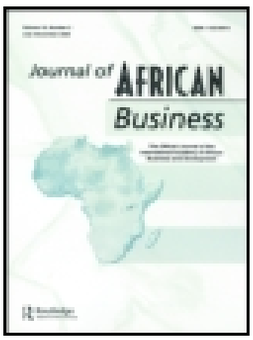

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Export Markets and Firm Productivity in Sub-Saharan Africa

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ABSTRACT

In this paper, we analyze the significance of export market destinations for productivity growth in Sub-Saharan Africa. We use matching and difference-in-differences techniques to evaluate these questions. We find that exports generate productivity growth among exporters, with the more productive firms exporting to multiple markets. We also find that changes in export markets are as a result of firm-level productivity growth suggesting that firms will sell products to additional markets if their productivity level increases hence the changes in export markets are correlated with productivity growth. Moreover, we find that exporting to multiple markets raises the firm's productivity growth by 42.3%, higher than exporting to only one export market at a time. These findings hold at the country and industry level and are robust to other factors that may correlate with increased productivity like age, size and ownership. At the policy level, policies on export promotion should provide information on how prospective exporters can enter into African export markets. Firms that have started exporting should be helped with credit access to expand their sales to other additional export markets.

KEYWORDS

Firm-level; export destinations; exports; productivity; Sub-Saharan Africa

JEL

D21; F12; F14; F61; O55

1. Introduction

Do export markets matter for productivity growth? If indeed export markets matter, which markets? These questions are important to researchers and policy makers because much is known about the impact of exporting on productivity growth but there is scanty information on the differential impact of export markets on productivity growth, especially in Sub-Saharan Africa. Globally, recent studies have examined the microeconomic activities of firms across industries and documented persistent variability between non-exporters and exporters, even in narrowly defined industries. Relative to non-exporters, exporting firms pay higher wages, have high-efficiency level and employ more workers (Bernard & Jensen, 1999). Moreover, the literature in international trade reveals that exporters are so few and export a small fraction of their output. Correspondingly, across firms and industries, exporters and non-exporters coexist, even in industries thought to be export intensive. Even among exporters, there exists marked variability in their behavior. At any given period in time and across firms and industries, there exist a significant number of exporters who sell their products in nearby markets, while

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another small proportion export to markets distant markets with distinctive features from the nearby markets (Gullstrand, 2011). A number of explanations have been advanced to explain this observed pattern among exporters. Firstly, firms are different – we have more productive firms and the less productive ones, the large and more experienced, and the small and less experienced ones, among other factors. Secondly, to initiate any foreign sales, a firm must consider how much it has to cover, in terms of costs, to access the export market because of the presence of sunk costs linked to export entry. These costs relate to conducting research on a number of variables like, information on distribution channels, regulations in the foreign market and preferences of consumers among others. These costs have to be incurred before the firm sells any units of the good in the foreign market, and once incurred, may not be recovered when the firm decides not to initiate any activity in the export market. Overall, these stylized facts reveal that sunk costs of exporting do explain the variation in the behavior of exporters across firms and industries (Clerides, Lach, & Tybout, 1998).

Accordingly, the literature generally supports the thesis that sunk costs of export market entry affect the export choices of trading firms. This may suggest that expanding sales to additional export markets creates new challenges for exporters, which vary from those encountered in the previous markets due to market-specific sunk costs of entry (Blanes-Cristóbal, Dovis, Milgram-Baleix, & Moro-Egido, 2008). This variation across markets points to the presence of different costs associated: (i) with collecting the necessary information about the market, (ii) setting up contacts in the foreign country, (iii) setting up distribution and marketing channels for the products, (iv) standardization of the products according to country-specific requirements. Consequently, various firms engage in export markets with varying degrees of export intensity and impact. Moreover, one common feature of firm-level data in Sub-Saharan Africa is the existence of exporters who sell products to three different destinations: (i) those who export products to nearby markets (regional market), (ii) those who export products to the distant markets (outside of Africa), and (iii) those exporting to both markets (within Africa and outside of Africa). Accordingly, it is documented that exporters who export goods to these markets have marked differences in terms of their productivity level before entry and during export market participation. Forexample, Lawless (2009) finds that productivity differences among firms influence firms' choices to sell products to a number of export markets. This implies that firms who accumulate high enough efficiency levels will likely participate in additional export markets.

Although various studies have documented stylized facts about the nature of trading firms, the literature has concentrated on discussing the heterogeneity between exporters and non-exporters leaving some key areas, like the geography of exports due to data limitations. In most cases, firm-level data does not report the destinations where exporters sell their products (Lawless, 2009), but report scanty information, especially, on whether the firm exports or not, capital stock and other measures of productivity. However, recent empirical advances have begun examining the effect of export markets on productivity and behavior of firms. Forexample, Eaton, Kortum, and Krarmaz (2011) analyze the sales patterns of French exporters in various destinations and find systematic correlation between firm sales and market size for markets that are less popular. Additionally, Eaton, Kortum, and Kramarz (2004) show the presence of great heterogeneity in export participation of exporters, whereby some firms export only to nearby

markets including France itself, with a tiny percentage of firms exporting to numerous markets. Taken together, the above facts indicate that firm efficiency level is important for export market destination entry and participation.

In this paper, we ask a basic question 'how do export markets shape firm productivity trajectories?' To evaluate this puzzle, we use data from three Sub-Saharan African countries, that is, Tanzania, Kenya and Ghana collected by the Regional Program on Enterprise Development (RPED) of the World Bank covering 12 years (1991–2002). We get our motivation from the much observed pattern in firm-level data, where some exporting firms sell to nearby markets while others target distant markets. If exporting confers benefits to exporters then these exporters should concentrate their effort where there is an opportunity to export their products – whether nearby or distant markets. Consequently, we break down our main analysis into three empirical questions: (i) what differences exist among firms exporting to various export markets? (ii) To what extent are the changes in the export market coverage the result of changes in firm-level productivity growth? (iii) What is the effect of exporting to different markets on productivity growth? Although substantial work has been done to examine the destination effects of exporting, most of the focus is on firms in advanced and emerging economies. Our results reveal that exporting is an important aspect of trading firms, with more productive firms exporting to multiple markets. We find a systematic relationship between changes in export markets and productivity growth indicating that firms generally sell products in additional markets if their productivity level increases above that in the current market. Examining the impact of exporting to different markets on productivity growth, we find that exporting to multiple markets raises the firm's productivity growth by 42.3%, higher than exporting to only one export market at a time.

Overall, our findings suggest that export markets raise productivity levels but it depends on which market the firm participates in. These findings hold at the country and industry level and are robust to other factors that may correlate with increased productivity like age, size and ownership. Conclusively, these findings have important policy implications on whether export market participation increases a firm's productivity and whether exporting firms should be supported to expand to additional export markets. Our results show that exporting per se may not present Sub-Saharan African countries with development gains, because exporters require high enough productivity to initiate export market participation, unless policies are directed at facilitating firms with entry to multiple export markets. We make a contribution to the literature that examines the effect of export markets on the productivity trajectories of exporting firms.

The rest of this paper is structured as follows: section 2 gives a brief review of related literature, section 3 presents the data, section 4 presents the empirical methodology, section 5 reports the results and section 6 concludes.

2. Review of related literature

Exploiting the richness of firm-level data, research has uncovered interesting patterns that exist among trading firms; with a general consensus building around the productivity differences that exists between exporters and non-exporters. Across industries, there exist firms who export and those who do not, coexisting together. Moreover, those who engage in export activities are in the minority, and once they start to export, they continue doing

so for considerable period of time (Bernard & Jensen, 2004). This reflects persistence of exporting revealed by firm-level data in most countries. Moreover, in some countries, exporting firms enter the export market by first starting small; by vending small quantities of their products in nearby markets to gain experience of reaching distant markets (Eaton, Eslave, Kugler, & Tybout, 2008). Consequently, a substantial number of these small exporters do not survive to celebrate their first anniversary due to stiff competition they encounter in the export markets. Those who survive their first entry grow rapidly and expand to other distant markets. This implies that exporting per se may not benefit every firm because of the presence of stiff competition and costs related to exporting. Moreover, exporting is known to be a rare activity among firms because of sunk entry costs related to initiating exporting in the international market. Consequently, only the large and more productive firms venture into the foreign markets while those who are small and less productive serve the domestic markets. If this is the case, then we would see firms who are large selling products in various destinations, both nearby and distant. However, this is not the case as shown by Eaton et al. (2008), who establish that some of the Colombian exporters are small and vend small quantities of their products.

Recently, research on trading firms has concentrated on discussing the characteristics of exporters against non-exporters. Little work has developed on firm behavior and destination markets due to data limitations, although some studies have taken crucial steps toward examining export destinations' influence on the behavior and productivity trajectories of exporters. Forexample, Serti and Tomasi (2012) show that export market destinations are important in explaining the prior differences in efficiency level of export starters. Their study shows that distant and less familiar destinations will be accessed only if the firm is large and more productive. Moreover, their finding reveals that exporting to distant and advanced markets requires adherence to specific set standards and quality; which may only be met by large and established firms. Similarly, Gullstrand (2011) analyses firm performance and export destination costs for the Swedish firms and finds that sunk costs vary across markets, and firm characteristics and high exchange rates dampen the firm's prospects of exporting.

Similarly, Eaton et al. (2011) analyze the sales patterns of French exporters in various destinations and find that firm sales rises systematically with the size of the market, especially if the market is less popular. Additionally, Eaton et al. (2004) show that there is great heterogeneity in export participation of exporters, whereby some firms sell only in nearby markets including France itself, with a small fraction of firms selling products in numerous markets. Grosse, Mudd, and Garcia Cerchiari (2013) examine the internationalization of Uruguay's firms and show that size indeed is important in the internationalization process, and show that the volume of sales tend to increase with firm size, implying that larger firms enter the export markets faster than small ones, and vend large quantities of their goods in these markets.

3. The data and descriptive statistics

3.1. Description of the data

In this paper, we use data from a panel survey of enterprises operating in the manufacturing sector of the three countries, namely Ghana, Tanzania and Kenya. The industries

surveyed include food and bakery, metal and machinery, garment, textile, wood and furniture. The panel surveys were conducted in waves covering years 12 years, from 1991 to 2002, and is the work of Regional Program on Enterprise Development (RPED) of the World Bank in partnership with the Center for the Study of African Economies (CSAE) of the University of Oxford. The data document complete information on exports sold in three basic destinations; (i) Within Africa – neighboring or regional markets, (ii) Outside of Africa – distant international markets, (iii) Both within and outside of Africa.

3.2. Market coverage and firm-size

In this section, we present market coverage according to firm-size classification. Firms are classified according to the number of workers they employ. We adapt the classification used by Klapper and Richmond (2011) with some modification. Thus, we classify firms in four classes; (i) micro firms-those employing from 1 to 9 workers, (ii) small firms-employing from 10 to 49 workers, (iii) medium firms – employing from 50 to 99 workers, (iv) large firms – employing 100 or more workers. We report information on market coverage by firm size in Table 1. We observe that exporters are a minority (12.3%) compared with non-exporters (87.7%), which is in line with data from some countries showing the same pattern (Bernard, Eaton, Jensen, & Kortum, 2003). The trade literature has observed that international trade is concentrated among few importers and exporters; fore-example, nearly 81% of U.S. trade is driven by the top 1% of these firms in 2000 (Bernard, Jensen, & Schott, 2005). When we compare the market coverage of our firms with the portrait of U.S. firms in 2000, we find that trade is driven by large firms – exporters who employ 100 or more employees (according to our classification). These large firms accounted for 48% of all exports between 1991 and 2002 in the three countries. Turning to firm size, we find that larger firms drive aggregate exports in the three countries, accounting for 63.3% of aggregate exports across the three destinations. We report that large firms selling to distant markets accounted for 30% of aggregate exports of the three countries between 1991 and 2002, while those selling to regional markets accounted for 23.7%. Only a small percentage (9.9%) of aggregate exports is from firms who export to both markets (within and outside Africa).

Another important feature to note from our analysis is that small firms too generated a significant contribution to aggregate exports. Our data shows that 28.3% of exports were generated by small exporters (those employing from 10 to 59 workers) across the three destinations. The most remarkable contribution came from small exporters who

Table 1. Market Coverage and Firm Size.

		Firm Size Classification			
Market	All firms	Emp 1-9	Emp 10-49	Emp 50-99	Emp = 100+
Non-exporters	87.7	38.5	39.8	11.4	10.3
Exporters	12.3	6.1	29.5	16.4	48.0
Destinations					
% exporting to Africa	41.1	1.4	9.3	6.7	23.7
% exporting outside Africa	57.7	1.5	15.5	10.7	30.0
% exporting to both Africa and outside Africa	16.4	0.5	3.5	2.5	9.9
Total contribution		3.4	28.3	19.9	63.3

Notes. The size class of firms reflects the categorization in the survey data, CSAE.

sold their products outside the African markets; they accounted for 15.5% of aggregate exports during that period. The medium and micro exporters generated lower percentages of exports; 19.9% and 3.4%. One key observation is that, across all firm sizes, firms selling to distant markets accounted for most of the exports generated during the period 1991–2002. This may suggest that exporting to distant markets appears attractive and many exporters may want to target these markets.

4. The theoretical and empirical model

This section presents the theoretical model that will guide the empirical analysis. The first part presents the baseline model, which is subsequently followed by the empirical framework.

4.1. Theoretical framework incorporating heterogeneous firms and trade costs

To guide the empirical work, we introduce some basic model adapted from Chaney (2008) and Melitz (2003). We propose that similar nations exchange differentiated products despite the presence of trade barriers that may hinder the effective exchange of their products. Producers know that their consumers love variety, and are willing to pay a price premium for products that are less substitutable (Krugman, 1980). Consequently, the price premium for products sold in the international market is an important motivation for producers to participate in the foreign market because the effect of trade barriers will be dampened by the returns from export market engagement. We further assume that an exporter decides to export its products in selected countries and fixes prices for its products in individual market in a manner that gives the best returns despite the competition in that particular market. As mentioned in our earlier assumption, countries h and f produce a continuum of distinct-differentiated goods, and that consumers in country f have utility of the form:

$$U_j = \left[\int \mathrm{q}_f(l)^{\frac{\sigma-1}{\sigma}} dl\right]^{\frac{\sigma}{\sigma-1}} \tag{1}$$

Therefore, the demand for product x in country f can be expressed as:

$$q_f(x) = \frac{p_f(x)^{-\sigma} Y_f}{p_f^{1-\sigma}} \tag{2}$$

where $p_f(x)$is the price charged in country f for product x, while Y_f is the real income in country f and P_f, is the price level denoted by the following expression:

$$P_f = \left[\int p_f(l)^{1-\sigma} dl\right]^{\frac{1}{1-\sigma}} \tag{3}$$

We can assume that individual firms produce their output with cost-minimizing technology denoted by $\frac{c}{z}$; where $z$is the productivity parameter that is expected to be drawn from a common distribution having a cumulative density function $G\ (z)$. Moreover, production costs are compounded by other costs related to selling product x in the international market. The first form of costs are the fixed costs, which we denote

by Fc_f, which are associated with establishing distribution channels, marketing costs, contact with sales agents or obtaining information on the regulation of the target market. These costs must be incurred before selling the first units of the good starts; and may rise with the volume of goods to be exported. The second form of costs is the variable costs, which we denote by Vc_f, and vary with the quantity of goods shipped. These are majorly tariffs, transportation and other distribution costs that vary with the units of the products; which we denote byτ_f. This implies that, for firm i to access market f to sell product x produced with technology z, it must sell at price that is optimal which is set as:

$$p_f(\boldsymbol{z}) = \frac{\sigma}{\sigma - 1} \frac{\tau_f c}{\boldsymbol{z}} \tag{4}$$

If equation (4) holds, then exports to the foreign market in country f for a firm using technology z can be expressed as:

$$s_f(z) = \left(\frac{\sigma - 1}{\sigma} \frac{P_f \boldsymbol{z}}{\tau_f c}\right)^{\sigma - 1} Y_f \tag{5}$$

This means that sales in the foreign market for firm i are positively correlated with its own efficiency level and the gross domestic products (GDP) and price level of importing country, while the variable costs of exporting have a negative relationship with the firm's exports. This implies that firm i will consider variable costs during subsequent sales to country f since these vary with every unit of sales destined for the foreign market.

Consequently, profits derived from foreign sales in country f are given by:

$$\pi_f(\boldsymbol{z}) = \varpi \left(\frac{P_f \boldsymbol{z}}{\tau_f c}\right)^{\sigma - 1} Y_f - F_f \tag{6}$$

where $\varpi = (\sigma - 1)^{\sigma - 1} \sigma^{-\sigma}$;

The profits generated from foreign sales should then be positive and increasing provided that:

$$z_f > \left(\frac{Fc_f}{\varpi Y_f}\right)^{\frac{1}{\sigma - 1}} \frac{\tau_f c}{P_f} \tag{7}$$

where the cutoff efficiency level that will guarantee firm i to export to country f can be expressed as:

$$\hat{z}_f = \left(\frac{Fc_f}{\varpi Y_f}\right)^{\frac{1}{\sigma - 1}} \frac{\tau_f c}{P_f} \tag{8}$$

Equation (8) implies that this is the efficiency cutoff point that must be reached by all prospective exporters before selling any units of their goods in the foreign market. Therefore, exporting to country f in a profitable manner requires that firm i (prospective exporter) must attain efficiency level higher than the minimum level $\hat{z}_f$ which is the recognized cutoff level, and 1-G ($\hat{z}_{ft}$) is the fraction of exporters entering country f at time t. It is vital to observe that, the efficiency cutoff level is increasing in trade costs and domestic cost levels and negatively uncorrelated with GDP and price level of the foreign country f (Lawless, 2009).

4.2. The implications of the above framework

The theoretical framework incorporating heterogeneous firms and trade costs described above generates predictable trajectories that we can test using Sub-Saharan African data. We note that our theoretical work suggests the following testable predictions:

Firstly, our model proposes that firms are different in their efficiency levels; with the large firms having higher efficiency levels. Therefore, to attain higher profits in the foreign market, prospective exporters must establish that their current and expected future profits can enable them to cover the fixed costs (which are sunk in nature) of entry into the foreign market *f*. This implies that each destination market *f* will have a minimum efficiency level that exporters must attain to sell to that market. This minimum efficiency level is defined as $\hat{z}_f$ and above, as specified in equation (8); that fixes the relationship between non-exporters and exporters. Consequently, non-exporters will be less productive than exporters because they cannot meet this efficiency level. If this efficiency level varies across export destinations, then it implies that; (i) the more productive firms initiate export activity, (ii) firms with higher level of efficiency sell to distant, less familiar markets and may enter additional destination markets.

Secondly, if efficiency levels vary across destination markets we would expect that; (i) the small and less efficient firms enter destination markets with low-efficiency level, (ii) the large and more efficient firms enter destination markets with higher efficiency level. Thirdly, given that exporting is correlated with learning, we expect that (i) firms exporting to distant and rich economies increase their efficiency further than those exporting to nearby markets, as a consequence of exporting; (ii) firms exporting in both African and outside of African markets have high rates of productivity growth.

4.3. The empirical methodology

4.3.1. Econometric specification

To examine the differential impact of export markets on firms, we use a two-step approach to guide the estimation process. In the first step, we estimate total factor productivity (TFP) at firm-level using the method pioneered by Levinsohn and Petrin (2003), herein called LP, to solve the simultaneity problem by using intermediate inputs to proxy for unobserved productivity shock. This method uses intermediate input proxies instead of investment to estimate a production function and corrects for simultaneity bias in the choice of inputs. One advantage of using intermediate inputs as proxies is that almost all firms in our dataset report positive use of intermediate inputs, like materials. Additionally, intermediate inputs link the estimation strategy and economic theory because these inputs are not state variables. Conversely, using ordinary least squares method tends to generate estimates of production functions that are biased, leading to biased productivity estimates. To this end, we derive our estimates of the production function using the LP method and obtain the estimates useful in the estimation of TFP in our data. In the second step, we recover the estimates of the production function and use them for estimating firm-level TFP. We regress firm-level TFP on the indicator variable and other control variables as specified in our baseline specification.

4.3.1.1 Productivity Measurement. Consider a firm with a Cobb–Douglas production function;

$$Y_{it} = A_{it} L_{it}^{\beta_l} K_{it}^{\beta_k} M_{it}^{\beta_m} + \varepsilon_{it} \tag{9}$$

where Y_{it} denotes output of firm i in period t which is a function of labor, L_{it}, capital, K_{it}, and intermediate inputs, M_{it}, A_{it} is the technology parameter, the betas (β_l, β_k and β_m) denote the elasticity of labor, capital and materials, respectively, and ε_{it} is the error term.

In the first step, we can take the natural logarithms of equation (9) above, and denote it using small letters, so that we write the production function as:

$$y_{it} = \beta_0 + \beta_1 l_{it} + \beta_2 k_{it} + \beta_3 m_{it} + \omega_{it} + \varepsilon_{it} \tag{10}$$

where y, l, k and m denote the natural logarithm values of output, labor, capital and intermediate materials, respectively. ω_{it}denotes the firm-level total factor productivity (TFP), which is known to the firm but unknown to the econometrician, and ε_{it} represents the disturbance (unpredictable component), for instance, demand changes.

When we re-arrange terms in equation (10) we obtain:

$$va_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \omega_{it} + \varepsilon_{it} \tag{11}$$

where term $va_{it} = y_{it} - \beta_m m_{it}$ denotes the natural logarithm of value added. Estimation of equations (10 and 11) by OLS method leads to biased estimates of capital and labor because these input choices may be correlated with productivity. More precisely, the estimates for capital inputs may be underestimated while those of labor input may be overestimated (Kapri, 2016). To obtain consistent estimates of the production function, we rely on the LP method and generate these estimates using *levpet* command.

We use value-added to estimate TFP using LP[1] (2003) approach, and proceed as follows:

Denote value added for firm i in period t as, va_{it}, then the production function can be written as:

$$va_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \omega_{it} + \varepsilon_{it} = \beta_l l_{it} + \lambda_{it}(k_{it},\, m_{it}) + \varepsilon_{it} \tag{12}$$

Where

$$\lambda_{it}(k_{it},\, m_{it}) = \beta_0 + \beta_k k_{it} + \omega_{it}(k_{it},\, m_{it})$$

Inserting a third-order polynomial approximation in $\lambda_{it}(k_{it},\, m_{it})$, we can routinely derive estimates of value-added from a regression equation using OLS. Thus, where β_0 is not independently identified from $\lambda_{it}(k_{it},\, m_{it})$. Once consistent estimates have been derived from the regression equation using OLS, we are done with stage one of Levinsohn and Petrin (2003) estimation routine, where parameters for β_l and φ_0 to the intercept have been derived.

$$va_{it} = \varphi_0 + \beta_l l_{it} + \sum_{i=0}^{3} \sum_{j=0}^{3-i} \varphi_{ij} k_{it}^{i} m\sigma_{it}^{j} + \psi_{it} \tag{13}$$

Next, we identify coefficient for β_k, where we start by calculating the estimated value for φ_0 using the equation of the form

[1]The detail of derivation of TFP index is found in Levinsohn and Petrin (2003).

$$\hat{\lambda}_{it} = \hat{va}_{it} - \beta_l l_{it} = \hat{\varphi}_0 + \sum_{i=0}^{3}\sum_{j=1}^{3-i} \hat{\varphi}_{ij} k_{it}^{i} m_{it}^{j} - \hat{\beta}_l l_{it}$$

Writing equation (13) this way, we can compute all the values of β^*_k for productivity ω_{it}, for all time periods by applying the following:

$$\hat{\omega}_{it} = \hat{\lambda}_{it} - \beta^*_k k_{it}$$

Following LP, we can recover the predicted firm-level productivity estimates and build an index of the firm's total factor productivity (TFP); thus, we can then write our estimates as:

$$\overline{\omega}_{it} = TFP_{it} = y_{it} - \overline{\beta}_1 l_{it} - \overline{\beta}_2 k_{it} - \overline{\beta}_3 m_{it} \tag{14}$$

where the bar denotes the recovered productivity estimates from each variable of interest (labor, capital, intermediate materials).

4.3.2. Exporting and firm productivity

To engage in export markets, firms must be productive to cover entry plus unit costs related to the quantities they intend to sell in these markets. As documented in previous studies, we would expect to see firms who are productive engaging in export markets while the less productive ones remain to serve domestic markets. To examine this relationship empirically, we follow Bernard and Jensen (1999) who evaluate the export premia for a variety of firm characteristics. We regress firm characteristics (in logs) on export status dummy – controlling for size and ownership status, year and industry effects, thus we express this as:

$$A_{it} = \alpha + \beta y_{it} + \gamma s_{it} + \lambda w_{it} + \sum z_{it} + \mu_{it} \tag{15}$$

where A denotes the logarithm of variables of interest, that is, total factor productivity, labor productivity, capital intensity, employment and skills, y is an indicator for export status, equal 1 if the firm exports, zero otherwise; s denotes firm size – measured by log of number of employees, w represents ownership status-equal 1 if firm has any foreign ownership, zero otherwise; z denotes firm age, country, year and industry effects, while μ is the error term.

The empirical results of equation (15) are reported in Table 2.

4.3.3. Exporting and export market destinations

In this section, we examine the heterogeneity among exporters who participate across different market destinations. Our interest is to evaluate if there are any marked differences in firm features among firms engaged in exporting: those exporting to African markets, outside African markets and those exporting to both markets (Africa and outside of Africa). To evaluate this, we estimate the variant of equation (15) by substituting the number and type of market for export status and analyze the following equation:

$$A_{it} = \alpha + \beta markets_{it} + \gamma s_{it} + \lambda w_{it} + \sum z_{it} + \mu_{it} \tag{16}$$

Table 2. Exporting and Firm Productivity.

Firm Characteristics	a	b	c	d
LnTFP	0.229**	N=4901	-0.114	N=3505
	(0.073)	R^2 =0.611	(0.132)	R^2 =0.081
Labour productivity	1.951***	N=5751	-0.039	N=3557
	(0.139)	R^2 =0.625	(0.124)	R^2 =0.333
Capital intensity	1.845***	N=5816	0.090	N=3627
	(0.124)	R^2 =0.680	(0.148)	R^2 =0.425
Wages	0.127*	N=3784	0.419***	N=2477
	(0.056)	R^2 =0.712	(0.089)	R^2 =0.208
Skills	0.204	N=4234	0.377*	N=3256
	(0.122)	R^2 =0.689	(0.170)	R^2 =0.242
Employment	1.331***	N=6146	1.397***	N=3976
	(0.065)	R^2 =0.655	(0.110)	R^2 =0.331
Firm size included	No		Yes	
Ownership dummy	No		Yes	
Firm age included	No		Yes	
Country dummy	No		Yes	
Industry dummy	No		Yes	
Year dummy	No		Yes	

Notes. Columns 1, reports firm characteristics, estimates (without controls), number of observations and R-squared, estimates (controlling for firm size, ownership, age, country, industry and time effects), and number of observations and R-squared, respectively.

a – size, ownership status, age, country dummy, industry and year effects not included in the regression; b – reports number of observations and R-squared; c – all controls included in the regression, d – reports number of observations and R-squared; significance levels *are: * p < .05; ** p < .01; *** p < .001; standard errors in parenthesis.*

Where A_{it} represents some key characteristics of the firm (TFP, labor productivity, capital intensity, employment and skills-proxied by weighted average education).

We report our empirical results in Table 3.

4.3.4. Changes in export markets and productivity

Previous studies show that firms that initiate exporting must achieve some productivity level, attained only by the more productive firms while the less productive ones will see this as a barrier to export market participation. In our model, we suggest that firms that intend to expand their market coverage (change number of markets they sell to) should be more productive. In other words, any change in the number of export market destinations should be the consequence of changes in firm productivity levels or specific market demand shocks. Thus, productivity cutoffs may impose bottlenecks to firms expanding their market coverage; consequently, entry into additional markets is possible if productivity level increases. This implies that productivity growth is a requirement for further expansion to additional markets due to differences in destination-specific trade costs (Blanes-Cristóbal et al., 2008). To evaluate this hypothesis, we estimate the following equation:

$$\%\Delta A_{it} = \alpha + \beta * \%\Delta markets_{it} + \gamma s_{it} + \lambda w_{it} + \sum z_{it} + \mu_{it} \tag{17}$$

We evaluate equation (17) and report the results in Table 4.

4.3.5. Productivity growth and export market participation

Although the evidence of learning-by-exporting in developed economies is inconclusive (Bernard & Jensen, 1999), there appears to be some agreement that firms in developing economies learn-by-exporting (Bigsten & Gebreeyesus, 2009; De Loecker, 2007; Fernandes & Isgut, 2015; Foster-McGregor, Isaksson, & Kaulich, 2014) and

Table 3. Exporting and Export Market Destinations.

	Export Market Destinations					
	African Markets		Outside African Market		Both Markets	
Firm Characteristics	a	b	a	b	a	b
LnTFP	0.141	N=3505	0.075	N=3505	0.112	N=3505
	(0.142)	R^2 =0.659	(0.115)	R^2 =0.659	(0.174)	R^2 =0.659
labour productivity	0.020	N=3557	0.204	N=3557	0.196	N=3557
	(0.157)	R^2 =0.724	(0.127)	R^2 =0.724	(0.193)	R^2 =0.724
Capital intensity	-0.181	N=3627	0.125	N=3627	0.064	N=3627
	(0.141)	R^2 =0.818	(0.113)	R^2 =0.818	(0.173)	R^2 =0.818
Wages	0.016	N=2477	0.015	N=2477	-0.109	N=2477
	(0.111)	R^2 =0.739	(0.089)	R^2 =0.739	(0.136)	R^2 =0.739
Skills	0.152	N=3256	-0.207	N=3256	-0.307	N=3256
	(0.211)	R^2 =0.663	(0.174)	R^2 =0.663	(0.265)	R^2 =0.663
Employment	0.892***	N=3976	0.702***	N=3976	0.676***	N=3976
	(0.094)	R^2 =0.799	(0.075)	R^2 =0.799	(0.120)	R^2 =0.799
Firm size included	Yes		Yes		Yes	
Ownership dummy	Yes		Yes		Yes	
Firm age included	Yes		Yes		Yes	
Country dummy	Yes		Yes		Yes	
Industry dummy	Yes		Yes		Yes	
Year dummy	Yes		Yes		Yes	

Notes. Column 1 is labeled as before, column 2 is the export market destinations – which we classify into three (African markets, Outside African markets, both markets-African and outside).

*a – size, ownership status and age included in regression but not country dummy, industry and year effects; b – all controls included in the regression. This applies to all export market destinations. *firm size not included in regression of log of employment; significance levels are: * p < .05; ** p < .01; *** p < .001; standard errors in parenthesis.*

Table 4. Changes in Export Markets and Productivity Growth.

	Export Market Destinations					
Firm Characteristics	ΔAfrican Markets		ΔOutside of Africa		ΔBoth Markets	
Dependent variable	a	b	A	b	a	b
ΔTFP	0.158	N=2388	0.032	N=2367	0.354	N=2441
	(0.574)	R^2=0.377	(0.492)	R^2=0.377	(0.701)	R^2=0.400
Δlabour productivity	0.003	N=2060	0.024	N=2045	-0.023	N=2067
	(0.026)	R^2=0.410	(0.024)	R^2=0.410	(0.033)	R^2=0.409
ΔCapital intensity	0.038	N=2146	0.031	N=2129	0.016	N=2153
	(0.024)	R^2=0.401	(0.022)	R^2=0.401	(0.031)	R^2=0.400
ΔWages	0.008	N=1206	-0.022	N=1203	0.161	N=1210
	(0.095)	R^2=0.247	(0.084)	R^2=0.245	(0.130)	R^2=0.247
ΔSkills	-0.110**	N=1732	0.031	N=1716	-0.061	N=1739
	(0.038)	R^2=0.294	(0.035)	R^2=0.287	(0.049)	R^2=0.289
ΔEmployment	0.022	N=2163	0.019	N=	0.016	N=2170
	(0.025)	R^2=0.352	(0.022)	R^2=	(0.032)	R^2=0.351
Firm size included*	Yes		Yes		Yes	
Ownership dummy	Yes		Yes		Yes	
Firm age included	Yes		Yes		Yes	
Country dummy	Yes		Yes		Yes	
Industry dummy	Yes		Yes		Yes	
Year dummy	Yes		Yes		Yes	

*Notes. a – size, ownership status and age included in regression but not country dummy, industry and year effects; b – all controls included in the regression. This applies to all export market destinations; significance levels are: * p < .05; ** p < .01; *** p < .001; standard errors in parenthesis.*

that destinations indeed matter (Boermans, 2013; Granér & Isaksson, 2009). One limitation of the previous literature is that export markets are taken as homogeneous with no marked differences. However, recent examination of export markets has shown that entry costs vary across different export markets (Blanes-Cristóbal

et al., 2008). We seek to understand whether export market create any marked differences in productivity growth of different firms. To evaluate this, we evaluate if the outcomes of exporters who target different export markets differ and which export markets increase productivity growth. We use Propensity-Score Matching (PSM) approach pioneered in the international trade literature by Girma, Greenaway, and Kneller (2004) and Wagner (2002), where exporters are matched to non-exporters at a point in time. This approach was used before, to compare exporters and non-exporters, where non-exporters are the reference group, and the export status is the indicator function. We follow the same approach and denote $\mathrm{Mkt}_{\mathrm{it}} \in \{0, 1\}$as indicator variable for the market targeted by the exporter.

Thus:

Let ΔZ^{1}_{ift+y} denote the change in the outcome measure at some time y, after entry into market *f* and ΔZ^{0}_{ift} the outcome of the exporter had it not targeted market *f*. Naturally, the major challenge of causal inference is that for each exporter, we can observe only ΔZ^{1}_{ift+y} but not ΔZ^{0}_{ift+y}because each firm receives either the treatment or no treatment (control group) but not both (Holland, 1986). Therefore, the expected causal effect of targeting market *f* is denoted by $\Delta Z^{1}_{ift+y} - \Delta Z^{0}_{ift+y}$; and writing this in expectation terms, we examine the average treatment effect on the treated (ATT) as:

$$\mathrm{ATT} = \mathrm{E}(\Delta \mathrm{z}^{1}{}_{\mathrm{ift+y}} - \Delta \mathrm{z}^{0}{}_{\mathrm{ift+y}} \,{}^{1}\!/_{2}\, \mathrm{kt}_{\mathrm{ift}} = 1) \tag{18}$$

The challenge with equation (18) is that we can observe $\Delta z^{1}{}_{ift+y}$ but not $\Delta z^{0}{}_{ift+y}$; requiring the construction of the correct counterfactual. Therefore, following established tradition in the literature, we can write the average effect of exporting to market *f* as:

$$\begin{aligned} ATT &= E\left\{\Delta Z^{1}{}_{ift+y} - \Delta Z^{0}{}_{ift+y} \,|Mkt_{ift} = 1\right\} \\ &= E\left\{\Delta Z^{1}{}_{ift+y} \,|Mkt_{ift} = 1\right\} - E\left\{\Delta Z^{0}{}_{ift+y} \,|Mkt_{ift} = 1\right\} \end{aligned} \tag{19}$$

Equation (19) creates an easy way to estimate observed outcome $\{\Delta Z^{1}_{ift+y}|Mkt_{ift} = 1\}$ but our causal inference becomes meaningful only if we have the right counterfactual for the unobserved portion of equation (18), that is, $E\{\Delta Z^{0}_{ift+y}|Mkt_{ift} = 0\}$, the average treatment outcome exporters would have received had they not initiated selling their products in market *f*. To analyze $E\{\Delta Z^{1}_{ift+y}|Mkt_{ift} = 1\}$, we evaluate a corresponding average value for firms who never sell in market *f* such that: We then specify a control group according to the observable characteristics and ex ante entry-level value of the outcome variable Z^{1}_{ift-1}. Accordingly, the factors influencing productivity growth are now known, so we proceed to estimate a probability function for targeting market *f* using a probit model. Following Rosenbaum and Rubin (1983), we adopt a propensity score matching method and write the propensity score for all firms as:

$$E\left\{\Delta Z^{0}_{ift+y}|Mkt_{ift} = 0\right\} \tag{20}$$

We then specify a control group according to the observable characteristics and ex ante entry level value of the outcome variable Z^{1}_{ift-1}. Accordingly, the factors influencing productivity growth are now known, so we proceed to estimate a probability function for

targeting market f using a probit model. Following Rosenbaum and Rubin (1983), we adopt a propensity score matching method and write the propensity score for all firms as:

$$P = \left(Mkt_{ift} = 1\right) = G(K_{ift-1},\ V_i) \tag{21}$$

Equation (21) implies that firm i targets market f based on the arguments of function G. In this case, K_{ift-1}denote the lagged covariates of interest (TFP, value added, capital intensity, employment) and $V_i$is the set of controls (firm size, age, ownership, industry, country and year effects). $P(Mkt_{ift} = 1)$ denotes the predicted probability of firm i selling in market f at period t.

We rely on the technique of nearest-neighbor matching with calliper, where we choose control group with the closest exporter according to its propensity score. Thus, for exporter firm i, targeting export market f, a non-exporter firm j is selected such that:

$$|p_{it}^{f} - p_{jt}^{f}| = \min_{\delta\in\{mkt=0\}} \left\{p_{it}^{f} - p_{jt}^{f}\right\} \tag{22}$$

We augment the results using difference-in-differences method that requires making observation of outcomes for two groups for two periods – the starting and ending periods. In this case, one group gets the treatment in the second period and not in the first period while the second group gets no treatment in either period. The objective here is to assess the effect of the treatment, whereby if the same observations within a group are observed in each period, we can deduct the average change in the outcome for the second (control) group, from the average change in the first (treated) group. More formally, we can express the difference-in-differences estimation as:

$$\Omega_1 = \left\{\psi_{11} - \psi_{10}\right\} - \left\{\psi_{01} - \psi_{00}\right\} \tag{23}$$

Where Ω_1 denotes the impact or outcome variable, $\left\{\psi_{11} - \psi_{10}\right\}$ is the outcome for the treated group and $\left\{\psi_{01} - \psi_{00}\right\}$ denotes the outcome of the control group.

To derive a testable empirical equation, we can write our difference-in-differences equation based on the sample of matched firms as:

$$\Delta\Omega_{ift} = \alpha\Omega_{ift-1} + \beta X_{ift-1} + \sum_{\omega=-1}^{2} \psi_{\omega} Market_{ift-\omega} + G_{jft} + \varepsilon_{it} \tag{24}$$

where $\Delta\Omega_{ift}$ denotes the change in the outcome variables (total factor productivity, labor productivity, employment or wages), *i,t, and f* index firms, time periods, foreign market, respectively, while G denotes the full set of industry, regions and time dummies. X is a vector of lagged control variables-firm age, size and ownership, and $Market_{ift}$ are dummy variables set to 1 if firm *i exported to destination market f*, at period t, and zero otherwise. The use of difference-in-differences improves the results of the matching process, presenting us with valid estimates of the treatment outcomes (De Loecker, 2007).

One key concern in our estimation is the endogeneity bias in our empirical estimates and reverse causality, which we remedy using two techniques. First, we lag by 1 year, all the covariates that apply in our difference-in-differences method. Second, we use difference-in-differences method to address the reverse causality problem since this method is suggested to improve the quality of the results of propensity score matching since the expected outcomes cannot solely be assigned to the average treatment before and after

the treatment since other factors contemporaneous with the treatment can be captured in the matching process.

The results of propensity are not shown here, but we present the results of difference-in-differences analysis in Table 5.

5. Empirical results and discussion

5.1. Exporting and firm productivity

In this section, we present our empirical analysis on the relationship between exporting and firm productivity in Table 2. As documented in previous literature, exporting generates firm productivity improvement. We find that firms who engage in exporting have high TFP than non-exporters. To note three pronounced examples, our results show that exporters have 22.9% higher productivity level as a result of export market participation. We also note that even after controlling for industry and time effects, exporters pay more wages (41.9%) than non-exporters. Moreover, exporters employ more workers (139.7%) than non-exporters, controlling for industry and year effects. These findings largely reflect the portrait of exporters in other countries (Bernard & Jensen, 1999).

5.2. Exporting and export market destinations

In this section, we document the relationship between exporting and export market destinations. Table 3 reports the results of equation (16) which examines the relationship between exporting and export market destinations. We show that, even after controlling for firm characteristic that might correlate with the dependent variables, firms engaged in exporting have high productivity across all the three markets. Firms exporting to African export markets having the highest total factor productivity level (14.1%), closely followed by firms selling to both markets (11.2%). Similarly, exporters who sell in markets outside of Africa have 7.5% higher productivity, than non-exporters.

Our findings may suggest that firms engaged in exporting improve their productivity as a result of the learning process that takes place during export market participation. Examining firms who sell in both markets, we note that they improve their productivity level, higher than those selling products in markets outside of Africa. This may suggest that exporting firms will sell to more markets if their efficiency level improves because they can afford to cover additional fixed costs associated with selling in more markets, as predicted in our theoretical model. This is consistent with the arguments that firm productivity is an essential component of exporting; and firms who have high productivity can export products to additional markets. This implies that, to sell abroad firms must not only cover sunk costs related to export market entry, but also variable costs. This is consistent with the argument of the existence of sunk costs of export market entry and may explain why some exporters sell products in only one export market.

5.3. Changes in export markets and productivity

In this section, we examine the relationship between the changes in export markets and productivity, and present the results in Table 4. The columns are labeled as before. We

Table 5. Productivity Growth and Export Market Participation (DID Results).

	Export Market Destinations					
	African Markets		Outside Africa		Both Markets	
Firm characteristics	ATT(a)	ATT(b)	ATT(a)	ATT(b)	ATT(a)	ATT(b)
ΔTFP	0.169	0.015	−0.302	−0.235	0.423	0.313
	(1.707)	(1.461)	(1.415)	(1.345)	(4.041)	(3.949)
	C=2278;T=265	C=2361;T=275	C=2188;T=355	C=2268;T=368	C=2436;T=107	C=2525;T=111
ΔLabor productivity	−0.047	−0.096*	0.008	−0.003	−0.401**	−0.212**
	(0.095)	(0.058)	(0.087)	(0.044)	(0.196)	(0.088)
	C=1738;T=211	C=2266;T=259	C=1706;T=243	C=2208;T=317	C=1870;T=79	C=2426;T=99
ΔCapital intensity	−0.070	−0.005	−0.002	−0.005	−0.410**	−0.133
	(0.056)	(0.062)	(0.047)	(0.082)	(0.184)	(0.087)
	C=1835;T=216	C=2360;T=266	C=1792;T=259	C=2297;T=329	C=1969;T=82	C=2525;T=101
ΔSkills	−0.070	−0.157**	0.157	−0.019	0.125	−0.024
	(0.071)	(0.077)	(0.109)	(0.060)	(0.312)	(0.127)
	C=1566;T=189	C=2105;T=228	C=1552;T=203	C=2072;T=261	C=1688;T=67	C=2251;T=82
ΔEmployment	−0.019	−0.127*	−0.005	−0.041	0.059	−0.246**
	(0.110)	(0.068)	(0.095)	(0.052)	(0.300)	(0.109)
	C=2071;T=233	C=2500;T=272	C=1992;T=312	C=2427;T=345	C=2213;T=91	C=2669;T=103

*Notes. a – reports the average treatment effect with covariates, b– covariates are excluded in the analysis; standard errors in parenthesis.; Significance levels are: *** p < 0.01; ** p < 0.05; * p < 0.1. All covariates are lagged 1 year.*

report a positive relationship between growth in changes in export market and productivity growth for African export markets. We note that when firms exporting to African markets increase their market coverage by 1%, they increase their total factor productivity by 15.8%, even when we control for firm age, size, ownership status, country, and industry and year effects. We observe that our findings may suggest an improved learning process for exporters selling products in African markets due to knowledge diffusion on account of sharing common borders, similarity in cultures and lower marginal costs associated with shorter distance to the exporting market (Defever, Heid, & Larch, 2015). This varies sharply with firms exporting to export destinations outside of Africa. Our results show that when firms exporting to these destinations attempt to increase their market coverage by 1%, their productivity increases by only 3.2%, controlling for firm characteristics (firm size, age and ownership), country, industry and year effects. One explanation that we advance for this sluggish productivity growth is that engaging in exporting involves incurring sunk costs that directly affect the outcome of the firm's export market participation. Sunk costs of export market entry influence the firm's decision to export to a specific market (Máñez, Rochina-barrachina, & Sanchis, 2008; Roberts & Tybout, 1997) and firms exporting to distant destinations face higher additional costs charged based on the distance covered (Serti & Tomasi, 2012). Therefore, if a firm who exports to distant markets increases market coverage by selling products to additional markets, such a firm may find its productivity growth slow down due to increase in marginal costs of export market entry.

The second explanation may be that sunk costs of exporting are market specific, that is, they vary from market to market (Blanes-Cristóbal et al., 2008). If a firm increases market coverage by exporting to additional distant markets, this increases the firm's marginal costs of production and distribution, consequently slowing down or sometimes, driving its productivity downwards. The third explanation may point to the fact that exporting to outside African markets, means that the firm enters export markets located in the developed economies which may expose the firm to an international market with strict regulation and stiff competition thereby creating export barrier to exporters. Consequently, if firms successfully launched their sales in a specific market, they must concentrate to grow their market share before expanding their sales to additional distant markets. This then implies that expanding market coverage to distant markets may come at a cost to productivity growth.

Turning to firms who export to both markets (Africa and outside of Africa), we find a positive relationship between productivity growth and growth in market coverage, robust to the inclusion of firm characteristics (firm size, age and ownership), country, industry and year effects. Our findings suggest that when market coverage increases by 1%, firm productivity growth rises by 35.4%, all else equal. We may suggest that productivity growth for exporters who sell in both markets may be coming from experience in participating in African market than from advanced markets, based on the fact that selling products in these markets helps firms to increase their productivity growth (15.8%) compared with 3.2% for those selling in advanced markets.

Overall, the main message of our finding is that simultaneous export market participation in African and advanced economies, seems to boost productivity growth more than when exporters target individual markets at a time. These results

are consistent with the insights in our model and show that exporting and market coverage are correlated.

5.4. Productivity growth and export market participation – difference-in-differences approach

In this section, we report the results of difference-in-differences that highlight the impact of exporting to different export markets on productivity growth. In Table 5, we observe that exporting to multiple markets effects the firm's productivity growth by 42.3%, higher than exporting to only one export market at a time. To explain this basic fact, we use the basic principles of the Chaney (2008) and Melitz (2003) models. Firms are born having similar features and begin production process with the resources they are endowed with, notably labor and capital. The output can either be marketed domestically or exported to an international market. To sell any unit of the good abroad, firms must pay for fixed (sunk) and variable costs, which they cannot know how much they have to cover. New exporters will learn the extent of the sunk costs and variable costs only when they start exporting. Consequently, only the large and more productive firms sell products abroad and those who survive the barriers to exporting thrive and expand their existence in additional markets (Eaton et al., 2008). This suggests that it is mostly firms who have acquired enough productivity who expand to additional markets, or simply these firms expand market coverage. This then implies that productivity is correlated with market coverage, and firms who expand their existence in other markets grow their productivity further as suggested by our results, and in line with our theoretical model. Henceforth, we can conclude that export market do matter for productivity growth and selling to multiple markets at a time leads to increased further productivity growth. Turning to other export markets, we report that firms who export to African markets have rates of productivity growth reaching 16.9%, while firms who export to distant and advanced markets face a drop in productivity growth by 30.2%. This drop may be due to distance creating increasing variable costs related to export market entry and participation (Serti & Tomasi, 2012)

Our findings reflect a new dimension in the effects of export markets on firm productivity, and may be at odds with previous studies. Forexample, De Loecker (2007) finds that firms exporting to high-income countries generate high levels of productivity growth than those exporting to low-income countries. Overall, our findings suggest that export markets raise productivity levels but it depends on which market the firm participates in. These findings hold at the country and industry level and are robust to other factors that may correlate with increased productivity like age, size and ownership.

6. Conclusion

In this paper, we analyzed the significance of export market destinations for productivity growth in Sub-Saharan Africa. As in previous studies, we find that exporting firms have high productivity than non-exporters even after controlling for size, age, ownership and other fixed effects. Moreover, our findings indicate that exporters have high productivity across all the three markets; with firms exporting to African markets having the highest

productivity. Additionally, we find evidence that firms exporting to more than one market perform well, and increase their productivity growth as a consequence of participating in these markets.

Overall, our findings suggest that although export market destinations do matter for productivity growth, exporters who simultaneously sell products to more than one market do receive the largest productivity growth premia. These findings hold at the country and industry level and are robust to other factors that may correlate with increased productivity like age, size and ownership. Conclusively, these findings have important policy implications on whether export market participation increases a firm's productivity and whether exporting firms should be supported to expand to additional export markets. At the policy level, policies on export promotion should provide information on how prospective exporters can enter into African export markets. Additionally, firms that have started exporting should be facilitated with information and credit access to expand their sales to other additional export markets so as to maximize welfare gains from export market participation.

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