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RESEARCH ARTICLE

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Financial constraints and the export decision of Pakistani firms

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Abstract

The payment of sunk costs associated with the entry to foreign export markets highlights the significance of financial dimension in the firm decision. The sunk costs become a challenge for the financially constrained firms. In this paper, we study the relationship between financial constraints and the export entry decision of the firms in a lower-middle income country context. We use new measures of financial constraints in finance literature alongside widely used measures of financial health in trade literature to scrutinise the relationship for Pakistani listed manufacturing firms. We find that being less financially constrained is a vital determinant of the Pakistani firms' export participation decision irrespective the high firm leverage before entry. The undeveloped financial system and heavy reliance on bank loans for external finance in Pakistan may be the plausible explanations for our findings. Our results suggest that measures of financial constraints are more appropriate than the widely used measures of financial health in studying the determinants of the export participation decision. In addition, we find evidence that future exporters improve their financial conditions prior to entering the export markets. However, we do not find any evidence that exporting improves financial conditions of the firms after entry.

KEYWORDS

developing country, export, financial constraints, panel data estimation, measures of financial constraints

1 | INTRODUCTION

Improvements in export performance is an important contributor to every country's economic growth. High export levels boost economic development by relaxing foreign exchange constraints, optimising resource allocation, facilitating technological change, and improving productivity. Recent developments in the field of international trade consider sunk costs alongside size, age and productivity as determinants of the export decision (Bernard & Jensen, 2004; Bernard & Wagner, 2001; Roberts & Tybout, 1997). According to this literature new exporters pay sunk costs to obtain information about foreign markets, establishing new market channels, and covering the cost of innovations in product quality. Consequently, only the most productive and largest firms,

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which can bear the entry cost enter the foreign market and compete with foreign products (Chaney, 2005). In this scenario, financially constrained firms would not be able to bear the sunk costs to fulfil the requirements of the foreign markets.[1]

Firms can be financially constrained due to either information asymmetry (Myers & Majluf, 1984) or agency cost (Jensen, 1986). The presence of information asymmetry leads to imperfect substitution between the internal and external finance. Payment of sunk costs and compliance with other requirements of international markets make financial status an imperative for the firm. Literature also gives a theoretical ground that firms' financial status affects firms' decision to export. By extending the model of Melitz (2003), Chaney (2005) include the concept of liquidity constraint to firm heterogeneity. Chaney (2005) and Manova (2013) have established the foundation of the relationship between financial conditions and export behaviour of the firms. A number of studies have also empirically tested this relationship (e.g., Greenaway, Guariglia, & Kneller, 2007 on British firms and Bellone, Musso, Nesta, & Schiavo, 2010 on French firms), which are surveyed in Wagner (2014a) and updated in Wagner (2019).[2] There are several studies in developing economy context, but fewer for lower-middle and low income countries.

Our paper fills in the gap by using micro-economic data on Pakistani listed manufacturing firms. Pakistan adopted trade liberalisation policy in 1980s. However, trade liberalisation by itself is not enough to promote exports; the literature shows that access to finance plays an important role in the firm's decision to export. Pakistani listed firms are found to be financially constrained (Saeed & Sameer, 2015), despite that Pakistan undertook financial liberalisation reforms in 1990s. Our study highlights the need of and identifies the relevant financial policies, which could assist firms to become exporters. The immature financial system and the reliance on external finance in Pakistan as well as other low and lower-middle income countries are important in interpreting our findings.

This paper aims to contribute to the existing literature by utilising new measures of financial constraints to examine the relationship between firms' financial constraints and the export-market participation decision.[3] What particular measure should be used to identify financial constraints is a matter of debate in the literature.[4] Rather than using the traditional approach in trade literature, which sorts financially constrained firms by a firm feature that are believed to be related to financial health, we use Whited–Wu index (WW index, hereafter) and assets tangibility as measures of financial constraints. These measures are the aggregation of several common sorting characteristics and therefore, give a better picture of firm's financial status. To the best of our knowledge, these measures of financial constraints have not yet been used in the literature to study the relationship between financial constraints and the firm export decision.

Previous studies in trade literature have primarily focused on the effects of firms' financial health such as liquidity and leverage ratios (e.g., Bellone et al., 2010; Greenaway et al., 2007; Nagaraj, 2014) on the exporting decision.[5] Liquidity and leverage ratios are better known as measures of financial health and not measures of financial constraints (Almeida, Campello, & Weisbach, 2004).[6] A firm is considered financially healthy if it has higher liquidity and lower leverage, but on this basis it is not straightforward to relate financial constraint with financial health by arguing that a financially unconstrained firm will have higher liquidity and lower leverage. In finance literature, neither leverage nor liquidity is used as a measure of financial constraints. First, a high level of liquidity does not necessarily reflect a good financial situation of the firm. Almeida et al. (2004) show that financially constrained firms are inclined to hoard more cash due to inability to obtain external finance.[7] Second, there is no clear theoretical foundation of a relationship between liquidity and financial constraints, or a relationship between leverage and financial constraints (Bellone et al., 2010). Third, high leverage may suggest that firms have easy access to external finance. Access to external finance (debt) means firms are financially less constrained, but in some papers firms would usually be considered financially constrained (risky) if they have higher leverage.

Widely used financial constraint measures in finance literature (Farre-Mensa & Ljungqvist, 2016) are Kaplan–Zingales (KZ) index (Kaplan & Zingales, 1997; Lamont, Polk, & Saa-Requejo, 2001), Whited–Wu (WW) index (Whited & Wu, 2006), Hadlock–Pierce (HP) index (Hadlock & Pierce, 2010) and assets tangibility (Almeida & Campello, 2007). To address the potential problems in trade literature, we use WW index and assets tangibility as measures of financial constraints. However, we also use measures of financial health (leverage and liquidity) to distinguish between the two aspects. We use multiple estimators to estimate our models and account for endogeneity concerns. Two main concerns in our empirical models are omitted variable bias in terms of firm level unobservables and simultaneity bias due to the binary nature of dependent variables. We estimate export decision models with fixed effects, System Generalised Methods of Moments (SGMM), dynamic random effects Probit and Logit estimators.

Studying the relationship between firm level financial constraints and the export decision plays a significant

role in the context of low and lower-middle income countries because exporting is a significant driving force of economic growth. The dismal export growth rate and poor condition of trade balance make Pakistan a good candidate to study the relationship and draw policy implications for supporting exports. We uses a panel of 291 Pakistani manufacturing listed firms over the period 2006–2014 and find that exporters are categorically different from non-exporters in terms of financial constraints they face. We contribute to the literature by showing that less financially constrained firms, despite having higher leverage, are more likely to enter export markets than more financially constrained firms. Our results suggest measures of financial constraints are more appropriate than the measures of financial health in studying the determinants of exporting decision. The undeveloped financial system and heavy reliance on bank loan for external finance in Pakistan are the plausible explanations for our findings. Consistent with the results of most papers, our results do support the findings that exporting does not bring improvements in firm financial status in the short run.

The rest of the paper is organised as follows. We review the existing literature and Pakistan's institutional background in Section 2. Section 3 describes the econometric methodology employed. Section 4 presents the data sources, calculation procedures of financial variables and summary statistics. Section 5 presents the empirical results while Section 6 concludes.

2 | LITERATURE REVIEW AND THE PAKISTAN'S BACKGROUND

The paper builds on the theoretical work related to the impact of financial constraints on firm investment (Fazzari, Hubbard, & Petersen, 1988; Kaplan & Zingales, 1997). Myers and Majluf (1984) and Stiglitz and Weiss (1981) show that financial markets are not perfect; therefore, information asymmetry may create a wedge between the cost of internal and external finance. In turn, firms may rely more on internal finance and may refuse investment projects with positive NPV due to expensive external funds. Chaney (2005) and Manova (2013) extend the model of Melitz (2003) to include financial constraints into the heterogeneous firm model of trade. If the firm intends to export, it must pay entry costs. According to Chaney (2005) firms finance the sunk costs using cash flows from domestic sales. Productive firms with good cash flows and less liquidity constrains are more likely to export. Manova (2013) instead assumes that firms must borrow to finance export costs. Since productive firms with high profits can offer good returns, they are less likely to be credit constrained and more likely to export. Although the authors model financial frictions in different ways, their predictions are similar: financially constrained firms are less likely to export.

Several empirical studies illustrate the implication of the nexus between financial health and exporting (e.g., Campa & Shaver, 2002; Greenaway et al., 2007). By using traditional measure of financial constraint—investment-cash-flow sensitivity—Campa and Shaver (2002) show that exporting firms have relatively easy access to external finance. Greenaway et al. (2007) find no evidence that UK firms enjoying better ex-ante financial health are more likely to start exporting by using leverage ratio, liquidity ratio, and riskiness as measures of firm financial health.[8] However, they find some ex-post financial advantages visible among entrants. Bellone et al. (2010) conduct an empirical study of French manufacturing firms. By using leverage, liquidity and the index of financial constraint in Musso and Schiavo (2008), they find that financially stable firms are more inclined to export. Moreover, the study rejects the argument that exporting impedes financial restraints of the firms in the future. More recently Nagaraj (2014) tests for the impact of financial constraint on extensive (new exporters) and intensive (volume exported by exporters) margins for Indian economy. The study uses leverage and liquidity ratios to gauge financial health of the firms. The results support the importance of financial smoothness for exports. Berman and Héricourt (2010) also use leverage and liquidity ratios and label them as financial constraint measures to study the relationship between finance factors and trade using firm survey date for nine developing countries. They show lower financial constraints have a positive impact on export market participation.

Some other papers use quite different financial measures to examine the relationship. Minetti and Zhu (2011) use survey data for Italian firms, in which firms are asked whether they are credit rationed or not and related dummy variables are generated as measures for credit constraints. Muuls (2015) uses Coface score, a direct measure of creditworthiness for Belgium firms, as credit constraints measure. Both papers find firms with lower credit constraints are more likely to export. Wagner (2014a) conducts a comprehensive survey on this topic. Overall, existing studies show that firm financial conditions play a vital role in the firm exporting decision.

We use a richer set of measures of financial constraints taken from the finance literature. Moreover, our analysis is on Pakistan—a lower-middle income country context with institutions that differ from both the developed Western and the prominent emerging economies. Since 1980s, Pakistan has set export-led industrialisation as a policy goal. The country undertook both trade and

financial liberalisation in the last few decades. In spite of undertaking export promotion measures, the performance of international trade remains disappointing. Figure 1a shows annual growth rate of export and import for the period 2006–2014. The average annual growth rates in this period for exports and imports are 2.92 and 4.97%, respectively. They are quite volatile over the period mainly due to political turmoil and display a downward trend. The significant gap between exports and imports leads to poor performance of the Pakistani trade balance with rising trade deficits of 18.5 billion US dollar on average during the period shown in Figure 1b. Given this background, our study will uncover the role of the financial status for the exporting decision of the Pakistani listed firms, and provide insightful policy implications for developing counties.

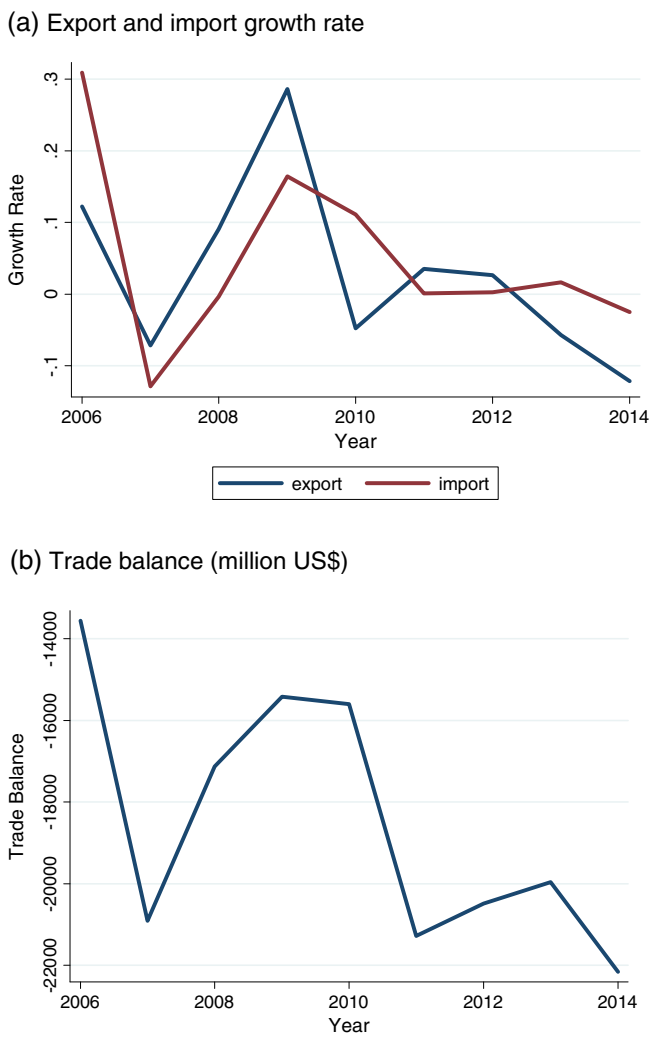

FIGURE 1 (a) Exports and imports growth rate. (b) Trade balance (million US$). *Source*: Pakistan Bureau of Statistics (ww.pbs.gov.pk/trade-tables) and author's calculation [Colour figure can be viewed at wileyonlinelibrary.com]

Pakistan, unlike developed countries, has an underdeveloped financial system including undeveloped bond and equity markets. Therefore, bank lending plays a dominant role in the external funding of corporate sector. Bank borrowing of the corporate sector was PKR 3.8 trillion, while corporate financing via capital market (bond and equity) stood at PKR 600 billion in 2016 (Financial Stability Review, 2016). A number of empirical studies for Pakistan also show that the corporate sector is mainly relying on bank loans in their need for external funding. A study conducted by Raza, Aslam, and Farooq (2013) covers 323 manufacturing listed firms and finds that Pakistani firms are mainly reliant on debts, in which short-term debts account for 77% of the total debt of sample firms. Sheikh and Wang (2010) also confirm that Pakistani firms rely on bank debt because of an undeveloped bond market. The heavy reliance on bank loans in Pakistan implies that high leverage may be an indicator of easy access to external finance rather than a signal of financial constraints in our sample. It also suggests that asset tangibility may be an important measure of financial constraints in Pakistan, as pledgeable assets support more borrowing. Because of differences in financial system, it is possible that listed companies in developing countries such as Pakistan behave differently when running out of funds as compared to the financially constrained firms in developed countries. Therefore, the financial indicators, used in the trade literature to examine the role of financial status in the export decision for developed countries may not play the same role in export decisions for different economic and financial contexts. We will examine the effects by using both *financial health* and *financial constraint* measures and provide interesting comparison.

3 | EMPIRICAL METHODOLOGY

We start our analysis by examining whether exporters are different from non-exporters in terms of financial status by following Bernard and Jensen (1999) but add more relevant control variables. We estimate the following model by pooled (OLS) estimator:

$$\ln X_{it} = \beta_0 + \beta_1 \text{Expdum}_{it} + \beta_2 \text{Age}_{it} + \beta_3 \text{TFP}_{it} + \beta_4 \text{Size}_{it} + + \beta_5 \text{Foreign dummy}_i + \text{Control variables} + e_{it} \quad (1)$$

Here, i and t denote firm and year. X_{it} is one of the four proxies of financial status: WW index, assets tangibility, leverage ratio, and liquidity ratio. Expdum_{it} is a dummy representing firm export status which is equal to

1 if the firm exports and 0 otherwise.[9] Age is calculated by the current year minus the year of incorporation of the firm; Size is measured by the natural log of number of employees. TFP is a natural log of total factor productivity, which is estimated by following the Olley and Pakes (1996) widely used method.[10] Foreign dummy is a time-invariant and equal to 1 if the firm is foreign-owned and 0 otherwise. By following Saeed and Sameer (2015), we define a firm as foreign-owned if it has 50% or more foreign shareholding. We also include industry, time, and regional dummies to control for industry, time, and regional specific effects.

Second, we investigate whether finance affects firm export entry using the empirical model for the determinants of firm export-participation decision. Following Bellone et al. (2010) and Nagaraj (2014), we model firm export decision as:

$$\begin{aligned}\text{Expdum}_t = \alpha + \beta_1 \text{Expdum}_{i,t-1} + \beta_2 \text{Size}_{I,t-1} + \beta_3 \text{Wage}_{i,t-1} \\ + \beta_4 \text{TFP}_{i,t-1} + \beta_5 \text{Age}_{it} + \beta_6 \text{Subsid}_i + \beta_7 \text{Fin}_{i,t-1} \\ + \beta_8 \text{Foreign dummy}_i + \text{Control variables} + e_{it}.\end{aligned} \tag{2}$$

We include lagged dependent variable in our model, as firms that were already exporting in previous years will not bear sunk cost in the current year; this may create a dependence of current year exporting on the previous year exporting status. Age, size, wage, and productivity are used as controls in the export decision (Bernard & Jensen, 1999; Greenaway et al., 2007; Rizov & Walsh, 2009). We expect a positive link between a firm Size and a firm's decision to export. Wage rate is calculated by natural log of cost of employees. In the literature, TFP is positively related to the export decision. Subsid is a time-invariant dummy variable that is equal to 1 if the firm has more than one business unit, and 0 otherwise. Following Bellone et al. (2010), we expect a positive link between firm subsidiaries and a firm's decision to export. We also expect a positive coefficient of foreign ownership on firm exporting decisions. Again, we include regional, time, and industry dummies to control for fixed effects across regions, time and sectors.

Our main variable of interest, Fin (lagged) is an indicator of firm financial status. Financial constraints are measured by WW index and assets tangibility. For comparison purposes, we also use leverage ratio and liquidity ratios as financial health measures. The higher the value of WW index, the more a firm is financially constrained. We expect WW index to relate negatively to the exporting decision. Almeida and Campello (2007) argue that firms with more tangible assets are less likely to be financially constrained. We expect a positive relationship between a firm's tangible assets and the exporting decision. Firms are also considered less financially constrained if they have higher liquidity ratio and lower leverage ratio in the trade literature. However, our study argues that these two variables proxy merely for financial health.

To address the issue of endogeneity, we lagged all the time-variant explanatory variables once (e.g., Bernard & Jensen, 1999, 2004; Greenaway et al., 2007; Nagaraj, 2014). Fixed effects, dynamic random-effects probit, random-effects logit, and SGMM estimators are used to estimate the relationships. Reason for using different estimators in the literature is failures of each estimator to completely control for the potential biases caused by endogeneity.[11] We use fixed effects estimator to control the issues of correlation between firm observed characteristics and firm unobservables. We also use dynamic probit and logit random-effects estimators because our dependent variable, the exporting decision, is binary. Firm current period probability to export correlates to previous year's export status because existing exporters do not need to pay sunk cost in the current year. This causes endogeneity due to autocorrelation between the errors. Therefore, we also estimate the empirical specification with SGMM proposed by Arellano and Bover (1995) and Blundell and Bond (1998) and following applications by (Roodman, 2009).

Third, to explore the dynamics of financial status before exporting, we look at the ex-ante financial situation for entrants to exporting. Our goal is to identify any changes in financial status of future exporters. The sample of firms is divided into five categories of export status: continuous exporters, never exported, entrants, switchers and exits.[12] We compare ex-ante financial status of exporting entrants and non-exporters to find out whether entrants become less financially constrained before entering export markets. The econometric specification follows Bernard and Jensen (1999) and Bellone et al. (2010). We only focus on non-exporting firms and entrants for their level of financial constraints and level of financial health 1 and 2 years before entry to exporting. Hence, t is the year when a firm enters into the foreign market. We estimate the following specification:

$$\begin{aligned}\text{Fin}_{i,t-s} = \alpha + \beta\,\text{Entrant}_{it} + \Upsilon\,\text{Size}_{i,t-s} + \eta\,\text{TFP}_{i,t-s} \\ + \text{Control variables} + \varepsilon_{it}\end{aligned} \tag{3}$$

where Fin is one of our four measures of financial status. Entrant is the dummy for export status where the firm does not export in the first year and export in the remaining period. We emphasise that Equation (3) does not test for the causal relationship. Instead, it identifies the premium for entrants before starting to export. In

other words, β shows to what extent the entrants were financially different from non-exporters 1 and 2 years before entering foreign markets. Time, region and industry dummies are also included.

Finally, to investigate whether exporting improves the firm financial status after entry, we focus only on the entrants and non-exporters to check for the ex-post advantages that exporting might provide to exporters in terms of financial benefits. We follow Bernard and Jensen (1999) and Bellone et al. (2010) and estimate the following model:

$$\Delta \mathrm{FIN}_{i,\frac{t}{t+s}} = \alpha + \beta \mathrm{Entrant}_{it} + \Upsilon\, \mathrm{Size}_{it} + \eta\, \mathrm{TFP}_{it} + \mathrm{Control\ variables} + \varepsilon_{it}, \tag{4}$$

where ΔFIN captures the change in financial indicators between $t + s$ and t periods. Here, s varies between 1 and 3 as t is the period when the firm starts exporting. The main explanatory variables are Entrant, Size and productivity as β is our key coefficient of interest and shows the growth in the exporting firms' financial status in comparison to non-exporters. We also include time, region and industry dummies.

4 | DATA, VARIABLES, AND SUMMARY STATISTICS

The firm-level financial data used in this study is extracted from the ORBIS database and consists of profit and loss account and balance sheet data for listed firms on Pakistan's stock market.[13] From this database, we select all Pakistani listed non-financial firms by using the US two-digit SIC industry classification. By following Aharony, Wang, and Yuan (2010) and Saeed and Sameer (2015), this study re-distributes the two-digit SIC into six-industry categories. The detailed industry classification is reported in Appendix.

Our ORBIS sample contains 349 firms, which comprise about 87% of all non-financial listed firms in Pakistan during the period. We clean data by removing outliers, such as non-positive values of sales, capital and total assets; firms with missing values for important variables are also removed. We include only those firms that have observations for a minimum of two consecutive years. We restrict our sample to the manufacturing sector only. The final sample represents an unbalanced panel of 1,205 firm-year observations of 291, mostly large, firms for the period 2006–2014.

Since ORBIS database does not provide export sales information, we collect this information from annual financial reports' analysis of companies, and merge it into our firm data.[14] We use GDP Price Deflator and Wholesale Price Index to obtain real values of the variables used in this study.[15]

4.1 | Measures of financial constraints and financial health

Widely used financial constraint measures in finance literature include KZ index, WW index, HP index (Farre-Mensa & Ljungqvist, 2016), and assets tangibility which are constructed by a combination of various firm variables. Our first measure of financial constraint is WW index, developed by Whited and Wu (2006) and derived from a structural intertemporal investment model. The model predicts that external finance constraints affect the intertemporal substitution of investment today for investment tomorrow, via the shadow value of scarce external funds. Whited and Wu (2006) demonstrates that the firms categorized as "constrained" by this index show characteristics typically associated with exposure to external finance constraints. The index is calculated as follows:

$$\begin{aligned}\mathrm{WW\ index} = &-0.091\mathrm{CF}_{it} - 0.062\mathrm{DIVPOS}_{it} \\ &+ 0.021\mathrm{TLTD}_{it} - 0.044\mathrm{LNTA}_{it} \\ &+ 0.102\mathrm{ISG}_{it} - 0.035\mathrm{SG}_{it}.\end{aligned} \tag{5}$$

Here, CF is ratio of cash flow to total assets; DIVPOS is a dummy variable with value of 1 if firm pays cash dividends and 0 otherwise; TLTD is ratio of long-term debt to total assets; LNTA is natural log of total assets; ISG is the 2-digit industry sales growth; SG is firm sales growth. By construction, firms with a high WW index are considered more financially constrained, characterised by low cash flow, low dividend, high leverage, low total assets, high industry sales growth, and low firm growth.

The coefficients for each variable in Equation (5) used for our sample are those generated by Whited and Wu (2006) for a sample of COMPUSTAT firms. The practice of out-of-sample extrapolation of index coefficients is followed by many papers as mentioned in Farre-Mensa and Ljungqvist (2016); examples are Guariglia and Yang (2016) and Chen, Hua, and Boateng (2017) for Chinese firms and Mancusi and Vezzulli (2010) for Italian firms. Re-estimating the structural model of Whited and Wu (2006) on Pakistani samples requires data not only for firm level financial variables, but also for three market variables related to the stochastic discount factor in Euler equation which are difficult to obtain and may be unreliable due to immature Pakistani stock markets. Therefore, we follow the practice of using the coefficients constructed by Whited and Wu (2006).

In a separate exercise following the literature, we also constructed KZ index and HP index for Pakistani listed firms and evaluated these financial constraint measures. We first examined firms' characteristics associated with external finance constraints according to quartiles sorted by the respective measures, to check whether the firm features move in the same direction as predicted by the indices. Our results indicate the malfunctioning of KZ index for Pakistani firms, as the mean value of q for all sample firms moves in the opposite direction. We further evaluated the suitability of the indices by ordered logit model regressing financial variables comprising the indices on liquidity categories as in Kaplan and Zingales (1997) and Hadlock and Pierce (2010). The regression results further support that WW index performs better than the other two indices for Pakistani firms. Therefore, we are confident that WW index with the coefficients in Whited and Wu (2006) is a suitable measure of financial constraints for Pakistani firms.[16]

Our second measure of financial constraint is motivated by the concept of assets tangibility as discussed in Almeida and Campello (2007). They argue theoretically that more tangible assets can sustain more external financing, because tangibility increases the value that creditors can capture in default states which, in turn, reduces the contractibility problem. Tangibility thus increases firm ability to access external finance. According to the theoretical expectation, firms with more tangible assets are less likely to be financially constrained. At the firm level, we first calculate assets tangibility by the following formula:

$$\text{Assets Tangibility} = \frac{\text{Cash} + 0.715\,\text{Receivables} + 0.547\,\text{Inventory} + 0.535\,\text{Capital}}{\text{Total Assets}}. \tag{6}$$

Here, Cash is firm cash holdings; Receivables represen firm accounts receivable; Inventory is the value of firm inventory; Capital is the value of firm fixed assets; Total Assets is firm book value of total assets. Higher tangibility means firms are less financially constrained. The coefficients for each variable in Equation (6) for Pakistani firms are those used in Almeida and Campello (2007) who construct a firm-level measure of expected asset liquidation following Berger, Ofek, and Swary (1996).[17] In determining whether investors rationally value the firm abandonment option, Berger et al. (1996) gather data on the proceeds from discontinued operations reported by a sample of COMPUSTAT firms. Similar data from discontinued operations in Pakistan is not available for estimating the coefficients. As the coefficients represent proportions of each tangible asset category produces (when exit occurs) rather than estimations from structural model, we feel that they would be fairly standard and stable across countries and time. Therefore we follow the practice in the literature (e.g., Xu, Xu, & Yuan, 2013, for Chinese firms) using the coefficients of Almeida and Campello (2007).

Nevertheless, assets tangibility may be strongly related to industry financial characteristics.[18] A high tangibility may be just capturing industry-related character. Therefore, we then use the ratio of the firm tangibility over industry level median—a firm asset tangibility scaled by industry median—in our study to eliminate the industry-related effects.

For widely used financial health measures in trade literature, our leverage ratio is the ratio of short-term debt to current assets, and liquidity ratio is measured by ratio of total current assets minus current liabilities to total assets.

4.2 | Summary statistics

The exports by our listed firms sample account for about 26% of Pakistan's total manufacturing exports over 2009–2014, rising from an average of 15% during the period 2006–2008 (according to authors' own calculations based on data from ORBIS and Pakistan Bureau of Statistics). Considering that the number of firms is less than 300 in total with 25% non-exporters, the figures show that our sample covers the major exporters in the country. The sample summary statistics are report in Table 1. Columns 1–3 report mean and standard deviation for main variables, for the entire sample, the subsample of exporting firm-years, and the subsample of non-exporting firm-years, respectively. In Column 4, mean differences between exporter and non-exporter observations are reported. Columns 5–6 are the minimal and maximum values for each variable for the full sample. Summary statistics confirm the stylised facts found in the literature; exporters are significantly different from non-exporters. At the mean exporters are older, larger, pay higher wages and are more productive. Comparing firms by ownership, foreign multinationals and firms with subsidiaries have a considerably higher probability to export than standalone firms. In terms of financial status, exporters are significantly more leveraged, have significantly lower WW index, and higher assets tangibility meaning that exporters are financially less constrained but more highly leveraged. The mean difference for liquidity between export observations and non-export observations is insignificant.

TABLE 1 Descriptive statistics for key regression variables

Variables	Full sample (1)	Exporters Expdum = 1 (2)	Non-exporters Expdum = 0 (3)	Mean diff (4)	Min (5)	Max (6)
Age	36.01 (21.61)	37.20 (20.51)	33.93 (23.31)	−3.27*** (1.29)	2	154
Number of employees	1,167.3 (1787.0)	1,470.7 (2,105.4)	626.55 (729.4)	−844.1*** (104.7)	11	17,667
TFP	2.079 (.1217)	2.084 (.1075)	2.069 (.1433)	−.0147*** (.007)	.659	2.373
Log (real wage)	12.282 (1.160)	12.43 (1.041)	11.82 (1.27)	−.609*** (.063)	7.722	17.15
Liquidity	.027 (.281)	.0274 (.273)	.0269 (.294)	−.0003 (.0162)	−1.612	.727
Leverage	.2121 (.1546)	.2400 (.1533)	.1624 (.1444)	−.078*** (.009)	0	.775
WW index	−.0429 (.0674)	−.0497 (.0637)	−.0309 (.0719)	.019*** (.004)	−.1899	.0882
Assets tangibility	.9899 (.1049)	.9949 (.0977)	.9811 (.1164)	−.014*** (.006)	.608	1.33
Foreign dum	.0886 (.284)	.1018 (.303)	.0668 (.249)	−.0349** (.0164)	0	1
Subsidiary dum	.3012 (.4589)	.3429 (.4749)	.2269 (.4193)	−.116*** (.028)	0	1
Observations	1,205	770	435			

Note: Standard deviations are in parentheses for Columns 1–3; standard errors for Column 4.

TABLE 2 Correlations between of financial measures

	WW index	Assets tangibility	Leverage ratio	Liquidity ratio
WW index	–			
Assets tangibility	0.1070 (0.0002)	–		
Leverage ratio	0.1271 (0.000)	0.2483 (0.000)	–	
Liquidity ratio	−0.1372 (0.000)	−0.1658 (0.000)	−0.5052 (0.000)	–

Note: Each box reports Pearson's r correlation coefficients. *P* values are reported in parenthesis for the null hypothesis that there is no linear correlation.

Table 2 reports the correlation matrix for the four financial measures, with leverage and liquidity highly negatively correlated while leverage and tangibility positively correlated. Some studies (such as Harc, 2015) show a positive relation between tangible assets and leverage ratio, as more tangible assets increase the borrowing ability due to the lesser problem of collateral. The negative relationship between tangibility and liquidity in Table 2 could be explained as follows: firms with more tangible assets may have easier access to loans and therefore they do not need to hold liquid assets all the time. Considering that one of the variables with positive coefficient in WW index is debt over asset, it is not too surprising that WW index and tangibility are positively correlated (as both are positively correlated with leverage), despite the fact that high financial constraints mean high WW index and low assets tangibility. WW index is a comprehensive measure taking into account several aspects of firm finance, whereas assets tangibility mainly measures one feature of assets. Therefore, we do not regard our results as conflicting evidence from the two measures; rather the measures proxy for different aspects of firm finance.

5 | EMPIRICAL RESULTS

5.1 | Comparison of exporters and non-exporters in terms of financial status

To confirm the differences between exporters and non-exporters in terms of finance, we regress the firm financial variable on firm export status, while controlling other important factors (Equation (1)). Table 3 presents the results of pooled OLS estimator. In Column 1, where WW index is the measure of financial constraint, the coefficient of export dummy is weakly significant and negative, meaning exporters are less financially constrained than non-exporters. Column 2 where assets tangibility is a financial constraint measure shows that exporters have more tangible assets than non-exporters. Regression results confirm that exporters are less financially constrained. For the mean firm, the WW index is 0.0052 lower and asset tangibility is 0.028 higher for exporter than non-exporter. Column 3 shows that exporters are significantly more leveraged than non-exporters. This implies that exporters are borrowing

TABLE 3 Difference between exporters and non-exporters in terms of financial status

	(1) WW index	(2) Tangibility	(3) Leverage	(4) Liquidity
Export dummy	−0.00518*	0.0280***	0.0613***	−0.0251
	(0.00314)	(0.00688)	(0.00953)	(0.0163)
Age	−0.00508**	0.000461	−0.0348***	0.0917***
	(0.00228)	(0.00504)	(0.00698)	(0.0118)
TFP	−0.337***	−0.200***	−0.160***	0.643***
	(0.0137)	(0.0297)	(0.0412)	(0.0712)
Log employees	−.0005***	0.00122	0.0171***	−.00012***
	(.00008)	(0.00320)	(0.00443)	(.00004)
Foreign dummy	0.0208***	−0.000850	−0.0195	0.0132
	(0.00486)	(0.0106)	(0.0146)	(0.0253)
Observations	1,205	1,205	1,205	1,205
R-squared	0.571	0.166	0.235	0.193

Note: Standard errors in brackets.
*Significant at 10%.
**Significant at 5%.
***Significant at 1%.

heavily, perhaps to pay the sunk costs of entry to export markets. It may imply that exporters have easy access to external finance. In Column 4, exporters are not significantly different from non-exporters in term of liquidity. Exporters' easy access to external finance may justify holding less of liquid assets.

5.2 | The link between financial status and the exporting decisions

To examine the role of financial status on export extensive margin, we estimate Equation (2) and report the results from four estimators: fixed effects, SGMM, dynamic random-effects probit,[19] and random-effects logit for financial constraint measures (WW index and assets tangibility) in Table 4 and financial health measures (leverage and liquidity) in Table 5.

In Table 4, Columns 1–4 report the results using WW index as financial constraints measure. Size and wage are significant with expected signs from SGMM estimator. We rely on SGMM result, as the *p* values of both m2 and Sargan tests are more than 0.05, meaning instruments are valid.[20] Our primary interest is the coefficient on FIN, WW index here. Three out of four estimators give a significant and negative coefficient of WW index, confirming financial constraint is a significant determinant of firm export decision: financially constrained firms are less likely to export. Columns 5–8 report results using asset tangibility as a measure of financial constraints. Except Column 5, all other estimators give significant and positive coefficients, which confirms that financially less constrained firms are more likely to export as they have higher tangible assets and can easily access external funds. The lagged export status dummy is always consistently significant and positive as expected. We also estimate specifications without lagged export dummy, for fixed-effects, dynamic random-effects probit and logit estimators as in Greenaway et al. (2007) and the results remain the same.

Table 5 reports the results for measures of financial health. In Columns 1–4, three out of four estimators give significant and positive coefficient for leverage, meaning firms with higher leverage are more likely to export. This could be interpreted as evidence that exporting firms have easier access to external finance and therefore borrow heavily to bear export sunk costs; it is implausible to argue that firms are not financially healthy because of high leverage. Columns 5–8 show insignificant coefficients when liquidity ratio is used which implies that liquidity does not play significant role in firm export decision.

Taken together, our results for financial constraints are consistent with the main findings in empirical literature using other financial constraint measures such as Muuls (2015) for Belgium, Wagner (2014b) for Germany, Minetti and Zhu (2011) for Italy and Kiendrebeogo and Minea (2017) for Egypt: firms with lower financial constrains are more likely to export. Our results for leverage and liquidity effects on export entry decision differ from

TABLE 4 Determinants of the decisions to export: financial constraints

	FIN=WW index				FIN = assets tangibility			
	Fixed effects (1)	GMM (2)	Dynamic random Probit (3)	Logit model (4)	Fixed effects (5)	GMM (6)	Dynamic random Probit (7)	Logit model (8)
$Expdum_{t-1}$	0.205***	0.546***	1.653***	5.046***	0.206***	0.613***	1.636***	4.997***
	(0.0701)	(0.0116)	(.2422)	(0.323)	(0.0701)	(0.0119)	(.2381)	(0.323)
$Employe_{t-1}$	−0.0133	0.115***	−.2044	0.132	−0.0142	0.101***	−.3050	0.178
	(0.0511)	(0.0112)	(.8800)	(0.216)	(0.0520)	(0.00770)	(.8786)	(0.218)
TFP_{t-1}	−0.0698	−0.112	−1.495	0.0388	−0.0864	−0.0431	−1.442	0.775
	(0.0785)	(0.0739)	(2.027)	(1.838)	(0.0803)	(0.0407)	(1.939)	(1.834)
$Wage_{t-1}$	0.0144	0.0134***	.1281	0.115	0.0134	0.0228***	.0732	0.147
	(0.0210)	(0.00392)	(.3389)	(0.234)	(0.0207)	(0.00501)	(.3402)	(0.236)
Age_{t-1}	0.0737	−0.145***	.0219	0.165	0.0896	−0.131***	.3144	0.0747
	(0.151)	(0.0319)	(1.440)	(0.240)	(0.157)	(0.0192)	(1.466)	(0.239)
FIN_{t-1}	−0.00463	−0.0022***	−.0347*	−0.113*	0.0336	0.344***	.7069*	2.990**
	(0.00369)	(0.000770)	(.0382)	(0.0606)	(0.186)	(0.0401)	(1.324)	(1.477)
Foreigndum			−.2692	0.0174			−.3632*	−0.119
			(.3899)	(0.540)			(.3817)	(0.523)
Subdum			.0789	0.625*			.1414	0.821**
			(.2503)	(0.360)			(.245)	(0.366)
Sargan(p)		0.087				0.085		
AR(2)		0.606				0.609		
Observations	907	907	907	907	907	907	907	907

Note: Standard errors in brackets. *Significant at 10%, **significant at 5%, ***significant at 1%. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The two-step system GMM estimator uses lagged values of all right side variables dated $t-3$ and time dummies as instruments. The dummies of foreign ownership and subsidiary are dropped by GMM due to their time-invariant feature.

findings for developed countries which show that export entry is associated with higher liquidity and lower leverage (e.g., Bellone et al., 2010; Greenaway et al., 2007; Nagaraj, 2014). However, our results are in line with some evidence from developing countries. Castagnino, D'Amato, and Sangiacomo (2012) find firms in Argentina are more likely to export if they have larger domestic bank debt, meaning having more access to bank credit. Du and Girma (2007) also find Chinese firms with more bank loans are more likely to export due to easy access to bank finance. Huang, Liu, and Görg (2017) find that Chinese firms with more interest expenditure or stocks issues have higher propensities to export.

As stressed by Manova (2010), firms are not always able to meet their financial needs with retained earnings or cash flows from operations and routinely rely on external financing for their export expenditures. This financing often comes in the form of bank loans or bank-provided trade credit in developing countries. In Section 2, we have shown that bank lending plays predominant role in external funding of Pakistani firms. Therefore, asset tangibility is important for firms to secure bank loans in this case. Unlike developed countries, firms in developing countries like Pakistan with undeveloped financial system rely heavily on bank loans for external finance and we expect access to domestic bank credit to be important for the entry to export markets. Thus, our results that firms with higher leverage but less financially constrained are more likely to export can be regarded as evidence that such firms have easier access to external finance rather than being financially constraints. This is consistent with the finance literature proposition that leverage and liquidity are not measures of financial constraints. Higher leverage captures better access to external finance, and tangibility is vital for access to external finance.

TABLE 5 Determinants of the decisions to export: financial health

	FIN = leverage				FIN = liquidity			
	Fixed effects (1)	GMM (2)	Dynamic random Probit (3)	Logit model (4)	Fixed effects (5)	GMM (6)	Dynamic random Probit (7)	Logit model (8)
$Expdum_{t-1}$	0.204***	0.599***	.7213***	4.969***	0.206***	0.572***	1.649***	5.043***
	(0.0696)	(0.0115)	(.2599)	(0.323)	(0.0699)	(0.0141)	(.2435)	(0.322)
$Employe_{t-1}$	−0.0166	0.0833***	−.7384	0.106	−0.00681	0.0997***	−.1237	0.166
	(0.0515)	(0.00817)	(.8964)	(0.223)	(0.0504)	(0.00813)	(.8666)	(0.216)
TFP_{t-1}	−0.0454	−0.00180	−1.208	0.363	−0.00746	−0.0219	−.2278	0.384
	(0.0845)	(0.0360)	(1.984)	(1.891)	(0.0782)	(0.0473)	(2.106)	(2.017)
$Wage_{t-1}$	0.0128	0.0196***	.1616	0.138	0.0107	0.0166***	.0396	0.122
	(0.0208)	(0.00392)	(.3326)	(0.239)	(0.0204)	(0.00418)	(.3419)	(0.238)
Age_{t-1}	0.0933	−0.0792***	1.783	0.152	0.0970	−0.0883***	.4642	0.134
	(0.150)	(0.0223)	(1.541)	(0.247)	(0.147)	(0.0203)	(1.490)	(0.247)
FIN_{t-1}	0.153*	0.0653**	2.567*	2.254**	−0.148	0.00471	−1.664	−0.382
	(0.0868)	(0.0270)	(1.337)	(1.137)	(0.0981)	(0.0295)	(1.205)	(0.859)
Foreigndum			−.0817	−0.0484			−.3187	−0.112
			(.3589)	(0.531)			(.3858)	(0.531)
Subdum			.0083	0.717**			.1055	0.659*
			(.2286)	(0.359)			(.2443)	(0.357)
Sargan(p)		0.016				0.603		
AR(2)		0.600				0.014		
Observations	907	907	907	907	907	907	907	907

Note: Standard errors in brackets. *Significant at 10%, **significant at 5%, ***significant at 1%. The Sargan test is a test of the over-identifying restrictions asymptotically distributed as chi-square under the null of instrument validity. AR(2) is a test for second-order serial correlation in the first-difference residuals, under the null of no second-order serial correlation. If the instruments are acceptable, the p-value of Sargan test and AR(2) should be greater than 0.05. The two-step system GMM estimator uses lagged values of all right side variables dated $t-3$ and time dummies as instruments. The dummies of foreign ownership and subsidiary are dropped by GMM due to their time-invariant feature.

Our results clearly show that empirical results could be very different when using different financial measures. This is consistent with the proposition that financial systems and funding resources are distinct for different countries. There are advantages capturing more comprehensive aspects of financial constraints by using WW index and assets tangibility popular in the finance literature rather than using leverage ratio and liquidity ratio from trade literature. Our results also show that the role of liquidity ratios is not significant for export participation decision in Pakistan. Pakistan is a lower-middle-income economy with underdeveloped financial and capital markets a situation distinct from developed countries. Therefore, it is important to use appropriate measures of financial constraints. Our results uncover the significant impact of financial constraints on the firm decision to export to foreign markets.

5.3 | Financial status of firms before entering export markets

The above discussion highlights the importance of financial constraints for export entry. Next, our analysis compares the ex-ante firm financial situation for exporters and non-exporters. The aim is to find out whether entrants become less financially constrained up to 2 years before entering export markets. We look at export entrants and non-exporters only.[21] The resulting sample consists of 412 observations when we lag 1 year ($t-1$) and 294 observations when we lag 2 years ($t-2$). Columns 1 and 2 of Table 6 provide results when WW index is used in Equation (3). The results show that entrants become less financially constrained 1 or 2 years before exporting as coefficient of entrant is statistically significant. Columns 3 and 4 of Table 6 using assets tangibility

TABLE 6 Ex-ante effects of export

	WW index		Assets tangibility		Leverage ratio		Liquidity ratio	
	$t-1$ (1)	$t-2$ (2)	$t-1$ (3)	$t-2$ (4)	$t-1$ (5)	$t-2$ (6)	$t-1$ (7)	$t-2$ (8)
Entrant	−0.430*	−0.583*	0.0482***	0.0474***	0.0585***	0.0577***	−0.0208	−0.0191
	(0.257)	(0.325)	(0.0109)	(0.0117)	(0.0131)	(0.0152)	(0.0169)	(0.0187)
Employee_{t-1}	−0.375***		−0.00354		0.0288***		−0.0325***	
	(0.115)		(0.00742)		(0.00711)		(0.00979)	
TFP_{t-1}	−1.845*		−0.341***		−0.186***		0.848***	
	(0.966)		(0.0588)		(0.0676)		(0.128)	
Employee_{t-2}		−0.454***		−0.0145*		0.0275***		−0.0387***
		(0.168)		(0.00803)		(0.00853)		(0.0119)
TFP_{t-2}		−1.669		−0.334***		−0.133*		0.764***
		(1.135)		(0.0740)		(0.0781)		(0.109)
Observations	412	294	412	294	412	294	412	294
R-squared	0.175	0.142	0.305	0.367	0.287	0.326	0.331	0.346

Note: Standard errors in brackets.
*Significant at 10%.
***Significant at 1%.

TABLE 7 Ex-post effects of export

	WW index		Assets tangibility		Leverage ratio		Liquidity ratio	
	t + 1 (1)	t + 3 (2)	t + 1 (3)	t + 3 (4)	t + 1 (5)	t + 3 (6)	t + 1 (7)	t + 3 (8)
Entrant	0.0911	−0.0132	0.00399	−0.00118	0.00530	0.00470	−0.00880	−0.00481
	(0.399)	(0.467)	(0.00339)	(0.00564)	(0.0107)	(0.0191)	(0.0111)	(0.0214)
Employee_t	0.0669	−0.366	0.000435	−0.000862	−0.00120	0.00125	−0.00216	0.0225*
	(0.215)	(0.283)	(0.00371)	(0.00382)	(0.00578)	(0.0116)	(0.00601)	(0.0130)
TFP_t	−0.419	3.025	0.0105	0.0730**	0.0240	0.176*	−0.0142	−0.548***
	(1.803)	(2.305)	(0.0177)	(0.0343)	(0.0484)	(0.0940)	(0.0503)	(0.106)
Observations	412	196	412	196	412	196	412	196
R-squared	0.121	0.170	0.347	0.291	0.039	0.082	0.061	0.238

Note: Standard errors in brackets.
*Significant at 10%.
**Significant at 5%.
***Significant at 1%.

confirm the results from WW index: entrants appear less financially constrained 1 and 2 years before entering export markets. Coefficient of entrants is highly significant and positive indicating that entrants have higher assets tangibility before entry, which helps them gain access to external funds. We find significantly positive coefficients for the dummy of entrants in Columns 5 and 6 using leverage ratio, which imply that future entrants borrow more before actual entry to foreign markets. Columns 7 and 8 show insignificant coefficients of the entrants dummy when liquidity is used, suggesting that liquidity is not statistically different for entrants 1 or 2 years prior export entry compared with non-exporters. These results weakly support previous findings (such as Bellone et al., 2010), which suggest that exporting entrants behave differently in terms of liquidity and leverage before starting to export.[22] Moreover, we find that entrants become less financially constrained before

entering export markets. We further show that entrants are able to raise external funds for additional expenditures as depicted by the significant coefficient when leverage is used. This finding rationalises the significance of finance for the export decision.

5.4 | Ex-post effects of trade on the firm financial status

Previously, we found that exporting entrants appear to have relatively easy access to external finance, and thus are less financially constrained in the period before entering foreign markets. Finally, we check for the ex-post advantages that exporting might provide to exporting firms in terms of financial benefits. To detect the ex-post effects of trade on firm financial status, we check the change of financial conditions over the first year period and third year period after firm entering export markets by estimating Equation (4) using OLS estimator. The results reported in Table 7 do not give any evidence to support the argument that exporting improves firm financial status or financial health in the near future; for all financial measures, the coefficients for entrants are insignificant. Even though our results are consistent with some previous findings (e.g., Bellone et al., 2010), they do not rule out any financial advantage to the exporting firms in the long run. Our data limitations do not allow us to look at the long run.

6 | CONCLUSIONS

This study uses a sample of manufacturing listed firms from a lower-middle-income country, Pakistan, for the period 2006–2014 to scrutinise the relationship between finance and the firm export decision. Our results show that firm financial conditions are an important element of firm heterogeneity. The contribution of the paper is that we introduce the latest measures of financial constraints in finance, WW index and assets tangibility, to examine the effects of financial constraints on the firm export decision. For comparison, we also use liquidity and leverage to examine what is more important for firms—to be financially more healthy or financially less constrained—when considering entry to export markets. We argue that leverage and liquidity are not plausible measures of financial constraints; they are better suited to measure financial health.

We find that exporters are financially less constrained despite high leverage. The undeveloped financial system and heavy reliance on bank loans for external finance in Pakistan may be the plausible explanation for our findings. High leverage may indicate easier access to external finance rather than financial constraints in the financial system of lower-middle-income countries like Pakistan. Our results suggest that exporters need to have easy access to external finance to be able to meet any additional expenditure related to exporting. Our evidence also shows that indicators of financial health such as liquidity do not play a vital role in the decision to export in Pakistan. We do find clear evidence of ex-ante financial advantage to future exporters. Coefficients on WW Index, assets tangibility, and leverage ratio are significant which indicates that entrants are less financially constrained 1 and 2 years before starting to export and more highly leveraged. Our study does support already existing evidence that exporting to international markets does not provide financial benefits at least in the short run. It is important to highlight that we cannot extend these results into the long run due to data limitations. The hypothesis that internationalization leads to access to external finance, may be true in the long run.

Overall, our empirical study backs the models of international trade based on firm heterogeneity and sunk entry costs. Financial constraints and underdeveloped financial institutions appear to restrict firms' participation in international trade. Our evidence suggests that export promotion policies should contain financial market measures, specifically measures designed to reduce the level of firm financial constraints and help the efficient but financially constrained firms enter international export markets. Developing more mature financial system and institutions would promote exports and economic growth in developing countries in the long run.

Data Availability

The data that support the findings of this study are available from ORBIS database of Bureau Van Dijk. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from https://www.bvdinfo.com/en‐gb/our‐products/data/international/orbis with the permission of Bureau Van Dijk.

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ENDNOTES

[1] A firm is considered financially constrained if the high cost of external funds prevents the firm from undertaking a positive net present value (NPV) investment project. In other words, the costs of internal and external finance differ substantially (e.g., Kaplan & Zingales, 1997).

[2] Wagner (2014a) covers the papers published between 2007 and 2014 and Wagner (2019) includes an update listing the papers published until spring 2019.

[3] Firm size, productivity, quality of labour, different level of entrepreneurial ability (Manasse & Turrini, 2001) and financial health (Greenaway et al., 2007) are considered the sources of firm heterogeneity and determinants of export market participation.

[4] Since there is no direct measure to capture the financial constraints firm faces the empirical literature uses indirect proxies such as dividend payments, credit ratings, age, size and four popular indices—Kaplan–Zingales (KZ) index, Whited–Wu (WW) index, Hadlock–Pierce index (Hadlock & Pierce, 2010), and assets tangibility. The literature is split on which of these is superior in measuring financial constraints and consequently empirical studies use a number of measures for robustness.

[5] Bellone et al. (2010) treats the measures of financial health (leverage and liquidity) in Greenaway et al. (2007) as financial constraint measures. It is difficult to identify differences between financial health and financial constraint. However, one can regard as financially unhealthy firms, which are on the verge of collapse or bankruptcy. A firm is considered financially constrained if it has a potential to grow, thus it is financially healthy, but faces constraints due to lack of finance.

[6] Even though Greenaway et al. (2007) also uses Quiscore, their analysis is mainly based upon the measures of leverage and liquidity ratios. Similarly, Bellone et al. (2010) uses index of financial health drawn from Musso and Schiavo (2008). However, these measures are not used in the literature on financial constraint and firm investment.

[7] This study theoretically and empirically proves that financially constrained firms increase their propensity to hold cash in the face of macroeconomic shocks. Increasing liquidity cannot necessarily be associated with lessening financial constraints.

[8] This study defines leverage as the ratio: firm short term debt/firm current assets; liquidity is the ratio: (firm current assets—current liabilities)/firm current assets. Firm riskiness is measured by the Quiscore; the measure is based on the information related to firm credit rating and probability of firm failure in last 12 months.

[9] Sample distribution based on export dummy is presented in Appendix.

[10] Stata command *opreg* (Yasar & Raciborski, 2008) is used to estimation TFP.

[11] Due to the binary nature of the dependent variable Greenaway et al. (2007) use a pooled probit estimator, which controls for clustering, that is, that observations within the same firms are not independent. However, unobserved heterogeneity is not fully controlled in the pooled probit. Random effects estimator takes the unobserved heterogeneity into account, however, it requires that firm specific unobserved effects are uncorrelated with the regressors. Therefore, commonly, the fixed effects (FE) estimator is used to eliminate the potential bias caused by omitted heterogeneity (Wooldridge, 2002). However, FE would give biased and inconsistent parameter estimates for the coefficients on the lagged dependent variable. Therefore, GMM is used when the model includes a lagged dependent variable (Wooldridge, 2002). Greenaway et al. (2007) has used first difference GMM to estimate export decision, modeled by a binary dependent variable.

[12] Continuous exporters are firms, which continuously export throughout the sample period. Non-exporters are firms, which have never exported to foreign markets throughout the sample period. Entrants are the firms that do not export in the first year and switch only once in the remaining period. Switchers are the firms, which switch more than once in the sample period. Exits are the firms that do not export in the last year and switch only once before. Sample distribution is presented in Appendix.

[13] ORBIS database is Bureau Van Dijk's publication, which contains information on over 200 million companies worldwide. The data are available from https://www.bvdinfo.com/en-gb/our-products/data/international/orbis with the permission of Bureau Van Dijk.

[14] State bank of Pakistan provides financial statement analysis of non-financial KSE listed firms from 1999 to 2014.

[15] Data on the deflators have been collected from the World Bank database for Pakistan. Capital stock and investment are deflated by Whole Sale Price Index while other variables are deflated by GDP Price Deflator.

[16] The results of the evaluations are available upon request. We do not just rely on WW index alone. We also use another financial constraint measure to address the concern of "parameter stability both across firms and over time" mentioned in Farre-Mensa and Ljungqvist (2016).

[17] Berger et al. (1996) find a dollar of book value produces, on average, 72 cents in exit value for total receivables, 55 cents for inventory, and 54 cents for fixed assets for the sample of COMPUSTAT firms.

[18] As in Rajan and Zingales (1998) and Manova (2013), some industries are more financially vulnerable and depend heavily on external finance than others, because the initial project scale, the cash harvest time, and the requirement for continuing investment differ substantially between industries.

[19] We use *xtpdyn* command in Stata, which implements the dynamic random-effects probit model as proposed by Rabe-Hesketh and Skrondal (2013).

[20] The value of the lagged dependent variable coefficient lies between the values of coefficients from OLS and fixed-effect estimators. It means GMM is also clear from finite small-sample bias.

[21] Entrants are the firms that do not export in the first year and switch to export only once in the remaining period.

[22] Greenaway et al. (2007) finds no clear ex-ante financial advantage of future exporters. Bellone et al. (2010) finds that future exporters are more liquid 1 year before entry.

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APPENDIX A.

1. Definitions of the variables used

Expdum: A dummy variable equal to 1 if the firm exports a positive amount, and 0 otherwise.

Leverage ratio: A ratio of a firm short-term debt over current assets.

Liquidity ratio: A ratio of a firm current assets minus short-term debt over total assets.

WW index: A combination of the six variables.

Cash flow: Measured as sum of net income and depreciation.

Divpos: A dummy variable that takes the value of 1 if firm pays cash dividend, and 0 otherwise.

Long-term debt: Long-term financial debts to credit institutions (loans and credits).

Total Assets: Fixed assets plus current assets.

Firm sales growth: Net sales growth rate.

Industry Sales growth: 2-digit industry sales growth rate.

Assets tangibility: A combination of five variables; the firm tangibility is divided by the industry median tangibility to get the final firm-level assets tangibility used in the study.

Cash: cash holdings.

Receivables: firm accounts receivable.

Inventory: value of a firm inventory.

Capital: value of a firm fixed assets.

Total assets: firm book value of total assets.

2. Table: Industry classification

Industry	Two-digit SIC code	No. of firms	Percentage
Food and tobacco	1, 2, 9, 20, 21, 54	38	11
Basic industries including petroleum	10, 12, 13, 14, 24, 26, 28, 29, 33	54	17
Construction	15, 16, 17, 32, 52	35	11
Textile and trade	22, 23, 31, 51, 53, 56, 59	135	42
Consumer durable	25, 30, 36, 37, 39, 50, 55, 57, 34, 35, 38	33	10
Others	No specific SIC code	27	9
Total sample		322	100

3. Table: Sample distribution

	No. of firms	Percent
Exporters Expdum = 1	187	64.26
Non-exporters Expdum = 0	104	35.74
Total	291	100.00

4. Table: Sample distribution

	No. of firms	Percent
Continuous exporters	118	40.56
Continuous non-exporters	75	25.66
Entrants	48	16.56
Switchers	38	13.00
Exits	12	4.22
Total	291	100.00