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on Indian exporters\***

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This paper studies how exporting firms in India respond to the removal of preferential market access abroad. We exploit episodes of unexpected graduations from the EU Generalized System of Preferences (GSP), whereby the EU removes preferential (i.e. lower than MFN) GSP tariffs from beneficiary countries in sectors in which they are considered to be internationally competitive. Graduations impact on Indian firms in a variety of ways. First, graduations lead to an increase in the likelihood of firms exiting exporting altogether and, for surviving exporters, to a reduction in the total value exported. Second, we find a strong knock-on effect from reduced export opportunities to lower purchases of both foreign and domestic inputs. Looking at quantity and prices of sales and inputs separately, we find that firms react mainly along the price margin as unit prices of both sales and purchases fall. Third, graduations trigger a substitution response: firms' product scope shrinks, and resources are re-oriented internally towards non-affected products, whose sales increase in the aftermath of graduations.

**JEL codes:** F13, F14

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**Disclaimer.** This is a working paper and represents research in progress. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. Any errors are attributable to the authors.

# The Impact of GSP Graduations on Indian exporters\*

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## Abstract

This paper studies how exporting firms in India respond to the removal of preferential market access abroad. We exploit episodes of unexpected graduations from the EU Generalized System of Preferences (GSP), whereby the EU removes preferential (i.e. lower than MFN) GSP tariffs from beneficiary countries in sectors in which they are considered to be internationally competitive. Graduations impact on Indian firms in a variety of ways. First, graduations lead to an increase in the likelihood of firms exiting exporting altogether and, for surviving exporters, to a reduction in the total value exported. Second, we find a strong knock-on effect from reduced export opportunities to lower purchases of both foreign and domestic inputs. Looking at quantity and prices of sales and inputs separately, we find that firms react mainly along the price margin as unit prices of both sales and purchases fall. Third, graduations trigger a substitution response: firms' product scope shrinks, and resources are re-oriented internally towards non-affected products, whose sales increase in the aftermath of graduations.

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## 1 Introduction

Firms in developing countries that are members of preferential schemes can benefit from lower tariffs when exporting to the donor country, compared to the Most Favoured Nation (MFN) tariffs that are applied to imports from non-member countries. These schemes, currently in place in most developed economies, are unilateral and have been shown to stimulate trade between donors and beneficiaries, as tariff preferences can enhance the competitiveness of the products eligible for the preferential regime (Frazer and Van Biesebroeck, 2010; Thelle et al., 2015), provided that the latter is made available with a good degree of certainty (Borchert and Di Ubaldo, 2020).<sup>1</sup>

Trade preferences are not always offered unconditionally, however, especially to larger countries that have achieved an intermediate level of development. In the EU and the US Generalized System of Preferences (GSP), for instance, preferential tariffs are revoked from beneficiaries in specific products or sections<sup>2</sup> when they are considered to have become sufficiently competitive. In the EU GSP, this curtailing is applied to lower-middle income countries when their share of EU imports in a particular section, out of total EU imports from all GSP members in that section, exceeds a certain threshold. This selective removal of preferences is called a ‘graduation’<sup>3</sup>, and it entails the reversal of the import tariff regime for that country-section pair from the lower GSP tariff to the higher MFN tariff.

This work investigates how firms respond to the worsening of trading conditions resulting from a graduation in the EU GSP. We use detailed firm-level data for Indian firms collected via the Annual Survey of Industries (ASI) that allow us to trace out the implications of GSP graduation for different kinds of firms in terms of size and location and along various response margins. In addition, we exploit graduations that arose from the 2014 reform of the EU GSP scheme and as such could arguably not have been foreseen by Indian firms. Thus the exogeneity of changes in market access conditions implies that we are able to obtain unbiased estimates of firm responses to this policy intervention.

India graduated in five EU GSP sections in 2014, with the average applied tariff on the affected products rising from about 1% pre-graduation to 5.5% post-graduation.<sup>4</sup> The ASI

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<sup>1</sup>For a comprehensive review of the functioning and the effect of preferential tariff schemes see (Ornelas, 2016) and (Ornelas and Ritel, 2020)

<sup>2</sup>In the EU GSP, GSP sections are large groups of products designed on the basis of the 21 sections of the HS classification. There are 32 sections in the EU GSP but, unlike the HS sections, GSP sections are not an exhaustive partition of all the products in the classification, as GSP sections include only product eligible for GSP tariffs. Overall, about 66% of products at the 8-digit level are eligible.

<sup>3</sup>In the EU GSP there also graduations affecting entire countries, in addition to the graduation in specific sections. The ‘country-graduations’ are applied when a member is classified as an upper-middle income country by the World Bank consecutively for three years. We do not focus on the impact of country-graduations in this paper, however.

<sup>4</sup>Put differently, the preferential margin for Indian exporters over the MFN tariff went from about 4.5 per-

provides information on each firm's product scope, its export status, as well as the value of inputs sourced domestically and from abroad, respectively, plus a range of firm-level characteristics including their location in rural or urban areas. We obtained access to the non-public version of the ASI featuring a firm panel-ID indicator, which allows us to study the impacts of the removal of GSP preferences on a variety of firm and product margins in a rigorous within-firm or within-firm-product setting, respectively.

We study the effects of graduations along three main dimensions of firms' activity. First, we investigate the direct impact of worse trading conditions on the extensive and intensive margin of exports of affected firms. We find that GSP graduations result in a substantial increase in the likelihood of exiting exporting altogether and, for continuing exporters, in a reduction of the value of exports. Total sales are also negatively affected, as firms do not seem to be able to re-direct lost exports to the domestic market. These effects are particularly large for small firms located in urban areas.

Second, as export success has been linked to the type of inputs that firms have access to, we study the impact of reduced export opportunities on the sourcing behaviour of affected firms. We find a strong 'knock-on' effect from graduations to a stark contraction of purchases of foreign inputs. As on the sales side, small firms are cutting back their import purchases almost three times as much as large firms. Furthermore, affected firms also cut back on domestic inputs: even though this latter effect is smaller than that on imports, it suggests that the impact of graduations propagates from exporters to domestic firms, which are indirectly also hit.

Third, we find evidence of firms responding to graduations by re-organizing activity internally. Firms reduce their product scope, possibly due to products made for the EU being substantially different from those sold in other markets (including the domestic market, see previous point). At the same time, affected firms that continue to export appear to shift resources from affected to non-affected products, as sales of non-affected products increase sharply post-graduation.

Lastly, we attempt to shed some light on the forces behind the aforementioned results. At the firm-product level, we can exploit information on quantity and unit-prices of outputs and inputs of Indian firms: the price-quantity distinction enables us to ascertain that it is prices of affected products (within firm-product groups over time) that contract post-graduation, rather than physical quantities produced. On the inputs side, we also find that affected firms opt for buying cheaper varieties of both foreign and domestic inputs. These findings suggest that products that faced a worsening in market access conditions in the EU are sold more cheaply

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centage points on average (with a 2.5 percentage point standard deviation) to zero.

post-graduation, relative to unaffected products, and are made with cheaper inputs. Hence, graduations might trigger a perverse mechanism, working in reverse compared to that found for firms' access to wealthier foreign markets (Bastos and Silva, 2010; Bastos et al., 2018). Products sold on the export market, or in richer and more regulated foreign economies, are likely to require more expensive inputs compared to products sold domestically. A deterioration of market access in the large, rich, and strictly regulated EU Single Market could have induced Indian producers to reduce the price or the quality of their products, and to correspondingly buy cheaper or lower quality inputs to produce them. These findings are also compatible with the studies linking access to better foreign inputs to firms' export performance, both in terms of higher prices and quality (Manova and Zhang, 2012; Bas and Strauss-Kahn, 2015). Yet in our setting the shock originates from the exporting side, and worse exporting conditions lead firms to downgrade their input mix.

Our paper contributes primarily to the literature on the effects of preferential tariff schemes, where studies have thus far been conducted with data aggregated at the country level (Sapir, 1981; Herz and Wagner, 2011; Gil-Pareja et al., 2014; Ornelas and Ritel, 2020) or the product level (Frazer and Van Biesebroeck, 2010; Thelle et al., 2015; Borchert and Di Ubaldo, 2020; Hakobyan, 2017, 2020; Gnutzmann and Gnutzmann-Mkrtchyan, 2017; Gnutzmann-Mkrtchyan and Volmer, 2022; Forge et al., 2024). To the best of our knowledge, this paper is one of only two studies that exploit firm-level data to assess the impact of the removal of GSP preferences (Albornoz-Crespo et al., 2021).

Our paper is closest to the study by Albornoz-Crespo et al. (2021) who study the exclusion of Argentinian pharmaceutical products from the US GSP in the mid-1990s, due to an intellectual property rights dispute between the two countries. Albornoz-Crespo et al. exploit custom data for Argentina and find an increase in exit from exporting for the affected Argentinian firms, both from the US and from third markets, suggesting firm-level product complementarities across markets. They find little impact at the intensive margin, however, due to the reshuffling of products within firm by surviving exporters, suggesting product substitutability within a market. Albornoz-Crespo et al. (2021) also study changes in products' hierarchy within firms. Other than the differences in the policy setting between the two papers (a dispute on IPR resulting in the exclusion of relatively small and well-defined number of products on one side, and surprise competitiveness-related graduations affecting five large and heterogeneous product sections on the other), and the level of development of the countries involved, we offer a set of complementary results on the behaviour of affected firms with respect to purchases of foreign and domestic inputs, a detailed examination of quantity versus price effects within-firm-product

groups for both outputs and inputs, and we unpack the graduation effects for small vs large firms located in different areas.

The linkages that we establish between the export sales and import behaviour of Indian firms create connections between this paper and the literature studying firm-level effects and determinants of exports, in particular the works focusing on input and output prices, and input prices and export destinations (Bastos and Silva, 2010; Manova and Zhang, 2012; Bas and Strauss-Kahn, 2015; Bastos et al., 2018). Lastly, we also add, albeit less directly, to a recent literature on tariff hikes, which has developed as a consequence of the US-China trade war (Amiti et al., 2019; Flaaen et al., 2020; Fajgelbaum et al., 2020).

The rest of this paper is organized as follows: Section 2 presents the policy setting of the EU GSP reform that we exploit, describes the data and their preparation for analysis, and our empirical approach. Section 3 presents the firm-level findings; Section 4 presents the findings of the firm-product-level analysis. Section 5 concludes.

## **2 Data preparation and empirical setting**

The analysis of the effects of GSP graduations on Indian firms relies on the Annual Survey of Industries (ASI) panel dataset over the 2011-2019 period. The ASI survey is carried out annually by the Central Statistical Organisation (CSO) at Indian Ministry of Statistics and Programme Implementation (MOSPI) and includes detailed balance sheet and production information for approximately 60,000 plants or establishments (the number increases progressively over time, from about 52,000 in 2011 to 67,000 firms in 2019). The unit of analysis in the ASI is a “factory”, defined as the premises where 10 or more workers are working with the aid of power, or 20 or more workers are working without the aid of power. For simplicity, we will henceforth refer to ASI factories as firms.

The ASI is the Indian government’s principal source of industrial statistics on the formal manufacturing sector and collects detailed information on values, quantities, and unit prices of the products that Indian firms make and sell, as well as of the inputs they purchase, both from abroad and domestically. The ASI survey is designed to provide as good a representation as possible of the distribution of Indian firms across States, districts, sectors, and size groups. In this regard, the ASI is therefore different from alternative data sources collecting similar information, such as the widely used CMIE Prowess database<sup>5</sup>, which only contains information on firms listed on the Bombay Stock Exchange. Hence, exploiting the ASI allows us to investigate

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<sup>5</sup>Prowess has been used to study the behaviour of multiproduct firms and their responses to trade liberalization along various dimensions (e.g., product scope, imports of intermediates, productivity, prices and markups). See, for instance, Goldberg et al. (2010a), Goldberg et al. (2010b), and De Loecker et al. (2016)

the impact of losing preferential market access not only on large firms but also smaller ones, including factories located in rural areas, i.e. dimensions not covered by other datasets.

Furthermore, note that the publicly available version of the ASI does not allow users to follow firms over time, as the survey is not released with a common firm-ID across the years. MOSPI has, however, shared with us the panel-ID version of the ASI, which allows us to study the impact of GSP graduations in a more rigorous within-firm or within-firm-product setting, rather than having to perform the analysis on a pooled cross-section of firms, or on a panel of industries. The firm-level panel-ID ASI has been used in previous works to study the effects of employment policies (Martin et al., 2017), and firms' choices about the product mix they produce (Boehm et al., 2022). For more information on the ASI and the level of detail provided see, for instance, Boehm et al. (2018).

## **2.1 The EU GSP, its 2014 reform, the preparation of the ASI data**

The preparation of the ASI data for analysis, and the design of the empirical exercises that we perform, need to consider several aspects of the policy change that we exploit as well as features of the ASI survey.

Our primary aim is to assess how Indian firms were affected by EU GSP graduations. Under the rules of the EU GSP, preferential tariffs are removed in specific GSP sections when a beneficiary country is considered to have become internationally competitive. Competitiveness is measured by import-shares (the share of EU imports from a beneficiary in a section, out of total EU imports from all GSP members in that section), and a combination of beneficiary country and product group (the latter is called a 'GSP section') is graduated when the EU import share of that country-section exceeds a certain threshold. The import shares are computed every three years (with trade data for the previous three-year period), and the graduations last for the subsequent three years.

The EU GSP underwent a major reform in 2014, affecting several of the elements which can determine a graduation: about half of the previous membership was excluded from the scheme<sup>6</sup>, the sections that group GSP eligible products were increased from 21 to 32 (some sections were split in two or three smaller aggregates), and the graduations thresholds were amended. All these changes triggered a number of new and plausibly unexpected graduations, which would not have occurred in the absence of the reform. We use these graduations as the main policy shock to identify the effect of worse market access in the EU on Indian firms.

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<sup>6</sup>This included (i) countries that have signed an FTA with the EU, (ii) all the countries that had been classified as upper-middle income (World Bank income per-capita classification), and (iii) territories under the control of EU member countries. This led to a dramatic cut in the number of GSP members from 177 to 88.

In 2014, India was graduated for the first time in five GSP sections.<sup>7</sup> These graduations were applied for the subsequent three years (2014-16). In 2017, the graduations of all but two sections were confirmed for the following three-year period (2017-19)<sup>8</sup>, and in addition, three more sections were graduated. This relatively complex scenario of graduations and de-graduations is shown in Table 1.

Table 1: Graduations in the EU GSP in 2014-2019.

2014 round	2017 round
Duration: 2014-2016	Duration: 2017-2019
<b>S-5</b> – Mineral products	<b>S-5</b> – Mineral products
<b>S-6a</b> – Inorganic and organic chemicals	<b>S-6a</b> – Inorganic and organic chemicals
<b>S-6b</b> – Chemicals, other than organic and inorganic chemicals	
<b>S-8a</b> – Raw hides, skins, and leather	
<b>S-17b</b> – Motor Vehicles, bicycles, aircraft and spacecraft, ships and boats	<b>S-17b</b> – Motor Vehicles, bicycles, aircraft and spacecraft, ships and boats
	<b>S-14</b> – Pearls and precious metals
	<b>S-15a</b> – Ferro-alloys and articles of iron and steel
	<b>S-15b</b> – Base metals (excl. iron and steel), articles of base metals

Source: Authors' elaboration

Our work focuses the effect of the 2014 graduations only, as they are the first triggered by the operation of the new system introduced in the reform and, to ensure that we analyse impacts on firms with homogenous treatment over the entire 2011-2019 period, we only use products within sections S-5, S-6a, and S-17b, respectively, to identify the sample affected by the GSP graduations. For the same reasons, we exclude firms in sections S-6b, S-8a, S-14, S-15a and S-15b from the analysis altogether and use as control observations firms in all the other sections (neither graduated nor de-graduated in 2014 or 2017), whether producing GSP-eligible products or not. Of relevance for the analysis is also that eligibility for GSP tariffs varies at the product-level (8-digit CN). Since graduations apply to all eligible products within a section, this implies that firms can have heterogeneous exposure to graduations depending on the product mix that they produce.<sup>9</sup>

The ASI sampling strategy must also be considered in preparing the data for analysis. The ASI survey features both a Census component and a Sample component, with slight changes in the construction of both components over the years. The Census component includes all firms

<sup>7</sup>Section 11 (Textiles) had been graduated for India before the 2014 GSP reform, and this graduation was again confirmed in the 2014 round. As the reform did not change market access conditions for this section, we do not consider Section 11 to be affected by it.

<sup>8</sup>Sections 6b and 8a were de-graduated in 2017, and re-obtained their GSP treatment.

<sup>9</sup>For instance, GSP section S-5 (mineral products) includes only about 25% of the products in HS-section 5; the rest of the products in the HS section not being eligible for GSP. So, among mineral products producers, there are likely to be firms that make and sell both GSP-eligible and non-GSP eligible products.



from the less developed States (6 states up to 2016, then 7 states), and all firms with more than 100 employees from the other States (all firms with more than 50, 75, and 100 employees across different sets of States from 2016). The Sample component uses strata at the State-4-digit NIC 2008 level<sup>10</sup> up to 2012, then strata at the District-4-digit NIC 2008 level up to 2016, then strata at the District-3-digit NIC 2008 level from 2016 onwards.<sup>11</sup> In each stratum 20% of the firms are sampled. This results in the sampling changing twice over the 2011-2019 period, namely in 2013 and in 2016. This will be considered in the design of the estimation sample, and the separation of firms in the treatment and control groups.

In the ASI, products and inputs are classified according to the NPC-MS classification introduced in 2011. This is a 7-digit classification based on the CPC 2.0 classification for the first 5-digits, while the last two digits are specific to the Indian classification. We have concorded the NPC-MS to the HS-2012 classification, by concording the first 5-digits (corresponding to the CPC 2.0) to the HS-2007 classification, and then the HS-2007 to the HS-2012.<sup>12</sup> This allowed us to then use information on product eligibility for the EU GSP, available from UNCTAD TRAINS, to identify the products that benefit from preferential market access in the EU, and those in sections that graduated in 2014: these latter will be the products that we consider to be potentially affected by graduations.<sup>13</sup>

To account for the pattern of graduations, as well as changes in sampling and product classification, we use three ASI surveys for the pre-reform period, i.e. 2011 to 2013, and five surveys from 2015 to 2019 for the post-reform period, respectively. Furthermore, as the ASI survey spans the Indian financial year (i.e., the 2014 survey covers the period from April 2013 to March 2014), but the graduations apply over calendar years, we exclude the 2014 survey from the analysis.<sup>14</sup>

## **2.2 Data characteristics**

The ASI provides two main pieces of information to identify firms potentially affected by graduations: the products produced, and the share of output exported. We define potentially affected

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<sup>10</sup>This is an Indian classification of industries, at the 5-digit level. The structure of the NIC 2008 is identical to the ISIC rev.4, the 5th digit is specific to India.

<sup>11</sup>These are the main features of the ASI sampling and changes over time; more details are provided in the ASI documentation.

<sup>12</sup>The NPC-MS was slightly revised in 2016: 337 new codes were introduced and 291 codes deleted. These amendments should, however, only apply to the last 2-digits of the classification, as the CPC 2.0 (i.e. the first 5-digits) was not revised.

<sup>13</sup>Note that GSP-eligibility is defined at the CN 8-digit level, whereas the product level information in the ASI is at the HS 6-digit level. To create an indicator of a GSP eligible product at the 6-digit level, we consider a 6-digit product to be GSP eligible if at least one of the 8-digit products therein is eligible.

<sup>14</sup>This is to make sure that we capture the pre- and post-2014 differences more cleanly, and we can avoid having firms affected by graduations only for part of the period covered by a survey.

firms as those exporting some (or all) of their output and producing GSP-eligible goods at some point in the pre-2014 reform period (in at least one year between 2011 and 2013), and that are subject to graduations in 2014.<sup>15</sup> The main caveat is that we can consider these firms as being only potentially affected, as we do not have information on the export destination, and on which product is exported (the exporting information is at the firm-level). However, we can compare the performance of potentially affected firms in the post-graduation years with a variety of control groups which we can reliably consider not to have been directly affected by graduations. More specifically, we can compare their performance with that of: exporters and producers of GSP eligible products that were not graduated, exporters and producers of products not eligible for GSP, and all exporters – the aggregation of the two previous groups. Firms in these control groups have certainly not been affected by graduations. Therefore, if an effect is detected for potentially affected firms relative to these controls, we can possibly ascribe that effect to the graduation and consider it as a lower bound estimate of the full effect. We will henceforth refer the potentially affected firms as treated or affected firms.

In order to address the issue of being able to observe only firms that are potentially affected by graduation, we perform a very conservative robustness check. We construct a restricted sample of affected firms, singling out those that produce only one product throughout the entire 2011-2019 period. For these firms we still do not observe the destination market but we can be sure about which product is exported, as they sell only one. That said, multi-product firms are the majority among the affected firms, even though the distribution of the number of products per firm is skewed towards firms with few products (the median value is 2, and the mean is 2.3, see Tables 2 and 3 below). This implies that approximately only 15% of the affected firms can be used for this robustness check, which leads to a considerable loss in degrees of freedom and is presumably the main reason for many estimation results in this robustness exercise lacking statistical significance.<sup>16</sup>

We take into account the complex pattern of graduations post-2014, and the changes in the sampling scheme of the ASI over time, via the following steps. First, we ensure that all the treated firms are exposed to the same change in the graduation regime, and all the control firms are equally unaffected. We do so by identifying affected firms as those with products in the three GSP sections that graduate in 2014 and do not re-obtain their preferences until 2019 (the end of our observation period, see Table 1). For the various control groups, we use firms with products in all the non-graduated sections. We exclude firms that graduate ex-novo in 2017 (sections

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<sup>15</sup>Since the exporting information is not disaggregated at the product level, and exporting can be a rather intermittent activity, we label firms as potentially affected even if the exporting and production of GSP eligible products does not happen in the same year.

<sup>16</sup>We present the results obtained with this restricted sample in the Appendix.

S-14, S-15a, S-15b) from both treatment and control groups, as well as firms producing a mix of products that graduate in 2014 and products subject to either a graduation or a de-graduation<sup>17</sup> in 2017.

Second, we take into account changes in the ASI sampling in 2013 and 2016. We base the analysis on firms that are observed at some point in *both* the pre- and post-reform periods (2011-2013, 2015-2019), thereby making sure that the changes in the sampling do not lead to changes in the composition of firms in our sample over time (e.g. firms from poorer states, or smaller firms). In our robustness analysis, we also follow a stricter approach. We construct treatment and control indicators by only using firms which were sampled in the same way, i.e. they appear in the surveys where the sampling was unchanged. As our focus is on effects post-2014, we use the 2013 and the 2015 surveys to identify such firms. However, for these ‘same-sampling’ firms, we also exploit the panel dimension of the data and extend the observation period to the full 2011-2019 period. We use these indicators in a robustness analysis.<sup>18</sup>

Note that our main approach of dealing with sampling changes over time, i.e. to ensure that we observe the same firms pre- and post-treatment, would not have been possible without having access to the panel-ID version of the ASI. Importantly, the within-firm estimation approach that we can adopt thanks to the panel data is a major factor in providing robustness to our results more in general, as it allows us to draw more reliable inference on the impact of graduations, and to partly overcome some of the weaknesses of the data.

Tables 2 and 3 present a simple set of descriptive statistics for the resulting samples of affected (or treated) and control groups firms. Overall, across the three groups, the total number of firms is 5,713, of which 594 are affected by graduations, and 5,119 are unaffected (3,777 are exporters and producers of GSP eligible product not subject to graduation, and 1,342 are exporters and producers of non-GSP eligible products). The affected firms employ a larger number of workers than the control group firms and pay higher average wages. The average number of products sold is also slightly larger for the affected firms. The share of output exported by affected firms is substantially lower than the control groups, however, at about 20% versus 40%.

Table 3 provides a more in-depth view of the characteristics of affected firms, depending on their rural or urban location, and the quartile of the size distribution. Urban firms are more numerous than rural firms, larger, and pay higher wages. They produce a slightly lower number of products, but export a larger share of their output. Along the size distribution of affected

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<sup>17</sup>Two sections re-obtain their preferences in 2017.

<sup>18</sup>These results are extremely similar to those presented in the paper and are available upon request from the authors.

Table 2: Descriptives statistics, all samples

<b>Affected firms</b>	
No. firms	594
Avg. number products sold	2.34
Avg. workforce	664.2
Avg. wages	219.9
Share of output exported	20.20%
<b>Control groups</b>	
No. exporters, <u>non-graduated GSP products</u>	3,777
Avg. number products sold	1.65
Avg. workforce	363.6
Avg. wages	143.5
Share of output exported	40.20%
No. exporters, <u>non-GSP products</u>	1,342
Avg. number products sold	1.66
Avg. workforce	272.8
Avg. wages	147.9
Share of output exported	38.90%
<b>Total</b>	
No. Firms	5,713
Avg. number products sold	1.73
Avg. workforce	352.7
Avg. wages	152.5
Share of output exported	37.80%

Source: Authors' elaboration

Table 3: Descriptives statistics, all samples

	All	Rural	Urban	Employment (size) quartile			
				1st	2nd	3rd	4th
<b>Affected firms – all</b>							
Number firms	594	253	341	111	128	173	182
Avg. products sold	2.34	2.49	2.22	2.14	2.03	2.19	2.81
Avg. workforce	664.2	611.7	703.1	36.7	159.5	358.8	1692.1
Avg. wages	219.9	218.7	221	189.2	205.1	205.9	277.3
Share of output exported (%)	20.2	18.1	21.7	31.8	19.9	18.1	15.2
<b>Affected firms – single-product firms</b>							
Number firms	92	32	60	24	24	30	14
Avg. products sold	1	1	1	1	1	1	1
Avg. workforce	294.8	317	281	37.1	151.7	361.7	907.9
Avg. wages	203.1	198.9	205.3	137.7	233.1	182.9	307.2
Share of output exported (%)	26.4	28.4	25.4	38.8	19.3	23.4	24

Source: Authors' elaboration

firms there is a great deal of variation in terms of number of workers, with average wages and the number of products sold rising with firm size (except for firms in the second quartile). The export share decreases along the size distribution. The second panel in Table 3 reports figures for the sub-sample of single-product firms. Note that there are only 92 such firms out of 594, and two thirds of them are in urban areas. The average workforce is about half as that in the full sample, at 294 workers. Mean wages are comparable to the full sample on average, but they are substantially lower among firms in the first quartile of the distribution, and higher in the top quartile. Lastly, the share of output exported is higher than for multi-product firms, this figure declining with firms' size, as found in the full sample.

### **2.3 Empirical strategy**

We explore the effects of graduations exploiting two different types of treatment indicators. When studying outcomes varying at the firm level, we use a binary variable identifying firms potentially affected by graduations, i.e. firms that export in the pre-reform period and produce GSP eligible products that are graduated in 2014. As the ASI provides also product-level information (e.g. quantity and prices of products sold), we construct a binary variable identifying potentially affected products within firms. These latter are GSP eligible products graduated in 2014 and produced by affected firms. This second variable will allow us to use more stringent firm-product fixed effects in estimation.

The effect of graduations, i.e. a worsening of market access conditions in the form of higher import tariffs in the EU, could have resulted in a variety of effects at the firm level and the product level. Starting from the firm-level outcomes, we explore changes in the probability that firms exit exporting<sup>19</sup>, the total value exported (for firms that continue exporting post-graduation, i.e., changes at the intensive margin), and the total value of inputs imported from abroad. Next, to corroborate these results, we also analyse impacts on the total value sold. We then investigate if firms' product scope is affected by the loss of preferential tariffs, by estimating the impact on the number of products sold. Lastly, we explore if firms re-orient resources internally away from affected products, and use the value sold of products not-affected by graduation as an outcome variable.

We then make use of the detailed data on the products made by Indian firms, as well as the inputs (both foreign and domestic) that they purchase. We estimate the impact of graduations on the value, quantity, and price of the affected products (in a within firm-product setting), as well as on values, quantities and prices of the inputs purchased by affected firms.

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<sup>19</sup>This is identified as permanent exit over the period post-graduation under observation.

The analysis of the effect of EU GSP graduations on the firm-level outcomes exploits a difference-in-difference setting at the firm-year level. More formally, we estimate the following equation:

$$y_{i,t} = \alpha + \beta_m(D[\text{affected}]_i \times D[\text{GSPreform}]_t) + \gamma_i + \delta_t + \varepsilon_{i,t} \quad (2.1)$$

where  $y_{it}$  denotes one of the outcome variables described above,  $D[\text{affected}]_i$  denotes a binary variable for potentially affected firms;  $D[\text{GSPreform}]_t$  denotes a binary variable taking value 1 in the post-reform years;  $\gamma_i$  and  $\delta_t$  denote full sets of firm and year fixed effects, respectively.  $\varepsilon_{i,t}$  is the model residual.  $\beta$  identifies the effect of graduations on affected firms relative to various control groups. To allow for heterogeneous effects across  $m \in \mathbb{I}$  subgroups of firms, such as small vs large firms or urban vs rural firms, we allow the estimated coefficient  $\beta_m$  to vary across groups.

For firm-product level outcome variables, with  $k$  denoting products (products made, or inputs purchased), we estimate the following model:

$$y_{i,k,t} = \alpha + \beta_m(D[\text{affected}]_{i,k} \times D[\text{GSPreform}]_t) + \gamma_{i,k} + \delta_t + \varepsilon_{i,k,t} \quad (2.2)$$

Standard errors are clustered at the firm level in specification (2.1), and clustered two ways, at the product and firm level, in specification (2.2).

### 3 Impacts of EU GSP graduations

In this section we discuss the full range of graduation impacts on Indian firms based upon the framework set out by specifications (2.1) and (2.2) above. We present three main sets of findings:

1. on the exporting activity of affected firms
2. on “knock-on” effects on imports and purchases of domestic inputs
3. on the internal re-organization of affected firms

#### 3.1 Exports

The first set of outcomes that we investigate is whether being subject to the removal of preferential tariffs in the EU results in direct effects on exports of Indian firms. We begin by investigating changes in the probability of exiting from exporting.

Table 4 presents three sets of results obtained relative to three different control groups: exporters of GSP-eligible products not subject to graduation (columns 1-3), exporters of non-GSP eligible products (columns 4-6), and all exporters (columns 7-9). Recall that we observe all firms in the estimation sample both pre- and post-graduation, and that all firms export in at least one of the pre-2014 years. We then define export exit as not having exported in any of the year post 2014 years, and find that the probability of exiting exporting is  $[e^{(0.086)} - 1] = 8.98\%$  higher for firms potentially affected by a graduation in the EU, relative to other exporters of GSP-eligible products not affected by graduation (column 1). This effect is smaller and not-statistically significant relative to exporters of non-GSP eligible products (column 4) and, when we combine firms in both control groups, we find an average effect of 7.57% in column (7).

Table 4: Exit from exporting, all firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome var.	<b>Export exit</b>								
Control group	Exp. GSP prod. non-grad			Exp. non-GSP prod.			All exporters		
Aff. firms	0.086*** (0.023)			0.035 (0.026)			0.073*** (0.022)		
Aff. Firms * 1st Q		0.239*** (0.059)			0.188*** (0.061)			0.226*** (0.059)	
Aff. Firms * 2nd Q		0.132*** (0.048)			0.0814' (0.050)			0.120** (0.048)	
Aff. Firms * 3rd Q		0.0945** (0.039)			0.0436 (0.041)			0.0820** (0.038)	
Aff. Firms * 4th Q		0.0129 (0.036)			-0.0379 (0.038)			0.000507 (0.035)	
Aff. Firms * rural			0.096*** (0.032)			0.046 (0.035)			0.084*** (0.032)
Aff. Firms * urban			0.077*** (0.028)			0.0266 (0.031)			0.065** (0.028)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	25424	25424	25424	10984	10984	10984	32574	32574	32574

Note: Standard errors clustered at firm level in parentheses, ' p < 0.15, \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Hence, even if we cannot observe directly which of the firms among the potentially affected ones is actually hit by EU graduations (since we do not observe the export destination, and which of the products they export is sold in the EU) we nonetheless find a noticeable impact, especially relative to firms which continue to export under the preferential regime.

In columns 2, 5 and 8 we interact the main indicator for affected firms with four mutually exclusive binary variables denoting firms in four quartiles of the employment distribution. These

results show that smallest firms are those most starkly affected by graduations as their exit probability is being substantially higher than firms in both control groups (approximately 25% higher, in column 3). The size and significance of the effect decreases monotonically along the size distribution, until becoming nil for firms in the fourth quartile. As heterogeneous firm models would suggest, smaller firms produce and export fewer products, and possibly to fewer destinations, compared to larger firms. Against that backdrop, it is plausible to find that smaller firms exhibit a lower degree of resilience to a sudden worsening of trading conditions in what might be their main export destination. The results in columns 3, 6, and 9 show that the exit probabilities across firms located in rural and urban areas are not materially different, although somewhat higher for rural firms.

Lastly, we re-run the models presented in Table 4 using the restricted sample of affected firms that produce one product only throughout the entire 2011-2019 period.<sup>20</sup> Results are presented in Table A1 in the Appendix and show that, for single-product firms, graduations lead to a very high increase in the probability of exiting exporting, about twice as large as that estimated on the sample including also multi-product firms. Of course the much higher exit probability in this robustness check reflects again the tendency of single-product firms to be small; in that sense, this exercise can be seen as magnifying the results from columns 2, 5, and 8 of Table 4. Note also the difference in the results for rural vs urban firms, where we find that the exit probability is significantly higher for single-product firms in urban areas.

Having seen that graduations can result in important changes at the firm-level extensive margin of exports, especially for smaller producers, we now investigate effects at the intensive margin. We restrict the estimation sample to continuing exporters only, for both the treatment and control observations, and estimate specification 2.1 using the log of total exports as an outcome variable. Results are presented in Tables 5 and 6, where we show again three sets of estimates which exploit the three different set of control observations.

On average over the entire post-graduation period, we do not find that the loss of preferential market access in the EU resulted in lower exports by Indian firms at the intensive margin. However, when we separate the effect by the two three-year sub-periods covered by the graduation rounds, we find stark differences: exports by continuing exporters contract in the first sub-period and are roughly unchanged (relative to the pre-graduation years) in the second. The effects are largest and more precisely estimated relative to the sub-sample of exporters of non-GSP eligible products; on average, in column 3 we find that affected firms' exports contract by about 12% over the 2015-16 period. Recall that the affected firms that we exploit in estimation,

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<sup>20</sup>Other affected firms, i.e. the multi-product ones, are excluded from this analysis.



Table 5: total exports, for continuing exporters

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome var.	<b>ln(Exports)</b>					
Control group	Exp. GSP prod.		Exp. non-GSP prod.		All exporters	
Aff. firms	0.0119 (0.068)		-0.0647 (0.077)		-0.0057 (0.067)	
Aff. Firms – 2015-16		-0.120* (0.073)		-0.161** (0.082)		-0.129* (0.072)
Aff. Firms – 2017-19		0.127' (0.079)		0.0211 (0.091)		0.102 (0.078)
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
<i>N</i>	10359	10359	4071	4071	13212	13212

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

as well as the control firms, maintain the same level of market access in the EU during the entire post-graduation period; hence, the difference between the earlier and the later years should not be ascribed the graduation rounds *per se* (i.e. to any change in their GSP status in those two periods), but rather to a time varying response of firms as they adjust to the initial shock.

Table 6 demonstrates again the differential response by small firms—albeit ones that continue to export—to graduations. The smallest firms, in the first quartile of the size distribution, are the only ones whose exports contract, but by a sizeable -35.6% over the entire post-graduation period (-45% over the first sub-period). Interestingly, we find no effect at all for rural firms, while urban firms see a large fall in exports (-21%) in the first few years post-graduation. Appendix Table A2 shows similar results for the restricted sample of single-product firms. No significant effect is found on average, although firms in the first quartile of the size distribution are again those whose exports contract post-graduation. Several coefficients lack significance in Table A2, which is conceivably at least partly due to the very few affected firms available for this analysis once the sample is restricted further to those that continue exporting post-reform.<sup>21</sup>

Taken together, the results on the export activity point to sizeable adjustments both at the extensive and the intensive made by Indian exporters in the aftermath of having preferential tariffs in the EU removed.

To corroborate this first set of findings on the direct effects of graduations on exports, we investigate whether Indian firms manage to re-direct the sales lost on the export market to the domestic market. As graduations affect primarily exports of Indian firms, sales on the

<sup>21</sup>Only about half (47 out of 92) single product firms are continuing exporters. Recall also the strong impact of graduation on export exit for single product firms, which reduces the chances of obtaining significant results at the intensive margin.

domestic market could have either remained unchanged, or have increased in case affected firms re-directed some of the lost EU exports to the domestic market. These two scenarios would have resulted in *total* sales either decreasing, or being unaffected by graduations, respectively.

Table 6: Value exported, continuing exporters, by size and rural-urban groups

Outcome var.	(1)	(2)	(3)	(4)
	<b>ln(Exports)</b>		<b>ln(Exports)</b>	
Control group	All exporters		All exporters	
Aff. Firms * 1st Q	-0.441** (0.206)		Aff. Firms – rural 0.119 (0.105)	
Aff. Firms * 2nd Q	0.115 (0.152)		Aff. Firms - urban -0.0923 (0.079)	
Aff. Firms * 3rd Q	0.114 (0.117)		Aff. Firms – rural – 2015-16	0.0338 (0.107)
Aff. Firms * 4th Q	-0.0309 (0.098)		Aff. Firms - rural – 2017-19	0.198' (0.126)
Aff. Firms * 1st Q – 2015-16		-0.599** (0.273)	Aff. Firms – urban – 2015-16	-0.243*** (0.089)
Aff. Firms * 1st Q – 2017-19		-0.283 (0.210)	Aff. Firms - urban – 2017-19	0.038 (0.091)
Aff. Firms * 2nd Q – 2015-16		-0.00014 (0.160)		
Aff. Firms * 2nd Q – 2017-19		0.209 (0.183)		
Aff. Firms * 3rd Q – 2015-16		-0.0381 (0.108)		
Aff. Firms * 3rd Q – 2017-19		0.251* (0.145)		
Aff. Firms * 4th Q – 2015-16		-0.122 (0.110)		
Aff. Firms * 4th Q – 2017-19		0.0467 (0.108)		
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
<i>N</i>	13121	13121	13212	13212

Note: Standard errors clustered at firm level in parentheses, ' p < 0.15, \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Table A3 in Appendix shows that total firm sales are on average unaffected by graduations (column 1), but we find a substantial contraction of about -9% in the first sub-period (column 2). Across the various sub-samples we find, similarly to other outcomes, that the impact is driven by sales of small firms and urban firms. In the last column, we split the effect between

firms that stop exporting post-graduation and those that continue to export, and find that the former group completely drives the aggregate impact on sales. To make a tighter comparison between the results for total sales and total exports, we re-run the models in Table A3 on the sample of continuing exporters only (i.e., the sample used in Tables 5 and 6). Results are shown in Table A4 and confirm that the pattern of sales is very close, and very likely to be driven, by that of total exports.<sup>22</sup> So, overall, it appears that affected firms were unable to re-direct sales from the foreign to the domestic market, as the reduction in exports at both the extensive and intensive margin seem to explain part of the contraction in total sales.

### **3.2 'Knock-on' effects on input sourcing**

The adverse impact of graduations could extend to the input sourcing behaviour of affected firms. Access to high quality and (mainly) foreign inputs has been shown to be a key element in enhancing firms' performance on the exporting side (Bas and Strauss-Kahn, 2015), in terms of both product quality and prices, especially for firms that manage to export to richer countries (Bastos et al., 2018). Therefore, if access to a rich and large market like the EU becomes harder, we could expect a similar process but working in reverse, whereby Indian firms have to make adjustments in terms of which inputs to buy. We begin testing this by assessing if Indian exporters affected by graduations changed their importing behaviour. Next, we analyse if purchases of domestic inputs are affected too. This latter effect, if found, could be indicative of the repercussions of graduation extending beyond exporters to domestic firms that are not directly involved on foreign markets, but that could be indirectly affected insofar they supply inputs to exporters.

The knock-on effect from reduced export opportunities is not so strong as to force affected firms to cease importing altogether <sup>23</sup>, but we do find large adjustments at the intensive margin. Table 7 presents these results. On average, the value of imports of affected firms falls by 18.7%, and falls by as much as 50% for the smallest firms in the first quartile of the size distribution, relative to unaffected firms (columns 1 and 2 of Table 7). Note that the sample size in these models is significantly smaller compared with earlier analyses as we can only use information on firms that report to have imported foreign inputs.

In columns (5)-(7) we re-run the models of columns (1)-(3) on the subsample of firms that continue to export post-graduation, because this is more directly comparable to the sample

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<sup>22</sup>For completeness, we also ran the models for total sales on the restricted sample of single-product firms. Results, in Table A5 in the Appendix, fail to show any significant impact of graduations. The pattern of the coefficients, however, is in line with that of the main sample, with the largest negative (albeit insignificant) effects found in the first sub-period post-graduation, and the smallest single-product firms.

<sup>23</sup>We do not find any effect for imports along the extensive margin, in Table A6. This is confirmed on the sample of single product firms, in Table A7.

used in Tables 5 and 6 above for exports. In that restricted subsample, we still find a sizeable contraction of the import values, although of a smaller magnitude and driven by significantly lower imports by the smallest firms. These results show that roughly the same firms whose exports contract also reduce their imports of foreign inputs. In addition, however, as coefficients in columns (5)-(7) are smaller than those in columns (1)-(3), we can infer that part of the fall in imports is due to firms that stop exporting. We will test if firms reduce the quantity of foreign inputs, or opt for cheaper ones, more rigorously in the models exploiting firm-product level data.

Table 7: value imported, all firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Outcome var.	<b>Ln(imports)</b>						
Control group	All exporters						
Sample					Sample of continuing exporters		
Aff. firms	-0.207*** (0.064)				-0.162** (0.071)		
Aff. Firms * 1st Q		-0.702*** (0.198)				-0.682*** (0.193)	
Aff. Firms * 2nd Q		-0.283** (0.132)				-0.0671 (0.131)	
Aff. Firms * 3rd Q		-0.126 (0.096)				-0.143 (0.113)	
Aff. Firms * 4th Q		-0.167* (0.097)				-0.137 (0.106)	
Aff. Firms – rural			-0.136' (0.091)				-0.0586 (0.097)
Aff. Firms - urban			-0.274*** (0.078)				-0.254*** (0.088)
Aff. Firms – stop exp.				-0.413*** (0.122)			
Aff. Firms – cont. exp.				-0.124* (0.069)			
Firm FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	12596	12514	12596	12596	9702	9634	9702

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

Besides foreign inputs, affected firms could alter their purchases of domestic inputs too. These latter are often not considered a crucial ingredient to achieve export success, but to the extent that firms' activity contracts in response to graduations, it is possible that purchases are cut from domestic input suppliers as well. Table 8 shows that there is indeed a contraction of

purchases of domestic inputs by affected firms, relative to the control groups.

Table 8: Purchases of domestic inputs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome var	<b>ln(Domestic inputs)</b>								
Control group	All exporters								
Sample	Sample of continuing exporters								
Aff. firms	-0.0622* (0.035)			-0.0675* (0.039)					
Aff. Firms – 15-16	-0.117*** (0.033)			-0.139*** (0.038)					
Aff. Firms – 17-19	-0.0199 (0.041)			-0.0148 (0.044)					
Aff. Firms * 1st Q	-0.143 (0.107)			-0.0137 (0.125)					
Aff. Firms * 2nd Q	-0.131' (0.089)			0.00194 (0.095)					
Aff. Firms * 3rd Q	-0.0479 (0.062)			-0.116* (0.067)					
Aff. Firms * 4th Q	-0.0172 (0.044)			-0.0511 (0.054)					
Aff. Firms – rural	0.0448 (0.047)			0.0751 (0.058)					
Aff. Firms – urban	-0.145*** (0.044)			-0.174*** (0.045)					
Aff. Firms – stop exp.	-0.142** (0.062)								
Aff. Firms – cont. exp.	-0.0145 (0.038)								
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	32186	32186	31982	32186	32186	21922	21922	21777	21922

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

In column (1) the size of the estimated effect is only about a third of that found for imports (column 1 in Table 7), and detected only in the first sub-period post graduation.<sup>24</sup> Across firm subgroups we see again small and urban firms to drive this finding, although only for the latter we estimate a significant coefficient. Similarly to imports, export exiters account for the bulk of the contraction in purchases of domestic inputs, although we find a sizeable (and in some cases

<sup>24</sup>For conciseness we do not show the split by sub-periods of the impact on imports in Table 7, as the coefficients for the 2015-16 and 2017-19 period are very similar and close to the average effect shown in column 1.

larger) impact also when the estimation sample is restricted to firms that continue to export.

The results on input sourcing presented in Table 7 and Table 8 paint a rather concerning picture from a development perspective. Not only do GSP graduations induce Indian exporters to cut back drastically on imports, but through the contraction of purchases of domestic inputs graduations are likely to indirectly affect also Indian firms not involved in exporting. This implies that, potentially, the losses imparted by graduations are amplified beyond the immediate 'target' of this trade policy mechanism and shared by local supply chain.

### 3.3 Firms' re-organization: sales of non-affected products and product-scope

Having established the immediate, direct, impact of graduation on the exporting and sale activity of Indian firms, and the repercussions on firms' input sourcing strategies, we investigate if affected firms respond to the worsening of trading conditions for *some* of their products by re-organizing resourced internally. These effects can only be studied for multi-product firms, although in our setting these happen to be the majority in our sample.

First, we assess whether affected firms tried to respond to the graduation shock by re-directing resources towards the production and sale of products *not* affected by graduations. For this exercise we use the product-level information on sales and the indicator of affected products to create a total of "unaffected sales" at the firm level. We find a considerable increase of 41.6% in sales of non-affected products by firms affected by graduation, relative to unaffected firms (Table 9). The effect rises over time, but is present in both the 2015-16 and 2017-19 sub-periods. The smallest firms among the size quartiles exhibit the largest coefficient, although the second largest effect is for the largest firms, for which the impact is estimated most precisely. Similarly to other outcomes, we find urban firms to drive the aggregate effects. In the last column, we show that the surge in sales of non-affected products is driven by firms that continue to export: this seems sensible, as continuing exporters are likely to be the largest, most resilient firms, with better capacity to shift resources and production internally. The result in column (5) also implies that firms that exit exporting as a result of their products being graduated out of the GSP cannot recoup their export losses, in contrast to continuing exporters.<sup>25</sup>

Lastly, we investigate the impact of graduations on firm-level product scope. Products made for the EU could well be very different from products made for the domestic market or for other foreign destinations, due to the stringent set of rules and standards that firms need to comply with when placing a product on the EU single market. Hence, the worsening of

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<sup>25</sup>For sales of non-affected products, we did not run models on the sample of single product firms as these firms, by definition, only sell affected products. Obviously, the same applies to the exercise on the number of products sold.

Table 9: sales of non-affected products, all firms

	(1)	(2)	(3)	(4)	(5)
Outcome var	<b>Ln(non-aff. sales)</b>				
Control group	All exporters				
Aff. firms	0.348*** (0.081)				
Aff. Firms – 2015-16		0.275*** (0.084)			
Aff. Firms – 2017-19		0.406*** (0.090)			
Aff. Firms * 1st Q			0.492* (0.282)		
Aff. Firms * 2nd Q			0.297* (0.166)		
Aff. Firms * 3rd Q			0.284** (0.139)		
Aff. Firms * 4th Q			0.405*** (0.136)		
Aff. Firms – rural				0.276*** (0.097)	
Aff. Firms - urban				0.407*** (0.118)	
Aff. Firms – stop exp.					0.0441 (0.130)
Aff. Firms – cont. exp.					0.510*** (0.101)
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
<i>N</i>	31393	31393	31393	31393	31393

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

trading conditions for these products might have induced firms to drop their production and sales completely.

Table 10: Number of products sold, all firms

	(1)	(2)	(3)	(4)	(5)
Outcome var.	<b>Number of products</b>				
Control group	All exporters				
Aff. firms	-0.233*** (0.062)				
Aff. Firms – 2015-16		-0.164** (0.064)			
Aff. Firms – 2017-19		-0.287*** (0.068)			
Aff. Firms – 1st Q			-0.377** (0.156)		
Aff. Firms – 2nd Q			-0.259** (0.131)		
Aff. Firms – 3rd Q			-0.198** (0.099)		
Aff. Firms – 4th Q			-0.214** (0.106)		
Aff. Firms – rural				-0.215** (0.098)	
Aff. Firms – urban				-0.246*** (0.071)	
Aff. Firms – stop exp.					-0.225** (0.105)
Aff. Firms – cont. exp.					-0.238*** (0.073)
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
<i>N</i>	32574	32574	32574	32574	32574

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

We investigate the extent to which this might have been the case by running specification (1) using the number of products sold as a dependent variable. Results point to a sizeable contraction of the product portfolio of affected firms which, on average, reduce the number of products by 20.7% (Table 10). Negative coefficients are found throughout in Table 10, all highly statistically significant, with the largest effects estimated for the second post-graduation sub-period and small firms. In other sub-samples (e.g., between urban and rural firms) the effect is rather similar.



To summarize the findings of this section on firm-level outcomes, we have found well-defined effects of EU GSP graduation on various dimensions of activity in firms that can be considered to be potentially affected by this change in trading conditions. The probability of exiting exporting increased, while total and export sales both decreased, suggesting that the domestic market did not help absorbing the sales that were lost abroad. We also find a sizeable contraction in imports of foreign inputs, and a noteworthy albeit less large reduction in the purchases of domestic inputs: both changes in sourcing behaviour are driven by both the intensive and extensive margins of exports. Lastly, affected (multi-product) firms attempted to respond to graduations by substituting away from affected products and increasing sales of non-affected products, as well as contracting the overall number of products sold.

## **4 Price versus quantity adjustments in response to EU GSP graduations**

To shed more light of the type of adjustments that Indian firms make in response to graduations, and allow us to interpret the variety of findings we have presented with data aggregated at the firm level, we now additionally exploit the detailed information about products made and sold by Indian firms as well as on purchases of foreign and domestic inputs. In the ASI, firms are asked to report values, quantities, and unit prices of each product they make and for each input they purchase, respectively.<sup>26</sup> This allows us to investigate the impact of graduations in a rigorous within-firm-product setting and thus to explore whether firms made differential adjustments between affected and non-affected products, e.g. along quantity versus price margins. For this we exploit specification (2.2) described above, which implies that we exploit variation within firm-product pairs that are observed both pre- and post-graduation. We show estimation results in Table 11, where we use data on products sold, foreign inputs, and domestic inputs, respectively. For each of these, we estimate specification (2.2) for values, quantities, and unit-prices, respectively, and for each we separate effects by firm location, and firms that stop or continue to export post-graduation.<sup>27</sup>

In Panel A of Table 11, for products sold, we can make a tight comparison between affected and non-affected products within firms, the latter products being used as control observations, together with non-affected products sold by non-affected firms. The disentangling of prices

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<sup>26</sup>Firms are asked to report this information for the 10 most important products made, the 10 most important domestic inputs and the 5 most important foreign inputs purchased, with a residual category reserved for products beyond these limits. Firms can, however, and do report information on a larger number of products. Also, for the firms that use the residual category, this covers an almost negligible fraction of the total (for output, it is about 2% of the total output produced).

<sup>27</sup>These latter results are presented in A8.

and quantities reveals a significant fall in prices charged for products sold, which is hidden underneath a statistically insignificant overall *value* effect (column 1).

These findings suggest that products that faced a deterioration of market access conditions in the EU are sold more cheaply post-graduation, relative to unaffected products, possibly to maintain some of their lost competitiveness abroad. Alternatively, a lowering of product quality—reflected by a drop in the unit prices—is also possible. In either case, our findings document the pressure on prices or quality that Indian exporters are exposed to by sudden graduations.

Beyond firms' behavioural changes on the output side, our data allows us to go further and investigate potential adjustments on the input side as well. Note that for these estimations we cannot construct an 'affected-product' indicator because imports and domestic purchases are not directly affected by graduations. Therefore, in Panels B and C of Table 11 the indicator picking up the effect of graduations is defined at the firm-level, although we use data at the firm-product-year level on the left-hand side of the model and firm-product fixed effects to exploit variation within these tight groups over time. Put differently, as for the output side analysis, we only use variation across firm-product pairs that we observe pre- and post-graduation.

We (again) find strong knock-on effects of graduations on firms' sourcing behaviour, namely a commensurate drop in prices of both imported and domestically purchased inputs, respectively. The price contraction of imports is about twice as large as that for domestic purchases (-20.8% and -11.1%, respectively). In terms of spatial impacts, we find a strong fall in import prices associated with firms located in urban areas, whereas the price drop for domestically sourced inputs is more pronounced (larger and more significant) for rural firms. In our view, these findings plausibly reflect the spatial allocation of firms in the sense that rural areas exhibit a higher share of smaller firms, which would tend to purchase inputs domestically, whereas larger firms are more prone to be found in urban areas and these are also the firms that are more likely to import on account of their larger size.

The fall in unit prices for both imported and domestically purchased products most likely reflects a substitution to lower quality inputs. If alternatively firms paid less for same quality inputs, this would raise their profits and is only plausible if their buying power increased; however, there's no reason why this should be the case. In turn, however, if the most plausible interpretation of the fall in prices on the input side is seen in a substitution towards lower quality, then this may also be the most likely interpretation for the fall in prices on the sales side, as these constitute simultaneous pricing choices by Indian firms that are related.

Finally, interesting heterogeneity emerges between firms that stop and those that continue

to export, as shown in Table A8. The former reduce the quantity purchased of foreign inputs rather markedly (changes in prices are not significant), but not that of domestic inputs. Firms that continue to export maintain or increase the quantity of the inputs they buy, but do so at a lower unit-price, both from abroad and domestically.

Recalling that these are within firm-product effects, it appears that firms affected by graduation opted to buy cheaper, or lower quality, varieties of the same inputs that they used to buy pre-graduation. Firms which were hit with a higher import tariff in the EU face a drop in the price of their affected products (Table 11), although not necessarily a drop in the quantity sold. These firms might have been led to resort to reducing the cost of their inputs. This mechanism is likely to apply better to the case of firms that continue to export, and that tried to maintain their sales abroad by cutting prices both on the output and on the input side, but kept buying foreign inputs to be able to produce exportable products.<sup>28</sup> Firms that stop exporting are instead found to reduce sharply the quantity of foreign inputs they buy (but not that of domestic inputs), as exiting exporting made it less necessary (or less possible) to keep sourcing inputs from abroad.

In light of this interpretation of our findings in this section, it seems that graduations might trigger a mechanism working in reverse compared to that studied for firms' access to foreign markets and, among those, to destinations with heterogeneous income, e.g., Bastos and Silva (2010) and Bastos et al. (2018). Product varieties sold on the export market, or in wealthier and more regulated foreign markets, are likely to require different skills and different inputs compared to products sold domestically. Worse market access in a large, rich, and strictly regulated economy like the EU Single Market could have induced Indian producers to reduce the price or the quality of their products, and to correspondingly buy cheaper or lower quality inputs to produce them.

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<sup>28</sup>Access to foreign inputs has been often found to be a key factor in promoting firms' export success For India, see for instance Anderson et al. (2018)

Table 11: Value, Quantity and Price Effects, Sales and Inputs, all firms

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome var	Ln(value)	Ln(Quant)	Ln(Price)	Ln(value)	Ln(Quant)	Ln(Price)
<b>Panel A</b>						
	<b>Products sold</b>					
Control group	Non-affected products sold by all exporters					
Aff. Product	-0.0376 (0.061)	0.181 (0.131)	-0.200* (0.105)			
Aff. Product – rural				0.0698 (0.110)	0.343* (0.183)	-0.199 (0.148)
Aff. Product – urban				-0.116* (0.062)	0.0645 (0.156)	-0.201* (0.116)
<i>N</i>	46133	45986	46035	46133	45986	46035
<b>Panel B</b>						
	<b>Foreign inputs</b>					
Control group	Foreign inputs imported by all exporters					
Aff. firm	-0.0677 (0.085)	0.0236 (0.112)	-0.233** (0.104)			
Aff. firm – rural				0.0122 (0.117)	0.0682 (0.152)	-0.190' (0.121)
Aff. firm – urban				-0.157' (0.101)	-0.0257 (0.142)	-0.280** (0.143)
<i>N</i>	24369	24197	24228	24369	24197	24228
<b>Panel C</b>						
	<b>Domestic inputs</b>					
Control group	Domestic inputs purchased by all exporters					
Aff. firm	-0.061 (0.057)	0.0569 (0.077)	-0.118** (0.053)			
Aff. firm – rural				-0.00977 (0.078)	0.13 (0.102)	-0.146** (0.065)
Aff. firm – urban				-0.112* (0.066)	-0.0162 (0.084)	-0.0906* (0.055)
<i>N</i>	24369	24197	24228	24369	24197	24228
Firm-product FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

*Note:* Two-way clustered standard errors, at the firm and product level, in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

## 5 Conclusion

This paper assesses how firms in a developing country respond to the worsening of market access conditions in a developed economy where they used to benefit from unilateral trade preferences. We exploit episodes of accidental (therefore unanticipated) episodes of graduation from the EU GSP, whereby trade preferences are revoked from large groups of products (i.e., sections). With detailed firm-level data for India, collected via the Annual Survey of Industries of which we exploit the firm-panel version, we study the impact of graduations along a number of firm and product margins.

We find that graduations are very harmful for affected firms, in a variety of dimensions. Firms are substantially more likely to exit exporting altogether, relative to unaffected firms. This effect is stronger for small firms and is confirmed when estimating our models on a very restricted sample of single-product firms. Surviving exporters are found to reduce the overall value exported, and multi-product firms are found to reduce the number of products they make and sell. Both export exiters and continuing exporters present a contraction in total sales, which suggests that the domestic market did not absorb the lost export sales. More encouragingly, though, continuing exporters seem to manage to re-direct resources internally such that sales of unaffected products increase strongly post-graduation.

At the firm-product level, we find that graduations induce Indian exporters to make adjustments to the price of both outputs and inputs. The unit price of affected products shrink post-graduation, relative to unaffected products. Similarly, we estimate a contraction in the price of both foreign and domestic inputs, again in a within-firm-product setting. These results imply that firms responded to graduations by selling the affected products more cheaply, and possibly by making them with cheaper inputs. These findings are particularly worrisome, especially from a development perspective, as they suggest that graduations could have sent affected firms in a downward spiral of lower quality output produced with lower quality inputs to compensate for the loss in competitiveness in a crucial foreign market.

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## 6 Appendix

Table A1: Exit from exporting, single-product firms as treated sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Outcome var.	Export Exit								
Control group	Exp. GSP prod. non-grad			Exp. non-GSP prod.			All exporters		
Aff. firms	0.176*** (0.056)			0.125** (0.057)			0.163*** (0.056)		
Aff. Firms * 1st Q		0.262** (0.111)			0.212* (0.111)			0.249** (0.110)	
Aff. Firms * 2nd Q		0.154' (0.106)			0.104 (0.107)			0.142 (0.106)	
Aff. Firms * 3rd Q		0.193** (0.094)			0.143' (0.095)			0.181* (0.094)	
Aff. Firms * 4th Q		0.0924 (0.133)			0.0416 (0.133)			0.08 (0.133)	
Aff. Firms * rural			0.102 (0.086)			0.0509 (0.087)			0.0893 (0.086)
Aff. Firms * urban			0.214*** (0.067)			0.163** (0.068)			0.202*** (0.067)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>N</i>	22178	22178	22178	7738	7738	7738	29328	29328	29328

Note: Standard errors clustered at firm level in parentheses, ' p < 0.15, \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01



Table A2: value exported, continuing exporters, single product firms

	(1)	(2)	(3)	(4)	(5)	(6)
Aff. firms	0.183 (0.190)					
Aff. Firms – 15-16		-0.0302 (0.235)				
Aff. Firms – 17-19		0.367* (0.191)				
Aff. Firms * 1st Q			-0.908* (0.499)			
Aff. Firms * 2nd Q			0.770*** (0.128)			
Aff. Firms * 3rd Q			0.562* (0.290)			
Aff. Firms * 4th Q			0.0765 (0.284)			
Aff. Firms * 1st Q – 15-16				-1.114* (0.636)		
Aff. Firms * 1st Q – 17-19				-0.698* (0.410)		
Aff. Firms * 2nd Q – 15-16				0.570*** (0.170)		
Aff. Firms * 2nd Q – 17-19				0.956*** (0.162)		
Aff. Firms * 3rd Q – 15-16				0.312 (0.330)		
Aff. Firms * 3rd Q – 17-19				0.739** (0.319)		
Aff. Firms * 4th Q – 15-16				0.0005 (0.349)		
Aff. Firms * 4th Q – 17-19				0.157 (0.292)		
Aff. Firms – rural					0.528' (0.337)	
Aff. Firms - urban					-0.0234 (0.213)	
Aff. Firms – rural – 15-16						0.501 (0.349)
Aff. Firms - rural – 17-19						0.548' (0.366)
Aff. Firms – urban – 15-16						-0.336 (0.288)
Aff. Firms - urban – 17-19						0.281 (0.208)
N	12167	12167	12076	12076	12167	12167

Table A3: Total sales, all firms

	(1)	(2)	(3)	(4)	(5)
Outcome var.	<b>Ln(Sales)</b>				
Control group	All exporters				
Aff. firms	-0.0471 (0.033)				
Aff. Firms – 2015-16		-0.0944*** (0.030)			
Aff. Firms – 2017-19		-0.0103 (0.039)			
Aff. Firms * 1st Q			-0.176' (0.116)		
Aff. Firms * 2nd Q			-0.106' (0.074)		
Aff. Firms * 3rd Q			-0.00935 (0.061)		
Aff. Firms * 4th Q			-0.0164 (0.042)		
Aff. Firms – rural				0.0517 (0.044)	
Aff. Firms - urban				-0.123*** (0.043)	
Aff. Firms – stop exp.					-0.188*** (0.063)
Aff. Firms – cont. exp.					0.0361 (0.035)
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
N	32572	32572	32572	32572	32572

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

Table A4: total sales by continuing exporters

	(1)	(2)	(3)	(4)
Outcome var.	Ln(sales)			
Control group	All exporters			
Aff. firms	-0.0235 (0.035)			
Aff. Firms – 15-16		-0.0964*** (0.033)		
Aff. Firms – 17-19		0.0305 (0.040)		
Aff. Firms * 1st Q			-0.0832 -0.112	
Aff. Firms * 2nd Q			0.0343 (0.078)	
Aff. Firms * 3rd Q			-0.0173 (0.062)	
Aff. Firms * 4th Q			-0.0444 (0.050)	
Aff. Firms – rural				0.105* (0.055)
Aff. Firms - urban				-0.119*** (0.038)
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
<i>N</i>	22174	22174	22174	22174

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

Table A5: total sales by single-product firms

	(1)	(2)	(3)	(4)
Outcome var.	Ln(sales)			
Control group	All exporters			
Aff. firms	-0.0248 (0.073)			
Aff. Firms – 15-16		-0.0946 (0.070)		
Aff. Firms – 17-19		0.028 (0.080)		
Aff. Firms * 1st Q			-0.141 (0.142)	
Aff. Firms * 2nd Q			-0.151 (0.120)	
Aff. Firms * 3rd Q			0.0547 (0.139)	
Aff. Firms * 4th Q			0.0789 (0.124)	
Aff. Firms – rural				-0.0609 (0.132)
Aff. Firms - urban				-0.00624 (0.082)
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
<i>N</i>	29326	29326	29326	29326

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

Table A6: Exit from importing

	(1)	(2)	(3)	(4)
Outcome var.	<b>Import exit</b>			
Control group	All exporters			
Aff. firms	-0.00911 (0.012)			
Aff. Firms * 1st Q		0.0199 (0.034)		
Aff. Firms * 2nd Q		-0.0178 (0.022)		
Aff. Firms * 3rd Q		0.00151 (0.021)		
Aff. Firms * 4th Q		-0.0226 (0.019)		
Aff. Firms – rural			-0.0209 (0.015)	
Aff. Firms - urban			-0.00001 (0.016)	
Aff. Firms – stop exp.				0.0233 (0.022)
Aff. Firms – cont. exp.				-0.0282** (0.013)
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
<i>N</i>	32574	32366	32574	32574

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

Table A7: import exit and value imported, single product firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Control group	All exporters							
Outcome var.	Import exit				ln(imports)			
Aff. firms	0.00572 (0.032)				-0.17 (0.149)			
Aff. Firms * 1st Q		0.0424 (0.070)				-1.621* (0.978)		
Aff. Firms * 2nd Q		-0.082*** (0.004)				-0.346* (0.182)		
Aff. Firms * 3rd Q		0.0821 (0.069)				-0.0882 (0.235)		
Aff. Firms * 4th Q		-0.081*** (0.004)				0.0611 (0.327)		
Aff. Firms – rural			-0.0138 (0.038)				-0.397 (0.278)	
Aff. Firms - urban			0.0157 (0.042)				-0.0268 (0.169)	
Aff. Firms – stop exp.				0.017 (0.049)				-0.319 (0.288)
Aff. Firms – cont. exp.				-0.00395 (0.040)				-0.114 (0.171)
<i>N</i>	29328	29120	29328	29328	10960	10878	10960	10960

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01

Table A8: Value, Quantity and Price, Sales and Inputs, by export status

Outcome var	(1) Ln(value)	(2) Ln(Quant)	(3) Ln(Price)
<b>Panel A</b>			
	<b>Products sold</b>		
Control group	Non-affected products sold by all exporters		
Aff. Product – stop exp	-0.0261 (0.117)	0.292 (0.235)	-0.238' (0.145)
Aff. Product – cont exp.	-0.0433 (0.059)	0.125 (0.134)	-0.181' (0.124)
<i>N</i>	46133	45986	46035
<b>Panel B</b>			
	<b>Foreign inputs</b>		
Control group	Foreign inputs imported by all exporters		
Aff. firm – stop exp	-0.467*** (0.180)	-0.430* (0.231)	-0.295 (0.211)
Aff. firm – cont exp.	0.0801 (0.089)	0.194' (0.123)	-0.209* (0.108)
<i>N</i>	24369	24197	24228
<b>Panel C</b>			
	<b>Domestic inputs</b>		
Control group	Domestic inputs purchased by all exporters		
Aff. firm – stop exp	-0.103 (0.089)	0.0187 (0.121)	-0.122' (0.076)
Aff. firm – cont exp.	-0.0403 (0.089)	0.0755 (0.123)	-0.116** (0.108)
<i>N</i>	24369	24197	24228
Firm-product FE	Y	Y	Y
Year FE	Y	Y	Y

Note: Standard errors clustered at firm level in parentheses, ' p <0.15, \* p <0.1, \*\* p <0.05, \*\*\* p <0.01