All These Worlds are Yours, Except India: The Effectiveness of Cash Subsidies to Export in Nepal*

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Abstract

This paper evaluates the effect of an ad-valorem subsidy on exports on firm-level export performance. The Cash Incentive Scheme for Exports (CISE) is a cash subsidy offered by the government of Nepal to firms based on their exports of a select group of products to countries other than India. Using customs data combined with information on cash disbursements for the period 2011-2014, we find that firms that received the subsidy increased the number of targeted products sold and the number of foreign destinations reached relative to firms in the control group. We do not find a significant impact of the subsidy on the intensive margin of exports of targeted product-destination pairs nor on exports of products and markets not included in the scheme. Given the high fiscal cost of the scheme, our results suggest that the subsidy has not been very effective in promoting exports and their diversification.

Keywords: Export Subsidies; Export Diversification; Export Margins; Least Developed Countries; Special and Differential Treatment for Developing Countries; Nepal.

JEL classification: F13; F14; F61; O24.

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1 Introduction

Export diversification matters for developing countries. It is considered a necessary condition to spur industrialization and development (Prebisch, 1950; Singer, 1950; Young, 1991; Hausmann et al., 2007); it contributes to rein in aggregate volatility that would otherwise be very difficult to offset with fiscal or monetary policy (Brainard and Cooper, 1968; de Ferranti et al., 2002); and is, quite often, seen by policymakers as a worthy objective in its own right (Bhagwati and Srinivasan, 1969; Panagariya, 2000).

It is hard to find a country for which export diversification is a more pressing issue than Nepal—the third poorest country in Asia (WTO, 2012). In 2011, one-third of its exports were accounted for by only 5 HS 6-digit products. The geographic concentration of its exports is even more dramatic. Landlocked and wedged between China and India, in 2011 Nepal sold 85% of its exports to only 5 countries, with 80% of these accounted for by India alone. In an effort to reduce its trade deficit and promote export diversification, in 2012 the government introduced the Cash Incentive Scheme for Exports (CISE)—an ad-valorem cash subsidy to exports of a select group of products *sold in countries other than India*.[1]

Our objective in this paper is to evaluate the impact of the CISE export subsidy on the export performance of firms in Nepal. To do so, we combine customs transaction data for the period 2011-2014 with information on subsidy payments to individual firms provided by the Central Bank of Nepal, the entity in charge of administering the scheme. We utilize the model of multi-product, multi-destination exporters of Bernard et al. (2011) to establish predictions about how an ad-valorem cash subsidy granted to firms exporting a specific set of products to countries other than India (which we refer to as 'the rest of the world' hereafter) affects firms' exports as well as their extensive (number of product-destinations exported) and intensive (average exports per product-destination) margins. In this model, the marginal cost of production and foreign market access are independent across all the product and destination pairs exported by a given firm. Thus, the model implies that the CISE subsidy would only affect exports of eligible products sold in the rest of the world. Within this subset of product-destinations, the model predicts that subsidized firms would increase their export sales, due to the higher marginal revenue they now face, and that this rise is

[1] Fuelled by large inflows of remittances from abroad, Nepal's chronically high trade deficit has consistently worsen since 2000, reaching 24% of GDP in 2011.

fully accounted for by the extensive margin—i.e. by an increase in the number of targeted product-destination pairs that firms export. Firms' average exports per product-destination are unaffected by the subsidy because the higher sales of existing product-destinations are exactly balanced by the lower sales of less profitable product-destinations that firms start to export in response to the policy change.

Several other models of multi-product exporters such as Eckel and Neary (2010), Mayer et al. (2014), Nocke and Yeaple (2014) and Arkolakis et al. (2016) allow for cost linkages to exist across the range of products that a firm exports. Under these circumstances, there is the possibility that the CISE subsidy could also affect non-targeted product-destinations. Since a substantial share of exporters in our data sell multiple products to multiple foreign markets, we also investigate whether the subsidy affects product-destination pairs not included in the CISE scheme—namely, eligible and non-eligible products sold in India and non-eligible products sold in the rest of the world.

The CISE subsidy is available to 24 industrial and 7 agricultural products such as carpets, pashminas, tea, coffee and spices. These products are of crucial importance for Nepal's aggregate exports. In 2011, the year before the subsidy was introduced, they accounted for 41% of total export value and close to two-thirds of it was sold in countries other than India; in the same year, 70% of all Nepalese exporters carried out at least one export transaction that involved exporting one of these products to the rest of the world, and therefore would have been eligible to receive the CISE subsidy. Nevertheless, we find that relatively few firms actually receive the subsidy and the ones that do are quite different from those eligible firms that do not get it in terms of their observable characteristics. Namely, subsidized firms are significantly larger, incorporate a higher share of domestic value added and eligible products and sales to the rest of the world account for a larger share of their export sales.

We address the non-random selection of exporters to receive the subsidy by combining the doubly-robust matching estimator proposed by Wooldridge (2007) with a linear panel model with firm and year fixed effects. This entails estimating the probability that firms selling eligible products to the rest of the world receive the CISE subsidy after 2012 based on observable characteristics measured in 2011—the year before the subsidy began to be offered. We use the estimated model of treatment status to compute an array of different weights that allows to estimate control groups

of firms that are very similar to treated firms in terms of their pre-treatment characteristics. We estimate the average treatment effect of the subsidy on treated firms' exports of different product-destination combinations by estimating a weighted regression of firm-level export outcomes on a dummy variable indicating whether a firm received the subsidy in a given year and firm and year fixed effects using the 2011-2014 panel. As we noted above, we estimate the effect of the subsidy separately for firms' exports of eligible products sold to the rest of the world and unsubsidized product-destination pairs. Thus, our identification strategy assumes that pre-treatment observable characteristics adequately control for firms' decision to participate in the CISE scheme while the use of firm and year fixed effects control for time-invariant factors and aggregate shocks affecting export performance respectively.

Our results lend support to the the predictions we derive from our theoretical framework. We find that, relative to the control group, firms that received the subsidy increase the number of destinations (other than India) they sell to by 10-12% and the number of products included in the CISE scheme they export by 6-7%. On the contrary, and just as the theory predicts, we find that the subsidy did not affect the intensive margin of targeted product-destinations—i.e. average exports per product, destination and product-destination combinations. The effect of the subsidy on firms' total export sales of eligible products sold to the rest of the world, while positive is not estimated very precisely. These results and the magnitude of the effect caused by the subsidy are very much in line with the findings of the literature that evaluates the effect of support services provided by export promotion agencies in developing countries (Álvarez and Crespi, 2000; Volpe Martincus and Carballo, 2008, 2010; Cadot et al., 2015). Furthermore, and consistent with our theoretical framework in which the cost of production and market access are independent across the product-destination pairs exported by a given firm, we do not find any evidence of the subsidy affecting firms' exports to India (regardless of whether the products are included in the CISE scheme or not) nor on sales of non-eligible products sold in the rest of the world.

The CISE scheme provides us with a rare opportunity to investigate how a 'textbook' ad-valorem subsidy to export sales affects export performance at the firm-level. To the best of our knowledge, we are the first to ever do so.[2] While export subsidies are ubiquitous across the world, there are

[2]Earlier work on export subsidies relied on country- or industry-level data; see e.g. Balassa (1978) and the papers reviewed in Rodrik (1995).

fewer empirical studies investigating them than almost any other instrument of commercial policy (WTO, 2006). As a case in point, the chapter by Bown and Crowley (2016) entitled "The Empirical Landscape of Trade Policy" in the Handbook of Commercial Policy edited by Bagwell and Staiger does not consider export subsidies at all (see footnote e, page 7) and the chapter on "Subsidies and Countervailing Duties" by Lee (2016) in the same handbook only reviews theoretical research on this topic.

There are two main reasons behind the dearth of empirical work on export subsidies, which we are able to overcome effectively in this paper. First, export subsidies take a wide variety of forms. Examples include concessions and exemptions on a variety of tax levies; access to public utilities at below-market prices and soft loans granted to firms located in special economic zones; export credit guarantees; co-financing grants for training, investment in physical capital, R&D, and business development conditioned on export performance, among others.[3] This remarkable degree of heterogeneity and the frequent imposition of a wide range of eligibility requirements makes it very difficult to identify empirically which firms are subsidized and to what extent. For instance, subsidies can take the form of foregone taxes and would therefore not be recorded in standard manufacturing surveys; in other cases, firms are eligible to enjoy a wide range of incentives—e.g. because of their location in special economic zones—and there is no systematic information available about which subsidies firms use and which ones they do not. This severely limits the opportunities to evaluate empirically the effect of subsidies on export outcomes.

In contrast, the CISE scheme is a simple, well defined, ad-valorem cash subsidy granted on the basis of exports of a list of products sold anywhere but India. Our data allows us to observe which firms are subsidized and how much cash they receive from their participation in the scheme. We can also easily identify the firms that would be eligible to receive the subsidy because we observe from our customs data which products firms export and where. These are crucial advantages relative to existing papers in the literature. Defever and Riaño (2017) and Defever et al. (forthcoming), identify firms that are eligible to receive a broad range of subsidies based on their export intensity and location in special economic zones, but do not observe which firms enjoy the different incentives

[3] Farole and Akinci (2011), Wang (2013), Defever and Riaño (2017), and Defever et al. (forthcoming) study a broad range of incentives (mainly tax exemptions) offered in special economic zones; Felbermayr and Yalcin (2013) investigate export credit guarantees; Görg et al. (2008) and Cadot et al. (2015) study co-financing grants provided to exporters.

available. Kalouptsidi (2018) does not observe which firms are subsidized either, and therefore infers the presence and magnitude of subsidies received by shipbuilders in China by means of a structural model. Some manufacturing surveys, in China and Colombia for example, provide information on subsidies received by firms, but in doing so they bundle together disbursements from several policy instruments which provide different incentives and might have different eligibility requirements (Girma et al., 2009; Helmers and Trofimenko, 2013).

A second reason for the paucity of data and empirical work on export subsidies is that they are prohibited by the World Trade Organization's (WTO) Agreement on Subsidies and Countervailing Measures (ASCM). This gives governments the incentive to not report export subsidies in order to avoid challenges by other WTO members and potential countervailing duties; see e.g. WTO (2006) and Haley and Haley (2013). Because Nepal is a WTO member classified as a Least Developed Country (LDC) by the United Nations, it is not subject to the disciplines of the ASCM under the principle of Special and Differential Treatment for Developing Countries (SDT).[4] This allows it to offer a direct cash subsidy to exports like the CISE scheme without risking retaliation. It is also worth noting that cash subsidies granted to exports of specific products to certain destinations are not uncommon among LDCs, particularly Nepal's neighbors. Bangladesh, for instance, offers these (with ad-valorem rates as high as 30%) to a wide range of products such as frozen shrimp, jute and straw products, leather goods and garments among others.[5] India also provides cash incentives ranging from 2 to 5% of exports to more than 100 products under its Merchandise Exports Incentive Scheme with subsidy rates varying according to the country to which the goods are sold.[6]

In addition to being the first paper in evaluating the impact of an ad-valorem export subsidy on firm-level export performance, our paper makes two important contributions to the flourishing literature that evaluates the effect of export promotion policies on export outcomes (Álvarez and Crespi, 2000; Bernard and Jensen, 2004; Volpe Martincus and Carballo, 2008; Görg et al., 2008; Volpe Martincus and Carballo, 2010; Cadot et al., 2015; Van Biesebroeck et al., 2015, 2016; Munch and Schaur, 2018). Ours is the first paper to evaluate the impact of export promotion policies in general on firm-level export performance in a least developed country. The existing literature, particularly that studying the activities of export promotion agencies (EPA) and their impact of

[4] See Article 27.2.(a) of the ASCM.
[5] See http://www.bangladeshcustoms.gov.bd/trade_info/export_incentives.
[6] See http://dgft.gov.in/sites/default/files/pn0617.pdf.

export performance, has focused exclusively on middle-income and developed countries (see Table 1 of Van Biesebroeck et al., 2016). This is important because by not being bound by the disciplines of the ASCM, the set of policy instruments available to LDCs to foster exports is substantially broader than for other member countries of the WTO.

The second contribution pertains to the specific intervention we evaluate. EPA offer a wide range of services to their clients that are intended to lessen informational frictions that affect international transactions more severely than domestic ones. These include logistic help to meet foreign buyers, provision of market research, information on customs clearance, shipping and insurance, co-financing of export business plans, and many more. This variety of interventions can potentially affect the fixed and variable costs of trade faced by firms in very different ways. The CISE subsidy, on the other hand, simply increases the marginal revenue of firms exporting a well defined set products to the rest of the world. Defining precisely the scope of the subsidy allows to establish sharp theoretical predictions about the way the policy affects firm-level exports and its different margins, which we corroborate in our empirical analysis.

While we find that firms that received the subsidy are exporting more targeted products and selling their output in more foreign destinations other than India, the lack of a robust effect on export values indicates that the CISE scheme has not been effective in achieving its stated objectives. This is all the more salient when we consider that the annual expenditure on the scheme exceeds the entire budget of EPA in countries that are substantially richer than Nepal (see Section 5 for more detail) and the tight constraints that Nepal faces on its public finances after the disastrous earthquake that hit it in 2015, generating economic losses in the order of 10 billion US dollars.[7]

Our paper also contributes to the literature on the question of whether the principle of SDT encourages developing countries to export more. While most empirical work in this area focuses on the role of non-reciprocal preferences granted by developed countries (see the review by Ornelas (2016)), we examine instead the use of otherwise prohibited export subsidies. In so doing, we also complement the theoretical work investigating the normative properties of the WTO's subsidy rules (Bagwell and Staiger, 2006; Lee, 2016)

The rest of the paper is organized as follows: Section 2 describes the CISE export subsidy and its eligibility requirements. Section 3 introduces our data and provides summary statistics

[7]This is also the reason why we only have data until 2014 to conduct our empirical analysis.

on export patterns in Nepal and the usage of the CISE export subsidy. Section 4 establishes a set of predictions about the effects of the CISE subsidy on firms' exports and their extensive and intensive margins grounded on a workhorse model of trade with multi-product and multi-destination exporters; Section 4 also explains our empirical strategy to estimate the causal effect of the CISE program. Section 5 presents our results. Section 6 concludes.

2 The Cash Incentive Scheme for Exports

The Cash Incentive Scheme for Exports (CISE) is an ad-valorem cash subsidy granted by the government of Nepal to firms on the basis of their exports of 24 industrial and 7 agricultural products sold in countries other than India.[8] The list of eligible goods and their respective subsidy rates is presented in Table 1. The products included in the scheme were chosen on the basis of their high export potential as determined by the Nepal Trade Integration Strategy report drawn by the Ministry of Commerce and Supply in 2010. The stated objectives of the scheme are to increase exports, improve the country's balance of payments position and foster export diversification.

Table 1: Eligible Products for CISE Export Subsidy and Subsidy Rates

Industrial Products		Agricultural Products
2% subsidy rate	1% subsidy rate	1% subsidy rate
Processed coffee	Ready-to-eat chow chow	Seeds
Semi-processed hides & skins	Bran	Cut flowers
Handicraft & wooden craft	Wheat flour	Fruits
Crust skin	Polyester or viscous yarn	Vegetables
Handmade paper & rel. products	Ready-made garments	Ginger
Processed honey	Polyester textile yarn	Cardamom
Tea	Vegetable fat/oil	Herbs
Carpet & woolen products	Transfer	
Pashmina & silk products	Ball pens	
Processed herbs & essential oils	Lentils	
	Precious & semi-precious jewelry	
	Gold & silver ornaments	
	Turmeric	
	Dried ginger	

Source: CISE 2070, Government of Nepal Ministry of Commerce and Ojha (2015).

[8] What the Nepalese Customs Act Rules and Regulations refers to as "third countries".

Subsidy payments are disbursed by the Nepalese Central Bank (*Nepal Rastra Bank*) upon receiving evidence that payment for an export transaction in foreign exchange has been deposited in a Nepalese bank. Monies are disbursed on a 'first come, first served' basis, which implies that not all eligible export transactions necessarily receive the subsidy. The initial budget allotted to the scheme in 2012 was 240 million Nepalese rupees (approximately 3.2 million US dollars), and was further increased to 300 million rupees in 2013. The subsidy is available both to direct exporters and "Export Trading Houses" (i.e. wholesalers), which are required to transfer 50% of the cash payment to the producer of the good in question.

There are two reasons adduced by the Ministries of Finance and Commerce and Supply to justify the exclusion of exports to India from the CISE scheme. First, as noted above, one of the goals of the program is to promote the diversification of Nepalese exports—particularly away from India. The second reason is that the movement of people and goods between India and Nepal has been essentially free since 1950 following the signature of the India-Nepal Treaty of Peace and Friendship (Sharma, 2015). Extending the subsidy to exports to India could therefore provide incentives for firms to sell goods in India, claim the subsidy and then reship the goods back to Nepal—thus subsidizing goods that are not actually exported.[9]

The CISE subsidy was first introduced by the Ministry of Finance in the Public Statement on Income and Expenditure for the 2010-11 fiscal year in November 2010, but the scheme only began to operate in practice in 2012 due to delays in the preparation of guidelines and regulations (Sapkota, 2011). In its inception, the CISE scheme required export shipments to incorporate at least 30% of domestic value-added and subsidy rates were increasing in the share of local content. This aspect of the program was quickly reformed in 2013 following complaints from exporters about the administrative burden involved in the calculation of domestic value-added. This shortcoming might account for the very low usage of the subsidy in 2012, which we document in the next section.[10] This led to the introduction of the product list with fixed subsidy rates presented in Table 1 in 2013. While there is an annual review procedure for the list of products to be included in the

[9]To further ensure that no subsidies are granted to exports to India, the CISE regulation stipulates that export transactions have to be denominated in convertible currencies, thereby excluding sales invoiced in Indian rupees, which are deemed non-convertible by the Nepalese Central Bank.

[10]Exporters were required to fill new value-added assessments for every export transaction for which they claimed the subsidy. This procedure was made more cumbersome because different government agencies involved in the administration of the CISE scheme, such as the Department of Customs and the Ministry of Industry, use different methodologies to calculate domestic value added (Sapkota, 2011).

scheme and their subsidy rates, which is administered by the Ministry of Industry, no changes have been made to the program since 2013. It is important to highlight that the products selected for the CISE scheme are also the ones that previous assessments such as Nepal's Trade Policy 2009 and the aforementioned Nepal Trade Integration Strategy have identified as incorporating a high share of domestic content.[11]

3 Data and Summary Statistics

We utilize transaction-level customs data provided by the Nepalese Department of Customs to conduct our analysis. The data contain the universe of international trade transactions (exports and imports) by product at the HS 6-digit level and by country of origin/destination between 2011 and 2014. Throughout this period there are 1,698 firms reporting at least one positive export transaction in at least one of 1,762 HS 6-digit products sold to/bought from 177 countries.

Table 2: Export Patterns in Nepal, 2011-2014

Year	# Firms	Median exports per exporter	Mean exports per exporter	Mean # HS-6 per exporter	Mean # destinations per exporter
2011	1,310	80.08	644.97	5.27	4.02
2012	1,313	94.60	686.76	5.20	3.82
2013	1,346	80.79	635.09	5.28	3.62
2014	1,375	98.49	684.70	5.44	3.73

Export values are denominated in thousand US dollars.

Table 2 provides a first pass at the export patterns in our data across different margins. The number of active exporters remains stable throughout our period study, with around 1,300 to 1,400 firms exporting each year. On average, Nepalese firms export 5 HS 6-digit products to 4 foreign markets. The average value of exports per exporter and the substantial degree of right skewness reflected in the large difference between mean and median exports per firm observed in Nepal are very much in line with the figures for other Least Developed Countries reported by Fernandes et al. (2016).[12] The only noticeable difference with respect to other LDC for which data is available, is

[11] All beneficiaries of the CISE subsidy in 2012 export products from the list in Table 1.

[12] The Least Developed Countries included in the World Bank's Export Dynamics Database are Bangladesh, Burkina Faso, Cambodia, Lao PDR, Malawi, Mali, Niger, Senegal, Uganda and Yemen.

that, with the exception of Bangladesh, Nepal has approximately twice as many exporters.

Table 3: Composition of Export Value by Product Type and Destination in 2011 (%)

Product: Destination:	Eligible	Non-Eligible	Total
India	15.4	51.3	66.7
Rest of the World	25.6	7.7	33.3
Total	41.0	59.0	100

Table 3 decomposes Nepal's exports in 2011—the year before the CISE export subsidy started to operate—according to the product and destination eligibility requirements imposed on the subsidy. Two key insights emerge from Table 3. As we have noted before, India accounts for two-thirds of aggregate exports, and most of these are of products that are not included in the CISE scheme. Eligible products are very important in Nepal's export basket and are sold primarily outside India. Thus, there is a significant extent of overlap between the product and destination eligibility criteria of the CISE scheme.

Table 4: Eligibility, Usage, and CISE Subsidy Disbursements

Year	# Exporters	# Eligible exporters	# Exporters receiving subsidy	Total subsidy disbursements (millions of US dollars)
2011	1,310	917	-	-
2012	1,313	878	28	1.570
2013	1,346	912	57	1.805
2014	1,375	921	151	3.813

Eligible exporters are those that have conducted at least one export transaction of a CISE-eligible product to a country other than India in a given year.

We next examine the amount of subsidies disbursed throughout our period of analysis using data provided by the Central Bank of Nepal. These data inform us of the total amount of cash that exporters receive in a given fiscal year; they do not allow us to identify the individual export transactions for which the firm receives the subsidy. Table 4 shows that approximately two-thirds of Nepalese exporters in 2011 would have been eligible to receive the CISE subsidy—i.e. they carried

out at least one export transaction of a CISE-eligible product to a country other than India. In 2012, however, only half of the allotted budget for the subsidy was distributed among 28 firms. Over the following two years both outlays and the number of exporters receiving the subsidy increased dramatically. Total subsidy disbursements more than doubled from 1.57 million to 3.81 million US dollars, while at the same time the number of exporters receiving subsidies increased fivefold, reaching 16.4% of eligible exporters in 2014.

Table 5: Sectoral Export Patterns and Subsidy Disbursements, Top-10 Export Sectors 2012-2014

Sector HS 2-digit	Export value (%)	Exports sold to India (%)	Exports of eligible products (%)	Eligible firms receiving subsidies (%)	Subsidy outlays (%)
Iron and steel	10.2	99.9	0.0	0.0	0.0
Coffee, tea, mate & spices	8.2	95.8	99.3	0.5	0.3
Carpets & textile floor coverings	8.1	0.8	100.0	12.1	45.3
Man-made staple fibres	7.8	82.0	75.3	50.0	12.2
Man-made filaments	7.2	99.1	6.7	14.3	0.3
Apparel and clothing accessories	6.3	6.0	100.0	0.6	2.2
Preparations of vegetables, fruit, nuts	4.7	99.8	0.0	0.0	0.0
Articles of iron or steel	4.2	93.6	6.7	14.3	0.5
Other made up textile articles	4.1	76.5	0.9	0.0	0.0
Edible vegetables, roots and tubers	3.2	5.6	99.8	30.8	31.4

Figures are averages over the period 2012-2014.

Table 5 examines the importance of eligible products, India as an export destination, and the allocation of subsidy funds across Nepal's most important export sectors in terms of value. Column 1 shows that Nepalese exports are significantly less concentrated across sectors than destinations served—no single HS 2-digit sector accounts for more than 10% of total exports over the 2012-2014 period. We can also see—consistent with the message provided by Table 3—that the sectors in which eligible products account for the largest share of export value are also the ones in which exports are mostly sold in the rest of the world.

The last two columns of Table 5 examine the usage of the CISE subsidy and the allocation of expenditure. Overall, only a low share of eligible firms received the export subsidy—the notable exception being firms exporting man-made staple fibres, in which three quarters of eligible exporters were subsidized. The disbursement of the subsidy has been highly concentrated among firms

exporting carpets, man-made fibers and edible vegetables. These three sectors alone account for 89% of all monies granted between 2012 and 2014.

4 Empirical Strategy

Our objective is to estimate the causal effect of the CISE export subsidy on export outcomes for the firms that received the subsidy—i.e. the average treatment effect on the treated. To be more precise, we estimate the impact of the subsidy on export sales and across both the extensive (number of products exported, number of foreign destinations served as well as the number of product-destination combinations exporterd) and intensive (average exports per product, average exports per country and average exports per product-destination) margins of exports. Based on the theoretical framework described below, we estimate the impact of the subsidy program on firm-level exports of a specific combination of products and foreign market destinations: exports of eligible products sold in the rest of the world—the set of varieties directly incentivized—as well as on the remaining product-destination combinations, non-eligible products sold in the rest of the world and both eligible and non-eligible products sold in India.

Theoretical Effects

We analyze how the CISE subsidy affects exports of targeted and non-targeted products and their extensive and intensive margins through the lens of the model of Bernard et al. (2011). Theirs is a generalization of the Melitz (2003) model that features firms producing multiple products which can be sold in multiple countries. In what follows, we briefly describe the assumptions of the model and establish testable predictions for the effects of the subsidy on firm-level exports of different product-destination combinations and their margins; formal proofs are provided in Appendix A.

Firms can sell their products in $C + 1$ foreign markets—India and the 'rest of the world' in the context of the policy we study. The representative consumer in each country has CES preferences defined defined over a continuum of symmetric products. After paying a sunk cost of entry to establish their 'brand', firms can produce one horizontally-differentiated variety of each of the continuum of products; all product varieties are produced with a linear technology that uses labor as the sole input. Firms are heterogeneous in terms of their productivity, which

determines the marginal cost for all varieties produced by a firm, and in terms of how consumers in different countries value these varieties; Bernard et al. (2011) assume that firms draw both of these random variables from independent Pareto distributions. These two sources of heterogeneity generate variation in firms' sales across products and destinations. In order to sell a product in a foreign market, a firm incurs a fixed cost and a variable iceberg transport cost.

The CISE scheme provides an ad-valorem subsidy granted on the basis of firms' export sales of a given subset of products sold in countries other than India. Having discussed the main assumptions of the model we can now establish the first prediction it delivers in terms of evaluating the impact of the CISE subsidy on firm-level export performance:

Prediction 1 *The CISE subsidy only affects firms' exports of targeted products to the rest of the world.*

This result follows directly from the assumptions of CES preferences and constant marginal costs, which imply that firms maximize the profits they derive from each product-destination variety independently. Thus, a firm would choose to export a product to a given destination if and only if the variable profit it derives from doing so exceeds the fixed cost of market access. The CISE subsidy, therefore, does not affect the decision to export nor the sales of non-targeted product-destination combinations. Given Prediction 1, we now focus our attention on the effect of the subsidy on exports of targeted products to the rest of the world. Among these, the subsidy has the same effect as a reduction in the marginal cost of production or the variable cost of trade. That is, it induces firms to lower the price they charge for these products, thereby increasing the sales of targeted product-destination pairs that incentivized firms export. Thus,

Prediction 2 *The CISE subsidy increases firms' exports of targeted products to the rest of the world.*

The positive impact of the CISE subsidy on firms' exports of targeted product-destination pairs can be decomposed along the extensive and intensive margins: i.e. the effect on the share of product-destination pairs that a firm exports and on the average exports per product-country respectively. The subsidy increases the sales and variable profits that a firm obtains from exporting targeted products to the rest of the world. This, in turn, implies that the productivity and product

attribute thresholds that characterize firms' decision to export subsidized product-destination pairs fall.[13] Therefore, we can establish that:

Prediction 3 *The CISE subsidy has a positive effect on the extensive margin of exports of subsidized product-destination pairs. That is, firms increase the number of targeted products sold in the rest of the world.*

The response of the intensive margin involves two effects that operate in opposite directions. On the one hand, the subsidy increases the sales of product-destinations that firms were already exporting, as we established in Prediction 2, and this naturally increases average exports per product-country. On the other hand, once the subsidy is available, firms start to export product-destination combinations that generate lower revenues and this has a negative effect on average exports per product-country. As it is well known, these two opposite effects perfectly cancel out when firms' sales follow a Pareto distribution (Chaney, 2008). This yields our last prediction:

Prediction 4 *The CISE subsidy does not affect average exports per product-destination—the intensive margin of exports—of subsidized product-destination pairs.*

As we noted above, the prediction that the CISE subsidy does not affect exports of non-targeted product-destination combinations rests on the assumption that there are no cost linkages—either in terms of production or market access—across the product-destination varieties a firm produces. Several models of multi-product firms such as Eckel and Neary (2010), Mayer et al. (2014), Nocke and Yeaple (2014) and Arkolakis et al. (2016), relax this assumption and instead incorporate the notion of core competence—i.e. that firms are most efficient in producing a specific product variety and become less so as they expand the scope of products they produce.

This class of models, therefore, raises the possibility that the CISE subsidy could affect firms' export performance in non-targeted products as well as sales to India. For instance, if the subsidy induces firms to export more products to the rest of the world, this could overstretch the organizational capital that a firm utilizes to manage different product lines, as in the model of Nocke

[13] Because of the CES demand function that firms face, both productivity and product attributes that shift consumers' demand enter firms' sales of a given product in a given market in the same way. To establish the results in Appendix A we assume that firms are heterogeneous in terms of the demand they face across products and destinations. These two formulations are equivalent for the purposes of establishing the effect of the CISE subsidy on firm-level exports and their margins.

and Yeaple (2014). Higher marginal costs across the whole product range of a firm can therefore have a negative impact on exports of non-targeted product-destinations. Expanding the range of subsidized products that a firm exports can also have a positive effect on non-targeted products if firm-destination-specific market access costs are decreasing in the number of products that a firm sells in a given market, as Arkolakis et al. (2016) find for Brazilian exporters. Since several firms that receive the subsidy export multiple products to multiple markets, we also investigate empirically whether there is any evidence of indirect effects of the subsidy on firms' export performance among non-targeted product-destination pairs.

Empirical Implementation

Guided by Prediction 1 from our theoretical framework, we first set out to estimate the effect of the CISE subsidy on firm-level exports of eligible products sold to the rest of the world. Letting i index firms, k products, c export destinations and t years, we define firm i's total exports of CISE-eligible products sold to the rest of the world in year t as $R_{it}^{E} = \sum_{c=1}^{C}\sum_{k=1}^{\underline{k}} r_{ikct}$, where $c \in \{1,\ldots,C\}$ denote export destinations other than India (which is indexed by $c=0$) and $k \in \{1,\ldots,\underline{k}\}$ index eligible products. The number of eligible product-destinations exported by firm i in year t is given by $N_{it}^{E,kc} = \sum_{c=1}^{C}\sum_{k=1}^{\underline{k}} \mathbf{1}(r_{ikct} > 0)$, where $\mathbf{1}(\cdot)$ is the indicator function, and average exports per product-destination are given by $\overline{R}_{it}^{E,kc} = R_{it}^{E}/N_{it}^{E,kc}$. With these definitions at hand, we estimate the following outcome regression using firm-year data over the period 2011-2014:

$$\ln y_{it}^{E} = \beta S_{it} + f_i + f_t + \varepsilon_{it}. \tag{1}$$

In the regression above y_{it}^{E} denotes a given export outcome—total exports, number of products, destinations, product-destinations exported or average exports per product, destination or product-destination—of eligible products sold in the rest of the world for firm i in year t.[14] Our variable of interest is S_{it}, an indicator that turns on when firm i receives the subsidy in year t and f_i and f_t

[14]The number of products and destinations exported as well as the average exports per product and average exports per destination are defined in an analogous way to the extensive and intensive margins at the product-destination level above. Let $R_{it}^{E,k} = \sum_{c=1}^{C} r_{ikct}$ denote firm i's total exports of product k in year t and $R_{it}^{E,c} = \sum_{k=1}^{\underline{k}} r_{ikct}$, indicate total exports of firm i to country c in year t. Then, the number of eligible products that firm i exports in year t is $N_{it}^{E,k} = \sum_{k=1}^{\underline{k}} \mathbf{1}(R_{it}^{E,k} > 0)$ and the number of rest-of-the-world countries that firm i exports to in year t is $N_{it}^{E,c} = \sum_{c=1}^{C} \mathbf{1}(R_{it}^{E,c} > 0)$. Average exports per product and per country for firm i in year t are $\overline{R}_{it}^{E,k} = R_{it}^{E,k}/N_{it}^{E,k}$ and $\overline{R}_{it}^{E,c} = R_{it}^{E,c}/N_{it}^{E,c}$ respectively.

are firm and year fixed effects respectively. Standard errors are clustered at the firm level.

The main challenge we face in estimating the effect of the CISE subsidy on export performance is the so-called fundamental problem of causal inference—we cannot observe what the exports of treated firms would have been had they not received the subsidy—and therefore need to estimate the expectation of this potential outcome. Since the allocation of subsidies is not random, export outcomes of firms that did not receive the subsidy are unlikely to be appropriate proxies for the expected counterfactual performance of treated firms. Therefore, to control for selection into the treatment based on observables we use the doubly-robust matching estimator method proposed by Wooldridge (2007); this estimator is also used by Van Biesebroeck et al. (2015) to evaluate the effect of the Trade Commissioner Service, an export promotion program in Canada. This method involves estimating regression (1) using different weighting schemes, which we describe in detail below, to construct an appropriate counterfactual for subsidized firms on the basis of their observable characteristics before receiving the treatment—i.e. 2011, the year before the CISE scheme came into place. This estimator has the advantage that it is consistent as long as either the conditional mean regression (1) or the treatment selection models are correctly specified (Imbens and Wooldridge, 2009). The key identifying assumption is that the pre-treatment observable covariates contain all relevant characteristics determining whether a firm receives the export subsidy or not, while the firm and time fixed effects in the outcome regression control for time-invariant factors and aggregate shocks affecting export performance. This means that we identify the effect of the subsidy by exploiting within-firm variation in export performance of treated firms relative to the firms in the control group determined by our weighting scheme.

We now specify our model for the probability of receiving the export subsidy among firms that carried out at least one export transaction satisfying the scheme's eligibility criteria (i.e. exporting one of the products listed in Table 1 to a country other than India) in 2011. We estimate a probit model in which the dependent variable takes the value 1 if a firm received the export subsidy at any point after 2012 and 0 otherwise. The set of covariates we use, $\mathbf{X}_i$, are: the log value of total exports, the share of exports sold in the rest of the world, the share of exports accounted for by eligible products, a dummy variable taking the value 1 when the difference between a firm's exports and imports exceeds 30% (a proxy for firms' domestic value addition), an indicator for the firm's importer status, the Herfindahl index of exports calculated at the HS 6-digit product level, as well

as sectoral measures of physical and human capital intensity.[15]

We implement three weighting schemes based in our specification of the treatment selection model: (i) inverse probability (IPW), (ii) propensity score matching (PSM) and (iii) Mahalanobis or nearest neighbor matching (NNM). To estimate the average treatment effect on the treated using IPW we assign a weight of 1 to subsidized firms and $\widehat{\rho}(\mathbf{X}_i)/(1-\widehat{\rho}(\mathbf{X}_i))$ to control firms, where $\widehat{\rho}(\mathbf{X}_i)$ denotes the estimated propensity score. PSM matching assigns a weight of 1 to each treated firm and its respective control—i.e. the unsubsidized firm that is closest in terms of its propensity score—and 0 otherwise. NNM works in the same way as PSM, but treated and control firms are matched according to the Mahalanobis distance between covariates instead of the propensity score.[16]

Several papers in the literature evaluating the effects of export promotion agencies, e.g. Volpe Martincus and Carballo (2008) and Görg et al. (2008), use a matching difference in differences method to estimate the impact of a policy intervention. Doing so would involve matching treated and untreated firms using the propensity score and then comparing the first difference in export outcomes between the two groups. This estimation strategy is very close to the one we employ. The main difference is that the matching difference in differences strategy requires us to identify different pre- and post-treatment periods for different firms depending on when they receive the subsidy for the first time. Our panel estimator relies instead on variation over time on export performance when the treatment status of a firm changes. For this reason we prefer to use the weighted panel regression method.

Another alternative could have been to estimate a triple differences model in which we compare within-firm exports of eligible and non-eligible products between firms that are subsidized and those that are not, over time. The identifying assumption in this case is that non-eligible products are an appropriate control group for eligible products. The data, however, strongly suggests the contrary. Eligible products integrate a higher share of domestic value-added and are more important among exports to the rest of the world. In addition to this, it is plausible that exports of non-eligible products and to foreign destinations not covered by the CISE scheme could be affected by the subsidy through cost linkages within firms, as we discussed in our theoretical framework. Under these circumstances, non-eligible products and non-targeted destinations should not be used as

[15] The latter two variables are constructed with U.S. data from Bartelsman and Gray (1996).

[16] Our results are robust to changing the the number of control firms used to match each treated firm with the PSM and NNM methods.

control groups either. We will investigate the existence of such indirect effects of the CISE subsidy in a separate set of regressions instead.

5 Results

In this section we first discuss the estimates of our model predicting the probability that a firm exporting eligible products to the rest of the world before the CISE scheme began to be implemented received the subsidy after 2012, and evaluate the quality of our matching procedure. We then move to discuss our estimates of the average treatment effect of the CISE subsidy on firm-level export outcomes, both for eligible products sold in the rest of the world and the other product-destination combinations that are not directly targeted by the policy.

Table 6 presents the estimates of the probit model used to calculate the propensity score. Column (1) shows that exporter size (in terms of export sales) is a strong predictor of treatment. Larger exporters are more likely to be aware of the availability of the export subsidy scheme and are also more likely to find it optimal to incur the administrative costs involved in applying to and securing the subsidy. The coefficients reported in columns (2)-(4)—all of which are positive and strongly significant—indicate that the firms that received subsidies after 2012 were already engaged in the activities that the CISE scheme sought to incentivize in 2011: i.e. exporting a high share of eligible products incorporating a high proportion of local content to countries other than India. Column (5) includes all the variables discussed before, and interestingly, once that size and the share of exports of eligible products to the rest of the world are controlled for, high domestic value added loses its significance in predicting a firm's treatment status. This is likely the case because eligible products sold outside India incorporate a high share of local inputs already, as we noted in Section 2. Column (6) presents the full specification used to estimate the propensity score. In addition to the covariates included in column (5), we add an indicator for a firm's importer status, the product-level Herfindahl index of export sales—which accounts for the possibility that higher sales concentration facilitates firms' coordination to lobby for subsidies (Caves, 1976; Grossman and Helpman, 1994)—and sector-level human and physical capital intensities, which intend to capture the potential for domestic value addition. While the first-stage probit model does a good job in predicting firms receiving the CISE subsidy, there still is substantial variation left unexplained.

This allows us to find unsubsidized firms (exporting eligible products to the rest of the world) that closely resemble treated firms in terms of their observable characteristics, and therefore constitute a suitable control group to estimate the effects of the subsidy on export outcomes.

Table 6: First Stage Probit for the Probability of Receiving the Export Subsidy

	(1)	(2)	(3)	(4)	(5)	(6)
Log export value	0.365***				0.506***	0.488***
	(0.034)				(0.052)	(0.054)
Shr. exports to ROW		0.542***			1.385***	1.322***
		(0.172)			(0.260)	(0.284)
Shr. exports eligible products			0.828***		1.031***	0.944***
			(0.183)		(0.214)	(0.230)
Domestic VA $\geqslant$ 30% dummy				0.707***	-0.001	-0.003
				(0.112)	(0.138)	(0.146)
Importer dummy						0.526
						(0.593)
Product-level Herfindahl						-0.213
						(0.334)
Physical capital intensity						-0.516
						(0.581)
Human capital intensity						2.555***
						(0.695)
Observations	917	917	917	917	917	912
Pseudo R-squared	0.194	0.012	0.032	0.050	0.309	0.329
χ^2 joint significance test (p-value)	0.000	0.002	0.000	0.000	0.000	0.000

The table reports the coefficients of a probit model estimated among the set of firms that conducted at least one export transaction of a CISE-eligible product sold to a country other than India in 2011 (the pre-treatment year). The dependent variable takes the value 1 if a firm received the CISE export subsidy at any point between 2012 and 2014 and 0 otherwise. All covariates, with the exception of physical and human capital intensities, which come from Bartelsman and Gray (1996), are measured in 2011. The propensity score used to weight the regressions presented in the main body of the paper corresponds to the specification in column (6). Standard errors in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

The identification of the treatment effect requires that the procedure used to match treated and control firms achieves balancing of the covariates used to predict treatment status. Table 7 presents standardized differences and variance ratios for each of the three weighting schemes we utilize. The large pre-treatment differences between subsidized and control firms—particularly in terms of size, the allocation of exports across products and destinations and domestic value-added—are largely eliminated by weighting. The standardized differences of all covariates with one

exception fall well below 20%, the informal criterion employed in the literature (Girma and Görg, 2007; Volpe Martincus and Carballo, 2008). Similarly, the variance ratios move closer towards unity after weighting and the overidentification test proposed by Imai and Ratkovic (2014) does not reject the null hypothesis that covariates are balanced. Table 8 presents the pseudo R-squared and joint significance tests obtained after running the treatment status probit model using only the treated firms and their respective controls (Caliendo and Kopeinig, 2008). The results of this exercise—i.e. that the pseudo R-squared measures are very close to zero and that we do not reject the null hypothesis of the joint significance test—suggest that once we control for observable covariates, assignment into the treatment is as good as random.

Table 7: Indicators of Matching Quality

Variable	Standardized differences				Variance ratio			
	Raw	Weighted			Raw	Weighted		
		IPW	PSM	NNM		IPW	PSM	NNM
Log export value	1.242	-0.056	-0.009	0.255	0.449	0.852	1.083	1.171
Shr. exports to ROW	0.288	0.070	0.006	-0.010	0.441	0.633	0.721	0.789
Shr. exports eligible products	0.473	0.050	-0.026	-0.010	0.608	1.155	1.242	0.962
Domestic VA $\geqslant$ 30% dummy	0.563	-0.032	0.057	0.000	1.692	0.992	1.021	1.000
Importer dummy	0.133	0.007	0.000	0.000	0.311	0.928	1.000	1.000
Product-level Herfindahl	-0.168	-0.01	0.1621	0.063	0.862	1.011	1.947	1.182
Physical capital intensity	-0.134	0.112	-0.154	0.011	0.425	0.947	0.533	1.001
Human capital intensity	0.565	0.001	0.055	0.009	0.958	1.041	1.576	1.024
Imai-Ratkovic overidentification test p-value (H_0: covariates are balanced): 0.258								

IPW stands for inverse probability weighting, PSM stands for propensity score matching weighting and NNM for Mahalanobis matching weighting.

Table 8: Joint Significance and Pseudo R-squared of Treatment Status Model

	Raw data	Weighted data		
		IPW	PSM	NNM
Pseudo R-squared	0.329	0.004	0.015	0.017
χ^2 test (p-value)	0.000	0.983	0.745	0.763

The table reports the pseudo R-squared and p-value of the χ^2 joint significance test from running the probit model of the probability of receiving the CISE export subsidy (column (6) of Table 6) and the same statistics when the model is estimated using only the treated and matched control firms. IPW stands for inverse probability weighting, PSM stands for propensity score matching weighting and NNM for Mahalanobis matching weighting.

Effect on Exports of Eligible Products Sold in the Rest of the World

We now discuss the magnitude of the effect of the export subsidy on export outcomes of targeted product-destination combinations. The sample we use in our estimation consists of 912 firms which conducted at least one export transaction involving an eligible product sold in the rest of the world in 2011; 141 of them received the subsidy at least once between 2012 and 2014. It is worth noting that the distribution of propensity scores of treated and control firms exhibit full overlap—this enables us to not exclude any treated firms from the analysis.

Table 9 presents our estimates of the average treatment effect of the export subsidy on treated firms' exports of eligible products sold to the rest of the world. First, note that the OLS estimates consistently understate the impact of the subsidy relative to our matching estimates for the extensive margin and indicate a negative effect of the subsidy both on the intensive margin of exports and on total export sales. As we discussed before, these estimates compare firms that received the subsidy with those that did not, only controlling for time-invariant firm-level characteristics that determine export performance and aggregate shocks. Table 6, however, shows that unsubsidized firms are systematically different from firms that actually received the treatment in terms of observable characteristics that determine their likelihood to obtain the subsidy.

Our matching-based estimates control for selection into treatment based on observable characteristics. The use of different weights when we estimate (1) ensures that our results are robust with respect to the choice of counterfactuals. All these estimates paint a similar picture which supports the predictions we derived from our theoretical framework. We find a very robust, positive and significant effect of the subsidy on the extensive margin of exports, as Prediction 3 establishes. More precisely, our estimates indicate that receiving the subsidy led firms to increase the number of product-destination combinations they export by 11-12% in the year they received the incentive relative to the control group. The two dimensions of the extensive margin—the number of destinations reached and the number of products exported—increase significantly when firms receive the subsidy, but the impact on the former margin is stronger: the number of destinations served by a subsidized firm increases by 10-12%, while the number of eligible products exported rises by 6-7%. Consistent with Prediction 4, we do not find a statistically significant effect of the subsidy on firms' average exports per product, destination or product-destination—i.e. the intensive margin of

exports. While our estimates of the average treatment effect of the subsidy on total export sales are all positive—as Prediction 2 suggests—they are not very robust. The range of the effect is very broad and the estimates are only marginally significant at the 10% level in two out of three of our specifications. The results reported in Table 9 remain unchanged when we add a measure of the intensity of treatment (the log of subsidy payments) to regression (1) following Van Biesebroeck et al. (2015); although in most specifications the point estimate of the treatment intensity variable is not statistically significant.

Table 9: Average Effect of Export Subsidy—Eligible Products sold in the Rest of the World

	Extensive Margin			Intensive Margin			Total
	Number of export			average sales per			export
	prod.-dest.	dest.	prod.	prod.-dest.	dest.	prod.	value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
OLS	0.079**	0.086**	0.061**	-0.205**	-0.203**	-0.136	-0.088
	(0.037)	(0.033)	(0.030)	(0.081)	(0.103)	(0.095)	(0.090)
Inverse probability	0.101***	0.108***	0.061**	0.026	-0.051	0.027	0.152*
(IPW)	(0.036)	(0.032)	(0.030)	(0.083)	(0.106)	(0.095)	(0.091)
Propensity score	0.112***	0.117***	0.069**	0.038	-0.040	0.043	0.181*
(PSM)	(0.041)	(0.037)	(0.034)	(0.095)	(0.118)	(0.106)	(0.104)
Mahalanobis matching	0.102***	0.093***	0.058*	-0.036	-0.070	0.001	0.100
(NNM)	(0.038)	(0.035)	(0.033)	(0.086)	(0.112)	(0.101)	(0.095)

Entries in the table are the average effect of the CISE export subsidy on the log export outcome in the corresponding column among firms that received the subsidy. All regressions include firm and year fixed effects. Products are defined at the HS 6-digit level. Standard errors clustered at the firm level in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

One potential concern is that the CISE scheme groups very different products and therefore that our benchmark results might mask heterogeneous responses of exporters to the subsidy. To address this issue, we estimate regression (1) on the subsample of firms exporting textile and clothing products included in the CISE scheme.[17] Doing so has two clear advantages: first, conducting our estimation on a set of firms that export relatively similar products makes for a cleaner comparison between treated and control firms; second, this subset of products alone accounts for approximately

[17]These are firms that export carpets & textile floor coverings, man-made staple fibres, man-made filaments, apparel and clothing accessories and other made up textile articles; that is, products belonging to HS 2-digit sectors 50 to 63 that are included in the CISE list.

one-third of all Nepalese exports of eligible products to the rest of the world and more than half of subsidy disbursements. The estimates of the impact of the subsidy on textiles & clothing exporters are reported in Table 10.[18] The findings from this estimation are very similar to the ones we obtain from our benchmark—both from a qualitative and quantitative standpoint.

Table 10: Average Effect of Export Subsidy—Eligible Products sold in the Rest of the World (Textiles and Clothing products only)

	Extensive Margin			Intensive Margin			Total
	Number of export			average sales per			export
	prod.-dest.	dest.	prod.	prod.-dest.	dest.	prod.	value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
OLS	0.081*	0.071**	0.085**	-0.118	-0.143	-0.119	-0.011
	(0.042)	(0.032)	(0.038)	(0.093)	(0.105)	(0.102)	(0.110)
Inverse probability	0.107***	0.073**	0.109***	0.042	-0.020	0.018	0.169
(IPW)	(0.040)	(0.032)	(0.037)	(0.093)	(0.107)	(0.101)	(0.108)
Propensity score	0.110**	0.078**	0.101**	0.032	-0.037	-0.019	0.159
(PSM)	(0.045)	(0.034)	(0.042)	(0.100)	(0.118)	(0.107)	(0.116)
Mahalanobis matching	0.112**	0.080**	0.100**	0.075	0.018	0.034	0.217*
(NNM)	(0.044)	(0.035)	(0.039)	(0.101)	(0.117)	(0.113)	(0.119)

Entries in the table are the average effect of the CISE export subsidy on the log export outcome in the corresponding column among firms that received the subsidy. All regressions include firm and year fixed effects. Products are defined at the HS 6-digit level. Standard errors clustered at the firm level in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

To put our benchmark results in context, we compare our estimates with those obtained by the literature evaluating the impact of export promotion agencies (EPA). Our findings are consistent with the work that focuses on export promotion in developing countries, e.g. Volpe Martincus and Carballo (2008) (Peru), Álvarez and Crespi (2000), Volpe Martincus and Carballo (2010) (Chile), and Cadot et al. (2015) (Tunisia). These studies have consistently found a positive and significant effect of promotion efforts on the extensive margin of exports (number of products exported and destinations served) ranging from 5 to 16%. Our estimates for the effect of the CISE export subsidy fall right in the middle of this range. This result is interesting in light of the fact that

[18] It is important to note that we re-estimate the propensity score we use to produce the estimates in Table 10. That is, we estimate the probability that a firm that conducted at least one export transaction involving eligible products within the textiles & clothing sectors in 2011 receives the CISE subsidy at any time after 2012. The estimates of the propensity score for this subsample of firms are available upon request.

the specific instruments that EPA rely upon to foster exports and that this literature assesses vary tremendously in scope (e.g. co-financing of export business plans, logistic help in meeting foreign buyers, advertising and promotion, among others) and are very different from the ad-valorem cash subsidy we study. Similarly to this literature, we do not find that the intensive margin of exports is significantly affected by export promotion; almost all instances in which the latter margin responds to instruments of export promotion have been identified in developed countries (Görg et al., 2008; Van Biesebroeck et al., 2015). One potential reason for the lack of response of the intensive margin to the subsidy is that exporters from developing countries find it very hard to sustain export orders from high income countries. Atkin et al. (2017) document that among Egyptian rug producers, only one in seven export relationships moves beyond trial orders. There is suggestive evidence that this is also a crucial bottleneck for Nepalese exporters. The WTO (2012) documents a high occurrence of export rejections due to not meeting international standards and technical requirements, particularly in traditional agricultural exports (e.g. honey, ginger, and herbal medicines) and rugs and carpets—some of the products that have received the highest share of the funds from the CISE scheme.

Our results show that the firms that received the export subsidy were predominantly large exporters that were already doing what the CISE scheme sought to encourage—that is, exporting eligible products to the rest of the world. This outcome might have been facilitated by the allocation of the subsidy on a first-come, first-served basis rather than through a more targeted way. It appears that the CISE scheme in its current version does not provide a strong enough incentive for firms to increase substantially the value of their exports and has instead rewarded firms for doing something that they would have done even if they were not subsidized. Perhaps cash subsidies could be more effective in increasing exports if they were supplemented with other interventions—e.g. providing training to reduce export rejections or improving the connectivity with Indian customs to avoid delays in the their ports—that would help Nepalese exporters to increase the scale of their operations.

Another crucial aspect of the CISE scheme is how expensive it is. The program's annual outlay—approximately 3.2 million US dollars in 2014 (see Table 4)—is larger than the entire budget of export promotion agencies in countries such as Bolivia, El Salvador, Guatemala, Honduras, Paraguay, and the Philippines (see Table 2.5 in Volpe Martincus, 2010)—all of which have a GDP per capita at

least three times as high as that of Nepal. Thus, while we find that the CISE subsidy has induced treated firms to diversify their exports, the lack of a robust effect on export sales combined with its high fiscal cost leads us to conclude that the scheme has not been very effective in achieving its stated objectives.

Effect on Exports of Non-Targeted Product-Destinations

As outlined in our theoretical framework, Prediction 1—i.e that the CISE subsidy would only affect exports of eligible products to the rest of the world—is based on the assumption that the cost of production and market access is independent across all product-destination combinations that a given firm exports. If there are linkages across products, for instance if firms face binding capacity constraints, or if the marginal cost for different product varieties is affected by the product scope that a firm chooses, then the subsidy could affect the exports of non-targeted product-destinations.

Since most firms in our sample are multi-product exporters operating in several different markets, we explore the possibility that the CISE export subsidy had any within-firm effects on exports of products and destinations not directly targeted by the scheme. To do so, we estimate a regression analogous to (1) where we aggregate firm i's exports of: (i) non-CISE-eligible products sold in the rest of the world, (ii) eligible products sold in India and (iii) non-eligible products sold in India in a given year t. We estimate the effect of the CISE subsidy on total export sales and the extensive and intensive margin in the same way as in our benchmark regressions. Naturally, for firms' exports of eligible and non-eligible products to India, we only assess whether the subsidy led firms to increase the number of products they export.

Table 11 reports the estimates of the average treatment effect for exports outcomes related to sales of non-eligible products in the rest of the world, eligible products shipped to India and non-eligible products sold in India. We do not find any significant effects of the subsidy on the export margins of non-targeted product-destination combinations.

Table 11: Average Effect of Export Subsidy—Other Product-Destination Combinations

	Extensive Margin			Intensive Margin			Total
	Number of export			average sales per			export
	prod.-dest.	dest.	prod.	prod.-dest.	dest.	prod.	value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
OLS							
Non-eligible in ROW	0.028	0.015	0.068	-0.072	-0.040	-0.098	-0.046
	(0.063)	(0.045)	(0.063)	(0.119)	(0.131)	(0.135)	(0.141)
Eligible in India			0.040	0.049	0.049	-0.061	0.148
			(0.056)	(0.184)	(0.184)	(0.197)	(0.206)
Non-eligible in India			0.021	0.194	0.194	0.079	0.162
			(0.080)	(0.250)	(0.250)	(0.264)	(0.298)
Inverse probability (IPW)							
Non-eligible in ROW	0.089	0.061	0.094	0.125	0.121	0.079	0.223
	(0.066)	(0.044)	(0.066)	(0.119)	(0.132)	(0.134)	(0.140)
Eligible in India			0.041	0.109	0.109	-0.092	0.235
			(0.056)	(0.209)	(0.209)	(0.230)	(0.236)
Non-eligible in India			0.069	0.156	0.156	-0.032	0.189
			(0.083)	(0.277)	(0.277)	(0.265)	(0.322)
Propensity score (PSM)							
Non-eligible in ROW	0.083	0.044	0.091	0.068	0.064	0.033	0.156
	(0.072)	(0.050)	(0.068)	(0.144)	(0.148)	(0.148)	(0.170)
Eligible in India			0.089	0.365	0.365	0.179	0.549*
			(0.064)	(0.270)	(0.270)	(0.282)	(0.306)
Non-eligible in India			0.003	0.186	0.186	0.067	0.134
			(0.085)	(0.308)	(0.308)	(0.320)	(0.339)
Mahalanobis matching (NNM)							
Non-eligible in ROW	0.071	0.058	0.078	0.061	0.045	0.056	0.146
	(0.074)	(0.052)	(0.071)	(0.147)	(0.161)	(0.159)	(0.161)
Eligible in India			0.019	0.213	0.213	0.111	0.278
			(0.058)	(0.230)	(0.230)	(0.230)	(0.252)
Non-eligible in India			0.021	-0.004	-0.004	-0.162	0.003
			(0.079)	(0.353)	(0.353)	(0.339)	(0.398)

iEntries in the table are the average effect of the CISE export subsidy on the log export outcome in the corresponding column among firms that received the subsidy. All regressions include firm and year fixed effects. Products are defined at the HS 6-digit level. Standard errors clustered at the firm level in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

6 Conclusion

In this paper we estimate the impact of the Cash Incentive Scheme for Exports export subsidy offered by the government of Nepal on firm-level exports. In so doing, we assess whether the program has fulfilled its objectives of increasing exports and fostering export diversification over the period 2012-2014. The scheme offers firms an ad-valorem subsidy of 1 or 2% of the value of their exports of a select group of 31 products, as long as these are sold in countries other than India. This is the first paper that evaluates the effect of a 'textbook' ad-valorem cash subsidy granted on the basis of export sales on firm-level export performance, and is also the first paper to assess the effect of an export promotion policy in a Least-Developed Country.

Using a doubly-robust matching estimator to control for firms' selection into the scheme, we evaluate the impact of receiving the subsidy on firms' exports of targeted and non-targeted product-destination combinations as well as on their extensive and intensive margins. To guide our empirical analysis we derive a set of theoretical predictions about the impact of the subsidy on exports and its different margins based on a workhorse model of trade in which heterogeneous multi-product firms export their output to multiple destinations. Our empirical results are consistent with the implications derived from our model.

We find that the subsidy increases the exports of targeted product-destinations of incentivized firms through the extensive margin—i.e. it induces subsidized firms to export more products and to sell to more foreign markets in the rest of the world. We do not find a significant effect of the subsidy on the intensive margin of exports among product-destination pairs targeted by the subsidy. We also do not find any discernable impact of the subsidy on firms' exports to India nor on exports of products not included in the CISE scheme.

Our analysis shows that while the subsidy has succeeded in encouraging Nepalese firms to reach new foreign markets and export new products, the limited response produced on the intensive margin and the high fiscal cost of the scheme have severely hindered its effectiveness in achieving its stated objectives of promoting exports and their diversification. Our work provides valuable insights for Nepal and other developing countries seeking to leverage the broader trade policy scope offered by the principle of Special and Differential Treatment for Developing Countries.

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Appendix

A Proofs

In this section we present the problem of an individual firm which produces multiple products to be exported to different foreign markets, following closely the model of Bernard et al. (2011). We derive predictions about how a subsidy targeting a subset of products and destinations—like the CISE scheme—affects the firm's exports along the intensive and extensive margins.

There are two differences between our formulation and the original model of Bernard et al. (2011). First, their model features a continuum of products while ours has a discrete number of products. This distinction is immaterial in the context of the problem an individual firm; the continuum of products assumption matters to calculate price indices and other aggregate variables in general equilibrium. Second, the model in Bernard et al. (2011) has two sources of firm heterogeneity: productivity, which is firm specific, and what they call "product attributes" which vary at the product-destination level; our model only features the latter. Since the demand function we assume is isoelastic (as would be the case when consumers have CES preferences), both productivity and product attributes enter the firm's revenue in the same way. Thus, a revenue shifter that varies across products and destinations encompasses both sources of heterogeneity.

Consider the problem of a firm based in Nepal, which can export its products to $C+1$ foreign destinations: India ($c=0$) and the rest of the world, $c \in \{1,\ldots,C\}$. In each country, individuals consume K products indexed by $k \in \{1,\ldots,K\}$. Nepalese firms have the option to produce a unique, horizontally-differentiated variety of each product. The demand faced by a firm selling a variety of product k in country c is:

$$q_{kc} = A_c z_{kc} p_{kc}^{-\sigma}, \tag{A.1}$$

where A_c denotes country i's size, z_{kc} is a product-destination-specific revenue shifter, p_{kc} is the price that the firm charges for product k in country c and $\sigma > 1$ is the elasticity of demand. The firm draws the revenue shifter it faces in a given product-country pair from a Pareto distribution with probability density function $g(z) = az^{-(a+1)}$ and cumulative density function $G(z) = 1 - z^{-a}$, with $a > 1$ and $z \geqslant 1$. We assume that the distributions from which the firm draws revenue shifters are independent across products and countries.

The firm produces all varieties using a linear technology that requires one unit of labor to produce one unit of output. Given the isoelastic demand function (A.1), being more productive is equivalent, from the point of view of the firm's revenue, to face a higher demand across all product-destination pairs. The firm incurs two costs if it chooses to export to country c: a fixed cost of $f_c > 0$ units of labor per product and an iceberg transportation cost $\tau_c \geqslant 1$. Thus, the marginal cost of producing a product variety to be sold in country c is $w\tau_c$, where w denotes the wage the firm pays its employees.

The CISE scheme offers a (gross) ad-valorem subsidy $S > 1$ to the firm based on its sales of targeted products to the rest of the world. Without loss of generality, we assume that only products $k = 1, 2, \ldots, \underline{k} < K$ receive the subsidy. The profit maximization of the firm can be written as

follows:

$$\max_{\{p_{kc}\}} \quad \pi = \sum_{k=1}^{K} \Big[\left(p_{k0} - w\tau_0\right) A_0 z_{k0} p_{k0}^{-\sigma} - w f_0 \Big] + \sum_{c=1}^{C} \left\{ \sum_{k=1}^{\underline{k}} \Big[\left(S p_{kc} - w\tau_c\right) A_c z_{kc} p_{kc}^{-\sigma} - w f_c \Big] + \sum_{k=\underline{k}+1}^{K} \Big[\left(p_{kc} - w\tau_c\right) A_c z_{kc} p_{kc}^{-\sigma} - w f_c \Big] \right\}. \quad \text{(A.2)}$$

The first term of (A.2) is the firm's profit from selling in India, while the second and third terms denote profits that the firm accrues respectively from exporting targeted and non-targeted products to the rest of the world.

Since the marginal cost for all product varieties is constant, this implies that there are no complementarities between product varieties. The firm, therefore, chooses the price of each product variety to maximize the profit it obtains from each product-destination pair in isolation.

Optimal prices are given by:

$$p_{kc} = \begin{cases} \frac{\sigma}{\sigma-1} \cdot \frac{\tau_c w}{S} & \text{if} \quad c \in \{1,\ldots,C\} \quad \text{and} \quad k \in \{1,\ldots,\underline{k}\} \\ \\ \frac{\sigma}{\sigma-1} \cdot \tau_c w & \text{if} \quad c = 0 \quad \text{or} \quad k \in \{\underline{k}+1,\ldots,K\}, \end{cases} \quad \text{(A.3)}$$

and sales of product k in country c before the subsidy and conditional on exporting, r_{kc}, are given by:

$$r_{kc} = \begin{cases} S^{\sigma-1} \left(\frac{\sigma-1}{\sigma}\right)^{\sigma-1} A_c z_{kc} \left(\tau_c w\right)^{1-\sigma} & \text{if} \quad c \in \{1,\ldots,C\} \quad \text{and} \quad k \in \{1,\ldots,\underline{k}\} \\ \\ \left(\frac{\sigma-1}{\sigma}\right)^{\sigma-1} A_c z_{kc} \left(\tau_c w\right)^{1-\sigma} & \text{if} \quad c = 0 \quad \text{or} \quad k \in \{\underline{k}+1,\ldots,K\}. \end{cases} \quad \text{(A.4)}$$

The subsidy does not affect the firm's exports to India nor its sales of non-targeted products to the rest of the world. The subsidy does not affect the probability of starting to export new product varieties within the set of products and destinations not directly targeted by the scheme either.[19] This establishes our first prediction:

Prediction 1 *The CISE subsidy only affects the firm's exports of targeted products to the rest of the world.*

Given Prediction 1, we now focus on the effect of the subsidy on targeted products sold in the rest of the world. From (A.3) and (A.4), it follows that conditional on exporting, the CISE subsidy lowers the price of targeted product varieties and increases their export sales (given that the elasticity of demand is greater than 1).

The firm will produce product variety k to be sold in country c if the profit it obtains from selling it exceeds the fixed cost wf_c. This defines a zero-profit cutoff for the revenue shifter for targeted product-destination combinations given by:

$$z_{kc}^{*} = \frac{(\sigma w)^{\sigma}}{(\sigma-1)^{\sigma-1}} \cdot \frac{f_c}{A_c} \cdot \left(\frac{\tau_c}{S}\right)^{\sigma-1}. \quad \text{(A.5)}$$

[19] This result follows directly from the fact that the zero-profit revenue shifter cutoff for non-targeted products and exports to India does not depend on S.

Total exports of eligible product-destination combinations for the firm, R^E, are given by:

$$R^E = \sum_{c=1}^{C} \sum_{k=1}^{\underline{k}} \left[\int_{z_{kc}^*}^{\infty} r_{kc}(z_{kc}) g(z_{kc}) \mathrm{d}z_{kc} \right]. \tag{A.6}$$

Firm sales for a given product-destination pair can in turn be decomposed as the product of the probability that a firm exports a given product variety, ϕ_{kc}—the extensive margin—and the average export sales per product-destination pair, $\overline{r}_{kc}$—the intensive margin:

$$R^E = \sum_{c=1}^{C} \sum_{k=1}^{\underline{k}} \phi_{kc} \times \overline{r}_{kc}. \tag{A.7}$$

The probability that the firm exports targeted product k to country c, ϕ_{kc}, is given by:

$$\phi_{kc} = 1 - G\left(z_{kc}^*\right) = \left(z_{kc}^*\right)^{-a} = \frac{(\sigma-1)^{a(\sigma-1)}}{(\sigma w)^{\sigma a}} \cdot \left(\frac{A_c}{f_c}\right)^{a} \cdot \left(\frac{S}{\tau_c}\right)^{a(\sigma-1)}, \tag{A.8}$$

which is increasing in the subsidy S. Average exports per product-destination, $\overline{r}_{kc}$, are given by:

$$\overline{r}_{kc} = \frac{1}{1 - G(z_{kc}^*)} \int_{z_{kc}^*}^{\infty} r_{kc}(z_{kc}) g(z_{kc}) \mathrm{d}z_{kc} = \frac{a\sigma w}{a-1} \cdot \left(\frac{f_c}{A_c}\right), \tag{A.9}$$

which are independent of the subsidy.

Plugging back (A.8) and (A.9) into (A.7) yields:

$$R^E = S^{a(\sigma-1)} \cdot \frac{a\underline{k}}{a-1} \cdot \frac{(\sigma-1)^{a(\sigma-1)}}{(\sigma w)^{\sigma a - 1}} \cdot \sum_{c=1}^{C} \left[\left(\frac{f_c}{A_c}\right) \tau_c^{\sigma-1} \right]^{1-a}. \tag{A.10}$$

The expected number of targeted product-destination combinations sold by a firm, $\overline{N}_{ck}^E$, is in turn given by:

$$\overline{N}_{ck}^E = \frac{1}{\underline{k}C} \sum_{c=1}^{C} \sum_{k=1}^{\underline{k}} \phi_{kc} = \frac{1}{C} \cdot \frac{(\sigma-1)^{a(\sigma-1)}}{(\sigma w)^{\sigma a}} \cdot S^{a(\sigma-1)} \sum_{c=1}^{C} \left(\frac{A_c}{f_c \tau_c^{1-\sigma}} \right)^{a}. \tag{A.11}$$

Using Equations (A.8), (A.9), (A.10) and (A.11), we establish the following predictions:

Prediction 2 *The CISE subsidy increases firms' exports of targeted products to the rest of the world.*

Prediction 3 *The CISE subsidy has a positive effect on the extensive margin of exports of subsidized product-destination pairs. That is, the firm increases the number of targeted products sold in the rest of the world.*

Prediction 4 *The CISE subsidy does not affect average exports per product-destination—the intensive margin of exports—of subsidized product-destination pairs.*