported intermediate inputs. This is a sure way for continued expansion in the firm level exports both along the intensive and extensive dimensions. More importantly we established that a policy programme such as TREO, by making intermediate inputs accessible to firms, has a direct and significant long-run impact on the growth of real exports. This makes a justifiable case to expand access to new users.

A central concern in the analysis is addressing potential endogeneity problems as a result of selection of firms both into being exporter-importer and into TREO programme. We utilise instrumental variable (IV) strategy and control for the year, sector, and firm fixed effects to reduce the bias that may be attributed to endogeneity issues.

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Appendix: A1

	Ln(exports)		Ln(#products)		#countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(imported inputs)	0.400***	0.147***	0.0230	0.0476***	0.290***	0.175***
	(0.0356)	(0.0255)	(0.0170)	(0.0086)	(0.0472)	(0.0352)
Exp_imp_treo Dum	2.223***	0.188	-0.273	0.0991	-1.922*	-0.571
	(0.239)	(0.220)	(0.173)	(0.108)	(1.158)	(0.650)
Ln(imp.inputs)*exp_imp_TREO	-0.0226	0.0299	0.0377**	-0.00176	0.500***	0.118*
	(0.0251)	(0.0227)	(0.0167)	(0.0137)	(0.118)	(0.0663)
Log(Duty paid)	-0.121***	0.00240	0.0537***	0.00173	-0.0906**	-0.0227
	(0.0181)	(0.0113)	(0.0074)	(0.0044)	(0.0355)	(0.0333)
#of varieties_imp	0.0043***	0.0040***	0.00305***	0.00244***	0.0176***	0.00371**
	(0.0005)	(0.0006)	(0.0004)	(0.0004)	(0.0039)	(0.0018)
Constant	4.266***	5.654***	0.619***	1.104***	1.968***	3.429***
	(0.206)	(0.133)	(0.118)	(0.0580)	(0.355)	(0.362)
Observations	9,758	9,758	9,758	9,758	9,758	9,758
R-squared	0.363	0.824	0.127	0.730	0.223	0.824
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES	NO	YES
Sector FE	YES	NO	YES	NO	YES	NO
Fstat	323.7	58.93	142.4	41.07	71.68	19.37

Table 9: Performance premia for continuing exporter-importers who uses TREO.

	Ln(exports)		Ln(#products)		#countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(imported inputs)	0.322***	0.140***	0.0228	0.0430***	0.140***	0.0681**
	(0.0360)	(0.0348)	(0.0164)	(0.0142)	(0.0192)	(0.0299)
Exp_imp_treo Dum	1.901**	-0.274	-0.496***	-0.287	-0.456	-1.613
	(0.830)	(1.087)	(0.141)	(0.584)	(1.513)	(2.471)
Ln(imp.inputs)*exp_imp_TREO	0.0084	0.147	0.0617**	0.0248	0.272	0.256
	(0.0984)	(0.143)	(0.0242)	(0.0693)	(0.173)	(0.265)
Log(Duty paid)	-0.135***	-0.0523**	0.0072	-0.00021	-0.103***	-0.0099
	(0.033)	(0.0254)	(0.0113)	(0.0119)	(0.0262)	(0.0268)
#of varieties_imp	0.0019***	0.0030***	0.0029***	0.0021***	0.0075***	0.0062***
	(0.0006)	(0.0011)	(0.0005)	(0.0007)	(0.0011)	(0.0018)
Constant	3.987***	4.358***	0.840***	0.859***	2.176***	1.938***
	(0.265)	(0.140)	(0.103)	(0.0626)	(0.207)	(0.168)
Observations	7,881	7,881	7,881	7,881	7,881	7,881
R-squared	0.118	0.766	0.051	0.701	0.095	0.780
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES	NO	YES
Sector FE	YES	NO	YES	NO	YES	NO
Fstat	59.30	12.05	45.87	26.98	21.22	9.496

Table 10: Performance premia for the new entrants exporter-importers who uses TREO