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Exporting and Productivity: Learning from Vietnam

Carol Newman[a], John Rand[b], Finn Tarp[b,c,*], and Nguyen Thi Tue Anh[d]

[a]Department of Economics, Trinity College Dublin, Dublin, Ireland, [b]Department of Economics, University of Copenhagen, Copenhagen, Denmark, [c]UNU-WIDER, Helsinki, Finland, and [d]Central Institute for Economic Management, Hanoi, Vietnam

*Corresponding author: Finn Tarp. E-mail: Tarp@wider.unu.edu, finn.tarp@econ.ku.dk

Abstract

For Africa to industrialise and develop, it must learn from successful cases of structural transformation. Just two decades ago, Vietnam had a level of per capita income and structural characteristics similar to many African economies. In the meantime, Vietnam has with great success taken a very different policy stance than typical in Africa. This is especially so in promoting export-oriented industry. If learning by exporting is a key driver of progress, then a fundamental reason for Africa's lack of transformation is likely to be the low policy priority given to export promotion in the past. To enlarge the body of empirical evidence, we use an extensive 2005–2012 firm-level panel data set from Vietnam and separate out productivity effects of exporting due to self-selection. This allows us to conclude that firms actually learn by exporting. We also examine how this learning takes place. Our findings suggest that productivity gains are associated with moving to larger scale for foreign-owned firms with little evidence of subsequent learning on export markets. We find strong evidence to suggest that private domestic firms learn and accumulate knowledge from export markets with learning attributed in some part to within-firm innovations, in particular research and development. These mechanisms are highly relevant to African countries where market size, innovation and research are seriously constrained.

Key words: learning by exporting, self-selection, productivity, Vietnam, firm ownership, innovation

JEL classification: F14, O14, D22

1. Introduction

Newman *et al.* (2016a, b) and Page (2012) provided detailed accounts of the multiple ways industry matters for Africa, and warn that without more robust growth of industry Africa's long-term development prospects may be at risk. They lament that the variety of economic

policy reform agendas pursued over the past 35 years with the assistance of the international donor community have not put the industrialisation challenge centre stage; and point to East Asian success for guidance to what is needed for African countries to prosper in the global economy. Vietnam is a case in point. Following economic collapse in the mid-1980s, quite similar to the crisis experienced across Africa, Vietnam initiated its *Doi Moi* 'renovation' reform process in 1986. Although several of the measures taken correspond with the tenets of the Washington Consensus (Williamson, 1990), there are also significant differences. Vietnam continued to intervene heavily in agricultural markets (Markussen *et al.*, 2011) and pursued an active industrial policy, switching only gradually from import substitution to export promotion. Vietnam did not focus immediate attention on international trade liberalisation and WTO membership as was the case following structural adjustment in Africa (Abbott and Tarp, 2012). Instead, a highly coordinated set of public investments, targeted policies and institutional initiatives was put in place with a keen eye to facilitating trade and promoting exports, much along the lines pursued in other East Asian countries in the 1970s as part of their export push strategies. WTO membership followed later in 2007, and had *per se* much less impact on economic performance than often assumed (Abbott *et al.*, 2009).

Consequent socio-economic outcomes in Vietnam have been impressive by any standard. Just 20 years ago, Vietnam's economy shared many structural features that are typical in African economies today. Since then, the share of industry in GDP has increased steadily to close to 40% in 2013, while aggregate growth remained more or less on par with the top African performers. In contrast, the industry share of GDP in Africa seems to have stabilised below 10% from around 2006.[1] To give a concrete example, aggregate growth rates have been strikingly similar in Mozambique and Vietnam since 1986 when they embarked on respectively a standard package of stabilisation and structural adjustment (Arndt *et al.*, 2000) and *Doi Moi* (Arndt *et al.*, 2012). In the case of Vietnam, this led to a completely changed landscape for industrial development, increased trading opportunities and a drastic fall in poverty headcount rates.[2] Such dynamics continue to be largely absent in Mozambique. Here, structural transformation remains sluggish, poverty is widespread and the enterprise sector continues to struggle to survive—not to mention the elusive goal of breaking into export markets (Jones and Tarp, 2013).

In sum, it would appear that Africa—and the development community more broadly—has a lot to learn from Vietnam when it comes to the formulation and implementation of trade and industrial development policy. At the same time, before becoming overconfident in the number of lessons that can be drawn, it is necessary to consider carefully whether engaging in exporting actually impacts on productivity at the firm level—or whether it is the other way around. In his comprehensive review of the literature, Syverson (2011) cautioned that despite the widely acknowledged strong correlation between the average productivity level of an industry's plants and that industry's trade exposure, there seems to be less evidence of large productivity impacts on the domestic

1 According to the World Development Indicators. See also Newman *et al.* (2016a, b) for a series of comparative statistics on industry, trade and economic performance in Vietnam, Cambodia and eight sub-Saharan African countries.

2 See McCaig (2011) on the role of exports in reducing poverty.

plants when they begin exporting. He goes on to note (p. 353) that 'exporters are almost inevitably more productive than their non-exporting industry counterparts, but most studies have found that this correlation largely reflects selection rather than a causal impact of exporting on productivity. Plants that choose to begin exporting were *already* more productive before trade.' As an example, Clerides *et al.* (1998) found that while efficient firms self-select to become exporters they do not experience any efficiency gains as a result of doing so in Columbia, Mexico and Morocco; and Sun and Hong (2011) find the same for state enterprises in China.[3] Rankin *et al.* (2006) only found weak evidence for selection in a sample of five African countries, and Harrison and Rodriguez-Clare (2010) drawn a somewhat more optimistic conclusion about learning by exporting,[4] but there is wide agreement on the need for an enlarged body of empirical evidence.

The first objective of the present study is to respond to this need for more empirical evidence focusing on Vietnam for the reasons outlined above. We ask how much self-selection matters for the positive correlation between exporting and productivity, and use the framework proposed by Clerides *et al.* (1998) to identify and distinguish self-selection and learning-by-exporting effects. If firms self-select into export markets, then there should be evidence that they are more productive than non-exporters in the period (s) prior to entry. Moreover, if firms learn by exporting they should experience an increase in productivity after entry into export markets. We rely on a rich firm-level panel data set from Vietnam for the period 2005–2012 and use a combination of descriptive and more formal econometric approaches to test these relationships. We find that there is a positive effect of exporting on productivity, controlling for self-selection, which strengthens the general evidence base for recommending export-oriented industrialisation. We also find that there are productivity gains from exporting and that these gains accumulate with years of experience on export markets. The export–productivity relationship is in the case of Vietnam most notable for foreign-owned firms, but this is due to initial productivity gains upon entry into export markets. While the productivity gain experienced by private domestic Vietnamese firms is not as large, the accumulated effect of years of experience on export markets far outweighs the initial effect for private firms.

Although sorting out the importance of self-selection in understanding the export–productivity relationship is an important policy relevant analytical challenge in its own right, a better understanding of the actual mechanisms underlying positive learning is critical for the effective design of industrial policy aimed at linking domestic producers with global

3 Bernard and Jensen (1999), Girma *et al.* (2004) and Delgado *et al.* (2002) also found that the relationship between exporting and productivity is largely due to self-selection, all in developed country contexts.

4 Relevant references here include Bigsten *et al.* (2004), who found significant efficiency gains from exporting in four African countries; Bigsten and Gebeeyesus (2009), who uncovered some evidence of learning by exporting in Ethiopia, though efficiency gains are highly correlated with firm size and state ownership; and Van Biesebroeck (2005), who identified productivity improvements for exporting firms in a number of African countries post-participation in foreign markets, as do Fernandes and Isgut (2005) in the case of Colombia and Blalock and Gertler (2004) for Indonesia. See also Fafchamps *et al.* (2008) on learning in Morocco.

value chains. The extent of learning is likely to be related to characteristics of firms or their capacity to adapt and change in order to benefit from export possibilities. Recent empirical studies in this vein have explored how differences in both the characteristics of firms and their behaviour impact on the decision of firms to enter export markets and the relationship between exporting and productivity gains. Aw *et al.* (2007, 2011) found a role for firm investments in R&D in explaining export patterns in Taiwan as well as interactive effects between such investments and exporting on productivity; and Lileeva and Trefler (2010) explored the link between investments in innovation, exporting and productivity in the case of the Canadian manufacturing sector. They find that trade liberalisation induces firms to begin exporting, export more and engage in more innovation and technology adoption. Further and even more recent results in the literature include prominent contributions by Atkin *et al.* (2014), Bustos (2011), Caliendo and Rossi-Hansberg (2012) and Wagner and Zahler (2015).

A second objective that is central to this study is on this background to explore how the characteristics and behaviour of firms impact on the exporting–productivity relationship. More specifically, we aim to add to the literature by exploring some of the underlying mechanisms at work. We find that for foreign-owned firms the driver to productivity growth from exporting is moving to larger scale;[5] while the positive relationship for domestic firms can be explained by variety of innovations undertaken by the firms and investments in R&D, as in, for example, Marin and Voigtländer (2013).

The remainder of the study is structured as follows. Section 2 presents and describes the data. Section 3 sets out our empirical approach to testing for self-selection and identifying learning-by-exporting effects, while Section 4 provides results. Section 5 concludes, underscoring the comparative lessons African countries can draw.

2. Data and descriptive statistics

We use data from the 2005–2012 Vietnamese Enterprise Surveys (VES) collected annually by the General Statistics Office (GSO) of Vietnam. The data include all firms with over 30 employees and a sample of smaller firms, which are all required by law to report accounting information, and selected additional information, annually to the GSO. The data were provided to us by the GSO in raw format and we undertook a number of measures to ensure that the data at the individual firm level are consistent both within and across years. These include correcting changes in coding over time on key variables such as location, legal ownership and sector, and ensuring that accounting information reported by firms is done in an accurate way and follows basic accounting principles. We also excluded any firms that leave and re-enter the sample after a period of absence. After these steps, a total of 168,684 observations on 54,830 firms were left for analysis. For most of our analysis, we only consider a balanced panel of firms to abstract from reallocation effects due to the exit of

5 For a stimulating contribution to the literature focused on African manufacturing, see Söderbom and Teal (2003). They argue that the key to success in African manufacturing exports is to enable large firms to use a more labour-intensive technology than at present; while Zeufack (2001) found that the performance gap between Africa and Asia has better be explained by there being poorer institutions in Africa.

inefficient firms.[6] This will assist in the identification of within-firm productivity effects that can be attributed to learning by exporting. The balanced panel of firms consists of 38,008 observations on 4,751 firms.

To explore the mechanisms underlying learning by exporting, we supplement our analysis with data gathered in the Technology and Competitiveness Survey (TCS), a specially-designed module that was included for a representative sub-sample of manufacturing firms in the 2009–2012 rounds of the Enterprise Survey. The survey gathered information on technology, investment and innovation, which we link to export status and productivity in our analysis. The survey covered a total of 4,603 private domestic manufacturing firms, which includes a balanced panel of 2,617 firms that we use in our analysis.[7]

The exporting status of firms can be determined from the Enterprise Survey using an indicator of whether firms report that they export goods or services. As this information was not gathered in all waves, we combine it with information on whether the firm paid export tax during the previous year. For most years, the output produced by export firms classified in this way corresponds quite well to the aggregate trade statistics produced by the GSO of Vietnam, with the exception of 2005 and 2009 where missing data make export firms under-represented in our sample. To overcome this, we imputed export status by classifying a firm as an export firm if they export in both the year before and the year after.[8] Table 1 illustrates the extent and importance of exporting over the 2005–2012 period for the full unbalanced sample and the balanced panel of firms.

Focusing on the balanced panel of firms, column 2 shows an increase in the proportion of firms that export from around 17% of the balanced panel sample in 2005 to over 35% of the sample by 2012. Our data also show (column 6 of Table 1) that these exporting firms account for over 81% of total output produced by the manufacturing sector in 2012, up from around 42% in 2005.[9] Just over 37% of firms are 'entry-exporters' (column 2 of Table 1) in that they start exporting at some point over the sample period. This highlights the increasing trade openness of the Vietnamese economy during this period and the dynamic nature of manufacturing enterprises.

We also disaggregate firms by ownership type and consider, in particular, private domestic firms. It is perhaps not surprising that a smaller proportion of private domestic firms export as compared with the entire sample that includes both foreign- and state-owned firms. A lot of entry and exit into export markets is also evident among private

6 Focussing on the balanced panel of firms comes with the caveat that it introduces an additional source of selection bias given that more productive firms are likely to survive and as such are more likely to enter export markets. We address the issue of self-selection of productive firms into export markets in our empirical analysis but do not explicitly treat the entry and exit of firms more generally. As a robustness check on our results, we also estimate all of our models using the unbalanced panel of firms. Our story remains unchanged giving us some confidence that any simultaneity introduced by focussing on the balanced panel of firms is not driving our results.

7 Our results using the balanced panel of firms from the TCS are checked for robustness to the use of the unbalanced panel. In most cases, our results hold.

8 All of our results are robust to the exclusion of data from 2005 and 2009 from the analysis. Results are available on request.

9 This does not mean that all of this output is exported. It represents the proportion of total output that exports firms account for, whether sold domestically or abroad.

Table 1: Proportion of Firms in Vietnam that Export and Proportion of Output Accounted for by Exporting Firms

	Percent firms All ownership types		Percent firms Private domestic firms		Percent revenue All ownership types	
	All firms (1)	Balanced (2)	All firms (3)	Balanced (4)	All firms (5)	Balanced (6)
2005	10.52	16.67	4.31	7.28	40.56	42.54
2006	19.70	26.20	10.52	14.22	58.86	61.04
2007	17.13	24.46	8.56	13.13	57.73	63.09
2008	15.56	23.62	7.38	12.41	57.01	63.27
2009	12.33	25.00	5.70	14.02	52.58	63.53
2010	17.15	35.02	7.96	21.66	62.11	72.87
2011	18.24	36.43	8.89	21.06	74.89	82.56
2012	20.85	35.68	9.26	20.51	77.72	81.67
Non-export	68.99	45.93	81.52	61.29		
Entry-export	25.30	37.40	16.32	31.26		
Exit-export	17.47	34.39	12.41	28.66		
Cont-export	2.03	6.82	0.45	1.95		

Source: Authors' calculations based on Vietnamese Enterprise Survey 2005–2012.

domestic firms with 31% of firms (balanced sample) entering export markets over the period and a further 28% exiting.

Table 2 illustrates the number of firms that begin to export over the timeframe of our analysis and the number of firms that continue to export in the years following initial entry. This is based on the balanced panel of firms. The number of firms entering export markets for the first time is much higher in the later years of the sample, at least up to 2011. Between half and two-thirds of firms continue to export 1 year after their initial entry into export markets. This proportion remains relatively constant over time. Although the survival rate of private domestic firms in export markets is somewhat lower, it is still around 50% on average. We also observe a lot of re-entry into export markets in the later years, both for the full sample and for private domestic firms.

3. Empirical approach

We follow the standard methodology applied in the literature for separating self-selection of productive firms into export markets from learning-by-exporting effects.

3.1 Detecting self-selection

Clerides *et al.* (1998) and Bernard and Jensen (1999) both found evidence for self-selection by examining the productivity trajectory of firms before they enter into export markets. If more productive firms self-select into export markets entry exporters should have higher productivity levels in the periods prior to entry into foreign markets than non-export firms.

To test this hypothesis, we compute a firm-specific measure of labour productivity, measured as value added divided by the number of employees, and examine whether productivity is higher for firms that enter export markets in the years prior to entry than firms that

Table 2: Export Dynamics

Year first export	2006	2007	2008	2009	2010	2011	2012
Balanced panel: all ownership types							
n	493	255	120	51	643	154	61
Continuing							
2007	334						
2008	302	124					
2009	304	130	120				
2010	179	146	62	43			
2011	346	163	72	24	320		
2012	355	158	70	16	300	88	
Balanced panel: private domestic firms							
n	241	131	69	40	364	111	53
Continuing							
2007	139						
2008	129	53					
2009	134	56	69				
2010	68	59	27	35			
2011	160	72	39	18	121		
2012	162	71	36	11	112	64	

Source: Authors' own calculations based on Vietnamese Enterprise Survey 2005–2012.

never export. We use a firm fixed-effects model that also includes sector fixed effects to control for the switching of firms between 4-digit sectors over the time period of the analysis, time dummies to control for general shocks to productivity and the probability of entry into export markets, and firm-specific time-varying characteristics. The model is described in equation (1):

$$\text{export}_{ijt} = \sum_{l=1}^{L} \alpha_l \text{lprod}_{ijt-l} + \alpha_4 \text{size}_{ijt-1} + \alpha_5 kl_{ijt-1} + \boldsymbol{\beta}\mathbf{X}_{ijt} + \eta_i + s_j + \tau_t + e_{ijt} \quad (1)$$

where export_{ijt} refers to the decision of firm i in sector j to enter the export market in year t; lprod is the measure of labour productivity that is included at various lag lengths; size is the number of workers; kl is the capital–labour ratio; $\mathbf{X}$ are other control variables including, for example, firm ownership; η_i are firm fixed effects; s_j are sector fixed effects; τ_t are time dummies; and e is a statistical noise term.

The size of the firm is included to proxy for the sunk cost element of entering export markets (Bigsten *et al.*, 2004). The firm's capital–labour ratio is included to control for underlying efficiency differences between firms (Clerides *et al.*, 1998). The model is estimated only for firms that enter export markets over the sample period and firms that never enter export markets. Moreover, firms that enter export markets are only included in the periods prior to and the period of entry. The coefficients of interest for testing whether there is self-selection into exporting are the α_l which we expect to be positive and statistically significant if the productivity of firms that enter export markets is higher in the periods prior to entry than firms that never export. We use *F*-tests to determine the appropriate lag length.

3.2 Detecting learning by exporting

We use a one-step approach to estimate learning-by-exporting effects where we estimate production function parameters and the impact of exporting on productivity simultaneously, while controlling for self-selection. This is similar to the approach used in Bigsten *et al.* (2004), Fernandes and Isgut (2005) and Van Biesebroeck (2005). Using this approach has the advantage of reducing the bias associated with the correlation between the export status of the firm and unobserved productivity.

Our core empirical model is given by equation (2):

$$q_{itj} = \beta_0 q_{ijt-1} + \beta_1 y_{ijt-1} + \boldsymbol{\varphi}_1 \mathbf{Z}_{1ijt} + \boldsymbol{\varphi}_2 \mathbf{Z}_{2ijt} + \eta_i + s_j + \tau_t + e_{ijt} \quad (2)$$

where q_{it} and q_{it-1} are the output levels of the firm (measured as the log of value added) in periods t and $t-1$, respectively; y_{it-1} is an indicator for whether the firm exported in the previous period; $\mathbf{Z}_{1it}$ is a vector of inputs that assuming a Cobb-Douglas functional form includes labour (measured as the log of the number of employees) and capital (measured as the log of the capital stock); $\mathbf{Z}_{2it}$ is a vector of control variables for selection into exporting, including the variables from equation (1) but at two lags along with an additional lag of previous export participation to capture the fixed costs associated with entering into the export market (see Roberts and Tybout (1997) and Bigsten *et al.* (2004)); η_i are firm fixed effects; s_j are 4-digit sector dummies; τ_t are year dummies; and e_{it} is a random error term.

The core parameter of interest is β_1 which if found to be positive provides evidence of learning by exporting even when selection effects are netted out. The idea underlying this is that there is heterogeneity in a firm's underlying productivity and this is related to the export status of the firm; if firms learn by exporting then past export status should influence future productivity. Despite the fact that we allow for heterogeneity in unobserved productivity in this model through the inclusion of firm, sector and time fixed effects, selection and other control variables, there are still a number of potential sources of endogeneity remaining that could lead to biased estimates of β_1 if a standard OLS fixed-effects estimator is used to estimate this model. First, it is possible that the controls for self-selection do not fully capture the range of omitted variables that relate to both a firm's unobserved productivity and their export status. For example, a new, more efficient manager is likely to make the firm more productive and is also more likely to seek out opportunities on export markets. Time-varying confounding factors such as this are not controlled for in our model and so the OLS estimator of β_1 will be biased if they are present. Second, it is likely that there are unobserved factors in equation (2) that are correlated with a firm's input choices. This is the standard simultaneity problem that arises in the econometric estimation of production functions.[10] Third, the inclusion of the lagged dependent variable as a regressor in this model allows for a dynamic adjustment process to changes in the factors of production. However, it complicates the econometric estimation of equation (2) given that the strict exogeneity assumption underlying the standard fixed-effects estimator will no longer hold, leading to biased results. Given the dynamic nature of our model, to address these endogeneity concerns we use the Arellano and Bond (1991) difference generalised method of moments (GMM) estimator. It uses first differences to control for unobserved firm

10 For a review of the issues associated with the econometric estimation of production functions, see van Beveren (2010) and Syverson (2011).

heterogeneity and internal instruments (lagged levels) for the endogenous lagged dependent variable and the other endogenously determined variables including the capital and labour inputs and the lagged export status.[11]

An additional concern when using this approach to identify impacts on productivity is that we only have data on the value of inputs and outputs and so cannot estimate physical productivity. This implies that using our measure, productivity changes will embody both within-firm efficiency gains and changes in prices and/or mark-ups that cannot be easily disentangled. As a robustness check, we consider whether the effects of exporting are different in competitive and concentrated sectors to eliminate the possibility that the observed productivity effects are due to changes in mark-ups as opposed to real technical efficiency improvements (Amiti and Konings, 2007). Sector-level concentration (at the 4-digit level) is measured using the standard Herfindahl–Hirschman Index (HHI) as follows:

$$\mathrm{HHI}_{jt} = \sum_{i=1}^{n} s_{ijt}^{2} \tag{3}$$

where s_{ijt} is the revenue share of firm i in sector j at time t. The higher the value of this measure the more concentrated the sector. By including an interaction term between the index and the lag of exports indicator, we ensure that the level effect of the lag of exports isolates the impact of exporting on productivity in competitive sectors where observed improvements are more likely to be due to productivity gains. In other words, it measures the effect of exporting on productivity as the HHI measure tends to zero.

We also explore some of the dynamics underlying the learning process by examining the extent to which the effect of exporting on productivity increases with years of experience on export markets. Moreover, if firms truly learn from exporting the effect on productivity should not disappear when a firm stops exporting. We examine both of these aspects by considering a model that includes the years of experience in export markets and an interaction term with a dummy indicator for whether a firm stops trading in a given year. This specification is described in equation (4):

$$\begin{aligned} q_{it} = {} & \beta_0 q_{it-1} + \beta_1 y_{it-1} + \beta_2 yrsy_{it-1} + \beta_3 D\left(y_{it-1} = 1, y_{it} = 0\right) \\ & + \beta_4 D\left(y_{it-1} = 1, y_{it} = 0\right) {}_{*} yrsy_{it-1} + \boldsymbol{\varphi}_1 \mathbf{Z}_{1it} + \boldsymbol{\varphi}_2 \mathbf{Z}_{2it} + \eta_i + \tau_t + s_j + e_{it} \end{aligned} \tag{4}$$

where $yrsy_{it-1}$ is the years of experience of the firm in export markets in the previous period and $D(y_{it-1} = 1, y_{it} = 0)$ is a dummy indicator for whether the firm stopped exporting in period t. As indicated above, if learning effects are present we would expect $\beta_1 > 0$ but if these effects accumulate over time then we might also expect $\beta_2 > 0$ signalling that the impact of exporting on productivity increases with years of experience in export markets. We would also expect that $\beta_4 = 0$ signalling that the effect of exporting on productivity growth is permanent and does not disappear when firms cease to export.

11 An alternative approach is Blundell and Bond's (1998) system GMM estimator. It is, however, unlikely that the initial conditions required for the validity of this estimator are satisfied in our case.

Table 3: Selection into Export Markets

Dependent variable	All firms		Private domestic firms	
Export market entry	(1)	(2)	(4)	(5)
L.Labour prod	0.009*** (0.003)	0.018*** (0.005)	0.008*** (0.003)	0.013** (0.005)
L2.Labour prod		0.0001 (0.006)		0.003 (0.006)
L3.Labour prod		0.014** (0.006)		0.015** (0.006)
L4.Labour prod		0.009* (0.005)		0.011** (0.005)
L.Size	−0.007 (0.005)	−0.011 (0.009)	0.007 (0.005)	0.006 (0.008)
L.Cap-lab ratio	−0.015*** (0.004)	−0.027*** (0.006)	0.0001 (0.004)	−0.009 (0.006)
F-test of joint significance		0.004		0.007
R^2	0.020	0.107	0.011	0.025
Number of firms	3,959	3,091	3,028	2,587
Number of observations	21,407	10,771	17,568	9,309

Source: Authors' calculations based on Vietnamese Enterprise Survey 2005–2012.
Note: A balanced panel of firms is used for this analysis. Firms that export in all years are excluded. Firms that enter into export markets are only included in the years prior to and the year of entry. Each model includes firm fixed effects along with 4-digit industry and time dummies. Columns (1) and (2) also include dummy indicators for ownership type to control for firms that change ownership over the sample period. *F*-test for joint significance refers to the *p*-value from the *F*-test of the joint significance of the lagged productivity variables. Robust standard errors clustered at the firm level are included in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.10$.

4. Empirical results

4.1 Self-selection

As outlined in Section 3, we test for self-selection by exploring whether entry into export markets is associated with higher levels of productivity in the periods prior to entry relative to firms that never export. We estimate the firm-level fixed-effects regression given in equation (1), which describes the decision to export. The results are presented in Table 3.

Our results suggest that firms that enter into export markets have a higher level of productivity in the period prior to entry than firms that never export. This is the case for all firms (column 1) and when we restrict the sample to private domestic firms (column 3). We use *F*-tests to find the optimal number of lags on labour productivity to include in the model and find that the productivity differences between entry exporters and non-exporters are evident up to four periods prior to entry into export markets. Our results are consistent with the findings of Clerides *et al.* (1998), Bernard and Jensen (1999) and Bigsten and Gebreeyesus (2009). They all find similar differences in productivity between exporting and non-exporting firms in the periods prior to entry onto export markets, suggesting that there is indeed self-selection at work.[12]

12 The age of the firm is likely to be positively correlated with selection into export markets and productivity (see, for example, Roberts and Tybout 1997). We cannot determine firm age from our data

4.2 Learning

To explore whether firms learn by exporting, we first estimate the model given in equation (2). Results are presented in Table 4. Columns 1–3 present the estimates from the standard OLS model while column 4 presents the Arellano and Bond (1991) difference GMM estimator.[13] Each model includes firm, sector and year fixed effects and so the identification of the effect of interest comes from within-firm variation in export status and productivity. As discussed in Section 2, we estimate the model for the balanced panel of firms.[14] The basic specification presented in column 1 excludes selection controls and does not control for persistence in the dependent variable. In column 2, controls for self-selection are included while in column 3 the lag of output is also included as an additional control. In all three models, the lag of exports is found to have a positive and well-determined impact on productivity. The magnitude of the coefficient declines with the inclusion of selection controls and the lagged dependent variables as expected.

As discussed in Section 3, the difference GMM estimator presented in column 4 controls for a range of endogeneity problems including the endogeneity of the lag of export status, simultaneity in input choices and the inclusion of the lagged dependent variable. We find strong support for the learning-by-exporting hypothesis when endogeneity concerns are addressed. The estimated coefficient is 0.232 implying that entry into export markets is associated with a 23% increase in productivity. The magnitude of the effect on productivity is similar to that found by Bigsten and Gebreeyesus (2009) using a similar approach for entry into export markets in Ethiopia.

In columns 5 and 6, we include a control variable for sector concentration by including the HHI (equation 3) and interact this with the lagged export variable. The inclusion of the interaction term nets out the effect of entry into export markets in highly concentrated sectors thus isolating the impact of exporting on productivity in competitive sectors where observed improvements are more likely to be due to real productivity gains rather than declining mark-ups. In both the OLS and difference GMM case, the interaction between sector concentration and the lag of exports is not well determined, suggesting that there is no statistically significant difference in the impact of exporting in concentrated and competitive sectors. Moreover, the joint impact of sector-level concentration and the interaction with exports on productivity is found to be statistically insignificant on the basis of an *F*-test. This leads us to conclude that sector-level concentration is not important in the realisation of productivity gains from trade.[15]

We also explore whether the effect of exporting on productivity grows with years of experience on export markets. To test whether this is the case, we include a variable measuring the number of years of exporting experience a firm has (equation 4). The results for

and so cannot include this as a control variable. Using a balanced panel of firms and including firm fixed effects go some way to controlling for the selection of older firms into exporting.

13 Standard errors are clustered at the firm level in this and subsequent tables. As a robustness check, we also cluster the standard errors at the 4-digit industry classification. All of our results hold. See Table A2 in the Appendix.

14 As a robustness check on all of our results, we estimate each model using the unbalanced panel. All of our results hold. See Table A1 of the Appendix.

15 In subsequent models, we continue to include a control variable for sector-level concentration but for the sake of parsimony we do not include an interaction with the lagged export status variable.

Table 4: Econometric Analysis of Learning-by-Exporting Effects

Dependent variable: lnva	(1) OLS	(2) OLS	(3) OLS	(4) Difference GMM	(5) OLS	(6) Difference GMM
L.export	0.042***	0.036***	0.032***	0.232**	0.040***	0.264**
	(0.010)	(0.011)	(0.010)	(0.091)	(0.012)	(0.117)
Inputs						
lnlab	0.713***	0.713***	0.688***	0.721***	0.688***	0.693***
	(0.014)	(0.015)	(0.015)	(0.240)	(0.015)	(0.241)
lncap	0.170***	0.173***	0.162***	0.493**	0.162***	0.498**
	(0.011)	(0.012)	(0.012)	(0.201)	(0.012)	(0.199)
Selection						
L2.export		0.013	0.011	−0.044	0.011	−0.056
		(0.011)	(0.011)	(0.074)	(0.011)	(0.074)
L2.lnlabprod		−0.065***	−0.072***	0.084***	−0.072***	0.086***
		(0.008)	(0.008)	(0.023)	(0.008)	(0.023)
L2.lnlab		0.012	−0.018	−0.260*	−0.018	−0.247*
		(0.015)	(0.015)	(0.138)	(0.015)	(0.143)
L2.cap-lab		−0.031***	−0.033***	−0.148**	−0.033***	−0.142**
		(0.011)	(0.011)	(0.070)	(0.011)	(0.072)
L.lnva			0.086***	0.419***	0.086***	0.422***
			(0.009)	(0.067)	(0.009)	(0.067)
Sector concentration						
HHI4					0.015	0.184
					(0.071)	(0.255)
HHI4 × L.export					−0.157	−0.984
					(0.143)	(1.842)
F-test of joint significance					0.541	0.736
AR(1)				0.000		0.000
AR(2)				0.323		0.358
Hansen				0.392		0.473
R^2	0.843	0.829	0.850		0.849	
Firms	4,751	4,751	4,751	4,751	4,751	4,751
Observations	33,257	28,506	28,506	23,755	28,506	23,755

Source: Authors' calculations based on Vietnamese Enterprise Survey 2005–2012.

Note: A balanced panel of firms is used for this analysis. Each model includes firm fixed effects along with 4-digit industry dummies and time dummies. Dummy indicators for ownership type are also included to control for firms that change ownership over the sample period. Columns 4 and 6 present the results from Arellano and Bond's (1991) difference GMM estimator where L.lnva, L.export, lnlab and lncap are treated as endogenous. The third and fourth lags are used as instruments for L.lnva and lnlab in first differences, the fourth and fifth lags of lncap, and the fifth lag of L.export (and of HHI4 × L.export in column 6). AR(1) refers to the *p*-value from the Arellano-Bond test for AR(1) in first differences and AR(2) to the test in second differences. Hansen refers to the *p*-value for the Hansen test of over-identifying restrictions. Selection controls and ownership dummies are treated as exogenous. The *F*-test of joint significance in columns 5 and 6 refers to the *p*-value from the test of the joint significance of HHI and HHI × L.export. Robust standard errors clustered at the firm level are included in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.10$.

Table 5: Econometric Analysis of Learning-by-Exporting Effects

Dependent variable: lnva	(1) OLS	(2) Difference GMM	(3) OLS	(4) Difference GMM
L.export	0.053*** (0.011)	0.180** (0.090)	0.085*** (0.013)	0.278** (0.129)
L.yrs_export	0.036*** (0.006)	0.090*** (0.024)	0.038*** (0.006)	0.081*** (0.022)
Stop export × L. yrs_export			−0.001 (0.009)	0.010 (0.014)
Stop export			−0.072*** (0.022)	−0.220** (0.101)
Inputs				
lnlab	0.681*** (0.015)	0.469* (0.262)	0.679*** (0.015)	0.487* (0.264)
lncap	0.168*** (0.012)	0.599*** (0.208)	0.169*** (0.012)	0.602*** (0.209)
Selection				
L2.export	−0.010 (0.012)	−0.006 (0.071)	−0.006 (0.012)	0.025 (0.079)
L2.lnlabprod	−0.073*** (0.008)	0.101*** (0.024)	−0.073*** (0.008)	0.105*** (0.025)
L2.lnlab	0.016 (0.015)	−0.046 (0.169)	−0.015 (0.015)	−0.003 (0.178)
L2.cap-lab	−0.026** (0.011)	−0.037 (0.086)	−0.025** (0.011)	−0.017 (0.090)
L.lnva	0.084*** (0.009)	0.428*** (0.068)	0.084*** (0.009)	0.438*** (0.070)
Sector concentration				
HHI4	−0.013 (0.074)	0.046 (0.108)	−0.012 (0.074)	0.054 (0.108)
AR(1)		0.000		0.000
AR(2)		0.888		0.827
Hansen		0.319		0.426
R^2	0.854		0.855	
Firms	4,751	4,751	4,751	4,751
Observations	28,506	23,755	28,506	23,755

Source: Authors' calculations based on Vietnamese Enterprise Survey 2005–2012.
Note: A balanced panel of firms is used for this analysis. Each model includes firm fixed effects along with 4-digit industry dummies and time dummies. Dummy indicators for ownership type are also included to control for firms that change ownership over the sample period. Columns 2 and 4 present the results from Arellano and Bond's (1991) difference GMM estimator where L.lnva, L.export, lnlab and lncap are treated as endogenous. The third and fourth lags are used as instruments for L.lnva and lnlab in first differences, the fourth and fifth lags of lncap, and the fifth lag of L.export. AR(1) refers to the *p*-value from the Arellano-Bond test for AR (1) in first differences and AR(2) to the test in second differences. Hansen refers to the *p*-value for the Hansen test of over-identifying restrictions. Years on export markets, selection controls, ownership dummies and the dummy indicator for exiting export markets are treated as exogenous. Robust standard errors clustered at the firm level are included in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.10$.

the OLS and difference GMM specifications are presented in columns 1 and 2 of Table 5. In both cases, firms with more years of experience on export markets have higher productivity. This suggests that in addition to a direct positive productivity impact associated with exporting, learning accumulates over time.[16] Take for example a firm with 2 years of experience on export markets. Based on the difference GMM estimator (column 2),

16 Our data do not allow us to determine firm age and so we cannot include this as a control variable. Firm age is likely to be correlated with selection into export markets and productivity. Using a balanced panel of data and taking care to address self-selection and endogeneity concerns through the inclusion of a rich set of control variables, including firm fixed effects, and employing

exporting in a third year will directly increase productivity in the subsequent period by 18%, while the 2 years of experience already accumulated will increase productivity by a further 18% (0.09 × 2). This suggests that exporting has a positive and non-diminishing impact on productivity.

As a check on whether what we observe is really a learning effect we include a dummy indicator for whether a firm stops exporting in a given year and interact it with years of experience in export markets. If it is learning we observe then we would expect the effect to persist; it is unlikely that a firm can 'unlearn' how to be more productive. If this is the case, then we would expect this interaction term to be statistically insignificant. The results are presented in columns 3 and 4 of Table 5 for the OLS and difference GMM estimators, respectively. As might be expected, the dummy indicator for a firm stopping exports is negative and well determined. This implies that exiting export markets is associated with a loss in measured productivity. The question remains, however, whether the learning accumulated before export markets persists. As revealed in columns 3 and 4, the interaction term is not well determined, suggesting that the impact of years of experience on export markets is the same regardless of whether a firm continues or stops exporting. This provides evidence in favour of the productivity effect of exporting being permanent and persistent.

4.3 Heterogeneous effects

In Table 6, we explore the possibility that there is heterogeneity in the impact of exporting on productivity across different forms of ownership status. Our sample includes foreign-owned, state-owned and private domestic firms. We include interaction terms between the lag of exports and indicator variables for private-owned and foreign-owned firms (columns 1 and 3) and interactions between the ownership indicators and the years of experience exporting (columns 2 and 4). The base category is state-owned firms.

In column 3, we focus on whether the direct effect of entry into export markets is different according to ownership type. The combined effect of the impact of exporting on productivity across ownership types is statistically significant as indicated by the joint *F*-test. Given that state-owned firms form the base category, the level effect captures the impact of exporting on the productivity of state-owned firms. We find a negative and statistically significant impact. This suggests that state-owned firms do not experience productivity gains from exporting and may in fact experience negative effects associated with entry. This is similar to Sun and Hong (2011), who found no evidence that state-owned firms learn from exporting in China. One possible explanation is that state-owned firms focus more on the domestic market (36% are exporters compared with 60% of foreign-owned firms). Moreover, they may have less absorptive capacity when it comes to the types of knowledge and technology transfers thought to underlie learning-by-exporting effects.

The interaction term between the lag of exports and the indicator for private domestic firms captures the differential impact of exporting on productivity for private firms relative to state-owned firms. The statistical significance of the interaction terms indicates that the effect for private firms is indeed different from state-owned firms. The marginal effect for private firms can be computed by summing the coefficient on the level effect and the

a difference GMM estimator, go some way to alleviating concerns that the age of the firm is driving our findings on learning by exporting.

Table 6: Econometric Analysis of Learning-by-Exporting Effects—Who Is Learning?

Dependent variable: lnva	OLS		Difference GMM	
	(1)	(2)	(3)	(4)
L.export	−0.025 (0.023)	−0.004 (0.023)	−0.600** (0.246)	−0.435** (0.204)
L.yrs_export		0.014 (0.011)		0.047 (0.033)
Ownership interactions				
Private × L.export	0.051** (0.026)	0.049* (0.027)	0.787*** (0.250)	0.771*** (0.215)
Foreign × L.export	0.095*** (0.029)	0.093*** (0.029)	1.102*** (0.331)	0.661*** (0.202)
Private × L.yrs_export		0.027** (0.012)		0.074*** (0.027)
Foreign × L.yrs_export		0.026** (0.012)		0.045 (0.033)
Ownership-level effects				
Privately owned	−0.015 (0.044)	−0.029 (0.046)	−0.198** (0.095)	−0.263** (0.104)
Foreign-owned	0.081 (0.237)	0.086 (0.237)	−0.276 (0.307)	−0.105 (0.293)
F-test of joint significance (L.export)	0.000	0.000	0.000	0.000
F-test of joint significance (L.yrs_export)		0.000		0.000
AR(1)			0.000	0.000
AR(2)			0.608	0.921
Hansen			0.096	0.139
R^2	0.850	0.854		
Firms	4,751	4,751	4,751	4,751
Observations	28,506	28,506	23,755	23,755

Source: Authors' calculations based on Vietnamese Enterprise Survey 2005–2012.
Note: A balanced panel of firms is used for this analysis. Each model includes firm fixed effects along with 4-digit industry dummies and time dummies. Inputs, controls for selection and the lag of value added are included in all models. The coefficients are almost identical to those reported in Tables 4 and 5. They are available on request. The *F*-test of joint significance refers to the *p*-value from an *F*-test of the joint significance of the interaction terms. Columns (3) and (4) present the results from Arellano and Bond's (1991) difference GMM estimator where L.lnva, L.export and its interaction with the ownership dummies, lnlab and lncap are treated as endogenous. The third and fourth lags are used as instruments for L.lnva and lnlab in first differences, the fourth and fifth lags of lncap, the fifth lag of L.export and the interaction terms. AR(1) refers to the *p*-value from the Arellano-Bond test for AR(1) in first differences and AR(2) to the test in second differences. Hansen refers to the *p*-value for the Hansen test of over-identifying restrictions. Years on export markets and the interaction with ownership status, selection controls and ownership dummies are treated as exogenous. Robust standard errors clustered at the firm level are included in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.10$.

interaction term. This implies that exporting is associated with an 18.7% increase in productivity for private domestic firms. The coefficient on the interaction term with foreign-owned firms is also statistically significant, indicating that the productivity gain associated with exporting is different for foreign-owned firms compared with state-owned firms. The marginal effect for foreign-owned firms, computed by summing the coefficients on the level effect and foreign ownership interaction term, indicates that exporting is associated with a 50% increase in productivity. This suggests that foreign-owned firms experience much greater productivity gains associated with exporting than private-owned and state-owned

firms. This is in contrast to other findings in the literature. For example, Sun and Hong (2011) found that foreign-owned firms benefit less from exporting than domestic firms in the case of China.

In column 4, we also include interaction terms with years of experience on export markets to determine whether there is heterogeneity across firms in the extent to which the positive productivity effects associated with entry into export markets accumulate over time. The *F*-test suggests that the joint effect of years of experience on productivity across ownership types is statistically significant. In this case, the level effect (the effect for state-owned firms) and the interaction term with foreign-owned firms are not statistically different from zero. The interaction term for private-owned firms is, however, statistically significant, suggesting that the effect of accumulated years of experience on export markets is different for private-owned firms compared with state- and foreign-owned firms. The magnitude of the coefficient suggests that each additional year of experience exporting leads to an additional 7% increase in productivity in all subsequent years and thus points to evidence of persistent learning effects for private domestic exporting firms. For foreign-owned firms, the years of experience exporting do not matter for productivity gains. The positive impact of entry into export markets on productivity is only evident in the initial year of entry. This may be explained by the fact that foreign-owned firms are likely to face a greater set of constraints when supplying local markets as compared with private-owned firms that have more local knowledge, connections and networks. As such, foreign-owned firms gain from accessing export markets by scaling-up and so experience a productivity boost as a result of doing so. Given their multi-national nature they have, however, little to learn from exporting per se and so the effect does not accumulate over time. In contrast, we find strong evidence to suggest that private-owned firms both learn by exporting and that these effects accumulate over time.

4.4 Mechanisms

As highlighted in the introduction, evidence from the literature suggests that firms differ in the extent to which they experience learning effects associated with exporting. In particular, a growing literature suggests that investment in R&D and innovation not only explain exporting patterns but are also linked with productivity improvements associated with exporting (Lileeva and Trefler, 2010; Aw *et al.*, 2011). Our analysis suggests that there are significant productivity gains associated with exporting for private domestic firms and that these effects appear to accumulate with years of experience exporting. To explore further the underlying mechanisms at work, we extend our analysis to consider some of the possible ways through which learning may occur.

We use information contained in the TCS described in Section 2 for 2009–2012. The sample is a sub-set of the manufacturing firms covered by the Vietnam Enterprise Survey and so can be matched to the main data set used in our analysis and allows for the inclusion of lags from periods prior to 2009 so all 4 years of the panel can be exploited. Moreover, with the addition of lags from earlier periods we can use the difference GMM estimator that requires at least four time periods to be estimated.[17] We consider a number of variables contained in the TCS which captures firm behaviour in relation to investment,

17 It should be noted that the full range of selection controls could not be included in these models given the limited time periods available.

Table 7: Descriptive Statistics on Technology and Competitiveness Variables

Percent of firms	2009	2010	2011	2012
Tech transfer	1.49	4.05	3.74	2.90
New machine	20.44	12.69	9.28	6.65
New ICT	25.91	14.33	11.39	8.52
Process innovation	28.51	59.57	62.93	65.84
Quality innovation	79.56	77.34	80.55	81.35
Variety innovation	50.13	42.45	42.53	41.88
Tech adaptation	24.19	9.32	7.34	5.01
R&D activities	12.84	11.50	10.89	6.57

Source: Authors' calculations based on the Vietnamese Technology and Competitiveness Survey 2009–2012. Means presented for balanced panel of 2,692 private domestic firms.

technology and innovation, and which could influence the productivity impacts of exporting. The list of variables considered with summary statistics is given in Table 7.

The mechanisms we considered in our analysis include technology transfers, measured by asking export firms whether their relationship with customers in export markets results in technology transfers from the customer to the domestic supplier. These could, for example, take the form of training in new machinery, production processes, or support in reaching quality standards or other requirements of customers abroad. Very few firms report receiving technology transfers, ranging from around 1.5% of firms in 2009, to between 3 and 4% during 2010–2012. We also consider investments in new machinery and information and communications technologies. In the TCS module, firms are asked to name the two most important production technologies (machines and equipment) and the two most important information and communications technologies (ICT) used by the firm. They are also asked to report when these technologies were acquired. For the purpose of our analysis, we treat firms that acquired the technologies during the previous year as having made an investment in new machinery or ICT. Between 6 and 20% of firms invested in new machinery while between 8 and 26% of firms invested in ICT between 2009 and 2012.

In addition, we include a range of indicators of innovations undertaken by the firm. The options given include improvements in process organisation (such as time-saving procedures); improvements in product quality; and an expansion of product variety. A large number of firms report that they engaged in process innovations (between 28 and 65%) and quality innovations (between 77 and 81%). Fewer firms, less than half the sample in each year, report that they expanded the variety of products they produce. Finally, we focus on whether firms engage in adaptations to existing technologies and investments in R&D activities. In the case of the former, firms are asked whether they modify existing production or process technologies in order to, for example, adapt them to the specific needs of the firm, increase efficiency or make them work faster or better. Between 5 and 24% of firms report that they engaged in technology adaptation of this kind in each year. Fewer firms, between 7 and 12%, report that they engaged in R&D activities. The proportion of firms engaging in either of these activities declined between 2009 and 2012.

We re-estimate the learning-by-exporting model for the (balanced) sub-sample of 2,617 private domestic firms included in the TCS module. The results are presented in column 1

Table 8: Learning-by-exporting channels—Difference GMM Estimator

Dependent variable: lnva	(1)	(2)	(3)
L.Export	0.339*** (0.111)	−0.072 (0.263)	0.492*** (0.123)
L.yrs_export	0.177*** (0.053)	0.241 (0.160)	0.150*** (0.056)
Variety innovation		−0.022 (0.245)	
L.Export × Variety innovation		0.913* (0.548)	
L.yrs_export × Variety innovation		−0.072 (0.364)	
R&D			−0.051 (0.128)
L.Export × R&D			−0.626 (0.555)
L.yrs_export × R&D			0.299** (0.155)
AR(1)	0.064	0.037	0.005
AR(2)	0.313	0.398	0.200
Hansen	0.391	0.692	0.394

Source: Authors' calculations based on the Vietnamese Technology and Competitiveness Survey 2009–2012 and the related sub-sample of the Vietnamese Enterprise Survey 2009–2012.

Note: The balanced panel of 2,617 private domestic firms is used for this analysis with a total of 7,760 observations in each regression. Each model includes firm fixed effects, 4-digit industry dummies and time dummies. The lag of value added, inputs and a control for sector-level concentration are included in each model. Indicators for all other forms of investments in innovations described in Table 7 are also included in columns 2 and 3. L.lnva, lnlab, lncap, L.export, L.yrs_export and their interactions are treated as endogenous. The second and third lags are used as instruments. AR(1) refers to the p-value from the Arellano-Bond test for AR(1) in first differences and AR(2) to the test in second differences. Hansen refers to the p-value for the Hansen test of over-identifying restrictions. Years on export markets and the sector-level concentration are treated as exogenous. Robust standard errors clustered at the firm level are included in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.10$.

of Table 8. We find a positive and statistically significant relationship between the lag of exporting and productivity confirming our findings from the main analysis. We interact in turn each of the measures described in Table 7 with the lag of export status and with the lag of years of experience on export markets to establish whether the learning effects observed can be attributed to technology transfers, investments or innovations. We find no evidence to suggest that learning is associated with technology transfers, new investments in machinery or technology adaptation (results not presented). We do find, however, that innovations that expand the number of varieties that the firm produces are associated with productivity gains after entry into export markets. Evidence for this is provided by the positive and statistically significant interaction term in column 2.[18] In addition, we find that firms that invest in R&D experience greater learning effects associated with years of experience on export markets (column 3). This is consistent with Aw *et al.* (2011) who found that simultaneous investment in R&D is important for learning effects from exporting.

Overall, our results suggest that there are positive productivity improvements associated with exporting for private domestic firms and that these effects grow over time. There is some evidence to suggest that the initial productivity gain from exporting is associated with variety innovations, while the accumulated productivity gains from exporting are related to

18 It should be noted that this result is not robust to the estimation of the model using the unbalanced panel and so should be regarded as tentative evidence.

R&D investments made by firms. We do not find any evidence that these improvements are linked to technology transfers or other types of innovations and investments.

5. Conclusion

In this study, we explored the relationship between exporting and productivity using firm-level data from Vietnam for the period 2005–2012. During this period trade and financial markets, investment laws and the regulatory framework in Vietnam underwent a significant change. As such, Vietnam represents an illuminating comparative country case to study when attention is on the potential impact of exporting on productivity, particularly for the dynamic and growing domestic sector. There are two key focuses of our analysis: first, to distinguish between self-selection of more productive firms into export markets and productivity effects associated with exporting; and second, to disentangle the mechanisms underlying the learning-by-exporting process.

We find strong evidence that productive firms self-select into export markets. Our analysis also points to a positive association between exporting and productivity. This is due to both initial gains associated with entering into export markets and accumulated productivity gains associated with years of experience exporting. We find that while foreign-owned firms gain more initially from entering export markets learning does not continue with years of experience. This suggests that there is an initial productivity gain for foreign-owned firms associated with accessing foreign markets rather than a cumulative learning effect. We hypothesise that this is due to local market constraints that are relieved upon accessing export markets, or a dearth in local knowledge that disadvantages foreign-owned firms when supplying domestic markets that is no longer of importance once they export.

We also find evidence of a positive association between exporting and productivity for private domestic firms and in particular productivity gains associated with years of experience exporting. This suggests that Vietnamese firms learn by exporting and that this learning leads to cumulative and persistent effects on productivity. We explore some of the mechanisms through which firms learn by exporting and find that initial productivity gains are associated with variety innovations while learning is positively associated with R&D.

In contrast to Vietnam, African countries did not over the past 35 years put the challenge of industrialisation and exporting and the constraints of domestic private and foreign firms centre stage in their development policies and strategies. While market liberalisation has been widespread as prescribed in packages of structural adjustment and the rankings inherent in the 'doing business' indicators, supported by the donor community, trade and industrial performance has been far from impressive and economic transformation sluggish. Not so in Vietnam, where economic transformation has gone hand in hand with a substantial reduction in the poverty rate. Arguably, key factors associated with Africa's relative lack of dynamics in the enterprise sector are associated with the very different path African countries took as compared with Vietnam in terms of a range of policy choices. They include policies related to infrastructure, human capital and institutions, agglomeration of industry, and of direct relevance to the present study, exports and associated firm-level performance. To the extent firms' learning from exporting is a critical driving force in development, this is clearly one of the core development constraints to be addressed head-on in Africa. It is for this reason this study has focused on uncovering the role of exports in firm-level productivity in a country from which much can be learnt.

Turning, in conclusion, to the more specific comparative lessons African countries can draw from these insights, it stands out, first, that the experience of Vietnam confirms that exporting has a key role to play in economic progress. Second, exporting is associated with increased firm-level productivity for private domestic firms with effects accumulating over time. Third, there are potentially significant gains to be realized by scaling-up and expanding focus beyond local markets. A fourth and final lesson is that complementary domestic policy reforms are required beyond trade and market liberalisation to help remove local market constraints and strengthen within-firm efficiency, improvements necessary for entry into export markets, and investments in R&D to ensure the full productivity gains from exporting can be realised. Such policy initiatives and concrete actions are likely to have a key role to play for private domestic firms in the learning process in Africa, as has been the case in Vietnam. Without firm-level learning and improvements in productivity, the sustainability of the recent economic progress realized in Africa is unlikely to be sustainable.

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Appendix

Table A1: Robustness Check—Difference GMM with Unbalanced Panel

Dependent variable: lnva	(1) Table 4 Col 4	(2) Table 4 Col 6	(3) Table 5 Col 2	(4) Table 5 Col 4	(5) Table 6 Col 3	(6) Table 6 Col 4	(7) Table 8 Col 1	(8) Table 8 Col 2	(9) Table 8 Col 3
L.export	0.309***	0.292**	0.331***	0.508***	−0.324	−0.239	0.272**	−0.068	0.482***
	(0.109)	(0.139)	(0.103)	(0.154)	(0.223)	(0.202)	(0.108)	(0.221)	(0.143)
HHI4 × L.export		−0.318							
		(1.582)							
L.yrs_export			0.101***	0.082***		0.051	0.154***	0.191**	0.120*
			(0.025)	(0.024)		(0.034)	(0.052)	(0.100)	(0.063)
Stop export × L.yrs_export				0.026*					
				(0.014)					
Private × L.export					0.820***	0.714***			
					(0.230)	(0.198)			
Foreign × L.export					0.616**	0.583***			
					(0.283)	(0.190)			
Private × L.yrs_export						0.100***			
						(0.028)			
Foreign × L.yrs_export						0.038			
						(0.036)			
L.Export × Variety innovation								0.728 (0.514)	
L.yrs_export × Variety innovation								−0.055	
								(0.216)	
L.Export × R&D									−0.846
									(0.640)

Continued

Table A1: Continued

Dependent variable: lnva	(1) Table 4 Col 4	(2) Table 4 Col 6	(3) Table 5 Col 2	(4) Table 5 Col 4	(5) Table 6 Col 3	(6) Table 6 Col 4	(7) Table 8 Col 1	(8) Table 8 Col 2	(9) Table 8 Col 3
L.yrs_export × R&D									0.337** (0.168)
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.108	0.093	0.019
AR(2)	0.250	0.299	0.736	0.916	0.957	0.689	0.465	0.235	0.258
Hansen	0.130	0.102	0.298	0.299	0.034	0.209	0.535	0.662	0.805
Firms	15,587	15,587	15,587	15,587	15,587	15,587	4,603	4,603	4,603
Observations	47,003	47,003	47,003	47,003	47,003	47,003	10,676	10,676	10,676

Note: Each model is estimated in exactly the same way as in the main tables. Where there are interaction terms in the model the level effects are also included but the results are not presented. In all cases, the coefficients are similar to those presented in the main result tables. Robust standard errors clustered at the firm level are included in parentheses. ***$p<0.01$, **$p<0.05$, *$p<0.10$.

Table A2: Robustness Check—Difference GMM with Standard Errors Clustered at the 4-Digit Industry Level

Dependent variable: lnva	(1) Table 4 Col 4	(2) Table 4 Col 6	(3) Table 5 Col 2	(4) Table 5 Col 4	(5) Table 6 Col 3	(6) Table 6 Col 4	(7) Table 8 Col 1	(8) Table 8 Col 2	(9) Table 8 Col 3
L.export	0.232**	0.264**	0.180*	0.278*	−0.601*	−0.436	0.339***	−0.072	0.492***
	(0.101)	(0.127)	(0.109)	(0.153)	(0.335)	(0.298)	(0.111)	(0.258)	(0.110)
HHI4 × L.export		−0.984							
		(1.946)							
L.yrs_export			0.090***	0.081***		0.047	0.177***	0.241	0.150***
			(0.027)	(0.025)		(0.034)	(0.047)	(0.159)	(0.051)
Stop export × L.yrs_export				0.010					
				(0.013)					
Private × L.export					0.787**	0.771***			
					(0.322)	(0.294)			
Foreign × L.export					1.102***	0.661**			
					(0.391)	(0.265)			
Private × L.yrs_export						0.074***			
						(0.024)			
Foreign × L.yrs_export						0.045			
						(0.031)			
L.Export × Variety innovation								0.913*	
								(0.496)	
L.yrs_export × Variety innovation								−0.093	
								(0.306)	
L.Export × R&D									−0.626
									(0.436)
L.yrs_export × R&D									0.299**
									(0.140)

Continued

Table A2: Continued

Dependent variable: lnva	(1) Table 4 Col 4	(2) Table 4 Col 6	(3) Table 5 Col 2	(4) Table 5 Col 4	(5) Table 6 Col 3	(6) Table 6 Col 4	(7) Table 8 Col 1	(8) Table 8 Col 2	(9) Table 8 Col 3
Firms	4,751	4,751	4,751	4,751	4,751	4,751	2,617	2,617	2,617
Observations	23,755	23,755	23,755	23,755	23,755	23,755	7,760	7,760	7,760

Note: Each model is estimated in exactly the same way as in the main tables. Where there are interaction terms in the model the level effects are also included but the results are not presented. In all cases, the coefficients are similar to those presented in the main result tables. Tests for autocorrelation and Hansen's test for over-identifying restrictions are as in the main tables. Robust standard errors clustered at the firm level are included in parentheses. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.10$.