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Does export intensity of heterogeneous firms affect leverage? Evidence from a small open economy

Imran Ramzan[1,*] • Ömer Lütfi Gebizlioğlu[2]

[1]*Faculty of Management Sciences, University of Central Punjab, Pakistan*
[2]*Department of International Trade and Finance, Kadir Has University, Turkey*

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Abstract

Exports at firm level improve the financial performance and contribute to economic growth. Exporting activities can require additional financing and pose a challenge to manufacturing firms, affecting their managerial financing decisions. This study explores the impact of export intensity on leverage using a dataset of manufacturing firms. The results of two-step system GMM reveal that export intensity has a negative influence on leverage. We find that a firm size positively impacts leverage, while cash holding has a negative connection with leverage. Finally, we note that board size exhibits a positive relationship with leverage. These findings suggest important policy implications for export promotion, specifically for a small open economy. The results are robust to different sensitivity checks.

Keywords: Leverage; Export intensity; Financial policy; GMM
JEL Classification Codes: F23, G32, G38

1. Introduction

Firms that are established in small domestic markets may be motivated to participate in foreign sales markets to gain the benefits from scale economies (Hennart, 2007). Firms that engage in foreign sales markets outperform domestic firms in terms of research and development capabilities, productivity, and size, and their advantages are translated into future growth opportunities (Chen and Yu, 2011; Ramzan, 2022). However, firms that participate in foreign sales markets demonstrate higher demands for funding relative to firms that restrict themselves to domestic sales markets. The financing issue is more complicated because it involves asymmetric information, capital control, and higher costs of monitoring (Pinto and Silva, 2021; Chen and Yu, 2011). This issue is connected to the firm's leverage position: the need for debt to meet operational requirements. The source of financing should be carefully evaluated during decision-making process because the high cost of financing may cause financial distress (Chen and

[*] Corresponding author. E-mail: imran.ramzan@ucp.edu.pk. ORCID: https://orcid.org/0000-0003-0012-1657

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Yu, 2011; Garcia-Appendini, 2018; Farooq et al., 2023). Therefore, it is important to examine the association between export intensity and leverage.

The current investigation analyzes whether export intensity influences a firm's financial structure (Maes et al., 2019; Pinto and Silva, 2021). Second, we analyze the determinants of capital structure and compare them with previous findings to examine if there are any differences. These questions are essential from a policy perspective, specifically for a small open economy. On one side, the leverage structure is sensitive to export-debt nexus, and corporate financial policies may affect a firm's financing decisions. If the level of debt of exporters is influenced by changes in profit taxation, the connection between debt financing and export intensity can serve as a pathway for corporate tax reforms to impact the performance of exporters. On the other side, exports promotion as a dimension of foreign market participation is an objective for low-income economies facing severe economic issues, particularly mounting trade deficits. Therefore, export intensity serves as a crucial indicator of a country's commitment to expanding its export capabilities and reducing trade deficits by actively participating in foreign sales markets.

The export literature indicates that foreign sales as a proportion of total sales depend upon leverage, firm size, and growth (Minetti and Zhu, 2011; Bernini et al., 2015). Several investigations point out that exporters are less leveraged, larger size, and older (Pinto and Silva, 2021; Ramzan, 2022). The pecking order theory attempts to explain the variation across firms in terms of financing decisions. The pecking order theory postulates that non-exporters are higher leveraged than exporters because the latter rely more on the internal financing than former due to the asymmetric information costs. Jensen and Meckling (1976) note that agency costs are more severe in firms that participate in foreign sales markets, as they operate in complex environments. When firms participate in the foreign sales markets, it becomes difficult and costly for the local lenders to monitor their foreign sales activities and are less motivated to provide financing.

Fewer studies have investigated whether export activities influence a firm's leverage. Chen and Yu (2011) analyzed the impact of export activities on the leverage of 566 Taiwanese firms. They found that export activities lead to a reduction in debt levels. Bernini et al. (2015) observed a negative connection between exports and leverage in French manufacturing firms. Pinto and Silva (2021) explored the connection between export intensity and leverage in 7,676 Portuguese SMEs and reported a negative relationship. These empirical investigations lack consensus with respect to determinants of capital structure due to differences in empirical methodologies and definitions. Furthermore, there are limited studies on the subject of the export-finance channel because most of them are confined to developed countries. Kuc and Kalicanin (2021) argue that much of the empirical literature on capital structure has focused on developed economies and little work has been done on developing economies (Booth et al., 2001). Moreover, export literature in context of Pakistan is also limited and focused on composition-based and resource-based theories (Khan and Khan, 2021; Khan, 2022). Past studies have not empirically tested the impact of export intensity on leverage using pecking order theory within the context of Pakistan. Accordingly, the current investigation is positioned to address the exigent theoretical gap and make relevant contributions.

We aim to contribute to the strand of trade and finance literature by analyzing the impact of export intensity on firm debt level based on corporate finance theory. To the best of our knowledge, no previous study has investigated the impact of export intensity on debt level for a sample of exporter manufacturing firms from different industries, taking the evidence from a small open economy. We collected annual data from Pakistan stock exchange (PSX) database for the period of 2013 to 2019. This study yields interesting findings and contributes to the literature on corporate finance, governance, and exports. We document that export intensity negatively influences the leverage of manufacturing firms. Our results gain the support from an

important corporate finance theory: pecking order theory which suggests that exporter firms rely more on internal sources of financing than external financing due to asymmetric information problems and high monitoring costs. Regression results indicate a positive relationship between board size and debt levels. We also find that firm size positively impacts the debt ratio of exporter manufacturing firms. Moreover, firms with higher cash holdings tend to have lower leverage. However, profitability, firm growth, firm age, operating leverage, and independent director do not have a significant influence on the leverage of Pakistani manufacturing firms.

The remainder of this empirical study is organized in the following forms. Section 2 demonstrates the data, econometric methodologies, variables, and descriptive statistics. Section 3 reports the results and their interpretation. The final section states policy implications and concludes.

2. Data and methodology

2.1. Data, Variables, and Descriptive Statistics

The relationship between export intensity and leverage is tested on panel data, gathered from the Pakistan stock exchange (PSX) database. The final sample is composed of 156 manufacturing firms over the period of 2013-2019. We clean the data by removing outliers, such as negative values of sales and total equity. We also exclude firms that have been assigned DEF (defaulter) by PSX, as well as those with incomplete information on export intensity, leverage, assets, and other related variables[1]. Therefore, the final sample consists of 156 manufacturing firms, out of which 117 firms are exporters and 56 firms are non-exporters.

We provide the descriptive statistics in Table 1. We note that export intensity is 28% on average, which is lower than the 43% found in Chen and Yu (2011), implying that Pakistani listed firms export less than Taiwanese firms.

Table 1. Descriptive statistics of variables

Variables	Full sample (1)	Exporters (2)	Non-exporters (3)	t-test (4)
Export intensity	0.21 (0.27)	0.28 (0.28)	0.00 (0.00)	0.28*** (28.09)
Leverage	0.50 (0.20)	0.51 (0.19)	0.47 (0.22)	0.04*** (2.96)
Board size	7.74 (1.26)	7.99 (1.37)	8.18 (1.42)	-0.19* (-1.95)
Independent director	0.16 (0.12)	0.16 (0.12)	0.17 (0.13)	-0.01 (-1.34)
Operating leverage	0.11 (0.13)	0.11 (0.13)	0.10 (0.13)	0.01 (0.84)
Firm growth	0.36 (7.91)	0.10 (0.20)	1.13 (15.82)	-1.03 (-1.08)
Firm size	15.76 (1.54)	16.00 (1.41)	15.02 (1.65)	0.98*** (8.82)
Firm age	1.55 (0.21)	1.57 (0.19)	1.51 (0.28)	0.07*** (3.32)
Short-term collateral	0.26 (0.13)	0.27 (0.13)	0.23 (0.14)	0.04*** (3.98)
Long-term collateral	0.44 (0.20)	0.44 (0.18)	0.42 (0.24)	0.02 (1.22)
Profitability	1.19 (0.64)	1.20 (0.60)	1.13 (0.74)	0.07 (1.56)
Cash-holding	0.21 (0.16)	0.20 (0.13)	0.25 (0.21)	-0.06*** (-4.33)

Notes: Values reported in parentheses for Columns (1) to (3) denote standard deviations. Column (4) presents the mean difference between exporters and non-exporters using a t-test, with values in parentheses indicating standard errors.

The average leverage value is 0.51 which implies that, on average, total debts are 0.51 times the total assets in exporter manufacturing firms. The mean difference for leverage between exporters and non-exporters shows that exporters are significantly more leveraged than non-ex-

[1] We collected data from 330 listed manufacturing firms across 19 different industries. The sample was then cleaned by removing 80 DEF firms, 12 firms with negative equity, and 82 firms with incomplete information.

porters. The possible reason could be that Pakistan has underdeveloped bond and equity markets and exporters rely heavily on the banking sector (Ramzan, 2022). The average board size is 7.99, and the proportion of independent directors is 0.16. Other firm characteristics included in the model are, the average operating leverage and firm growth, which are 0.11 and 0.10, respectively. On average, the mean value of firm size is 16, while firm age is 1.57. The mean difference for firm growth and firm age between exporters and non-exporters is significant, while it is insignificant for firm growth. Short-term and long-term collateral have mean values of 0.27 and 0.44, respectively. However, profitability has a mean value of 1.20, and cash holding is 0.20 on average.

2.2. Econometric methods and models

We begin with a baseline specification and analyze the panel data using OLS regression. We employ the fixed effects (FE) and random effects (RE) approaches to uncover the link of export intensity with leverage. In OLS, there is a possibility of unobserved effects related to specific firms (Baltagi, 2005). Therefore, FE and RE estimators perform better relative to the OLS estimator (Le and Phan, 2017). FE estimator captures the correlation between individual-specific effects and independent variables, while the RE estimator assumes that independent variables are uncorrelated with individual-specific effects. We select the FE estimator based on the assumptions that it allows to control for unobserved heterogeneity across individuals and reduces selection bias. Furthermore, it is preferred when effects of the independent variables vary across firms as is the case in our study. Our selection of the FE estimator is also supported by the outcomes of the Breusch-Pagan test, F-test, and Hausman test. To improve the model, we apply diagnostic tests such as cross-sectional dependence, autocorrelation, and heteroskedasticity (Le and Phan, 2017). We use Driscoll-Kraay and robust standard errors to enhance the model's efficiency (Hoechle, 2007). Additionally, we incorporate time and industry dummies to account for potential industry and business cycle effects (Greenaway et al., 2007). The linear equation for the baseline model is as follows:

$$Lev_{i,t} = \alpha + \beta x_{i,t} + \mu_{i,t} \quad (1)$$

The subscript *i* indicates an exporter firm at time *t*, $Lev_{i,t}$ is the dependent variable of the *i* exporter firm in year *t*. $x_{i,t}$ is a vector of explanatory variables, which includes export intensity, board size, independent director, operating leverage, firm growth, firm size, firm age, short-term collateral, long-term collateral, profitability, and cash-holding and $\mu_{i,t}$ represents the error term. We construct the export intensity by using export sales to total sales, while book leverage ($Lev_{i,t}$) is formulated using total liabilities to total assets (Bernini, Guillou, and Bellone, 2015; Pinto and Silva, 2021). Board size is calculated by the total number of directors on the board. The independent director is calculated by the ratio of independent directors to the total number of directors on board. Operating leverage is calculated by the ratio of operating expenses scaled to total assets. Firm growth is calculated by the ratio of $sales_t$ minus $sales_{t-1}$ to $sales_{t-1}$. Firm size is calculated by taking the natural logarithm of total assets. Firm age is calculated by taking the log of number of years since inception. Taking the log of firm age curtails the effects of outliers and makes the variable normally distributed. Short-term collateral is calculated by the ratio of inventories and accounts receivable minus accounts payable, divided by total assets, while long-term collateral is calculated by the ratio of fixed tangible assets to total Assets. Profitability is calculated by the ratio of sales to total assets. Cash-holding is calculated by the ratio of current assets minus account receivables and inventories, divided by total assets.

Wintoki, Linck, and Netter (2012) claim that endogeneity problem still exists in the model because unobserved heterogeneity can be controlled through FE and RE regressions, but they do not account for reverse causality, which is another source of endogeneity. Using these estimators in short panel data could result in biased outcomes. Therefore, we exploit the endogeneity problem in two ways. *First*, we use all time-variant explanatory variables as one-period

lagged, except for dummy variables and firm age. *Second,* we adopt system GMM method to exploit the issue of endogeneity (Blundell and Bond, 1998). System GMM offers several advantages over other methods. Flannery and Hankins (2013) argue that the GMM approach is a better choice for dynamic models that require instruments. It is also suitable for a short time period with many panels. This approach does not require external instruments, which are more complex than internal instruments (Wintoki et al., 2012). Nagaraj (2014) claims that it addresses both endogenous regressors and serial correlation issues in the model. We apply Hansen and Arellano-Bond tests to assess the joint validity of the instrument set and serial correlation, respectively. It is expected that residuals are correlated in AR (1) but uncorrelated in AR (2) (Le and Phan, 2017; Pinto and Silva, 2021). This research reports OLS, FE, RE and system GMM results for reliability and comparison purpose. We follow the studies of Bridges and Guariglia (2008) and Dixon et al. (2017) and establish the following model to explore the connection between export intensity and leverage:

$$Lev_{i,t} = \alpha + \theta Lev_{i,t-1} + \beta ExpInt_{i,t} + \delta X_{i,t} + \nu_s + \nu_t + \varepsilon_{i,t} \quad (2)$$

We apply the system GMM estimator for the dynamic model proposed by Blundell and Bonds (1998), which allow us to exploit the endogenous relationship between export intensity and leverage.

3. Empirical analysis

We estimate the baseline regression using OLS estimator. Table 2 presents the results of OLS using leverage as a dependent variable. The results show that export intensity and leverage are negatively associated because the coefficient of the estimator of export intensity is statistically negative at the 1 percent level. Specifically, the estimated coefficient of export intensity in Column (1) is -0.119, which means that if export intensity is increased by 1%, this will lead to a decrease in the leverage by approximately 0.119%, keeping all else equal.

Determinants of leverage are regressed using fixed effects, random effects, and fixed effects with Driscoll-Kraay (FE-DK), and their outcomes are reported in Table 2. All models provide consistent results, showing that the coefficients of export intensity are negative and statistically significant. The Breusch and Pagan LM test is significant, favoring random effects regression over OLS regression. The Hausman test value is 58.251, and its p-value is less than 5%, favoring the FE regression over RE regression. The F-test also favors the FE regression over OLS regression. Hence, FE regression is selected over OLS and RE regressions. The results of FE regression confirm that export intensity is negatively associated with leverage. The coefficient value of export intensity in Column (2) is -0.146, which implies that, on average, if export intensity is increased by 1% then leverage will decrease by 0.146%, holding other variables constant.

Although fixed effect regression may control the unobserved individual effects, the problems of autocorrelation and heteroscedasticity still persist and may lead to model inefficiency. To address these issues, we apply the Modified Wald, Pesaran, and Wooldridge tests for heteroscedasticity, cross-sectional dependence, and autocorrelation. Pesaran's test shows that there is no issue of cross-sectional dependence. However, Wooldridge and Modified Wald tests indicate that there is an issue of autocorrelation and heteroscedasticity in model. To alleviate these issues, we estimate the FE regression with Driscoll-Kraay standard errors. The significant level of estimated coefficients and their relationship with leverage remains similar to that of the FE model. The results of FE-DK method reconfirm that export intensity is negatively associated with leverage. Board size and independent directors have a positive impact on leverage. Similarly, firm growth, firm size, and long-term collateral have a positive influence on leverage while cash holdings are negatively associated with leverage. The results of FE-DK estimator

are reported in Column (4) and support the main conclusion that export intensity and leverage are negatively connected.

Table 2. Effect of export intensity on leverage

Variables	(1) OLS	(2) FE	(3) RE	(4) FE-DK	(5) GMM
LLeverage					0.377
					(0.315)
Export intensity	-0.119***	-0.146***	-0.120***	-0.146***	-0.162*
	(0.036)	(0.048)	(0.034)	(0.018)	(0.091)
Board size	-0.010***	0.013	0.006	0.013**	0.112***
	(0.004)	(0.008)	(0.005)	(0.005)	(0.039)
Independent director	0.041	0.061	0.057	0.061***	0.106
	(0.068)	(0.056)	(0.047)	(0.016)	(0.255)
Operating leverage	0.170**	-0.002	0.023	-0.002	0.430
	(0.069)	(0.058)	(0.058)	(0.051)	(0.656)
Firm growth	0.017	0.031	0.043**	0.031**	-0.056
	(0.031)	(0.021)	(0.017)	(0.012)	(0.190)
Firm size	0.007	0.151***	0.043***	0.151***	0.163**
	(0.005)	(0.042)	(0.010)	(0.015)	(0.062)
Firm age	-0.097***	-0.421	-0.158**	-0.421	-0.896
	(0.034)	(0.474)	(0.079)	(0.226)	(1.425)
Short-term collateral	0.055	0.102	0.089	0.102	-2.232**
	(0.085)	(0.107)	(0.065)	(0.078)	(0.886)
Long-term collateral	0.089	0.130	0.073	0.130*	-1.385**
	(0.062)	(0.093)	(0.049)	(0.063)	(0.540)
Profitability	0.010	-0.005	-0.028**	-0.005	0.057
	(0.019)	(0.043)	(0.013)	(0.010)	(0.065)
Cash-holding	-0.235***	-0.182	-0.198***	-0.182**	-2.229***
	(0.074)	(0.142)	(0.061)	(0.073)	(0.720)
Constant	0.423***	-1.383	0.233	-1.383***	-0.067
	(0.112)	(1.042)	(0.216)	(0.288)	(1.974)
Year dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Observations	819	819	819	819	468
R-squared	0.370		0.160		
R-squared (within)		0.200		0.200	
F-test (overall)	90.108	7.250		119.480	
Prob > F	0.000	0.000		0.000	
Wald test			173.590		
Prob > chi2			0.000		
AR1/AR2					0.038/0.555
Hansen Test					0.698

Notes: The dependent variable is leverage, measured by using total liabilities to total assets. The Breusch and Pagan LM test indicates a value of 1009.01 (Prob > Chi2: 0.000), Pesaran's test reports -0.882 (p-value = 0.378), the Modified Wald test for heteroscedasticity shows 81137.23 (Prob>chi2: 0.000), and the Wooldridge test for autocorrelation indicates 72.180 (Prob>F = 0.000). The values in Column (5) were estimated using 'xtabond2' command in Stata proposed by Roodman (2009). Values in parentheses indicate standard errors. *** p<0.01, ** p<0.05, * p<0.1

The unobserved individual effects can be controlled through fixed effect estimator with adjusted standard errors. However, the issue of reverse causality, which is another source of endogeneity, still persists. Therefore, we exploit the endogeneity problem in two ways. *First,* we use all time-variant explanatory variables with a one-period lag, except for dummy variables and firm age. *Second,* we adopt system GMM method to exploit the issue of endogeneity (Blundell and Bond, 1998). The estimated coefficients using the two-step GMM approach are reported in Column (5). The coefficients of the two-step system GMM confirm once again that export intensity is negatively associated with leverage. The outcomes are consistent with the pecking order theory, which suggests that exporters rely more on internal sources of financing due to asymmetric information problem. Board size shows a significant positive relationship with leverage, implying that larger board size enables exporting firms to secure more external financing. This is consistent with the findings of Anderson et al. (2004) who contend that debt costs decrease with larger board sizes, leading to increased debt. Firm size exhibits a positive association with the debt ratio, corroborating the findings of Chatterjee and Eyigungor (2023) who also found a positive relationship. According to Rajan and Zingales (1995), larger firms are less likely to fail due to diversification, which positively affects the supply of debt. Larger firms also provide more information, have better investment opportunities, and pose a lower risk of bankruptcy (Rajan and Zingales, 1995). As a firm grows, its size increases, enhancing its borrowing capacity and concurrently increasing the debt ratio, which supports the trade-off theory. Short-term and long-term collaterals show a negative relationship with leverage; as does cash holding. The Arellano-Bond test shows no issue of autocorrelation in two-step system GMM estimator, and the Hansen test validates the instrument set.

3.1. Robustness checks

We conducted robustness tests to support our conclusion. Table 3 (Appendix A below) presents the results of robustness checks, which are consistent with the main finding that export intensity is negatively related to leverage. This implies that exporters with higher export sale to total sales ratio employ less debt. *Firstly,* we applied the two-stage least square and one-step Arellano-Bond estimators, both estimators demonstrated a negative relationship between export intensity and leverage. *Secondly,* we estimated Eq. (2) by winsorizing the export intensity at 0.1, and the results are presented in Column (3). The result confirms that export intensity is negatively linked with leverage. Next, we estimated Eq. (2) following the definition of Demirguc-Kunt and Maksimovic (1999), who defined leverage as total liabilities minus current liabilities scaled by total assets. The result in Column (4) once again supports the negative relationship between export intensity and leverage. Finally, we estimated Eq. (2) to explore the relationship between export intensity and leverage for both exporters and non-exporters (if a firm does not have export sales, then export intensity is equal to zero). The outcome remained consistent and supported the findings of the main empirical model.

4. Conclusion and policy implications

This study contributes to the relationship between export intensity and finance. We show that export intensity is negatively associated with the leverage of Pakistani manufacturing firms and is consistent with the pecking order theory. One possible reason for the negative association between export intensity and leverage is that when Pakistani manufacturing firms enter foreign sale markets through the export channel, it becomes difficult for lenders to monitor the operations of exporter firm. Furthermore, asymmetric information problems may also arise between lenders and borrowers. Local lenders may be reluctant to offer debt financing to exporter firms due to the high cost of monitoring and the presence of asymmetrical information. Consequently, exporter firms depend more on internal funds compared to external funds. We find that firm size shows a positive connection with leverage, which is in line with the expectations of and corroborates the trade-off theory. Larger firms are more diversified and less likely to fail. They

have established a better financial position with a positive credit history and greater borrowing capacity. Moreover, they have diverse financing options which further contribute to their greater supply of debt. These results suggest important policy implications that can affect the export scheme. They can also indirectly influence the use of debt financing and, therefore, the relationship between export intensity and finance. The results suggest that a capital structure composed of debt and equity is an important factor that should be considered when the government plans to support the exporter firms. The promotion and growth of the export sector is crucial for an economy such as Pakistan, which has been facing trade deficits for a long time. Therefore, governmental actions for the promotion of export firms are critical, particularly for the economies where exporters face problems while trying to access export finance.

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Appendix A. Tables not included in the text

Table 3. The effect of export intensity on leverage

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
L.Leverage		0.511***	-0.020	-0.054*	-0.022
		(0.093)	(0.035)	(0.031)	(0.029)
Export intensity	-0.119***	-0.124***	-0.144***	-0.087***	-0.050*
	(0.032)	(0.047)	(0.037)	(0.019)	(0.029)
Constant	0.764***	-2.206***	0.418***	0.079	0.241**
	(0.116)	(0.841)	(0.126)	(0.075)	(0.121)
Corporate Governance Control	YES	YES	YES	YES	YES
Firm's characteristics Control	YES	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES
Observations	819	585	805	805	1,078
R-squared	0.370				
F-Stat	13.56				
Prob > F	0.00				
Chi-square		482.71	435.47	510.76	510.76
Prob > Chi2		0.00	0.00	0.00	0.00

Notes: Leverage is the dependent variable. Column (1) and Column (2) show the results of 2SLS and one-step Arellano-Bond estimators, respectively. Colum (3) displays the outcomes of Arellano-Bond one-step estimation when export intensity is winsorized, while Column (4) shows the outcomes when alternative definition of leverage is considered. Column (5) reports the results for the entire sample. Values in parentheses indicate as standard errors. *** p<0.01, ** p<0.05, * p<0.1.