# Sustainable Commodities and Sectors for Durable Export Growth in Ethiopia: Application of SEM

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#### Abstract

Sustainable exports are critical for the overall economic growth of most emerging economies. For Ethiopia, the export sector is the backbone of the economy and has made significant contributions to the economy in terms of employment, foreign exchange earnings, and attracting foreign direct investment. The sector, however, has faced several challenges, including commodity dependence, low productivity, unstable prices, inadequate infrastructure, and regulatory and technical constraints, among others. Using firm-level data, this study presents a rigorous empirical analysis of the determinants of sustainable export to draw policy implications for sustainable export sector growth in Ethiopia. Results from the Structural Equation Model (SEM) reveal that most variables of interest considered in this study affect total sales and exports differently, attesting to the fact that exporting firms face different challenges compared to firms serving only the domestic market. Specifically, government support packages, the share of foreign ownership, and electricity use affect total exports (sales) negatively (positively) and significantly. The factors that positively affect export performance the most are firm size, age of a firm, availability of raw materials, and sustainability of export (the latent variable of the structural model). Foreign ownership (at least partial) and R&D activities of an exporting firm also help shield exporting firms from the negative impacts of operational obstacles that firms face in Ethiopia. Policies should be directed to attract more foreign investment toward exporting firms and promote R&D activities to improve the competitive position of exporting firms in Ethiopia.

**Keywords:** Exports, Ethiopia, Commodities, Sustainable **JEL Code:** F13, F1

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# **1. INTRODUCTION**

#### 1.1. Background of the Study

The recent success stories of Asian economics and other evidence from around the world supports the notion that participation in global trade could serve as an engine of growth and also improve export performance (Santos-Paulino, 2002; Balat, Brambilla, and Porto, 2009). Eicher (1999) showed that there is a gain from trade for developing countries even in the absence of international spillovers. Getting a cue from Asian countries, several African and Latin American economies tried a similar strategy of openness to trade in general and export-oriented growth in particular, however outcome of the strategy has been, at best, mixed for African and Latin American countries. Quantification of these potential gains is also not an easy exercise since there are several moving parts and factors involved (Costinot, and Rodríguez-Clare, 2014). Furthermore, for the case of Africa, dependence on few agricultural commodities as main sources of export earnings may keep the continent in a commodity dependency trap (UNCTAD, 2021). The current pandemic makes voices of commodity dependence concerns even louder (UNCTAD, 2020)<sup>1</sup>. In fact, some studies either question the link between growth and export performance/diversification or added qualifications for the case of developing countries (Mania and Rieber, 2019; Edo, Osadolor, and Dading, 2020). Some countries succeeded, and others are still struggling with the same age-old problems hindering the export sector. Mayer and Fajarnes (2008) concluded that for African countries the necessary growth in export to reach the level that is high enough to achieve the internationally agreed development goals (of early 2020s) is a nine-fold increment in Africa's manufacturing exports, and a tripling of its primary exports. But how would this be achieved and what prevented it from achieving this level of growth so far? In an effort to achieve these targets, there are several initiatives in African countries in recent years not only to increase exports globally, but also within Africa countries (UNCTAD, 2019). This is, however, a slow process and is not a standalone panacea to achieve the kind of big push effort for overall economic growth of a country. These concerns warrant a deeper analysis of the challenges and prospects of the export sector particularly for countries like Ethiopia that depend on few commodities as a source of its export earnings.

<sup>&</sup>lt;sup>1</sup> Although the pandemic is still a concern and a source of uncertainty, at least for the metal exports, there seems to be a recovery after the pandemic, with four-fifths of commodity prices now above their pre-pandemic levels (see World Bank (2021).

# **1.2.** Objectives of the Study

The overall objective of this study is to investigate the challenges that major export commodities in particular and the export sector, in general, have faced during the past decades and to identify promising export commodities for a sustainable sector to ensure durable export growth in Ethiopia. In other words, the study aims to identify the structural, technical, and regulatory constraints and challenges both at the national and international levels that hinder the performance and sustainability of the export sector. Finally, the study provides policy insights and recommends policy options and strategies to address these constraints and challenges. More specifically, the following are detailed objectives that the study intends to address:

- a. Estimate a structural equation model to identify key factors that promote/hinder exports and sustainability of exports.
- b. Identify challenges and opportunities for export growth in Ethiopia, and
- c. Identify strategies and policy options for enhancing and sustaining Ethiopia's exports deemed relevant to durable export growth.

As the title of the paper indicates, the expected outcome of this empirical exercise is to provide insights as to how a country can attain sustainable export sector growth. The term "sustainable" is a loaded word and it is difficult to capture it with one or two variables. Sustainability can be attained if all (or almost all) factors that affect it work together as if they depend on each other. In addition to the difficulty with defining the term sustainability, there is also no consensus in the literature on the factors that determine sustainable growth (of export). In our literature review, we try to present survey of the literature on determinants of export performance in general, entry into export, and survival rate of firms in the export sector. In our empirical analysis, where data allows, we estimate our model considering variables that are believed to determine exports and survival/sustainability of exports.

# **1.3.** Significance of the Study

The export sector plays key roles in the Ethiopian economy including employment, foreign currency earnings, as well as attracting foreign investors, cannot be overstated. The importance of the sector attest to its significant and the gaps in the literature initiated to undertake a comprehensive study. The importance of the sector to the overall economy has been documented (Belay, 2005; the World Bank Group, 2014), Gebrehiwot, 2019). Its contributions to employment, foreign currency earnings, GDP, and foreign direct

investment attraction are important to the overall healthy performance of the economy. Several studies note how critical the export sector is to the healthy performance and sustainable movement of the overall economy. Gebrehiwot and Gebru (2015), for instance, emphasized that the country's export potential has not yet been realized, and they suggest a couple of pointers for the government to explore untapped trading partners. Identifying the key determinants of export performance at the country- firm- and commodity-levels provide insights and directions to the right buttons to push to create a sustainable export sector. There is no shortage of studies that highlight the importance or role of the export sector for the growth of the overall economy, but more is needed to identify the critical bottlenecks and shortcomings of trade policies. The key is to provide a detailed insight on what derives and what hinders the export sector both at the commodity level and at the firm level. As such, a study on the micro-level analysis of the determinants of export is warranted.

## 1.4. Scope of the Study

This is an empirical study grounded on theoretical frameworks and uses firm-level survey data to identify key constraints of the Ethiopian export sector and to highlight the prospects of the sector for the coming decades. The World Bank's firm-level survey data was used to present the statistical and economic significance of key constraints that firms face as they attempt to participate in the export market. The firm-level survey data from the World Bank Group (2011 and 2015 enterprise survey) has national coverage to provide policy insights.

The rest of this paper is organized as follows. The next section presents a conceptual framework that links the export status of a firm to its potential determinants followed by a review of the empirical literature. Section three discusses the datasets employed and the methodologies adopted for data collection and analysis. Descriptive statistics of some key indicators will also be highlighted in this section. In section four, we present the results and policy implications of the findings from estimation. The last section concludes and provides directions for future research.

# 2. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

# 2.1. Conceptual Framework

The standard trade theory predicts that countries specialize and export goods and services for which they have comparative advantage or resources best suited for these goods and services (Feenstra, 2015). In practice, these comparative advantages are not static; they change from time to time depending on advancement in technology, competition, trade policy, and changes in productivity across countries. Several studies present reviews of the literature on the determinants of export by estimating augmented export function at the firm level. Most of them suggest that the traditional comparative advantage theory fail to explain firm level patterns of trade flow (Bayar, 2017; Baldwin and Harrigan, 2011) and note the need for a new framework that allows for trade where effects of firm heterogeneity (Melitz, 2003), economies of scale, possibility of product differentiation and imperfect competition (Linder, 1961; Krugman, 1980) could be accounted. This study relies on this later literature that allows for these key features of firms and markets to construct the framework of firm-level determinants of exports. Studies from management perspectives also present conceptualization of a theoretical framework (Nazar and Saleem, 2009)<sup>2</sup> although they mostly focus on strategies from marketing and managerial viewpoint.

To sustain export levels and increase trade volume, the traditional trade theory narrative argued that countries must ensure that they do not lose their comparative advantage position through continuous improvements in productivity, and quality of resources, and reduction in trade costs. Melitz (2003) took this analysis to the firm-level and predicted that large and more productive firms export more (Bayer, 2017). Similarly, for firms to stay on top of the productivity ladder, they need to attract a skilled labor force and innovate to maintain their export status. Firm-level analysis of export determinants and contributing factors use such framework as a springboard to expand and extend the trade theory to micro-level analysis.

To build a theoretical framework, one can start from a firm-level profit-maximizing setup and augment the model with sales in export and domestic markets. Beginning with Melitz (2003)'s model, several subsequent studies expand the trade model with additional features of firm characteristics. The key to Melitz (2003)'s model is to introduce a firm level heterogeneity that incorporates features that allow only some firms to be able to export. In this setup, the labor use (the only factor of production in this model) is

<sup>&</sup>lt;sup>2</sup> There are also several studies from the management perspective (discipline) that provide a related, but different, theoretical framework focusing on resource and management strategies of firms as key framework to understand the performance of exporting firms (for instance, see Zou and Stan,1998; Sousa, Martínez-López, and Coelho, 2008; Chen, Sousa, and Xinming, 2016). These studies discuss the lack of consensus on one dominant theoretical framework and also on how to measure export performance. For instance, one of these studies report that there are over 50 ways/indicators of export performance in the literature.

a function of fixed cost (f), output (q), and productivity ( $\phi$ ) at the firm-level. This implies that the amount of labor that a firm uses relates positively with the fixed cost and output levels and negatively with the productivity at the firm-level.

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According to the assumption of the model, higher productivity (higher value of  $\varphi$ ) allows the firm to produce at lower marginal cost or produce a higher quality at the same cost level. It is also assumed that the firm faces a residual (after all other firms share the total market demand) demand curve with a constant elasticity  $\sigma$ . The model also introduces a cut-off productivity level where a firm may decide to enter the export market. This cut-off productivity level is determined by the export profit function, which is given as (Melitz, 2003, equation 16 in the paper):

$$\pi_{\chi}(\varphi) = \frac{r_{\chi}(\varphi)}{\sigma} - f_{\chi}....(2)$$

Where  $\pi_x$  is profit from the export market,  $r_x$  is revenue from the export market, and  $f_x$  is fixed cost used to make export products.  $\sigma$  is the demand elasticity that the firm faces in the export market (from the residual demand curve). Note that both the profit and revenue specifications are functions of the firm-level productivity indicator,  $\varphi$ . Therefore, the decision to join the export market is determined by this profit function, such that if the profit from the export market is positive, then the firm will export. The key question for exporters is to know what determines the firm-level productivity index and to know whether the firm-level productivity is above the cut-off point to join the export market. If a firm can change this index either alone or together with other firms, it can influence its export status.

Several studies extended Melitz's (2003) model to introduce product quality (Antoniades, 2015), price variations (Johnson, 2012), market size, and toughness of competition (Melitz and Ottavino, 2008), and heterogenous firms (Melitz and Redding, 2014). And still, other studies attempt to show how these theoretical frameworks can be subject to empirical analysis; that is, what estimation equations best capture these features. For instance, Helpman, Melitz, and Rubinstein (2008) introduced a generalized gravity equation that accounts for the productivity differences and also allows for the self-selection of firms into export markets. The survival of a firm in an export market (export status of a firm as in Melitz's paper) is also the focus of several studies that attempt to undertake survival analysis to assess determinants of a firm's survival in an export market (Córcoles, Díaz-Mora, and Gandoy, 2015; Gorg, 2012; Wagner, 2013, Fugazza, 2014). Other studies added augmented estimation equations with variables to show ways to

improve the survival rate of a firm in an export market. For instance, Piveteau (2021) show that accumulation of customers in a foreign market is more important than sunk cost to explain persistence in the export market. This is a hint into the role of global marketing network for the success of exports, which is very important in the context of African countries.

Hence, this study adopted a similar firm-level 'gravity-type' estimation equation to highlight factors that determine the export status (volume of a firm) in an export market and, in turn, sustainability of export in a country<sup>3</sup>. Survival analysis would also be an appropriate method to identify factors that determine the survival rate of an exporting firm. However, such analysis requires a long time-series data to allow for a long enough duration spell for robust results.

Grounded on this theoretical framework, the study built a structural equation model that shows the network of key variables as noted in the above literature. The structural model built in the study help us transition to estimation models based on this framework. In addition to variables introduced in the theoretical framework, below we present review of the empirical literature to add variables that appear important in empirical studies.

## 2.2. Review of Empirical Literature

The empirical literature is vast and varies by methodology, level of analysis, sample size, period, as well as variables of interest. A significant amount of the studies are at the macro-level that link export performance to overall economic performance indicators. The firm-level studies became popular only recently after increased availability of firm-level data. In this section we present review of both macro-level and firm-level studies. Reviews of empirical works on Africa in general and Ethiopia, in particular, are presented at the end to prepare the groundwork for our empirical analysis.

Some studies focus their attention at identifying key factors that hinder the performance of the export sector. There are a wide range of factors listed as culprits both at the macro- and micro-levels. The factors blamed range from within-country transit time, which is a manifestation of a country's institutional features (Freund and Rocha, 2011), market access (Fugazza and McLaren, 2014), productivity, access to intermediate inputs (Fan, Li, and Yeaple, 2015), product quality, global shocks (both demand and supply) (Charnavoki and Dolado, 2014; Jongwanich, 2010; Mayer and Fajarnes, 2008), firm-level efficiency

<sup>&</sup>lt;sup>3</sup> There are several studies (both theoretical and empirical) that link sustainable export sector to the overall economic growth. Since this is an established fact, we don't present review of theoretical framework on this aspect.

(Söderbaum and Teal, 2000). Firm (production) capacities Whitfield & Staritz, 2021), and several other product-and firm-specific factors (Fugazza and Molina, 2016). Others put the blame on both home and destination countries characteristics (Brambilla, Lederman, and Porto, 2012; Bastos, Silva, and Verhoogen, 2018). The World Bank (2020)'s study put the impact of shocks to export prices to the forefront and note that both transitory and permanent shocks affect not just traditional agricultural commodities' prices but also that of metals, including gold, and hence export performance in a country. Given that gold has become one of the top export commodities of Ethiopia in recent years, it is another hurdle to the performance of the export sector in the country.

Wagner (2007, 2012) note that the literature on the relationship between international trade (both exports and imports) and firm performance, measured either by productivity, wages, profitability and survival, grew exponentially. In his literature survey article, Wagner (2007) concluded that there is substantial evidence for self-selection (to the export market) hypothesis, and that the evidence on the learning-by-exporting hypothesis is mixed. Updating his literature survey work, Wagner (2012) more explicitly point to the role of productivity and concluded that exporters and importers are more productive than non-exporters and non-importers; the exporting firms were also more productive in the years before they started exporting, confirming the hypothesis of self-selection as in Melitz (2003).

Using cross-country studies, Brenton, Saborouwski, and Uexkull (2010), on the other hand, confirm the importance of learning-by-exporting (previous export experience) together with a range of product- and country-specific factors in determining the survival of new export flows. Hence, they concluded that a policy that focuses only on entry into exporting (a perilous activity, as they describe it) misses the dynamic aspect of exporting, they recommend policy geared towards building experience both regional and global to increase the survival rate of exporting by firms from low-income countries.

In cases where firm-level analysis is impossible due to lack of data, some studies investigate the survival of export flow for a specific commodity export at a country level (Brenton, Saborouwski, and Uexkull, 2010; Cadot *et al.*, 2013). For instance, Brenton, Saborouwski, and Uexkull (2010) found that the survival of export flow is determined by a range of product– and country-specific factors as well as a country's experience with exporting. Using transaction-level export data from four African countries Cadot *et al.* (2013) reported that the probability of success in the export market (that is, survival of an exportable product) rises with the existence of cross-firm externalities, possibly due to information spillovers mediated through banks. Besedes and Pursa (2006), using data on exports to the U.S, also note that if a country can

survive in the exporting market for the first few years it will face a very small probability of failure and will likely export the product for a long period of time, supporting the learning-by-exporting notion. Kostevc and Zajc Kejzar (2020) also highlight the role of production network for high rate of survival in the export market for Slovenian firms. Corcoles, Diaz-Mora and Gandoy (2015) looked even deeper into the global production chains to highlight factors that affect survival of exports or stability of trade relationships in the global production chain; they concluded that initial value of trade, export distance, geographic and product diversification, and market size are some of the key factors explaining survival in the global production chain. The number of export destination markets that a country had access to also matter. Mora and Olabisi (2022) show that having more destinations is the most notable driver of long-run export growth, particularly for low-income countries. Long-run export growth is something used to proxy sustainable export growth that the present paper is addressing.

At the firm-level, Macchiavello and Morjaria (2015) highlight the importance of reputation (a measure of reliability) for the case of Kenyan rose export sub-sector. Export promotion is also another factor that previous studies link to increased firm-performance (Munch and Schaur, 2018). Using Chinese firm-level data, Vannoorenberghe, Wang, and Yu (2016) added the dimension of diversification of export destinations, and they show that for small exporters diversification of export destinations relate with volatile exports, and the opposite holds for large exporters. Similarly, using firm-level data, Gorg *et al.* (2012) found that firm and product characteristics, specifically, firm productivity, product scale and tenure (experience), associate with a higher export survival rate.

Such survival analysis is idea and help to study the concept of sustainability, and in most cases does not even necessarily require firm-level data, but it needs a longer time series trade flow data either at commodity or commodity group level or country level. In the absence of a long time series data at the firmlevel, we resort to other estimation technique to estimate determinants of sustainable exports. We believe that other equally important estimation technique can be adopted to provide a concreate policy recommendations from firm-level analysis given the heterogeneity that exists across firms in countries like Ethiopia.

In addition to the survival analysis, there are also several other studies that investigate the determinants of export performance using other estimation technique. Some of these studies looked into macro level indicators including real GDP, exchange rate (Gebremariam and Ying, 2022), world demand, foreign direct investment, and production capacity (Jongwanich, 2010); While others looked at industry and sectoral level

and note the importance of labour cost, foreign direct investment, and firm-size (Liu and Shu, 2003). Firmlevel studies provide even richer insights relevant for detailed policy recommendations. Studies that identify determinates at the firm-level point to firm-size, motivation to internationalize and use of differentiation strategy (Baldauf, Cravens and Wagner, 2000), affiliation with a business group, product innovation, and intensity of R&D (Sterlacchini, 2001), R&D-related capabilities (Lefebvre, Lefebvre, and Bourgault, 1998; Kleinknecht and Oostendorp, 2002), among others.

As one can tell from the review above, there are several variables of interest and mixed findings. After presenting a comprehensive review of the literature on determinants and measures of export performance, Beleska-Spasova (2014) summarized the studies as: (i) methodologically fragmented, (ii) conceptually diverse, a large number of determinants have been identified as having direct or indirect influence on the firm's export performance, and (iii) inconclusive results of the impact of different determinants on export performance. This summary echoes our findings of the literature review presented above. We can also add that the issue with diverse methodology and conceptual framework emanates from the type of data employed and the sample firms/countries/regions focused on in a given study. Studies in African countries are also marred by the same methodological and conceptual issues. As presented below, the case of Ethiopia is not different, in fact, as we dig deep into commodity and firm-level studies, both the methodology and variables of interest diverges as each commodity or commodity group face different challenges given the heterogenous nature of production and marketing process for each commodity.

The empirical literature on the export sector in African countries in general focuses on four research areas. The first strand presents a mere description of the characteristics and trends of key export sector indicators. The second strand attempts to identify determinants of the performance of the export sector. The third focuses on the trade policy that a country should implement, and the fourth deals with the role of regional and international trade blocs or institutions and their impacts on the performance of the export sector (Gebrehiwot, 2019).

Until recently, firm-level analysis was rear in the context of African countries. This is understandable given the lack of systematic firm-level data to undertake such analysis. However, there have been improvements in recent years as a result of initiatives from the World Bank Group and other institutions that collect firmlevel data and make it available for researchers. Some studies, short of a deeper firm-level analysis, just characterize African firms as showing an upward trend in internationalization, having a significant level of informal exporting (Ibeh, Wilson, and Chizema, 2012). Abreha *et al.*, (2021) also characterize manufacturing firms in SSA countries as dependent on imported inputs, on average about 14% (mostly imported from EU and US, but currently switching to China and other East Asian countries) and as having low domestic value added (at 38% value added creation) and very limited intraregional value-added trade within SSA.

In the African context the list of export performance determinants is even longer given the type and nature of the products they export; it is partly because of this that Deaton (1999) noted that African policymakers and scholars have seen exports as both "a hope and a curse" mainly due to the instability and trends of export commodity prices; other recent studies also support such characterization (Addison, Ghoshray, and Stamatogiannis, 2016). What factors explain such characterization? Brenton, Cadot, and Pierola (2012) blame the difficult business environment that African exporters operate as a source of short export survival; specifically, they note the role of trade facilitation, legal environment, and access to credit as key that explain the low export survival rates of firms in Africa compared to firms in comparable low-income countries. Soderbom and Teal (2000) highlight the importance of workers' skill (both education and experience) and efficiency of firms as key for the success of manufacturing exports from Africa.

#### 2.2.1. Studies on the Export Sector of Ethiopia

Ethiopia is no exception to this generalization, despite policy reforms and several initiatives to improve performance (Gebrehiwot, 2019). The Ethiopian export sector, although tipped to serve as a backbone of the country's economy in terms of employment, foreign currency earnings, and attracting foreign investors, faces several challenges to achieve the predicted potential benefits. Despite an uptick in some performance indicators for some export commodities (Cepheus, 2021), the export sector mainly faces five challenges. First, the export sector faces diversity issues (Belay, 2005) both in terms of products, partners, and destination markets. Second, due to lack of competitiveness, lack of backward and forward linkages (Giannecchini and Taylor, 2018), and fluctuations in global prices, the sector has been facing instability in earnings, which makes investment planning and expansions difficult. Third, changing rules and regulations both at the national and international levels create another hurdle and add cost on exporters, especially for small-scale exporting firms that just started to navigate the global market (Abebe and Schaefer, 2014; Clarke, 2009; Sadeghi *et al.*, 2018; Okafor, 2012). Fourth, the sector also faces resource and infrastructure constraints, including a lack of access to credit, foreign currency, and institutional support (Eshetu and Mehare, 2020). Finally, some of these constraints push exporters to look for opportunities (legal or illegal) to profit from foreign currency transactions at the expense of reinvestment in the sector, which drains the

much-needed foreign currency from the sector (Lemi, 2019; Forstater, 2018; Asmah, 2020). It is unrealistic to expect these challenges to disappear overnight, however remedy initiatives need to start as soon as possible to realize the full potential of the sector. For policymakers to prioritize and design appropriate policy tools to support the export sector, they need evidence from a rigorous empirical analysis grounded on theoretical frameworks. The purpose of this study is to fill this gap by providing empirical evidence and insight for policymakers.

In the Ethiopian context (and other developing countries, for that matter), there are several studies at the subsector or commodity level that attempt to highlight export performance challenges. The World Bank Group's (2014) 3<sup>rd</sup> Ethiopia Economic Update report provides a comprehensive and detailed account of the profile, challenges, and policy directions to strengthen the export performance of Ethiopia. The report notes that the Ethiopian export sector, although it registered a remarkable contribution to the growth performance over the past decade, has been exposed to vulnerabilities, an unconducive business environment, lacks competitiveness, and is too small to contribute to the structural transformation of the country's economy. Similarly, the International Trade Centre (2018), based on a survey of about 230 exporters in Ethiopia in 2016 with a focus on the impact of Non-Tariff Measures (NTM), reported that "96% of trading companies report facing situations they perceive as burdensome related to the application and implementation of NTMs." Further, the study further notes that "... exports are much more affected than imports, with 90% of exporting companies reporting facing burdensome NTMs, while only 56% of importing companies report such problems." These findings attest to the fact that the export sector needs special attention if the country is to realize the full potential of the export sector in terms of its contributions to the wider economy. Whether these NTMs emanate from domestic rules and regulations or from trading partners (international or regional levels) needs to be studied further to address the issue directly.

There are several other studies that attempted to address each of the aforementioned potential challenges that the export sector has been facing in the country. Most previous studies on Ethiopia focus on two issues: the challenges that the export sector faces in terms of lack of diversity (Belay, 2005; Mbate, 2014) and the determinants of the performance of the export sector in general (Bereket, 2020; Eshetu and Mehare, 2020). These issues are the flip sides of the same issue; if one can identify the challenges, it would be relatively easier to know what determines the performance of the export sector. Bereket (2020), for instance, looked at the determinants of the export sector and found that the sector is affected by changes in key macro variables (including GDP, population, and exchange rate) as well as institutional quality and trade policy. Other similar studies zoomed into constraints at the subsector or commodity level to highlight key

performance determinants. For instance, leather industry (Zhao, 2014), teff (Sankaranarayanan *et al.*, 2020 for teff export ban), coffee (Tamru, Minten, and Swinnen, 2021; Schafer, 2019; Minten, Schäfer, and Kuma, 2019; Bassa and Goshu, 2019), apparel (Staritz and Whitfield, 2019), floriculture (Melese, 2017), live animal and meat (Eshetu and Abraham, 2016), cut flower (Suzuki, Mano, and Abebe, 2018), sesame (Baker and Yuya, 2020), and oilseeds (Allaro, 2011) have been studied in recent years. Below we will summarize the findings of these commodity-level studies.

#### 2.2.2. Commodity-level Studies

There are several commodity-level studies mainly focused on highlighting the challenges that each commodity faces as they attempt to penetrate the international market. Most studies focus on four promising commodities-coffee, leather, flower, oilseeds, and apparel – in their analysis. This is partly because these commodities are expected to create linkage with the farmers (coffee and oilseeds) and also attract foreign investors (leather, flower, and apparel). Below we review some of the commodity-level studies.

Coffee is by far the most studied export commodity in Ethiopia, this is no surprise since coffee is at the top of the list of Ethiopia's export commodities in terms of export earnings. There are several contending factors for the success of the sector and its export performance. For instance, Schafer (2019) credited the re-emergence of private large-scale coffee plantations not just for increased and efficient production, but also for its role in creating rural employment opportunity. Worako, Minten, and Schafer (2019) emphasized on the role of producer cooperatives in coffee production and suggested that policymakers should pay attention to improving productivity (of producers) and quality (of products), not just regulation of markets to improve overall performance of the sub-sector (see also Cramer and Sender, 2019). Elimination of vertical integration in the coffee export sub-sector is also credited in the dramatic increase in export earnings and a slight quality improvement in Ethiopia (Minten *et al.*, 2014)<sup>4</sup>. Foreign exchange control has also found to be influencing coffee exports in a way that is not anticipated by policymakers in Ethiopia. Tamru, Minten, and Swinnen (2021) show that due to the foreign exchange control, coffee exports were willing to incur losses when exporting coffee by buying coffee at a higher price locally (either from farmers or commodity exchange market). They note that this makes coffee farmers unintended beneficiaries. Depending on how the exporters end up using the hard-earned foreign currency, it may create distortions

<sup>&</sup>lt;sup>4</sup> This conclusion contradicts a recent development where at least one region (Oromia) in the country brought back the vertical integration arrangement to, arguably, cut middlemen to benefit individual coffee farmers or farming cooperatives.

or resource misallocation. For instance, hording foreign currency or using it import products not in line with the development priorities of the country may benefit only the exporters, not the country at large. Other studies added additional variables to the list of determinants of export performance, for instance Deresa (2016) added factors that specifically affect farmers' cooperative unions from exporting expected amount of coffee from their farms; the list includes, coffee quality, export barriers from destination countries, delay in transportation, communication barriers, and costly administrative procedures/document processes. Bekele and Mersha (2019) highlighted institutional quality to the list of determinants of coffee export performance. These variables seem to be typical problems facing exporters of agricultural and perishable commodities, which characterize most export commodities of Ethiopia.

Oilseeds<sup>5</sup> is another promising agricultural commodity that the country counts on as one of the major sources of foreign currency earnings. Allaro (2011) note that Ethiopia has not taken advantage of this potential, and, in fact, only sesame and niger seeds have been exported in a larger quantity to bring the needed foreign currency. Allaro (2011) went on to conclude that real output (production levels) and exchange rate are key determinants of oilseeds export performance. The findings imply that there may be production constraints and relative currency overvaluation that hinder export of more and diverse oilseeds production.

The cut flower export sub-sector is another up and coming commodity group that recently became the darling of both domestic and foreign investors. Despite market ups and downs for this product, Ethiopia was once joined the ranks of the top five flower exporters worldwide (Melese, 2017). Workers in the cut flower export sub-sector earn and save significantly more than similar workers in other sectors (Suzuki, Mano, and Abebe, 2018). Although the sub-sector scored medium and above in most technological capabilities measures, it is a bit behind in terms of competitiveness indicators. Melese (2017) indicated the need for support to deepen capabilities, which in turn would improve competitiveness in the global cut-flower market. Dube and Govindasamy (2018) studied the horticulture sub-sector in general and identified determinants of export performance of the sub-sector; their study concluded that real effective exchange rate, foreign direct investment, and prices are key determinants of the performance of the sector.

The apparel export industry in Ethiopia showed a huge potential and the government also placed noteworthy emphasis on this sub-sector as a savior of the country's export sector that has been relying on

<sup>&</sup>lt;sup>5</sup> This commodity group includes those specialty oilseeds for which Ethiopia has potential (sesame, safflower, linseed, niger and castor) and those oilseed crops that are also grown widely in other parts of the world (soybeans, cotton, and rapeseed)

agricultural commodities for decades. The sub-sector did not disappoint, exports of apparel increased significantly since the 2000s (Staritz and Whitefield, 2019). Low labor cost, preferential trade agreements (with U.S and EU) and foreign direct investment as well as active industrial policies have been credited for the rise in the export of the apparel products (Staritz and Whitefield, 2019). However, the country has not taken full potential of the sub-sector. In recent years, there are some developments that help continue the upward trend (FDI continued interest in the country's cheap labor), but also there are also other factors that may hinder apparel exports<sup>6</sup>. Whitefield and Staritz (2021) identified other key factors that limit the success and survival of the apparel export sub-sector. They note that firms engaged in the production and export of apparel lack the required capabilities to enter the appeal global value chain, which leads to high learning costs and risks. As a result, firms face limited learning channels, where either the firms do not even try to enter the global value chain or even if they enter, they fail to remain (survive) in the export market, which leads to a learning trap (Whitefield and Staritz, 2021).

The leather sub-sector is in a similar situation as that of apparel both in terms of performance and challenges. For instance, Mbate (2015) note that the leather sub-sector is promising and calls for targeted state-led industrial policy to diversify exports to the flourishing leather industry in Ethiopia. Tariff protection is identified as one of the policy tools that benefited the sub-sector. Zhao (2014) looked at the effect of export tax on the leather industry, more specifically the cost and benefits of the export tax on the sub-sector. The results of the study suggest that, although there is efficiency loss (close to 0.5% of Ethiopia's GDP) due to the export tax, the gains through employment, foreign direct investment, and as a result increase value added in leather goods outweigh the efficiency loss (Zhao, 2014).

Broadly, the performance of the manufacturing sector and its export contributions were not up to the expectation. Oqubay (2019) notes that the sector is dominated by small firms, and resource-based industries, and characterized by low-value added and low technology-intensive products, as well as weak inter- and intra-sectoral linkages. The author identified four key areas of constraints that the government needs to consider targeting to improve performance: labor force skills, sectoral linkages, and competitive export logistics and trade facilitations.

There are other export sub-sectors that are not targeted and developed, but has potential for growth given the proximity of the country to the Middle East. These sub-sectors include export of live animals and related

<sup>&</sup>lt;sup>6</sup> For instance, the termination of preferential access of the US market through AGOA, and the disruption in the production value chains due to COVID-19).

animal products. However, unlike the coffee, flower, and apparel sub-sectors, the live animal and meat export sub-sector is marred by long list of challenges often faced a neglected product with little to no support from the government. There are also very limited studies on this sub-sector. Eshetu and Abraham (2016), one of the only few studies on this sub-sector, highlight that the live animal and meat export sub-sector faces challenges ranging from absence of promotional activities to inadequate infrastructure, and prevalence of traditional production system that hinder not just exports but also provision of enough domestic supply.

# **3. METHODOLOGY AND DATA**

#### **3.1.** Types and Sources of Data

To achieve the stated objectives, the study utilized firm-level survey data from the World Bank Enterprise Survey for 2011 and 2015. Another survey data used in this study is the primary survey data that we collected from 230 exporters headquartered in Addis Ababa, Ethiopia. The sample size of this survey (230 firms) may not be big enough and may not be representative of exporters in the country to use the data for econometric estimation. For estimation purposes, we use the firm-data from the World Bank. The World Bank Group collected the data from a larger sample of firms from different regions of the country. The survey data for the case of Ethiopia was conducted in 2011 and 2015 and had a large enough sample to run a regression to identify key challenges and constraints that exporters face. The survey data paints a clearer picture of the export sector and its challenges. The study estimated structural equation model to identify critical constraints that exporters face and to highlight major determinants of the performance of Ethiopia's export sector. This analysis is supplemented by secondary data to highlight the trends of some key indicators of the export sector for the World Bank's World Development Indicators (WDI) (2021a and

2021b). In addition, the study used primary survey data to paint a clearer picture of the export sector and its challenges.

#### 3.2. Model Variables and Methods of Data Analysis

As noted in the literature review section, we would like to address the issue of sustainable growth of the export sector. The term sustainable (or sustainability) is loaded in a sense that it is difficult, if not impossible, to pin it down to one or two variables. It encompasses several aspects and as such it is a hypothetical construct. Although we know what it means and entails, we do not have an observable variable to measure it adequately. This is where the phrase latent variable is crucial for our discussion. As Skrondal and Rabe-Hesketh (2004) noted latent variables that falls under the hypothetical construct category do not correspond to real phenomena that means they cannot be measured directly even in principle. Instead, the construct is operationally defined in terms of a number of items or indirect indicators<sup>7</sup>. In economics (and other social sciences), we also have terms like sustainability, reservation wage, willingness to pay, which are difficulty to measure directly and to gather accurate data from uncontrolled survey.

The question is what statistical techniques are available to estimate a model with a latent variable. Since the 2000s there has been an exponential growth in interest and literature on this topic both in its application and development of techniques to estimate such models. Recognizing that the latent variables (as a hypothetical construct variable) is useful in several disciplines, methods to investigate construct validity (best fit), the measurement and interrelationship among constructs are also deemed essential (Skrondal and Rabe-Hesketh, 2004; Kline, 2015). These studies and other previous works (Bentler (1978) and Bagozzi (1980 1981)) argue that construct validity is best investigated by means of structural equation models with latent variables. Survival (duration) analysis is the next best method that may help to estimate something close to sustainability (see Kosteve and Zajc Kejzar, 2020, Besedes and Pursa, 2006), given the limit spell in the data, it not possible to estimate the survival (duration) model for the present study. We believe that structural model is the best technique to address the concept of sustainability given the nature of the data.

Although there are some criticisms (Pearl, 2012) about its estimation approaches, the structural equation models (SEMs) are by far the most popular estimation technique for models with latent variables

<sup>&</sup>lt;sup>7</sup> Skrondal and Rabe-Hesketh (2004) presented detailed examples to describe latent variables. They use terms from psychology (like anxiety, life-satisfaction) and brainpower (like intelligence) to show that these variables don't have real counterpart in the world of observables.

(Skrondel and Rabe-Hesketh, 2004; Tarka, 2018; Low and Meghir, 2017) There have been several applications of the structural equation models in economics (Leipras, 2019; Möschl, et al., 2022).

# **Structural Equation Model (SEM)**

The term Structural Equation Modeling (SEM) does not designate a single statistical technique but instead refers to a family of related procedures (Kline, 2015). For instance, terms such as covariance structure analysis, covariance structure modeling, or analysis of covariance structures are also used in the literature to classify these techniques under a single label.

As it connects both observable and unobservable variables grounded on a theoretical framework (in this case a firm's profit maximizing motive), as such it is often noted that structural equation modelling is not just an estimation method, it is also a way of thinking, writing, and estimating. In addition to its advantage to allow inclusion of latent variables and simultaneous estimation of system equations, the fact that it is also closely related to theoretical framework makes it an ideal estimation technique for situation that involve unobserved (yet envied) factors in an estimation.

Leipras (2019) undertook similar study using structural equation model to estimate the role of internal and external knowledge in affecting export performance through innovation. Using firm-level data from Germany, the study concluded that both internal and external knowledges positively influence export performance through firm innovativeness as a mediator. Low and Meghir (2017) also highlight the widespread use of the structural equation model in economics.

From the discussion above, sustainable export or sustainable export growth can be attained if there is government support program, infusion of new (production or service) technology, and inflow of foreign capital (with its global and regional marketing networks and managerial skills), among other factors.

Figure 1: Ideal Structural Model with expected paths and correlations between key variables



\*sales can be total sales (domestic + exports) or only export sales.

As noted above, the study presented simple descriptive statistics and visuals of the trends in the export and import volume for major commodities and trading partners during the last two decades. Using the survey datasets, the study estimated export supply functions to identify factors driving exports. Several studies (Wagner, 2007, 2012; Bayar, 2018; Chen, Sousa, and Xinming, 2016) present an extensive survey of the empirical methods that previous studies adopted to estimate export-related functions. As indicated in the theoretical framework section, following previous studies (Shao, Xu, and Qiu, 2012; Kostevc and Zajc Kejžar, 2020; Kandilov and Zheng, 2011; Das *et al.*, 2007, Bai, Krishna, and Ma, 2017), the study used indicators of export market participation (export volume, export value, export status, export revenue, export profit) to estimate an export function as below.

$$E_{ijt} = \alpha_i + \gamma_j + \beta_i X_{it} + \theta_i Y_{jt} + \epsilon_{it}....(3)$$

Where  $E_{ijt}$  is export (volume, status, duration, revenue, or profit) status for firm *i* commodity group *j* and year *t*.  $\alpha_i$  and  $\gamma_j$  are firm- and commodity group-specific fixed effects that affect the export status of a firm.  $X_{it}$  and  $Y_{jt}$  are time-varying firm- and commodity group-specific explanatory variables, respectively.  $\epsilon_{it}$  is the error-term. The coefficients of interest for this study are  $\beta_i$  and  $\theta_i$ . These two coefficients capture the firm-specific and commodity group-specific challenges and potentials that significantly affect the current export status of a firm.

Given the nature and type of the firm-level data, the study used export value and export status indicators to estimate the above export function for completeness and robustness checks. For instance, a firm may export products directly or indirectly (through other firms); we have considered both the direct and indirect exports, and also total exports (direct plus indirect) and compare that to firms engaged only in domestic sales to identify determinates of exports compared to domestic sales.

Depending on the level of analysis and availability of data, previous studies included explanatory variables ranging from firm size to R&D spending to composition of employees for firm-level analysis and macro variables (GDP, unemployment rate) for country or sectoral level analysis. For instance, several studies selected estimation explanatory variables following Melitz (2003)'s theoretical framework for country-level analysis to show the importance role of human capital (Agosin, Alvarez, and Bravo-Oriega, 2012) on export diversification, liberalization of imported-inputs (Fan, Lai and Qi, 2019) on exports or survival of exports. Fugazza and Molina (2016) selected explanatory variables from a gravity model and augmented the gravity type variables with product characteristics. Other studies focus on variables that fit the objectives of their study (for instance, spillover effects (Duan *et al.*, 2020)). Most studies that use firm-level data, however, estimate production function type equations (Bai, Krishna and Ma, 2017; Kostevc and Zajc Kejzar, 2020). Bai, Krishna and Ma (2017) also highlight on the mode of export (direct and indirect) and point to the fact that direct export calls for more sunk costs but also allows firms to increase productivity. In this study, we have combined both direct and indirect exporters since the number of observations in the data is not big enough to treat each separately.

Agosin, Alvarez, and Bravo-Oriega (2012) also identified three variables that affect export diversification and hence export performance. Using cross-country analysis, they find that trade openness and financial development (credit to the private nonbank sector) do not have any effect on export diversification; on the other hand, they found that factor endowment or accumulation (through schooling) help diversify export. Fonchamnyo and Akame (2016) also show that value added in various sectors and foreign direct investment are key players for export diversification. Their findings point to the idea that not just labor endowment, but also effective factors through skill upgrade is a key indicator for the performance of the export sector.

Duan *et al.* (2020) highlight the role of spillover effects on exports. The spillover effects may emanate from exposure to the foreign market, learning-by-exporting, and information from a trading partner, among others. However, there is no consensus as to how these spillover effects affect exports. Duan *et al.* (2020) present survey of the literature on spillover effects and they conclude that there is an overall positive effect of spillovers on exports that is statistically significant, but economically negligible. Since the study undertook a meta-analysis, it is expected to get such a weak finding, nonetheless, it implies that spillover

effect is not something we can ignore. In this study we try to capture the spillover effect through the share of foreign ownership in each firm. Abegaz and Lahiri (2020) presented evidence of spillover effects from foreign-owned and domestic exporting firms for the case of exporting firms in Ethiopia. The study concluded that foreign-owned exporting firms' spillover emanate through downstream and upstream linkages whereas for domestic exporting firms the spillover effects come through input-supplying sectors. In both cases, the spillover effects increase the probability of domestic firms' export entry and survival rates (Abegaz and Lahiri, 2020).

Entry (sunk) costs (Das *et al.* 2007; Bernard and Wagner, 2001) and import-input trade liberalization (Fan, Lai and Qi, 2019; Kasahara and Lapham, 2013) are also well-studied variables that are expected to affect entry into the export market, this is particularly true in countries where there is shortage of capital and domestic inputs to venture into the export market.

Other firm characteristics that previous studies consider as key for entry to the export market are firm size, productivity, and labor quality (Bernard and Wagner, 2001). Labor quality is often proxied by the skill or education level of employees of a firm. Bernard and Wagner (2001) report that in their estimation that substantial sunk cost is needed to enter the export market, and large firms with high productivity and skilled workers are more likely to export. Based on a theoretical model and empirical estimation findings, De Loecker and Warzynski (2012) relate this productivity advantages to export firm's markups where exporters change higher markups upon entry into the export market. Munch and Schaur (2018) show that export promotion is even more important to promote firm-level performance (sales, value added and employment); they note that for smaller firms, the gain in value added (from export promotion, subsidies, and tax distortions) is three times higher than the direct costs of export promotion (Wang et al., 2017, Quaye and Acheampong, 2017) for more on the role of export promotion).

Brenton, Cadot, Pierola (2012) highlight on a more broader business environment (including, trade facilitation, legal environment, and access to credit) as key to high export survival rate. Financial development (proxied by trade credit and trade credit insurance) in a country, specifically export-related financial needs are also the focus of recent studies (Jaud, Kukenova, and Strieborny, 2015) and put forward as instrumental for sustainability of exports. Paudel and Cooray (2018) identified landlockedness as another key variable that affect export performance, as such countries should improve determinants of export to relief exports from the additional trade cost due to landlockedness. This is relevant for the context of Ethiopia where the firms tend to be smaller compared to counter parts in other parts of the developing

world (Westphal (1990) for discussion on promotion strategies that South Korea pursued during early years of its industrialization process).

For the present study, we closely follow the firm-level studies to estimate a production function but augment the production function with variables specific to the case of Ethiopian firms. As such, we plan to include factors of production (labor, land, capital, and skill) in our production functions. In addition to these firm-specific factors, we augment our specification with variables that reflect the challenges that firms in Ethiopia face when they export their products. We will categorize the explanatory variables into three: firm-specific factors, trade policy and regulations, and constraints. The firm-specific factors include firm size, employment composition, land, capital stock, sector/commodity type, age, ownership structure (i.e., the share of foreign ownership), among others. Trade policy and regulation factors include commodity-specific taxation and regulation as well as competition policies. The constraint category includes issues with access to utilities (water, electricity, etc.), availability of infrastructure, both hard and soft (Portugal-Perez and Wilson, 2012; Edwards, Alves, 2006), input costs (land, finance, imported inputs, building rents, etc.), and issues related to finance (credits, foreign currency, etc.). The World Bank's firm-level survey data contains information on these and other related variables that we could use in our estimation. As such, the data is well-suited to highlight the significance and importance of each factor in the context of Ethiopia.

Given the findings of previous empirical works in identifying key variables as determinants, we selected the following variables for our model estimation. It is important to note that the variable selection is partly based on availability of such variables in the data we are using for our estimation.

We use two dependent variables, total sales of a firm in a given year (*sales*) and share of exports in total sales (*exportshare*) to compare how key factors of interest affect sales and exports. The traditional production function variables are included as explanatory variables. These variables are number of labor employed (*labor*), cost of electricity (*electric*), raw materials used (*rawm*), and size of a firm (*size\_emp*) measured by number of permanent employees. To reflect the export market exposure of sample firms, we augmented the traditional production function with variables relevant for export firms, including percentage of foreign import input used in production (*foreigninptpct*) and the share of foreign ownership in a firm (*foreignshare*)

Sustainable export (*sustainexport*) is our latent variable, which is expected to be affected by an index of government support (*governmentsupport*), R&D activities proxied by introduction of new product during

the last three years (*newproductlast3*), and age of a firm (*ageoffirm*). The latent variable is, in turn expected to affect the dependent variables (see Figure 4 below for detailed of the framework and how each variable is linked). Given the difficulty that firms face in production, in exporting, and even in sourcing or securing some inputs, we computed a composite index for obstacles (*obstacleindex*) that firms face in production, marketing and finance areas, which is expected to affect not just sales and exports but also sustainable exports through its influence on R&D activities and the ownership share of foreign firms. We present descriptions of some of these model variables and trends of other key trade pattern indicators in the next section.

# **3.3.** Descriptive Statistics of the Data

#### 3.3.1. Ethiopia's Trade Flow Trends compared to Sub-Saharan African Countries

In this section, we present trends of some of Ethiopia's trade sector performance key indicators. More specifically, a highlight of the trends in key trade indicators of Ethiopia in comparison to sub-Saharan African (SSA) countries has been presented, followed by descriptive statistics on some key model variables from the firm-level survey data obtained from the enterprise survey of the World Bank.

To get an idea of the current state of the trading sector of Ethiopia, we present below three graphs to depict some trends of key trade indicators of the country compared to sub-Saharan African (SSA) countries. Figures 1 and 2 show trends of key export and import commodity groups, respectively. Figure 3 compares growths in exports and imports with the growth in the GDP of the country between 2000 and 2020. Tables 1A.1 and 1A.2 in appendix present sample firms' subsectors by region and sale distributions, respectively, based on the World Bank's Ethiopia enterprise survey from 2011 and 2015.

Figure 1 depicts that the composition of Ethiopia's export is different from that of the SSA average. In recent years, food exports<sup>8</sup> account for more than 70% of merchandise exports of Ethiopia, whereas for an average SSA country, fuel is the dominant merchandise export accounting for more than 80% of merchandise export since 2000. Manufacturing goods export account for less than 20% of total merchandise export of Ethiopia, whereas for an average SSA country manufacturing goods export is mostly above 20% since 2000. It is important to note the important role of AGOA (Africa Growth Opportunity Act) for the high manufacturing exports of SSA countries (see Didia, Nica, and Yu, 2015; and Seyoum, 2007 for more discussion on this). In terms of ores and metals exports, Ethiopia is also

<sup>&</sup>lt;sup>8</sup> According to the World Bank definition, food comprises the commodities in SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and SITC division 22 (oil seeds, oil nuts, and oil kernels). Included in this list are coffee, chat, fruits, vegetables, and pulses, the top export commodities of Ethiopia.

behind most SSA countries. Exports of agricultural raw materials<sup>9</sup> have declined for both Ethiopia and an average SSA country. Even from SSA standard, the fact that Ethiopia's export is dominated by exports of food items, with a declining share in manufacturing goods export, attest to the fact that the sector is set up to face earning instability and declining prices, which are tell-tale signs of failure (Africa's Pulse (2018) for more details on the trends for SSA countries).



Figure 1. Composition of Exports in Ethiopia and SSA: 2000-2020

The composition of imports is a bit better than that of exports, at least compared to an average SSA country (see Figure 2 below). For instance, food imports have been declining, albeit with several up and down swings. Manufacturing imports have also increased, especially since 2010, compared to a sharp decline for an average SSA country. Fuel imports have also declined since 2013, with a significant

Source: Authors' computations based on WDI data

<sup>&</sup>lt;sup>9</sup> According to the World Bank, agricultural raw materials comprise SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap). For the case of Ethiopia, this includes hides and skins.

impact on the trade balance. These import flow patterns (i.e., an increase in imports of manufactured goods and a decline in fuel imports) may be an indication of a healthy economy that substitutes fuel imports with renewable energy sources and imports more manufacturing goods. However, whether the increase in imports of manufacturing goods is a good sign for the economy is open for debate since the composition, rather than just the volume, of the imports of manufactured goods matters even more.





How have the export and import sectors been doing compared to the rest of the economy? Figure 3 compares the growth rates of imports and exports to that of GDP to highlight the performance gap of the trade sector versus the whole economy compared to an average SSA country. Only in 2018 and 2019 that the export sector grew faster than GDP, whereas imports grew faster than GDP for five of the nine years since 2011. For an average SSA country, unlike that of Ethiopia, export grew faster than GDP for close to half of the years between 2000 and 2020, whereas imports grew slower than GDP for more than half of the years between 2000 and 2020. One other key trend that is not in favor of Ethiopia is the low and declining share of exports in GDP. Between 2010 and 2020, the share of export in GDP went down from close to 20% to below 10%. SSA countries experienced a similar trend, but the average share remained above 20%. These trends, put together, are not in the right direction for Ethiopia. Micro-level study of exporting firms and empirical analysis may be able to flash out what is ailing the trade sector in general and that of the export sector in particular; that is exactly what we plan to do in this study.





Source: Authors' computations based on WDI data.

#### 3.3.2. Ethiopia's Trade: Firm-level patterns and distribution

The distribution of sample firms by subsector and region is presented in Table 1A.2 in Appendix. The table shows that firms engaged in the service subsectors are dominant in the sample, with retail, wholesale, transport, and food subsectors accounting for 16%, 11%, 10%, and 7%, respectively<sup>10</sup>. The subsectors with potential for manufacturing exports, including textile (2%), garment (3%), and leather (3%), accounting for less than 10% combined share. The regional distributions are not that surprising, with Addis Ababa accounting for 62% of the location of the sample firms, followed by Oromia (14%) and Tigray (10%). Although the same of Oromia is no surprise given its proximity to the capital and road networks, the fact that Tigray's share is more than two other bigger regions of the country, Amhara (7%) and SNNP (5%), is a bit surprising. For the present study, the fact that most of the firms are concentrated in Addis Ababa justifies the decision we made to take a sample from Addis Ababa for our survey of exporters.

Year	Variable description and code	Mean	Standard Deviation
2011	Domestic sales (%), d3a	93.8012	21.3962
	Indirect exports (%), d3b	2.1118	12.4153
	Direct exports (%), d3c	3.87733	16.8611
	Total sales three years ago, n3 (in birr)	12,950,310.98	69,542,139.53
	Exports to neighboring countries, AFd3f	38.14894	41.0196
	Exports to developed countries, AFd3g	46.04167	42.29831
	Exports to other locations, AFd3h	11.55319	25.91022
2015	Domestic sales (%), d3a	93.0047	23.1047
	Indirect exports (%), d3b	.456368	6.61546
	Direct exports (%), d3c	5.64033	20.5775
	Total sales three years ago, n3 (in birr)	43,048,688.78	149,557,293.7

Table 1A.3. Firm-level distribution of sales in 2011 and 2015

<sup>&</sup>lt;sup>10</sup> This distribution is dominated by the service sector and there are several sub-sectors missing from the list compared to the broad economic classification that the UN reports as standard (See Table 3A for the list of UN classification)

Source: Computed from the World Bank's Ethiopia Enterprise Surveys (2011 and 2015)

Table 1A.3 paints a picture of the sales distribution of sample firms during the 2011 and 2015 survey years. There was very little change between the two years in terms of domestic sales, where it hovers around 93% during both years, but there is a slight switch from exporting indirectly (2% in 2011, and 0.46% in 2015) to more direct exports (4% in 2011, and 6% in 2015) between the two years. Although there is no similar information in 2015, in 2011, sample firms exported more to developed countries (46%) followed by exports to neighboring countries (38%). Total sales also almost quadrupled between 2011 and 2015. We expect that the number of exporting firms has increased more since the World Bank survey, and we expect to see more exporters and more sales to the neighboring countries as trade negotiations and road networks improved in recent years.

# 4. RESULTS AND DISCUSSIONS

#### 4.1. Results from the Structural Equation Model

We estimated three different structural equations under different assumptions. Since the assumption of the standard estimation equation is too restrictive (i.e., assumes gaussian distribution of the error term), we relaxed this assumption and estimated the asymptotic distribution free estimator to compare the results for robustness. Hence, we estimated three different specifications: Maximum Likelihood (ML), Maximum Likelihood with Missing Values (MLMV), and the Asymptotic Distribution Free (ADF) estimators. The default distributional assumption of the variables is normality. However, our test results for normality shows that none of the endogenous variables are normally distributed. As a result, we opt for an estimation technique that doesn't impose distributional assumptions (distribution free estimation) and compare the findings with specifications that assumes normality (Maximum Likelihood).

Results from the three specifications are reported in Table 4A, Figure 4 also reports results from ADF in a path diagram. Goodness of fit for each of these specifications are reported in Tables 5A.1 (ADF), 5A.2 (MLMV), and 5A.3 (ML). For each specification, we estimated two different equations with two different key dependent variables: Total sales and export shares. Other than these two variables, the other variables (both endogenous and exogenous) variables in each specifications remain the same. The results reported in Table 4A and Figure 4 show both the direct and indirect effects of each endogenous and exogenous variables.

The goodness of fitness statistics reported in Tables 5A.1-5A.3 are for each equation within a specification and an overall Wald test for the significance of each specification. For each equation within a specification,

R-squares have been reported, correlation between dependent variable and its prediction (mc) and Bentler– Raykov squared multiple correlation coefficient (mc-squared). For all cases higher values of the statistics (R-squared, mc, and mc-squared) indicate good fit of each model. The Wald test for each specification tests for the null hypothesis that all coefficients equal to zero. We have also reported overall goodness of fit for each specification (at the bottom of Table 4A). Where possible, we have reported coefficient of determination (CD), standardized room mean square residual (SRMR), information criteria (AIC and BIC). Overall, based on these test statistics, the preferred specification is ADF, but there are cases where some test statistics show the restrictive ML specification as a better fit for the data. We present results from all three specifications to show robustness of the results.





Total effects of each of the variables are the combination of the direct and indirect effects. For instance, percent of foreign input affects exports both directly and indirectly through foreign share. Similarly, the new product variable affects exports directly and also indirectly through sustainable exports. In other words, foreign share and sustainable exports mediate the effects of foreign input and new product on exports, respectively. The total effect is the sum of the direct and indirect effects. To arrive at the total value, we also need to calculate the indirect effect that operates through the mediator. To arrive at the indirect effect, we need to multiply the effect of the explanatory variable on the mediator and the effect of the mediator on the dependent variable. From the diagram above, the effect of the percentage of foreign input use on export share comes through direct effect (0.0014) and indirect effect through foreign share

(0.42\*0.021 = 0.0088) for a total effect of 0.01 (0.0014 +0.0088). The breakdowns of the effects into direct, indirect, and total effects are reported in Tables 6A.1-6A.6 for the three specifications.

The findings of the study from all three specification are similar, but the goodness of fit statistics indicates that the specification that allows for the Asymptotic Distribution Free (ADF) fits the data better than the other two estimators (see Tables 5A1-3). In this section, we discuss results from the ADF estimator reported in Table 4A for both total sales and export shares (column 2 and 3).

Estimation results show that, with the exception of new product introduction (proxy for R&D activities), all other variables affect both total sales and exports statistically significantly. However, the way some of these variables affect total sales and exports is different. Only labour input and raw material affect both sales and exports in the same way, that is an increase in labour and raw material use increases both total sales and exports. The other variables have opposite signs for sales and exports. Most of the variables affect total sales positively but exports negatively. For instance, the government support index, share of foreign ownership, electricity use, obstacle index affects total sales positively and significantly. This supports the notion that government policy initiatives and foreign investment incentives are really geared towards production for domestic sale at the expense of exports. The positive sign on the obstacle index for sales (and negative sign for exports) suggest that firms engaged in engaged in domestic sales benefit from the obstacles where are firms engaged in exports were affected negatively. It also seems that use of electricity (with government monopoly as supplier and one needs to get the blessings of the only supplier to get access) is a function of the effectiveness of the government, as such firms engaged in exports were as a disadvantage compared to firms mainly engaged in domestic sales. The age of a firm, which proxy experience of a firm, is also not an advantage to export. In fact, new firms tend to export more than older firms. The only two factors that work in favour of exporting are percentage of foreign inputs used in the production and size of the firm. Firms that use more foreign imported inputs and larger firms tend to export more than other firms. The later factor is in line with Melitz (2003)'s paper that supports the notion that larger firms tend to export more. Most of these results hold in the other two specifications as well (ML and MLMV) with the exception of the foreign share variable. In the ML and MLMV specifications, foreign share affects only exporting firms positively and significantly, suggesting that firms with higher foreign ownership share tends to export more. This finding is consistent with the literature that foreign direct investments are attracted to the export sector of a country and their entry into a country (especially developing countries) leads to more export.

What about the indirect effects from other factors? As indicated in Table 6A.1 and 6A.2, sales and export shares are also affected indirectly through variables that serve as mediators. Introduction of new product, government support, obstacles, and age of the firm affects sales (or export shares) through the latent variable, sustainable export. That is, these variables are expected to have a long-lasting impact since they are expected to influence sustainability of exports. It appears that the indirect effects of these variables on export shares are statistically significant. For instance, the introduction of new products during past three years affects export shares through sustainable export positively and significantly. This is consistent with expectation where R&D activities (through new products) affect sustainability of exports which in turn affects exports positively. The age of a firm also has similar effect, which supports the notion that experience of a firm affects exports only through sustainable exports, note that the direct effect of age of a firm is negative and statistically significant. The indirect effect of the percentage of foreign input through foreign ownership share is negative and statistically significant, which is the opposite of the direct effect. This finding implies that firms that has significant share of foreign ownership and that uses more foreign inputs tend to export less compared to firms with no foreign ownership share. More specifically, partially foreign owned firms that import some of its inputs tend to serve the local market than the export market.

The obstacle effect has two indirect effects, one through sustainable export and the other through foreign ownership share. The combined indirect effect of the obstacle index variable is positive and significant. This finding is unexpected since the obstacle index captures constraints that firms face. Interpretation of this finding is not straight forward, but we think that the mediation variables (foreign ownership and sustainability of exports) shield the expected negative effects of the obstacle index from negatively affecting exports. This is not true for the case of the total sales, where the findings show that the obstacle index has negative and significant effects, that is, the mediation variables didn't shield total sales from the negative effects of obstacles that firms face when selling products in the local market.

Total effects are reported in Table 6A.1., except for firm size, all other variables affect total sales positively and significantly. The only surprising variable is the obstacle index, which is not supposed to have a positive coefficient. The direct effect of the obstacle index variable is positive, which is by far large in magnitude compared to the negative indirect effect. The indirect effect comes through the two mediation factors: R&D activities and foreign ownership share. As noted above these negative mediation effects are not big enough to compensate for the positive direct effect of the obstacle index. But the question is why the obstacle index had positive direct effect? Is it because the firms take advantage of the business environment constraints and use it to their advantage to sale more in the local market? This needs to be studied further.

On the other hand, only some of the variables have positive and significant total effect on export share. Firm size, age of a firm, raw materials, obstacle index, and sustainable export (the latent variable) has positive and significant effects. The only surprise here is again with the obstacle index variable. However, for the case of share of export, the dominate positive effect comes through the mediation factors (foreign share and R&D activities), unlike the effect on the total sale. This result is less surprising since the direct effect of obstacle index on export share is negative, which is expected. But the positive effects work through the mediation factors, where, as noted above, exporting firms shield themselves from the negative impact of the obstacles through attracting foreign investors and spending more in R&D activities.

## 4.2. Challenges of Ethiopia's Export Sector

In this section, we summarize the findings of the empirical analysis, both from the survey and the SEM, focusing on the challenges that the export section has faced. In the exports survey, we asked exporters specific questions on factors that affect export performance, and non-tariff barriers that survey results, we report challenges as reported by exporters and list them as ranked by exporters. From the SEM analysis, we report key operational obstacles that hinder the performance of the export sector in general, that are found to be statistically and economically significant.

#### 4.2.1. Political instability, rules and regulations, and access to inputs

As discussed in the previous section, factors that affect exporting varies by commodity groups (as shown in Table 2A in appendix). For all commodities in the export sector, the top five factors in terms of their impact on exporting are: availability of foreign currency, political instability in Ethiopia, security and safety, political instability in partner countries, and informal payment to authorities (corruption), in order or importance. It is clear that instability in Ethiopia and in neighbouring trading partners which result in safety and security issues have been creating major disruptions to export any commodity out of Ethiopia (see Figure 5). The exchange rate restriction by the National Bank of Ethiopia and corruption are also the by-products of the political instability in the country and its neighbouring trading partners.

The next four critical factors are: transparency in rules and regulations, access to trade finance, transparency in rules and regulations of partner countries and access to land, in that order. These factors are typical of constraints that exporters in developing countries face as rules and regulations change frequently and sometimes without public discussion and end up creating uncertainty for exporters.

Figure 5. How would each of these factors affect your export business? Please assess or rate each challenge based on a scale of 1 to 5 (where 1 is extremely important, and 5 not important)



#### 4.2.2. Non-tariff measures and their impacts

Non-tariff measures have become another critical issue that affect exporting not just in developing countries, but also in developed countries. To understand the importance of the issue for the case of Ethiopia, we asked exporters the type of non-tariff measures that affected their export business and how these measures affect their performance (see Figures 6 and 7). On average, non-tariff measures didn't affect exporting firms that much, if any it affected only with a limited impact. Exporters report that of the non-tariff measures that affect their export performance, domestic regulations on technical requirements, and export clearance measures top the list followed by regulations of pre-shipment inspection by trading partners. These measures create additional burden on exporters both in terms of time and finance (see Figure 7). These factors revolve around regulation by home country and partners countries authorities. As

noted above, the frequent change of regulation and the lack of transparency when rules and regulations are designed create significant uncertainty and negatively impact export performances.

140 -124 120 -11413 1060 100 -80 -60 -40 -20 -0 Yes, but have only limited No, this is not affecting my Yes, very high impact impact company at all Technical requirement from trading partners' regulation Conformity assessment from trading partners' regulation Pre-shipment inspection from trading partners' regulation Rules of origin from trading partners' regulation Private standards set by an importing firm Technical export requirement set by domestic (Ethiopian) regulation Licenses and other export measures set by domestic (Ethiopian) regulation Export clearance measures set by domestic (Ethiopian) regulation

Figure 6. Which of the following non-tariff measures affect your export business?

Figure 7. How did the non-tariff barriers or measures burden your company?



## 4.2.3. Supply and demand side constraints

We have also asked exporters open-ended questions about supply side and demand side constraints. The responses are plotted in Figures 8 (supply side) and 9 (demand side) to show the key works that emerge from the open-ended responses. For the supply side constraints, the responses of the exporters echo what we discussed above as overall obstacles that the exporters sector has faced, including foreign currency access, political instability, corruption, and input shortage. There are other key terms that emerge as important for exporters when it comes to supply side issues, for instance, ECX (the Ethiopian Commodity Exchange), quality, logistics, regulation, inefficient, among others. These terms refer to the challenges that exporters face in the form of low quality of inputs (raw materials and human capital), and inefficiency of supply logistics for inputs and exports.

Figure 8. Supply side constraints: Open-ended responses from exporters



For the demand side, key terms that stand out from the list of open-ended answers are politics, instability, unfair competition/concentration, corruption, price variations (including due to exchange rate variations), shortage of inputs, etc (see Figure 18F). The political instability is the factor that affects all aspects of trade including supply and demand side as noted above, so there is no surprise here. Unfair competition, which could be due to corruption at the custom clearance and dry port level relates to the weak government institutions that characterize most trade agencies in the country. Variation in prices partly due to frequent changes in the exchange rate highlights the earning instability that exporters have faced as they attempt to export. Given the direction (devaluation of the currency) and the magnitude of the change in the exchange rate, this will have significant impact on the bottom line of exporters. Although there is not that much the government can do about this, avoiding a last minute significant chance in the value of the local currency could go a long way to help exporters maintain a stable flow in earnings for sustainable growth.





4.2.4. Emerging challenges from the structural equation model (SEM) analysis

Focusing only on the export equation part of the specification, it is apparent that three key variables affect exporting significantly than others. The SEM identifies factors that affect total sales and exports separately. To better understand the specific constraints of the export sector, we need to look at those factors that negatively affect only the export sector but not the total sales. Some factors, in face, affect total sales positively while exports negatively. As discussed above, the variables that affect exports negatively and significantly are critical for policy makers to understand the reasons for poor export performance despite better performance in terms of local supply of the same products.

Based on the results from the SEM analysis, government support index, share of foreign ownership, electricity use, obstacle index affects total exports (sales) negatively (positively) and significantly. This supports the notion that government policy initiatives and foreign investment incentives are really geared towards production for domestic sale at the expense of exports. The negative sign on the obstacle index for exports suggests that firms engaged in exports are in a position to be hit negatively by these obstacles compared to firms engaged solely on domestic sales. One example of this, as confirmed in the findings, is access to or use of electricity (with government monopoly as supplier and one needs to get the blessings of the only supplier to get access), which is a function of the effectiveness of the government, as such firms engaged in exports were at a disadvantage compared to firms mainly engaged in domestic sales. From the policy documents, it is clear that exporting is the priority of the government, however these findings confirm that the policies and the institutional setups are not ready yet to support exporting. At the minimum, government should eliminate the discriminatory nature of the policies, institutional support systems and access to resources to boost export performance for sustainable growth of the sector. The age of a firm, which proxy experience of a firm, is also not an advantage to export. In fact, new firms tend to export more than older firms. One implication of this is that newer firms tend to be larger and flexible to adapt new technology to response to the export market. One way the government should address this issue is through an incentive package to motive older firms to upgrade their technology to enable them to access the export market, something similar to the Trade Adjustment Assistance (TAA) program that the US government launched in the 1960s.

Government should also build upon the two factors that are currently working in favor of the export sector, percentage of foreign inputs used in the production and size of the firm. That is, continue the policy of making imported inputs available to exporters in the short term, and plan to substitute these imported inputs with domestic supply in the long term. Firm size is another critical factor that helps exporting, the question is how to make firms bigger. One critical factor is access to finance to expand firm size, in this regard the

recent decision to allow foreign banks to enter the Ethiopian market seems the right decision in this respect. With access to foreign banks, local firms could borrow the necessary capital needed to increase their size and be able to target foreign markets.

# **5. CONCLUSIONS AND POLICY IMPLICATIONS**

The overarching objectives of the study were to identify and characterize the trends of major export commodities, their role in the overall economy, and the dynamics of the major trading partners of Ethiopia. The other aim of the study was to identify the structural, technical, and regulatory constraints and challenges both at the national and international levels that hinder the performance of the export sector. Using firm-level data collected from exporters and secondary data from national as well as international sources, the study presented rigorous empirical analysis to help draw policy implications for sustainable export sector growth.

From the trend analysis, we can deduce that Ethiopia still dependents on few export products, imports products with rising prices, and tends to trade more with emerging economics (with China taking the lions share in recent years). It is also clear form the data that the tariff structure of trading partners hinders Ethiopia's export of consumer goods and raw materials more than other products. Results from the survey indicate that exporting firms experience difficulties with custom (duties and process) as well as insufficient supply of utilities and infrastructure. The sample firms also report service provisions from most government institutions are far below expectation, particularly in terms of support for access to land. Results from the structural equation model reveal that the variables that positively affect exporting the most are firm size, age of firm, raw materials, and sustainable export (the latent variable). Sustainable export is further affected by exporting firms' innovation activities. Foreign ownership (at least partial) and R&D activities of an exporting firm also shield exporting firms from the negative impacts of operational obstacles that firms face in Ethiopia. Policy should be directed to attract more foreign investment to exporting firms and promote R&D activities to improve competitive position of exporting firms.

Specifically, the following policy implications can be drawn from the findings of the study.

1. *The need for a better service from government institutions*. Results both from the survey and empirical analysis confirm that there seems to be a disconnect between government institutions and the export sectors. Government should re-evaluate its exporters support mechanism and revamp the network to provide helpful and timely support for exporters

- 2. Channel foreign currency for importation of inputs necessary for export goods production. Foreign currency shortage is one of the bottlenecks, particularly to supply imported inputs for export purposes. To mitigate this problem, government should increase retained foreign currency earnings of exporters and tie that to the importation of inputs necessary for export goods production. As is clear from the survey results, most exporters use their retained foreign currency earnings to import goods not necessarily needed as an input in export production. Government should design a policy to channel the foreign currency earnings for import of essential inputs that would help the export sector.
- 3. Attract foreign firms and provide incentive for a joint venture with local firms. The empirical findings confirm the significant role of foreign firms in helping domestic firms penetrate international markets. Attracting foreign investors to form a joint venture with domestic firms is the best way to materialize the potential benefit expected from foreign firms. The positive experience from Asian countries in this regard provides a good historical lesson.
- 4. Design an incentive package that promote firms' R&D activities. Sustainable export and overall growth of the export sector also hinges on innovation at the firm level. The literature and experience from other countries indicate that one of the key inputs of innovation is skilled manpower. Although firms report no issues with access to manpower, only few firms actually engaged in R&D activities. This implies the need to promote R&D activities by providing an incentive package tied to R&D activities at the same time ensure availability of skilled manpower capable of doing R&D activities. As Fikru (2014) noted such R&D activities lead to build up of firm capabilities that may result in international certification of products to easily access global markets.

There are some areas that needs further study to sharpen the policy implications. First, some potential exportable products (like live animals, leather and related products) are underdeveloped and only few exporters engaged in exporting these products, the reasons are not apparent either from the survey data or any previous studies. This warrants more study to identify the bottlenecks that hinder the expansion of an otherwise potential export subsector. Second, the need to engage in R&D activity can't be overstated, one should then ask what are the key ingredients for firms to engage in such activities? Further study is needed to identify the optimal incentive package that promote R&D activities not only by exporting firms but also by other firms. The role of foreign firms is critical here, as noted above, incentive package for a joint venture tied to R&D activities is one area to look into closely.

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# Appendix: Descriptive Statistics of Key Variables and Results

Commodities/products/sub-sectors	Total number of exporters	Percentage of total	Sample (30% of population)
Coffee	129	13.58	40
Pulses, oilseeds and spices	457	48.11	133
Flower /Horticulture	77	8.11	22

Table 1A.1. The 12 sub-sectors and the sample size and share drawn from each

Tanners, Footwear, and Leather	61	6.42	18
Meat	11	1.16	5
Live Animals*	105	11.05	0 (no sample taken yet)
Textile and Garment	58	6.11	17
Other Agriculture-related products	52	5.47	15
Total	950	100.00	250

\*There is no complete and consistent data on the number and address of live animal exporters from any source. We decided to take no sample from this group.

Industry Subsector	Region of The E	stablishment					
	Addis Ababa	Amhara	Dire Dawa	Oromia	SNNP	Tigray	Total
Food	40.82	6.80	6.80	27.89	9.52	8.16	100.00
	6.49	9.01	37.04	19.16	19.72	8.33	9.85
Tobacco	100.00	0.00	0.00	0.00	0.00	0.00	100.00
	0.22	0.00	0.00	0.00	0.00	0.00	0.13
Textiles	56.00	8.00	8.00	8.00	4.00	16.00	100.00
	1.51	1.80	7.41	0.93	1.41	2.78	1.68
Garments	57.45	4.26	0.00	14.89	0.00	23.40	100.00
	2.92	1.80	0.00	3.27	0.00	7.64	3.15

Table 1A.2. Distribution of sample firms: Percentage frequencies of subsectors by region.

Leather	85.42	2.08	0.00	6.25	2.08	4.17	100.00
	4.43	0.90	0.00	1.40	1.41	1.39	3.22
Wood	66.67	14.29	0.00	4.76	4.76	9.52	100.00
	1.51	2.70	0.00	0.47	1.41	1.39	1.41
Paper	81.25	0.00	0.00	18.75	0.00	0.00	100.00
•	1.41	0.00	0.00	1.40	0.00	0.00	1.07
Publishing, printing,	80.88	2.94	0.00	5.88	4.41	5.88	100.00
	5.95	1.80	0.00	1.87	4.23	2.78	4.56
Chemicals	90.70	2.33	2.33	2.33	0.00	2.33	100.00
	4.22	0.90	3.70	0.47	0.00	0.69	2.88
Plastics & rubber	67.80	0.00	3.39	22.03	1.69	5.08	100.00
	4.32	0.00	7.41	6.07	1.41	2.08	3.95
Non-metallic mineral	43.42	2.63	0.00	10.53	9.21	34.21	100.00
	3.57	1.80	0.00	3.74	9.86	18.06	5.09
Basic metals	47.50	20.00	0.00	20.00	0.00	12.50	100.00
	2.05	7.21	0.00	3.74	0.00	3.47	2.68
Fabricated metal prod	62.16	0.00	8.11	10.81	0.00	18.92	100.00
	2.49	0.00	11.11	1.87	0.00	4.86	2.48
Machinery and equipment	63.64	18.18	0.00	13.64	0.00	4.55	100.00
	1.51	3.60	0.00	1.40	0.00	0.69	1.47
Electronics (31 & 32)	90.00	10.00	0.00	0.00	0.00	0.00	100.00
	0.97	0.90	0.00	0.00	0.00	0.00	0.67
Precision instruments	50.00	0.00	0.00	50.00	0.00	0.00	100.00
	0.22	0.00	0.00	0.93	0.00	0.00	0.27
Transport machines (3	53.33	6.67	0.00	33.33	0.00	6.67	100.00
	0.86	0.90	0.00	2.34	0.00	0.69	1.01
Furniture	45.24	14.29	2.38	19.05	9.52	9.52	100.00
	2.05	5.41	3.70	3.74	5.63	2.78	2.82
Recycling	0.00	0.00	0.00	100.00	0.00	0.00	100.00
	0.00	0.00	0.00	0.47	0.00	0.00	0.07
Construction Section	80.82	2.74	1.37	2.74	4.11	8.22	100.00
	6.38	1.80	3.70	0.93	4.23	4.17	4.89
Services of motor vehicles	70.69	10.34	3.45	8.62	1.72	5.17	100.00
XX 71 1 1	4.43	5.41	7.41	2.34	1.41	2.08	3.89
Wholesale	62.57	14.04	1.17	14.62	3.51	4.09	100.00
D - 1	11.57	21.62	7.41	11.68	8.45	4.86	11.46
Retail	66.39	7.79	0.41	13.11	3.69	8.61	100.00
<b>TT</b> 1 1	17.51	17.12	3.70	14.95	12.68	14.58	16.35
Hotel and restaurants	33.66	9.90	0.00	23.76	17.82	14.85	100.00
	3.68	9.01	0.00	11.21	25.35	10.42	6.77
I ransport Section I:	71.43	6.67	1.90	11.43	0.95	7.62	100.00
I.T.	8.11	6.31	7.41	5.61	1.41	5.56	7.04
11	88.24	0.00	0.00	0.00	5.88	5.88	100.00
T ( 1	1.62	0.00	0.00	0.00	1.41	0.69	1.14
I otal	62.00	/.44	1.81	14.34	4.76	9.65	100.00
	100.00	100.00	100.00	100.00	100.0 0	100.00	100.00

Computed from the World Bank's Ethiopia Enterprise Surveys (2011 and 2015)

Figure 4A. Scatterplots of key variables: Exports (direct and indirect), sales, and obstacles



Figure 5A. Scatterplots of key variables: Export share, foreign share, government support indicator, firm size (by employee), percent high school graduate employee



# Table 2A. Rankings of factors affecting exporters by commodity groups (5, not that important in affecting export and 1, extremely important)

	Coffee and Chat		Oil Seeds		Leather Hides &	Leather and Hides &Skin		Textile and Cloth		Other Agricultural Products		Other Manufacturing Products		
Factors	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N	Mea n
National_Bk_restrictions_on_fx	104.00	5.36	131.00	5.44	34.00	5.76	8.00	6.00	105.00	5.02	2.00	6.00	386.00	5.65
Political_instability	104.00	5.30	132.00	5.34	34.00	5.76	8.00	4.38	106.00	4.91	2.00	6.00	388.00	5.38
Security_and_safety	103.00	5.06	131.00	4.99	34.00	5.47	8.00	4.25	106.00	4.44	2.00	4.00	386.00	4.60
Political_instability_in_TP	104.00	4.88	132.00	4.66	34.00	3.94	8.00	5.25	106.00	4.13	2.00	3.50	388.00	4.27
Informal_payments_to_authoritis	103.00	4.86	131.00	4.56	34.00	5.50	8.00	4.63	106.00	3.91	2.00	4.50	386.00	4.64
Trnsp_rules_and_regulations	104.00	4.54	132.00	4.28	34.00	5.00	8.00	4.00	106.00	3.99	2.00	3.00	388.00	3.97
Access_to_trade_finance	104.00	4.53	132.00	4.42	34.00	5.47	8.00	5.25	106.00	3.99	2.00	4.00	388.00	4.52
Access_to_land	104.00	4.50	131.00	4.44	34.00	5.12	8.00	4.63	105.00	4.14	2.00	4.50	386.00	4.55
Trnsp_rules_and_regulationsi~P	103.00	4.41	132.00	4.29	34.00	3.97	8.00	5.00	106.00	4.04	2.00	5.00	387.00	4.53
Preferential_market_access	103.00	4.30	131.00	4.42	34.00	3.65	8.00	4.13	105.00	4.68	2.00	5.00	385.00	4.45
Unfair_competition	104.00	4.30	132.00	4.31	34.00	5.26	8.00	4.50	106.00	4.48	2.00	4.50	388.00	4.55
Exchange_rate_volatility	104.00	4.26	132.00	4.51	34.00	5.12	8.00	4.63	106.00	4.92	2.00	6.00	388.00	5.06
Insufficient_lo_supply_of_inputs	104.00	4.25	132.00	4.50	34.00	5.15	8.00	3.38	106.00	4.47	2.00	6.00	388.00	4.82
Unfair_competition_in_TP	103.00	4.24	131.00	4.33	33.00	3.79	8.00	4.50	106.00	4.49	2.00	5.50	385.00	4.62
Shortage_of_qualified_labor	102.00	4.24	131.00	4.19	34.00	3.18	8.00	4.50	106.00	4.17	2.00	4.50	385.00	4.18
Issue_on_getting_paid_after_export	103.00	4.18	132.00	4.11	34.00	3.53	8.00	4.38	106.00	4.13	2.00	2.50	387.00	3.62
High_cost_of_import	101.00	4.13	131.00	4.23	34.00	5.29	8.00	4.88	106.00	4.54	2.00	4.00	384.00	4.44
Issue_with_tax_authority	104.00	3.79	132.00	3.64	34.00	3.50	8.00	4.25	106.00	3.81	2.00	3.50	388.00	3.71
Insufficient_fo_supply_of_inputs	103.00	3.79	132.00	4.03	34.00	3.76	8.00	4.25	105.00	4.30	2.00	5.00	386.00	4.30
Customs_process	104.00	3.74	131.00	3.73	34.00	3.47	8.00	2.50	106.00	3.83	2.00	3.00	387.00	3.32
Low_demand_for_goods_or_service	104.00	3.74	132.00	3.86	34.00	4.00	8.00	4.25	106.00	4.30	2.00	5.00	388.00	4.31
Nontariff_barriers	104.00	3.63	132.00	4.02	34.00	3.18	8.00	4.25	106.00	4.13	2.00	3.50	388.00	3.74
Insufficient_info_on_foreign mrkt	101.00	3.57	131.00	3.69	33.00	3.88	8.00	3.75	103.00	4.12	2.00	4.50	380.00	4.00
Availability_of_infrastructure	104.00	3.56	132.00	3.65	34.00	4.18	8.00	3.88	106.00	3.75	2.00	3.00	388.00	3.57
Supply_of_utilities	104.00	3.54	132.00	3.64	34.00	5.12	8.00	3.63	106.00	3.68	2.00	2.00	388.00	3.37
Tariffs_and_custom_duties	103.00	3.36	132.00	3.52	34.00	3.56	8.00	2.75	106.00	3.58	2.00	2.50	387.00	3.11

Classification of goods by broad economic categor	ries Unique categories	Basic classes in SNA
1 Food and beverages	Unique Categories	Basic Classes in SNA
11 Primary		
111 Mainly for industry	1	Intermediate
112 Mainly for household consumption	2	Consumption
12 Processed		
121 Mainly for industry	3	Intermediate
2 Industrial supplies not elsewhere specified		
21 Primary	5	Intermediate
22 Processed	6	Intermediate
3 Fuels and lubricants		
31 Primary	7	Intermediate
32 Processed		
321 Motor spirit	8	Not classified
322 Other	9	Intermediate
4 Capital goods (except transport equipment), and	parts and accessories ther	reof
41 Capital goods (except transport equipment)	10	Capital
42 Parts and accessories	11	Intermediate
5 Transport equipment and parts and accessories the	hereof	·
51 Passenger motor vehicles	12	Not classified
52 Other		
521 Industrial	13	Capital
522 Non-industrial	14	Consumption
53 Parts and accessories	15	Intermediate
6 Consumer goods not elsewhere specified		
61 Durable	16	Consumption
62 Semi-durable	17	Consumption
63 Non-durable	18	Consumption
7 Goods not elsewhere specified	19	Not classified

Table 3A. Broad Economic Classifications Rev.4, its unique categories and System of National Account (SNA) classes

Source: United Nations. (2018)

Table 4A. Structural Equation Model Estimated Coefficients from various estimators

	Variable	Asymptotic I (ADF) Estim	Distribution Free ator	Maximum L Missing valu	ikelihood with es Estimator	Maximum Lil Estimator	xelihood
1	Sales or Export Shares	Sales	Export Shares	Sales	Export Shares	Sales	Export Shares
	foreignshare	1.3*	26***	.076	.38***	016	.36***
	newproductlast3	4.9	32	-2.2	-1.5	-3.6	-1.1
	SustainExport	1	1	1	1	1	1
	government support	-1.9	1.1***	.14	029	.24	-9.5e-03
	electric	12***	89*	1.7	.61	13**	53
	obstacleindex	44***	-3.3***	.59	1.4	1.5	2.9*
	labor	2.8***	9.0e-03	3.7**	17	3.4***	.054
	rawm	2***	.091***	2.2***	.044**	1.3***	.045**
	ageoffirm	.091**	-5.3e-03***	.043	-1.4e-04	.029	3.1e-03
	foreigninptpct	45	.095***	.3	034	.2	044
	size_emp	085***	6.6e-03***	081**	6.4e-03*	051*	6.8e-03*
	Constant	-192***	13***	-95	1.7	-55	-2.4
2	Foreign share						
	SustainExport	26**	1***	.011	56***	.022	-0.91***
	obstacleindex	-21***	-22***	.59	.027	26	-1.3
	foreigninptpct	.49***	.49***	.049*	.057**	.084*	.091**
	Constant	39***	43***	4.4	6.8	8.2	7.5
4	New products (last 3yrs.)						
	obstacleindex	053*	011	1***	1***	07	07
	Constant	1.4***	1.4***	1.6***	1.6***	1.6***	1.6***
5	SustainExport						
	newproductlast3	-1.1	1.4	-2.2	2.7	-3.6	2
	government support	5.9**	-1.6***	.14	.13	.24	.16
	ageoffirm	055**	.013***	.043*	-1.8e-03	.029*	-4.4e-03
6	Statistics						
	Ν	653	653	1492	1492	653	653
	Chi2	68.445***	73.910***	997.703***	151.357***	942.767***	106.897***
	Standardized root mean squared residual (SRMR)	0.2	0.171	++	++	0.071	0.041
	Coefficient of Determination (CD)	0.778	0.672	1.00	0.108	1.00	0.159
	Information Criteria: AIC	+++	+++	119169	112101	68827	66596
	Information Criteria: BIC	+++	+++	119546	112489	68903	66694

Legend: \* p<.05; \*\* p<.01; \*\*\* p<.001; ++ values not computed due to missing values, +++ values not computed with ADF

Table 5A.1. Goodness of fit for estimation equations from the asymptotic distribution free estimators

		ADF	sales						ADF Ex	ports			
Dependent	Variance	Variance -		R-		mc2	Dependent	Varianc	Variance		R-		
variables	Fitted	Predicted	Residual	squared	mc		variables	e Fitted	Predicted	Residual	squared	mc	mc2
Observed							Observed						
												0.65	
sales	67990.0	36605.0	31385.0	0.538	0.734	0.538	exportshare	844.0	361	482.000	0.428	4	0.428
												0.73	
foreignshare	1842.0	1030.0	812.0	0.559	0.748	0.559	foreignshare	1846.0	990	856.000	0.536	2	0.536
												0.01	
newproduct~3	0.859	0.002	0.857	0.003	0.0534	0.0029	newproduct~3	0.715	0.000105	0.715	0.000	2	0.000
Latent							Latent						
												0.54	
SustainExp~t	10648.0	2505.0	8143.0	0.235	0.485	0.235	SustainExp~t	636.0	187	449.000	0.294	2	0.294
Overall				0.778			Overall				0.672		
Wald Test													
	chi2	df	р					chi2	df	р			
observed							observed						
sales	140000.0	10.0	0.0				exportshare	716.84	10.000	0.000			
foreignshare	571.340	3.0	0.0				foreignshare	1860.38	3.000	0.000			
newproductlast3	5.350	1.0	0.021				newproductlast3	0.230	1.000	0.632			
latent							latent						
SustainExport	11.720	3.000	0.008				SustainExport	157.03	3.000	0.000			

mc = Correlation between dependent variable and its prediction.

 $mc2 = mc^2$  is the Bentler-Raykov squared multiple correlation coefficient.

Table 5A.2. Goodness of fit for estimation equations from the maximum likelihood with missing values (MLMV) estimator

MLMV Sales							MLMV Exports						
Dependent variables	Varianc e Fitted	Variance Predicted	Residua 1	R- squared	mc	mc2	Dependent variables	Variance Fitted	Variance Predicted	Residual	R- squared	mc	mc2
Observed							Observed						
exportshare	452.0	263.0	189.0	0.5820	0.763	0.582	sales	46781.0	23266.0	23515.0	0.4970	0.705	0.497
foreignshare	538.0	99.20	439.0	0.1840	0.429	0.184	foreignshare	866.0	8.6400	858.0	0.0100	0.099 8	0.00997
newproduct~3	0.614	0.0097	0.6040	0.0158	0.126	0.0158	newproduct~3	0.760	0.0042	0.7550	0.0056	0.074 6	0.00557
Latent							Latent						
SustainExp~t	304.0	6.02	298.0	0.0198	0.141	0.0198	SustainExp~t	66.10	66.1000	0.0000	1.0000	1	1
Overall				0.1080			Overall				1.0000		
	chi2	df	р					chi2	df	р			
observed							observed						
exportshare	198.52	10.0	0.0				sales	640.3100	7.0000	0.0000			
foreignshare	100.80	3.0	0.0				foreignshare	13.5800	3.0000	0.0035			
newproductlast 3	23.96	1.0	0.0				newproductlast3	3.6500	1.0000	0.0559			
latent							latent						
SustainExport	4.1500	3.0000	0.2458				SustainExport	39.4700	3.0000	0.0000			
							1	1					

mc = Correlation between dependent variable and its prediction.  $mc2 = mc^2$  is the Bentler-Raykov squared multiple correlation coefficient.

										· · · ·			1
ML Sales							ML Exports						
Dependent	Variance	Variance		R-			Dependent	Variance	Variance		R-		
variables	Fitted	Predicted	Residual	squared	mc	mc2	variables	Fitted	Predicted	Residual	squared	me	mc2
vanaoies	Third	Titulettu	rtebruuur	Squarea	ine	11102	Variabiles	Titted	Treatered	reordau	squarea	ine	11102
Observed							Observed						
sales	46781.0000	23266.0000	23515.0000	0.4970	0.705	0.497	exportshare	486.0000	243.0000	243.0000	0.501	0.708	0.501
foreignshare	866.0000	8.6400	858.0000	0.0100	0.0998	0.00997	foreignshare	857.0000	257.0000	600.0000	0.3	0.548	0.3
newproduct~3	0.7600	0.0042	0.7550	0.0056	0.0746	0.00557	newproduct~3	0.7550	0.0042	0.7510	0.0056	0.0748	0.0056
Latent							Latent						
SustainExp~t	66.1000	66.1000	0.0000	1.0000	1	1	SustainExp~t	301.0000	5.9100	295.0000	0.0197	0.14	0.0197
Overall				1.0000			Overall				0.159		
	chi2	df	р					chi2	df	р			
observed							observed						
sales	640.3100	7.0000	0.0000				exportshare	198.8100	10.0000	0.0000			
foreignshare	13.5800	3.0000	0.0035				foreignshare	116.4100	3.0000	0.0000			
newproductlast3	3.6500	1.0000	0.0559				newproductlast3	3.6800	1.0000	0.0552			
latent							latent						
SustainExport	39.4700	3.0000	0.0000				SustainExport	2.9500	3.0000	0.3996			

Table 5A.3. Goodness of fit for estimation equations from the maximum likelihood (ML) estimator

 $\label{eq:mc} \begin{array}{l} mc = Correlation \ between \ dependent \ variable \ and \ its \ prediction. \\ mc2 = mc^2 \ is \ the \ Bentler-Raykov \ squared \ multiple \ correlation \ coefficient. \end{array}$ 

Table 6A.1. Structural Ec	quation Model Estimation	: Total Effects from ADF	estimator

Total effects	Coefficient	Std. err.	Z	P>z		Coefficient	Std. err.	Z	P>z
ADF sales					ADF exports				
Structural					Structural				
foreignshare					foreignshare				
newproductlast3	.2806936	.6164916	0.46	0.649	newproductlast3	1.473379	.8013851	1.84	0.066
SustainExport	2599309	.0811125	-3.20	0.001	SustainExport	1.030071	.0761996	13.52	0.000
govtsupport	-1.542612	.1305484	-11.82	0.000	govtsupport	-1.672312	.1310679	-12.76	0.000
obstacleindex	-20.60819	1.347829	-15.29	0.000	obstacleindex	-22.03141	1.135116	-19.41	0.000
ageoffirm	.0142388	.0011879	11.99	0.000	ageoffirm	.0137994	.0010239	13.48	0.000
foreigninptpct	.4869634	.02901	16.79	0.000	foreigninptpct	.4907144	.0272653	18.00	0.000
newproductlast3					newproductlast3				
obstacleindex	0534352	.0230917	-2.31	0.021	obstacleindex	0110684	.0230944	-0.48	0.632
SustainExport					SustainExport				
newproductlast3	-1.079878	2.37356	-0.45	0.649	newproductlast3	1.430366	.7817517	1.83	0.067
govtsupport	5.934699	1.817387	3.27	0.001	govtsupport	-1.623492	.1804047	-9.00	0.000
obstacleindex	.0577034	.1232794	0.47	0.640	obstacleindex	0158318	.0305732	-0.52	0.605
ageoffirm	054779	.0196577	-2.79	0.005	ageoffirm	.0133965	.0011081	12.09	0.000
sales					exportshare				
foreignshare	1.330897	.6023077	2.21	0.027	foreignshare	2585455	.0215308	-12.01	0.000
newproductlast3	4.232186	1.644691	2.57	0.010	newproductlast3	.7245504	.5248664	1.38	0.167
SustainExport	.6540586	.2637869	2.48	0.013	SustainExport	.7336796	.0353723	20.74	0.000
govtsupport	1.981919	.3203053	6.19	0.000	govtsupport	1128136	.0883488	-1.28	0.202
electric	11.92207	1.249325	9.54	0.000	electric	8852033	.3633782	-2.44	0.015
obstacleindex	16.04849	2.078775	7.72	0.000	obstacleindex	2.369339	.6957303	3.41	0.001
labor	2.845947	.3459776	8.23	0.000	labor	.0090018	.0907376	0.10	0.921
rawm	1.963653	.0742699	26.44	0.000	rawm	.0911548	.0148958	6.12	0.000
ageoffirm	.0548437	.0024188	22.67	0.000	ageoffirm	.0045048	.0006607	6.82	0.000
foreigninptpct	.1935648	.0456502	4.24	0.000	foreigninptpct	0314847	.0197638	-1.59	0.111
size_emp	0852862	.0051216	-16.65	0.000	size_emp	.0065585	.0016619	3.95	0.000

	Direct effects	ADF Sales				Direct effects	ADF Exports			
		Coefficient	Std. err.	Z	P>z		Coefficient	Std. err.	Z	P>z
Direct										
Effects	Structural					Structural				
	foreignshare					foreignshare				
	SustainExport	-0.260	0.081	-3.200	0.001	SustainExport	1.030	0.076	13.520	0
	obstacleindex	-20.593	1.347	-15.290	0.000	obstacleindex	-22.015	1.133	-19.430	0
	foreigninptpct	0.487	0.029	16.790	0.000	foreigninptpct	0.491	0.027	18.000	0
	newproductlast3					newproductlast3				
	obstacleindex	-0.053	0.023	-2.310	0.021	obstacleindex	-0.011	0.023	-0.480	0.632
	SustainExport					SustainExport				
	newproductlast3	-1.080	2.374	-0.450	0.649	newproductlast3	1.430	0.782	1.830	0.067
	govtsupport	5.935	1.817	3.270	0.001	govtsupport	-1.623	0.180	-9.000	0.000
	ageoffirm	-0.055	0.020	-2.790	0.005	ageoffirm	0.013	0.001	12.090	0.000
	sales					exportshare				
	foreignshare	1.331	0.602	2.210	0.027	foreignshare	-0.259	0.022	-12.010	0.000
	newproductlast3	4.938	2.522	1.960	0.050	newproductlast3	-0.325	0.783	-0.410	0.678
	SustainExport	1.000	Constained							
	govtsupport	-1.900	2.644	-0.720	0.473	govtsupport	1.078	0.191	5.650	0.000
	electric	11.922	1.249	9.540	0.000	electric	-0.885	0.363	-2.440	0.015
	obstacleindex	43.682	12.240	3.570	0.000	obstacleindex	-3.315	0.880	-3.770	0.000
	labor	2.846	0.346	8.230	0.000	labor	0.009	0.091	0.100	0.921
	rawm	1.964	0.074	26.440	0.000	rawm	0.091	0.015	6.120	0.000
	ageoffirm	0.091	0.029	3.130	0.002	ageoffirm	-0.005	0.001	-4.580	0.000
	foreigninptpct	-0.455	0.300	-1.520	0.129	foreigninptpct	0.095	0.026	3.600	0.000
	size emp	-0.085	0.005	-16.650	0.000	size emp	0.007	0.002	3.950	0.000
Indirect										
Effects	Indirect effects					Indirect effects				
	Structural					Structural				
	foreignshare					foreignshare				
	newproductlast3	0.281	0.616	0.460	0.649	newproductlast3	1.473	0.801	1.840	0.066
	govtsupport	-1.543	0.131	-11.820	0.000	govtsupport	-1.672	0.131	-12.760	0.000
	obstacleindex	-0.015	0.032	-0.470	0.638	obstacleindex	-0.016	0.031	-0.520	0.604
	ageoffirm	0.014	0.001	11.990	0.000	ageoffirm	0.014	0.001	13.480	0.000
	newproductlast3					newproductlast3				
	SustainExport					SustainExport				
	obstacleindex	0.058	0.123	0.470	0.640	obstacleindex	-0.016	0.031	-0.520	0.605
	sales					exportshare				
	newproductlast3	-0.706	1.602	-0.440	0.659	newproductlast3	1.049	0.579	1.810	0.070
	SustainExport	-0.346	0.264	-1.310	0.190	SustainExport	-0.266	0.035	-7.530	0.000
	govtsupport	3.882	2.725	1.420	0.154	govtsupport	-1.191	0.172	-6.930	0.000
	obstacleindex	-27.634	13.443	-2.060	0.040	obstacleindex	5.684	0.506	11.230	0.000
	ageoffirm	-0.036	0.027	-1.320	0.188	ageoffirm	0.010	0.001	8.910	0.000
	foreigninptpct	0.648	0.311	2.090	0.037	foreigninptpct	-0.127	0.012	-10.160	0.000

Table 6A.2. Structural Equation Model Estimation: Direct and Indirect Effects from ADF estimator

Total Effects		OIM					OIM		
MLMV Sales	Coefficient	std. err.	Z	P>z	MLMV Exports	Coefficient	std. err.	Z	P>z
Structural					Structural				
foreignshare					foreignshare				
newproductlast3	0242689	.0971163	-0.25	0.803	newproductlast3	-1.499391	.7706699	-1.95	0.052
SustainExport	.0111078	.0111185	1.00	0.318	SustainExport	5584134	.0587857	-9.50	0.000
govtsupport	.0015552	.0119457	0.13	0.896	govtsupport	0731462	.0985656	-0.74	0.458
obstacleindex	.5946157	.639156	0.93	0.352	obstacleindex	.1807454	.840245	0.22	0.830
ageoffirm	.0004805	.0005013	0.96	0.338	ageoffirm	.0010259	.0028974	0.35	0.723
foreigninptpct	.0488071	.0207657	2.35	0.019	foreigninptpct	.0573076	.0202463	2.83	0.005
newproductlast3					newproductlast3				
obstacleindex	1026667	.0211433	-4.86	0.000	obstacleindex	1026667	.0209756	-4.89	0.000
SustainExport					SustainExport				
newproductlast3	-2.184855	8.022109	-0.27	0.785	newproductlast3	2.685092	1.408277	1.91	0.057
govtsupport	.1400073	1.062633	0.13	0.895	govtsupport	.1309893	.1770218	0.74	0.459
obstacleindex	.2243119	.8248981	0.27	0.786	obstacleindex	2756696	.1551657	-1.78	0.076
ageoffirm	.0432613	.0173679	2.49	0.013	ageoffirm	0018372	.0051927	-0.35	0.723
sales					exportshare				
foreignshare	.0757882	.2752637	0.28	0.783	foreignshare	.3769324	.0321722	11.72	0.000
newproductlast3	-4.372711	8.029155	-0.54	0.586	newproductlast3	.633941	.7026444	0.90	0.367
SustainExport	1.000842	.0032199	310.83	0.000	SustainExport	.7895159	.0366495	21.54	0.000
govtsupport	.2800378	1.063538	0.26	0.792	govtsupport	.0748669	.0903103	0.83	0.407
electric	1.684508	6.683395	0.25	0.801	electric	.6145675	.4891334	1.26	0.209
obstacleindex	1.085561	10.11402	0.11	0.915	obstacleindex	1.327898	.7722223	1.72	0.086
labor	3.71069	1.3099	2.83	0.005	labor	1747748	.102791	-1.70	0.089
rawm	2.209	.1941151	11.38	0.000	rawm	.0438858	.0141207	3.11	0.002
ageoffirm	.0865576	.0173713	4.98	0.000	ageoffirm	0015944	.0026512	-0.60	0.548
foreigninptpct	.3079488	.2544707	1.21	0.226	foreigninptpct	0123599	.0228174	-0.54	0.588
size_emp	0811555	.0301601	-2.69	0.007	size_emp	.0063723	.0026998	2.36	0.018

# Table 6A.3. Structural Equation Model Estimation: Total Effects from MLMV estimator

					MLMV - Exports				
MLMV - Sales					sales				
Direct effects					Direct effects				
							std.		
	Coefficient	std. err.	Z	P>z		Coefficient	err.	Z	P>z
Structural					Structural				
foreignshare					foreignshare				
SustainExport	0.0111	0.0111	1.0000	0.3180	SustainExport	-0.5584	0.0588	-9.5000	0.0000
obstacleindex	0.5921	0.6411	0.9200	0.3560	obstacleindex	0.0268	0.8448	0.0300	0.9750
foreigninptpct	0.0488	0.0208	2.3500	0.0190	foreigninptpct	0.0573	0.0202	2.8300	0.0050
newproductlast3					newproductlast3				
obstacleindex	-0.1027	0.0211	-4.8600	0.0000	obstacleindex	-0.1027	0.0210	-4.8900	0.0000
SustainExport					SustainExport				
newproductlast3	-2.1849	8.0221	-0.2700	0.7850	newproductlast3	2.6851	1.4083	1.9100	0.0570
govtsupport	0.1400	1.0626	0.1300	0.8950	govtsupport	0.1310	0.1770	0.7400	0.4590
ageoffirm	0.0433	0.0174	2.4900	0.0130	ageoffirm	-0.0018	0.0052	-0.3500	0.7230
sales					exportshare				
foreignshare	0.0758	0.2753	0.2800	0.7830	foreignshare	0.3769	0.0322	11.7200	0.0000
newproductlast3	-2.1860				newproductlast3	-1.4860	1.3735	-1.0800	0.2790
govtsupport	0.1399				govtsupport	-0.0286	0.1719	-0.1700	0.8680
electric	1.6845	6.6834	0.2500	0.8010	electric	0.6146	0.4891	1.2600	0.2090
obstacleindex	0.5918	10.0429	0.0600	0.9530	obstacleindex	1.3829	0.8190	1.6900	0.0910
labor	3.7107	1.3099	2.8300	0.0050	labor	-0.1748	0.1028	-1.7000	0.0890
rawm	2.2090	0.1941	11.3800	0.0000	rawm	0.0439	0.0141	3.1100	0.0020
ageoffirm	0.0433				ageoffirm	-0.0001	0.0050	-0.0300	0.9770
foreigninptpct	0.3042	0.2553	1.1900	0.2330	foreigninptpct	-0.0340	0.0236	-1.4400	0.1510
size_emp	-0.0812	0.0302	-2.6900	0.0070	size_emp	0.0064	0.0027	2.3600	0.0180
Indirect effects					Indirect effects				
							std.		
	Coefficient	std. err.	Z	P>z		Coefficient	err.	Z	P>z
Structural					Structural				
foreignshare					foreignshare				
newproductlast3	-0.0243	0.0971	-0.2500	0.8030	newproductlast3	-1.4994	0.7707	-1.9500	0.0520
govtsupport	0.0016	0.0119	0.1300	0.8960	govtsupport	-0.0731	0.0986	-0.7400	0.4580
obstacleindex	0.0025	0.0100	0.2500	0.8030	obstacleindex	0.1539	0.0851	1.8100	0.0710
ageoffirm	0.0005	0.0005	0.9600	0.3380	ageoffirm	0.0010	0.0029	0.3500	0.7230
newproductlast3					newproductlast3				
SustainExport					SustainExport				
obstacleindex	0.2243	0.8249	0.2700	0.7860	obstacleindex	-0.2757	0.1552	-1.7800	0.0760
sales					exportshare				
newproductlast3	-2.1867	8.0292	-0.2700	0.7850	newproductlast3	2.1199	1.1342	1.8700	0.0620
SustainExport	0.0008	0.0032	0.2600	0.7940	SustainExport	-0.2105	0.0366	-5.7400	0.0000
govtsupport	0.1401	1.0635	0.1300	0.8950	govtsupport	0.1034	0.1402	0.7400	0.4610
obstacleindex	0.4938	0.8399	0.5900	0.5570	obstacleindex	-0.0550	0.3262	-0.1700	0.8660
ageoffirm	0.0433	0.0174	2.4900	0.0130	ageoffirm	-0.0015	0.0041	-0.3500	0.7240
foreigninptpct	0.0037	0.0134	0.2800	0.7830	foreigninptpct	0.0216	0.0078	2.7700	0.0060

Table 6A.4. Structural Equation Model Estimation: Total Effects from MLMV estimator

Total Effects		OIM					OIM		
ML - Sales	Coefficient	std. err.	Z	P>z	ML – Exports	Coefficient	std. err.	Z	P>z
Structural					Structural				
foreignshare					foreignshare				
newproductlast3	0778856	.2009409	-0.39	0.698	newproductlast3	-1.806017	1.320053	-1.37	0.171
SustainExport	.0215919	.0303801	0.71	0.477	SustainExport	907447	.0871961	-10.41	0.000
govtsupport	.0051445	.0193278	0.27	0.790	govtsupport	1456787	.1840471	-0.79	0.429
obstacleindex	2550353	1.229958	-0.21	0.836	obstacleindex	-1.179595	1.649508	-0.72	0.475
ageoffirm	.0006233	.0009302	0.67	0.503	ageoffirm	.0039728	.0046221	0.86	0.390
foreigninptpct	.0841723	.0329389	2.56	0.011	foreigninptpct	.0905488	.0327172	2.77	0.006
newproductlast3					newproductlast3				
obstacleindex	0702139	.0367266	-1.91	0.056	obstacleindex	0702139	.0366239	-1.92	0.055
SustainExport					SustainExport				
newproductlast3	-3.607173	6.883478	-0.52	0.600	newproductlast3	1.990218	1.467208	1.36	0.175
govtsupport	.2382604	.8473188	0.28	0.779	govtsupport	.1605368	.2034044	0.79	0.430
obstacleindex	.2532737	.5011437	0.51	0.613	obstacleindex	139741	.126197	-1.11	0.268
ageoffirm	.0288659	.0141081	2.05	0.041	ageoffirm	0043781	.0051109	-0.86	0.392
sales					exportshare				
foreignshare	0162631	.211073	-0.08	0.939	foreignshare	.3552879	.0319947	11.10	0.000
newproductlast3	-7.2135	6.880279	-1.05	0.294	newproductlast3	.2954068	.972805	0.30	0.761
SustainExport	.9996488	.0045609	219.18	0.000	SustainExport	.6775951	.0502963	13.47	0.000
govtsupport	.4763571	.8470474	0.56	0.574	govtsupport	.099294	.1354633	0.73	0.464
electric	12.53144	4.374648	2.86	0.004	electric	5346778	.6075948	-0.88	0.379
obstacleindex	1.984765	7.952624	0.25	0.803	obstacleindex	2.370848	1.213877	1.95	0.051
labor	3.356564	.9189686	3.65	0.000	labor	.0537188	.1277399	0.42	0.674
rawm	1.347874	.1060226	12.71	0.000	rawm	.0450521	.0147362	3.06	0.002
ageoffirm	.0577204	.0140929	4.10	0.000	ageoffirm	.0001802	.0034013	0.05	0.958
foreigninptpct	.1937632	.1731527	1.12	0.263	foreigninptpct	0116015	.0241318	-0.48	0.631
size_emp	0505972	.0203477	-2.49	0.013	size_emp	.0067705	.002826	2.40	0.017

Table 6A.5. Structural Equation Model Estimation: Total Effects from ML estimator

ML - Sales					ML Exports				
Direct effects					Direct effects				
		std.							
	Coefficient	err.	z	P>z		Coefficient	std. err.	z	$P>_Z$
Structural					Structural				
foreignshare					foreignshare				
SustainExport	0.0216	0.0304	0.7100	0.4770	SustainExport	-0.9074	0.0872	-10.4100	0.0000
obstacleindex	-0.2605	1.2351	-0.2100	0.8330	obstacleindex	-1.3064	1.6552	-0.7900	0.4300
foreigninptpct	0.0842	0.0329	2.5600	0.0110	foreigninptpct	0.0905	0.0327	2.7700	0.0060
newproductlast3					newproductlast3				
obstacleindex	-0.0702	0.0367	-1.9100	0.0560	obstacleindex	-0.0702	0.0366	-1.9200	0.0550
SustainExport					SustainExport				
newproductlast3	-3.6072	6.8835	-0.5200	0.6000	newproductlast3	1.9902	1.4672	1.3600	0.1750
govtsupport	0.2383	0.8473	0.2800	0.7790	govtsupport	0.1605	0.2034	0.7900	0.4300
ageoffirm	0.0289	0.0141	2.0500	0.0410	ageoffirm	-0.0044	0.0051	-0.8600	0.3920
sales					exportshare				
foreignshare	-0.0163	0.2111	-0.0800	0.9390	foreignshare	0.3553	0.0320	11.1000	0.0000
newproductlast3	-3.6076				newproductlast3	-1.0532	1.4367	-0.7300	0.4640
govtsupport	.2381803				govtsupport	-0.0094849	0.1987	-0.0500	0.9620
electric	12.5314	4.3746	2.8600	0.0040	electric	-0.5347	0.6076	-0.8800	0.3790
obstacleindex	1.4740	7.9224	0.1900	0.8520	obstacleindex	2.8557	1.3262	2.1500	0.0310
labor	3.3566	0.9190	3.6500	0.0000	labor	0.0537	0.1277	0.4200	0.6740
rawm	1.3479	0.1060	12.7100	0.0000	rawm	0.0451	0.0147	3.0600	0.0020
ageoffirm	0.0289				ageoffirm	0.0031	0.0050	0.6300	0.5290
foreigninptpct	0.1951	0.1738	1.1200	0.2620	foreigninptpct	-0.0438	0.0264	-1.6600	0.0970
size emp	-0.0506	0.0203	-2.4900	0.0130	size emp	0.0068	0.0028	2.4000	0.0170
Indirect effects					Indirect effects				
		std.							
	Coefficient	err.	z	P>z		Coefficient	std. err.	z	P>z
Structural					Structural				
foreignshare					foreignshare				
newproductlast3	-0.0779	0.2009	-0.3900	0.6980	newproductlast3	-1.8060	1.3201	-1.3700	0.1710
govtsupport	0.0051	0.0193	0.2700	0.7900	govtsupport	-0.1457	0.1840	-0.7900	0.4290
obstacleindex	0.0055	0.0144	0.3800	0.7040	obstacleindex	0.1268	0.1139	1.1100	0.2650
ageoffirm	0.0006	0.0009	0.6700	0.5030	ageoffirm	0.0040	0.0046	0.8600	0.3900
newproductlast3					newproductlast3				
SustainExport					SustainExport				
obstacleindex	0.2533	0.5011	0.5100	0.6130	obstacleindex	-0.1397	0.1262	-1.1100	0.2680
sales					exportshare				
newproductlast3	-3.6059	6.8803	-0.5200	0.6000	newproductlast3	1.3486	1.0102	1.3300	0.1820
SustainExport	-0.0004	0.0046	-0.0800	0.9390	SustainExport	-0.3224	0.0503	-6.4100	0.0000
govtsupport	0.2382	0.8470	0.2800	0.7790	govtsupport	0.1088	0.1386	0.7800	0.4320
obstacleindex	0.5107	0.5571	0.9200	0.3590	obstacleindex	-0.4849	0.5932	-0.8200	0.4140
ageoffirm	0.0289	0.0141	2.0500	0.0410	ageoffirm	-0.0030	0.0035	-0.8500	0.3950
foreigninptpct	-0.0014	0.0178	-0.0800	0.9390	foreigninptpct	0.0322	0.0120	2.6900	0.0070

Table 6A.6. Structural Equation Model Estimation: Direct and Indirect Effects from ML estimator