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**FIRM SIZE AND PARTICIPATION IN  
THE INTERNATIONAL ECONOMY:  
EVIDENCE FROM BANGLADESH**

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**Abstract**

This paper examines the trade participation of Bangladesh's manufacturing firms using a three-year panel. It distinguishes between extensive and intensive margin effects using a Heckman sample selection model. Particular attention is paid to the role of imported intermediates and inward foreign direct investment (FDI) in promoting export development. While there is a strong association between export performance and firm size, these two indicators have a positive impact on trade participation at the intensive margin for firms of all sizes, and importing intermediates also have a positive impact on trade participation at the extensive margin. An analysis of marginal effects from the model shows that small firms experience the smallest export boost from importing and inward FDI, although the effect is still quantitatively large. From a policy perspective, the paper highlights the importance of international openness and global value chain linkages as drivers of export success, including for smaller firms. It also stresses the possible alternative ways through which small and medium-sized enterprises (SMEs) may participate in the international economy, such as by exporting indirectly. Reconciling legitimate policy interest in SME trade with the universal empirical finding that larger firms participate to a greater degree in the trading economy should be an important objective of future research.

**Keywords:** trade policy, foreign direct investment, manufacturing, Bangladesh, small and medium-sized enterprises, sample selection model

**JEL Classification:** F13, F15, O24

## Contents

1.	INTRODUCTION .....	1
2.	DATA AND DESCRIPTIVE ANALYSIS.....	2
3.	ECONOMETRIC MODELS AND RESULTS .....	6
3.1	Productivity Estimates .....	7
3.2	Trade Models .....	8
4.	CONCLUSION AND POLICY IMPLICATIONS .....	11
	REFERENCES .....	13

## 1. INTRODUCTION

Bangladesh has seen rapid growth over recent years, with aggregate gains translating into significant improvements in individual well-being: growth in real GNI per capita in PPP terms averaged 4.7% per year between 2000 and 2017 (World Bank, World Development Indicators). Income growth has been accompanied by a significant poverty reduction, with the \$1.90/day poverty headcount ratio declining from 34.8% in 2000 to 14.8% in 2016 (World Bank, World Development Indicators).

A key feature of Bangladesh's development model has been integration in the world economy, as it has sought, with great success, to become a manufacturing platform in sectors like ready-made garments. Bangladesh is a leading exponent of the value chain development model (Baldwin 2011), relying heavily on imported intermediates to be competitive in labor-intensive final products. There is great interest in this model all around the region and elsewhere, so it is important to have a clear sense of how it has worked, and which firms have been able to benefit from trade in which ways.

At the same time, policy makers around the world are becoming increasingly interested in the question of the extent to which smaller businesses can gain from trade, and in particular inclusion in global value chains (GVCs). The reason for this interest is that in most economies, small and medium-sized enterprises (SMEs) account for the bulk of employment, and can even constitute a significant share of exporting firms by number. This is particularly true in Bangladesh, where SMEs account for over 99% of all industrial firms, and 85% of industrial sector employment; however, their small size means that despite their overwhelming number, they only contribute around 25% of total manufacturing value added (Hela uz Zaman and Jahirul Islam 2019).

In terms of the sectoral distribution of activity, the World Bank (2019) finds that the bulk of micro (87%) and small (94%) firms are in nonmanufacturing services, typically trading. By contrast, around 50% of medium enterprises are involved in industrial activities. Size, therefore, represents a potential barrier for entry into industrial activities, including manufacturing, but on a numerical basis, there is nonetheless a substantial number of Bangladeshi SMEs engaged in manufacturing activities, as a subset of the industry aggregate: 831,000 micro-enterprises, 31,000 small enterprises, and 3,000 medium-sized enterprises. The Enterprise Surveys data used in this paper show that within manufacturing, small and micro-enterprises are concentrated in the food, apparel, and electronics sectors, while medium enterprises are very heavily concentrated in apparel, with only small numbers of firms engaged in other types of manufacturing activities.

To trade economists, the policy focus on SMEs can sometimes appear misplaced. It is well established using data for many countries that it is large firms that account for the lion's share of exports by value, as they tend to be more productive and are therefore better able to absorb the additional costs associated with entering foreign markets (see Bernard et al. 2007 for a review of the evidence). Moreover, there is clear evidence that exporters tend to be larger and more productive than other firms before they enter foreign markets, and that the gains from exporting itself are in fact more limited than had previously been assumed in much of the development literature (Bernard and Jensen 1999). Even though bilateral trade is dominated by large firms, it is nonetheless important to understand how trade dynamics, and GVC participation, affect smaller firms as well, taking account of the different ways in which that may happen.

While there is now a large literature on the firm-level determinants of trade behavior (see Bernard et al. 2007 for a review), it only partially deals with the question of firm size. As noted above, there is extensive evidence showing that exporting firms tend to be larger and more productive than other firms. The Organisation for Economic Co-operation and Development (OECD) (2018) analyzes the available data for member countries systematically, and shows that the proportion of exports accounted for by SMEs is typically lower than their proportion of value added in the economy as a whole, which shows the general tendency in place, albeit with substantial variation across countries. But there is relatively little evidence on the role of SMEs per se, particularly in developing economies. An exception is Wignaraja (2012), who uses firm-level data for five ASEAN countries to show that while larger firms do indeed account for the bulk of GVC integration, the share of SMEs has been growing over time. One contribution of the present paper is to build on this emerging evidence base to examine the links between firm size and international engagement more closely, paying attention to the possibility of causation operating in both directions. A second contribution is to extend the literature on the firm-level determinants of trade behavior to include Bangladesh, where the literature is currently very thin.

I investigate two hypotheses, drawing in part on previous work by Wignaraja (2012) for ASEAN. First, I examine the possibility that SMEs participate in the global economy differently from larger firms by examining the impact of firm size on the propensity to export directly, export indirectly (through a third party, like a wholesaler), and import intermediate inputs. The output of this exercise is an indication of the extent to which firm size mediates the relationship between production behavior and international integration. Second, I examine the possibility that SMEs react differently to international integration from larger firms, by looking at interactions between firm size and two indicators of international engagement (imports of intermediates and foreign ownership) in determining export behavior. The output of this exercise is an indication of the extent to which international engagement has different outcomes for SMEs as compared with larger firms.

Against this background, the paper proceeds as follows. Section 2 discusses data sources and provides some basic descriptive analysis. The following section then presents a series of econometric models and discusses results. The final section concludes and discusses policy implications.

## 2. DATA AND DESCRIPTIVE ANALYSIS

The World Bank has conducted three firm-level Enterprise Surveys in Bangladesh, in 2007, 2011, and 2013. The combined data set is available in panel format, covering approximately 1,300 firms once the sample is limited to manufacturing only.<sup>1</sup> This sample is smaller than most rigorous surveys of firms conducted by national statistical offices, but has the advantage of being freely available to researchers, and capturing a range of information not typically included in government surveys. I therefore use this data set to examine the integration of SMEs with international markets in the Bangladeshi context.

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<sup>1</sup> The survey also includes service firms, but crucial data points are typically either not available or are apparently poorly recorded. Examples include the variables capturing export behavior, as well as the cost of intermediate inputs.

Table 1 provides a list of variables used in the analysis along with definitions and sources, while Table 2 provides summary statistics, and Table 3 presents a correlation matrix.

**Table 1: Variables, Definitions, and Sources**

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
Exporter Direct	Dummy variable equal to unity if the firm directly exported some of its production.	Enterprise Surveys
Exporter Indirect	Dummy variable equal to unity if the firm indirectly exported some of its production, for example through a wholesaler or distributor.	Enterprise Surveys
Foreign	Dummy variable equal to unity if the firm is owned at least 10% by a foreign investor.	Enterprise Surveys
GDP Deflator	GDP deflator.	World Development Indicators
Importer	Dummy variable equal to unity if the firm directly imported any of its intermediate inputs.	Enterprise Surveys
ISO	Dummy variable equal to unity if the firm has an internationally recognized quality certification, such as ISO 9001.	Enterprise Surveys
Log(Capital)	Logarithm of the value of the firm's equipment and land and buildings, deflated by the GDP deflator.	Enterprise Surveys; World Development Indicators
Log(Capital/Empl.)	Logarithm of capital per worker, calculated as the total value of the firm's equipment and land and buildings deflated by the GDP deflator, divided by the total number of employees.	Enterprise Surveys; World Development Indicators
Log(Electricity)	Logarithm of the value of electricity used by the firm, deflated by the GDP deflator.	Enterprise Surveys; World Development Indicators
Log(Employees)	Logarithm of the total number of employees of the firm.	Enterprise Surveys
Log(Exports)	Logarithm of the percentage of sales that are exported directly or indirectly multiplied by sales, deflated by the GDP deflator.	Enterprise Surveys; World Development Indicators
Log(Inputs)	Logarithm of the value of intermediate inputs used by the firm, deflated by the GDP deflator.	Enterprise Surveys; World Development Indicators
Log(Value Added)	Logarithm of the value of total sales less intermediate inputs, deflated by the GDP deflator.	Enterprise Surveys; World Development Indicators
Log(Value Added/Empl.)	Logarithm of value added divided by the total number of employees.	Enterprise Surveys; World Development Indicators

**Table 2: Summary Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Exporter Direct	1,295	0.371	0.483	0.000	1.000
Exporter Indirect	1,295	0.102	0.303	0.000	1.000
Foreign	1,294	0.027	0.162	0.000	1.000
GDP Deflator	1,295	118.220	19.847	106.471	164.259
Importer	1,137	0.400	0.490	0.000	1.000
ISO	1,253	0.227	0.419	0.000	1.000
Log(Capital)	1,249	16.167	2.574	9.148	22.247
Log(Capital/Empl.)	1,247	11.465	1.868	5.684	18.200
Log(Electricity)	1,262	12.550	2.127	7.721	19.497
Log(Employees)	1,292	4.711	1.617	1.386	9.306
Log(Exports)	554	18.629	1.640	12.674	22.454
Log(Inputs)	1,200	16.281	2.466	8.862	22.151
Log(Value Added)	1,216	16.416	2.245	11.480	22.572
Log(Value Added/Empl.)	1,213	11.730	1.242	8.717	17.744

**Table 3: Correlation Matrix**

	Exporter Direct	Exporter Indirect	Foreign	GDP Deflator	Importer	ISO	Log (Capital)
Exporter Direct	1.000						
Exporter Indirect	-0.807	1.000					
Foreign	0.074	-0.052	1.000				
GDP Deflator	0.137	-0.076	-0.058	1.000			
Importer	0.325	-0.299	0.104	0.095	1.000		
ISO	0.029	-0.058	0.197	0.126	0.158	1.000	
Log(Capital)	0.012	0.026	0.094	0.072	0.163	0.197	1.000
Log(Capital/Empl.)	-0.163	0.191	0.051	-0.050	-0.093	0.075	0.759
Log(Electricity)	0.106	-0.062	0.088	-0.083	0.203	0.092	0.426
Log(Employees)	0.254	-0.240	0.060	0.174	0.367	0.172	0.323
Log(Exports)	0.263	-0.221	0.066	0.254	0.281	0.051	0.361
Log(Inputs)	0.151	-0.089	0.077	-0.049	0.267	0.094	0.450
Log(Value Added)	0.204	-0.185	0.033	0.352	0.290	0.112	0.395
Log(Value Added/Empl.)	0.021	-0.010	-0.014	0.276	0.024	-0.019	0.194

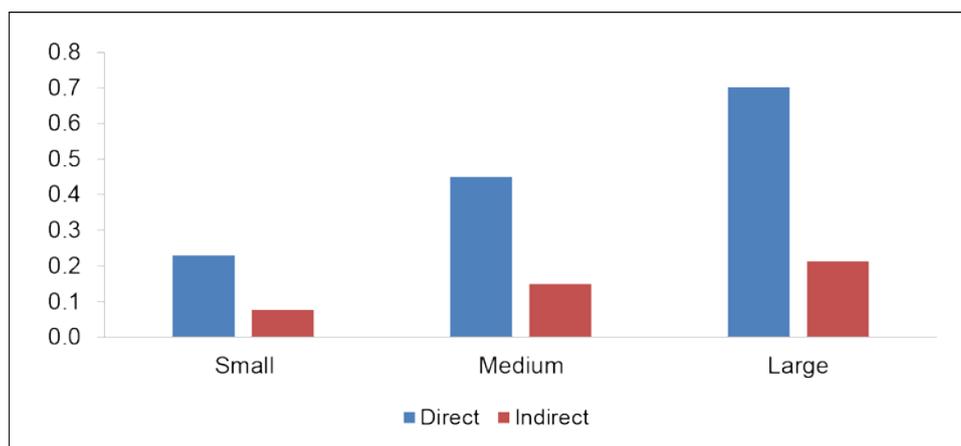
  

	Log (Capital/Empl.)	Log (Electricity)	Log (Employees)	Log (Exports)	Log (Inputs)	Log (Value Added)	Log (Value Added/Empl.)
Exporter Direct							
Exporter Indirect							
Foreign							
GDP Deflator							
Importer							
ISO							
Log(Capital)							
Log(Capital/Empl.)	1.000						
Log(Electricity)	0.098	1.000					
Log(Employees)	-0.371	0.466	1.000				
Log(Exports)	-0.048	0.376	0.584	1.000			
Log(Inputs)	0.127	0.590	0.457	0.465	1.000		
Log(Value Added)	-0.026	0.329	0.602	0.826	0.297	1.000	
Log(Value Added/Empl.)	0.306	-0.018	-0.167	0.488	-0.050	0.687	1.000

The first step in analyzing the data descriptively is to track export behavior by firm type. Specifically, I am interested in the proportion of firms in different size groups that export directly and indirectly. The categories used to sort firms are not mutually exclusive: some firms engage in exports both directly and indirectly. Those firms are counted in both sums. To compute the relevant statistics, I use the data as defined above and take counts, using employment-based cutoffs for firm types, namely: small (< 99 employees); medium (100 to 250 employees); and large (> 250 employees). These thresholds are based on the national definitions used in Bangladesh,<sup>2</sup> but omit the accompanying conditions on total assets, as there is good reason to believe that this variable is poorly recorded in the Enterprise Surveys data. For ease of interpretation in this descriptive exercise, I limit consideration to the most recent year of data available, namely 2013. However, all estimations conducted below use the full sample, for all available years.

Figure 1 shows results. In line with the previous literature, the data clearly suggest that firm size is an important determinant of export behavior. There is a clear positive association between the number of employees and propensity to export. In an extension of previous work, the data show that this association is relevant both for indirect and direct exports. However, the role of firm size seems to be stronger in relation to the latter. The clear implication of the data is that SMEs are less likely to engage in all forms of export activity than large firms. An important caveat is that the Enterprise Surveys data are known to overrepresent large firms and exporters, so the propensities reported should be taken as indicative of general trends in the data only.

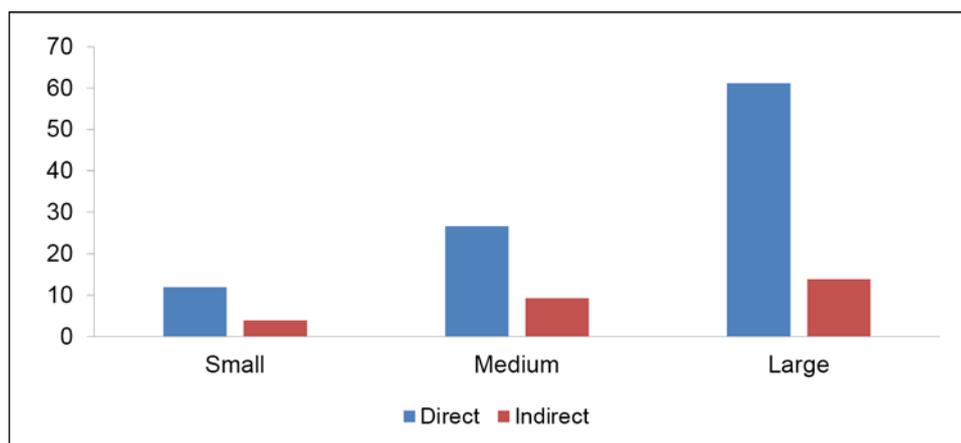
**Figure 1: Export Propensity by Firm Size Type**



Source: Author's calculations based on World Bank Enterprise Surveys data.

Figure 1 examines the extensive margin of exporting, or export propensity. Figure 2, by contrast, focuses on the intensive margin, namely the average percentage of sales that are exported, conditional on exporting. Again, the data clearly show that there is a similar association between firm size and export intensity to what was seen for export propensity. Large firms are more likely to enter export markets, and tend to export more relative to total sales when they do.

<sup>2</sup> <https://bdnews24.com/business/2011/06/20/bangladesh-bank-redefines-sme>.

**Figure 2: Export Intensity by Firm Size Type**

Source: Author's calculations based on World Bank Enterprise Surveys data.

The descriptive analysis suggests that international engagement is relatively limited among SMEs in Bangladesh, at least as far as export behavior is concerned. However, that finding does not mean that SMEs are not relevant to the engagement of Bangladesh's external sector as a whole, or indeed that trade is of little importance to Bangladeshi SMEs. On the one hand, export propensity and intensity figures are still both substantially larger than zero, which means that there are important numbers of firms actively engaged with the international economy in Bangladesh. Second, it is important to distinguish between small and medium firms: Over 50% of the latter group are engaged in exports either directly or indirectly. While the number is smaller than for large firms—which is over 90%—it is still high, and suggests that larger SMEs are indeed highly engaged with the world economy.

Naturally, a descriptive analysis is useful for highlighting broad tendencies in the data, and identifying simple associations. Thus far, it has not been possible to say anything about mechanisms or links between different kinds of observed effects. The next section turns to that question, using fully specified econometric models.

### 3. ECONOMETRIC MODELS AND RESULTS

The above descriptive analysis provided a first snapshot of the participation of Bangladeshi SMEs in the international economy. This section develops fully specified econometric models that seek to explain export behavior, taking account of the indirect exports that are more common among smaller firms, in terms of firm-specific factors such as productivity, size, and capital intensity. The explanatory variables of most interest are indicators of the extent to which a firm is engaged with the international economy in an inward sense, namely as an importer of intermediate goods, and a recipient of inward FDI. The maintained hypothesis is that engagement in these two ways has the potential to boost exports, after controlling for other factors. The actions of exporting, importing, and receiving inward FDI can be understood as observable proxies for GVC participation, which typically includes a mixture of these three processes.

### 3.1 Productivity Estimates

A necessary precursor to examining the international integration of SMEs in Bangladesh is to obtain estimates of total factor productivity (TFP) at the firm level. TFP is a key determinant of the ability to enter international markets, and is used as a standard control variable in most firm-level econometric work associated with trade. However, estimating TFP is by no means straightforward. It is simple to write down a production function, such as Cobb-Douglas, augmented by a TFP parameter. But obtaining consistent and unbiased econometric estimates requires the application of substantial technique. Simultaneity plagues simple approaches. For instance, OLS estimates of a production function will suffer from this problem if there are unobserved shocks to TFP and the firm responds by changing a nonsticky variable, such as labor demand.

A variety of methods have been developed in the literature to deal with this problem. Levinsohn and Petrin (2003) provide an approach that is commonly used in developing countries as it only requires data on intermediate inputs to control for unobservable shocks, at the cost of some assumptions on decision timing and functional form. I adopt their approach here. Akerberg, Caves, and Frazer (2015) note that the Levinsohn and Petrin (2003) approach may not identify labor demand in empirically relevant circumstances, and propose a correction, which I also apply as a robustness check.

Table 4 presents results, with standard errors based on 1,000 bootstrap replications. As the proxy variables, I use intermediate input use and electricity purchases, both of which are widely observed in these data. Both estimators have difficulty with the data on capital stock. While the series represents the best available data in this data set, it is clearly subject to problems of accuracy. For instance, firms may be unable to properly estimate the value of land or plant and equipment, or alternatively may be concerned about doing so because of perceived tax or regulatory obligations. It is contrary to expectations that the capital variable has a statistically insignificant coefficient in both columns of Table 4, which in turn gives rise to concerns as to the accuracy of the TFP estimates produced in this way. Nonetheless, I proceed with them as the best available data, while noting that sample size is much larger for the more flexible Levinsohn and Petrin (2003) estimator. I use both estimates of TFP, and also a simple measure of labor productivity, namely value added per worker, as a robustness check in the paper's main regressions, discussed in the next section.

**Table 4: Production Function Estimation Results**

	LP	ACF
Log(Employees)	0.710*** (0.000)	1.002*** (0.000)
Log(Capital)	0.003 (0.957)	-0.054 (0.383)
N	1,152	207

Source: Author's calculations.

### 3.2 Trade Models

Standard trade theory suggests that export behavior can be understood as the net outcome of two firm-level decisions. The first is whether or not to enter foreign markets, known as “export propensity.” The second is how much to sell overseas, conditional on having entered. This setup is consistent with Melitz (2003) or Chaney (2008)-style models, which emphasize the existence of both an extensive and an intensive margin of trade.

This way of thinking about trade outcomes—as the expression of two separate decisions—has important implications for the estimation of firm-level models that have exports as a dependent variable. There is extensive empirical work suggesting that the majority of firms do not export, which means that there is the clear potential for sample selection bias if only an intensive margin model is estimated. Similarly, estimating only an export propensity model as a binary choice outcome—exporting versus not exporting—loses much of the richness in the data, and does not allow for overall trade impacts to be estimated.

Thankfully, there is a simple and well-established econometric technique that makes it possible to estimate both models simultaneously. Heckman (1979) shows that sample selection can be understood as an omitted variable problem, in which bias in the intensive margin equation arises from not accounting for the probability that a given firm exports at all. The fix is straightforward: estimate a binary choice model such as a probit with exporting as the outcome, and include the estimated inverse Mills ratio from that equation as an explanatory variable in the intensive margin equation. While the model can be estimated in two stages as this intuitive explanation suggests, standard practice is now to estimate both models together by maximum likelihood.

Against this background, I estimate a Heckman sample selection model of exports. As the dependent variable, I calculate total exports, namely direct and indirect (through a wholesaler or distributor). The reason for summing these two types of exports is that many SMEs participate indirectly in the world economy through intermediary firms. The dependent variable therefore takes the broadest possible account of the ways in which these firms can interact with world markets.

In addition to standard controls—productivity, capital intensity, and size—I include two measures of GVC participation: a dummy for direct imports of intermediate goods, and a dummy for foreign ownership, defined on the basis of a 10% threshold. The model therefore shows how these two variables impact export behavior, taking account of the two-step decision process set out above. Finally, I include fixed effects by year and by sector, where I group the standard Enterprise Surveys data into four sectors—food, clothing, machinery, and chemicals—so as to ensure a sufficient number of observations in each. I am unable to include firm fixed effects, as relatively few firms are observed in all three periods, so parameters become difficult to identify.

Ideally, a Heckman sample selection model should be overidentified, with one variable that appears in the selection equation but not the outcome equation. The rationale for this approach is that if the two sets of variables are the same, the model is only identified due to the nonlinearity of the inverse Mills ratio, which can cause estimated standard errors to be unduly large when there is nonetheless a strong correlation with the explanatory variables. In this case, I use a dummy variable indicating whether or not a firm has an international quality certification, such as ISO 9001. Compliance with technical norms and standards primarily impacts firm fixed costs of market entry, and so can be expected to have a significant impact on export propensity (selection) but not intensity (outcome) (Shepherd 2015).

Table 5 presents regression results. Each numbered model consists of two equations, marked selection (probit first stage; export propensity) and outcome (OLS second stage; export intensity), but they are estimated simultaneously by maximum likelihood rather than in two separate steps. The three models use different measures for productivity, namely Levinsohn and Petrin (2003) and Akerberg, Caves, and Frazer (2015), as discussed above, as well as a naïve measure of labor productivity, as opposed to TFP, namely value added per worker.

All three models perform very similarly, due to the fact that the three measures of productivity are very closely correlated. This result is due to the poor estimation of the impact of capital on the production function, discussed above. Nonetheless, the models fit the data well, as evidenced by strong pseudo-R2s, and coefficients that are appropriately signed, and typically statistically significant at the 1% level. In terms of the control variables, productivity, firm size, and capital intensity are all robustly associated with greater export propensity and intensity, although there is some variation across models. Importantly, the ISO dummy has the expected positive sign, and a statistically significant coefficient at the 1% level, which means that the attempt to overidentify the model and improve the accuracy of estimates has been successful.

The two variables of primary interest are the dummy for importing intermediate inputs and the dummy for inward FDI. Both have positive and statistically significant coefficients in all three outcome equations. However, only the importing dummy also has a statistically significant coefficient in the selection equations. The conclusion is therefore that engagement with the international economy in ways that is typical of GVC participation can indeed boost imports, although the nature of the engagement matters: importing intermediates increases the probability of exporting, as well as the value of exports conditional on entry. By contrast, accepting inward FDI primarily impacts the value of exports conditional on entry.

In line with the framework presented earlier, these findings confirm that in Bangladesh as elsewhere, firm size is an important determinant of export behavior: Larger firms are more likely to enter foreign markets, and tend to export more when they do. But the above results do not directly say anything about the impact of GVC participation, as proxied by direct imports of intermediates and foreign ownership, in interaction with firm size. Indeed, interpreting the results in Table 5 in other than a qualitative sense is not straightforward because of the relationship between the outcome and selection equations, and the nonlinearity of the latter. To summarize the overall impact of variables like importer and foreign on direct exports, it is necessary to carefully specify and calculate marginal effects. In what follows, I consider the effect of direct imports and foreign ownership on the expected value of exports, taking account of the selection effect. I focus on Model 1, given that differences across specifications are very minor. To differentiate effects by firm size category, I calculate marginal effects for the three size categories identified earlier based partly on the national classification, namely: small (< 99 employees); medium (100 to 250 employees); and large (> 250 employees). I present marginal effect estimates and 95% confidence intervals graphically, with 95% confidence intervals based on standard errors calculated using the delta method. Apart from the variables of interest, other variables are assumed to be at their average levels as defined by the three size groups.

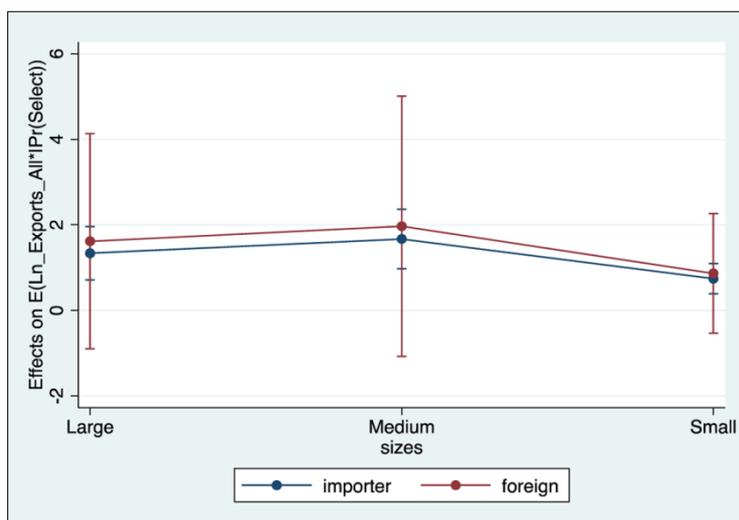
**Table 5: Trade Model Regression Results**

	LP		ACF		VA/Empl.	
	Outcome	Selection	Outcome	Selection	Outcome	Selection
TFP	0.937*** (0.000)	0.225** (0.049)	0.937*** (0.000)	0.225** (0.049)	0.937*** (0.000)	0.225** (0.049)
Log(Employees)	0.751*** (0.000)	0.459*** (0.000)	0.971*** (0.000)	0.512*** (0.000)	1.020*** (0.000)	0.523*** (0.000)
Log(Cap/Empl)	0.054*** (0.002)	0.111*** (0.005)	0.001 (0.974)	0.098** (0.034)	0.051*** (0.004)	0.110*** (0.006)
Importer	0.139** (0.043)	0.357*** (0.000)	0.139** (0.043)	0.357*** (0.000)	0.139** (0.043)	0.357*** (0.000)
Foreign	0.253*** (0.007)	0.411 (0.216)	0.253*** (0.007)	0.411 (0.216)	0.253*** (0.007)	0.411 (0.216)
ISO		0.479*** (0.000)		0.479*** (0.000)		0.479*** (0.000)
Constant	-0.964** (0.040)	-8.156*** (0.000)	-0.964** (0.040)	-8.156*** (0.000)	-0.964** (0.040)	-8.156*** (0.000)
N	1,031		1,031		1,031	
Pseudo-R2	0.746		0.746		0.746	
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Wald Test	0.11		0.11		0.11	

Note: The dependent variable is log(exports) and estimation is via the Heckman sample selection model. Robust standard errors corrected for clustering by sector are reported in parentheses below parameter estimates. The Wald test is of the null hypothesis of independent equations. Statistical significance is indicated as follows: \* (10%), \*\* (5%), and \*\*\* (1%).

Source: Author's calculations.

Figure 3 presents results. It is immediately obvious that the point estimates are very close for the two variables, but that confidence intervals are much larger for the foreign ownership dummy. None of the size categories shows a statistically significant marginal effect of foreign ownership. However, all three size categories show significant effects for imports of intermediates, with the point estimate being largest for medium firms and smallest for small firms. However, the estimated confidence intervals are overlapping, which means that while there are indications of different effects by firm size, those differences are not statistically significant. While there is substantial uncertainty around the estimates, it is important to keep the quantitative estimates in perspective. Exponentiating shows that the effect of importing intermediates is to increase the expected value of exports by 110% for small firms, 431% for medium firms, and 281% for large firms. These differences are of clear economic significance, even with the attendant uncertainty. The data therefore provide some indication that the effect of engagement with the international economy varies according to firm size, and is smallest for small firms.

**Figure 3: Marginal Effects and 95% Confidence Interval, by Firm Size Category**

#### 4. CONCLUSION AND POLICY IMPLICATIONS

This paper has analyzed the export behavior of Bangladeshi manufacturing firms, paying particular attention to the links between GVC participation and export propensity and intensity. GVC participation cannot be observed directly, so I have used direct imports of intermediate goods and the presence of foreign ownership as observable proxies. In line with the previous literature, mostly from other countries, I find that firm size is positively associated with export performance, even after controlling for productivity and capital intensity. There is clear evidence in the data that importing intermediates and welcoming foreign investment are associated with superior export performance at the extensive and intensive margins (importing) and intensive margin only (foreign investment). These findings are consistent with a mechanism where these two types of GVC participation serve to reduce the costs associated with exporting, so participation in internationalized production in turn promotes greater outward engagement with world markets through exporting.

In an extension to previous work, I look at the impact of imported intermediates and foreign ownership on export behavior across the firm size distribution. I find substantial evidence that the net effect of these two types of GVC participation is to boost exports for firms of all sizes, thereby including SMEs as well as larger firms, with a particularly strong and precisely estimated effect for direct imports of intermediates. However, the size of the effects varies with firm size, and is smaller for small firms, albeit with doubt as to the statistical significance of the difference. In economic terms, however, the conclusion to be drawn is therefore that small firms are less able than their larger peers to take advantage of the opportunities offered by GVC participation, as measured by these two observable proxies.

In policy terms, this paper's results are important for two reasons. First, I present evidence from a developing country that although exports are dominated by larger firms in value terms, there is nonetheless substantial participation by smaller firms in a numerical sense, and that this performance can be boosted by facilitating access to imported intermediates and foreign investment. Second, the fact that the trade effects of GVC participation are smallest for small firms means that there is a need to better understand the mechanisms that may be at work. One issue might be absorptive capacity, while another could be capacity or financial constraints, which make it more

difficult for smaller firms to expand production in response to market opportunities. While the Enterprise Surveys data do not make it possible to examine these mechanisms explicitly, they nonetheless provide a useful first picture of the landscape of SME exports in Bangladesh, taking account of direct and indirect exports. Given the policy attention given to this issue, an important point that should not be lost from sight is that opening to the international economy by facilitating imports of intermediates as well as inward FDI holds the potential for small firms to benefit by increasing exports, although issues such as capacity constraints need to be investigated further. Economic openness is therefore an important part of the policy tool kit for expanding exports by SMEs.

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