Are exporters Healthier?

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Abstract- This study explores the relationship between exports and financial health using a panel dataset of 98 Iranian manufacturing firms during 1999- 2018. In this study, financial health index built by principal component analysis (PCA) method on eight variables: asset return, instant ratio, financial leverage, equity ratio, sales return, cash ratio, and working-capital. We find that firms with higher levels employment and lower leverage are likely to be exporters and also exporters are healthier than domestic firms. Treatment groups (exporters) had an average financial health of 0.04, while other firms had an average financial health of - 0.28.

Key words: Exports, Financial Health, firm Heterogeneity, score matching

JEL codes: F10; G32; L25

I. Interdiction

All developed and developing countries, due to demand constraints, need to expand their market through export. According to the Export Development Strategy, exports not only increase production levels, but also increase product diversification and quality, transfer knowledge, boost economic growth. At the micro level, exports can also improve firms' productivity.

There are two important hypotheses regarding entry into the export market: First, the self-selection hypothesis According to Melitz (2003), firms start exporting when they have the characteristics (i.e. productivity) to enter the export market. Second, learning by exporting hypothesis that, due to exposure to international competition and increased innovation, it will improve firm productivity and performance.

Financial restraint has long been one of the important factors in bankruptcy for financial studies. In the literature of international finance, it is argued that export start-ups can improve firms' access to foreign funds. Initial field studies have been carried out by Chaney (2005). He argued that, despite the fixed costs of entering foreign markets, only firms with sufficient cash would be able to export if firms were financial constrained.

In this paper, we first propose a new method for measuring financial health as an indicator of financial constraint, then we evaluate the financial impact of export activities using scoring matching.

The remainder of the paper is organized as follows. Section 2 presents Literature review and theoretical background gives .Section 3 describes our data and econometric strategy for measuring financial health index and test selling abroad improves firm financial health. Section 4 reports the results of the analysis. Section 5 concludes.

II. Literature review and theoretical background

In 1995 Bernard and Jensen published the first in a series of papers that focus on different between exporters and non-exporters. They found that export, provide the opportunity for domestic firms to become familiar with new technology and improve productivity by applying it. Exporters tend to produce more, pay more, and make more profits than other firms and also export improves firm performance in three ways: (i) monetization through domestic and international sales; (ii) non-repayment of export market

entry costs, (iii) by increasing productivity through learning effects. Fierce international competition can be seen as a factor in demonstrating the impact of exports on productivity (Clerides et al, 1998).

According to Clerides et al (1998) and Melitz (2003), Self-selection (i.e. exporting-by-learning) and learning by-exporting are the main candidate explanations of the export-productivity link but these emphasize different causal paths. On the one hand, relatively more productive firms may self-select into international markets. Highly productive firms receive a relatively high return from exports because of either the existence of sunk export costs (Albornoz and Ercolani, 2007).

In 2016 Chaney pointed that, access to finance may be both a determinant and an outcome of internationalization. He has shown that financial resources are an important driver of export participation and that a lack of such resources may constitute an important impediment to the success of the international strategy of the firm.

Extant empirical literature on causality give support both of the export self-selection and learning by-exporting by Rasekhi and mojdeh (2013) and , Rasekhi and haghjoo (2015) by Iranian manufacturing establishments. Numerous studies have been done abroad in this regard. In this study for investigate the export financial health causation in the export market, the table (1) summarizes the studies conducted in this area.

Table (1): Review the literatures

author	Data	Estimation model	Result
Facundo Albornoz and Marco Ercolaniy (2007)	**Panel of Argentinian firms spanning 1992-2001**	**Propensity score matching (PSM) techniques and GMM regressions**	**Firms that are new to exporting seem to experience particularly high productivity gains but begin enjoying them before entering into the export market.**
David Greenaway, Alessandra Guariglia, Richard Kneller (2007)	**9292 UK manufacturing firms over the period 1993–2003**	**Panel**	**Exporters exhibit better financial health than non-exporters. They did not find evidence that firms enjoying better ex-ante financial health are more likely to start exporting, and strong evidence that participation in export markets improves firms' financial health.**
Kent Eliasson, Pär Hansson and Markus Lindvert (2009)	**All Swedish manufacturing firms with one employee or more during 1997 to 2006.**	**Matching approach**	**1. Exporters have higher productivity than do unmatched non-exporters before entry into the export market. 2. Productivity increase among future exporters relative to matched non-exporters 1-2 years before export entry.**
Armando Silva (2011)	**All manufacturing Portuguese firms with less than 100 workers and all the universe of firms with more than 100 workers during 1996-2003**	**Propensity score matching**	**Firms enjoying better financial health are more likely to become exporters and that new exporters show improvements in their financial situation.**
Valdec, Miljana, and Jurica Zrnc. (2015)	**Firm-level dataset covering the Croatian manufacturing sector from 2002 until 2012**	**Propensity score matching**	**Exporters have characteristics superior to those of non-exporters and there is pervasive evidence of self-selection into export markets, meaning that firms are successful years before they become exporters.**
Haeng-Sun KIM(KILF) (2016)	**3353 Korean manufacturing firms over the period 1994– 2011**	**Pooled Probit**	**He found that leverage for financially-constrained firms is negatively associated with the probability of exporting while leverage for financially unconstrained is not and, future exporters have higher leverage before they begin to export, while**

			in the sample of financially-unconstrained firms, firms with ex-ante lower leverage self-select to export.
Elisabeth Maes, Nico Dewaelheyns, Catherine Fuss, Cynthia Van Hulle (2019)	**Belgian small and medium sized enterprises (SMEs) between 1998 and 2013**	**Propensity score matching**	**They found that the positive linkage between pledgeable short-term assets and short-term debt financing is more pronounced for exporters.**

III. Data sample and summary statistics

3.1The dataset

The dataset collected from the profit and loss and balance sheet data for 98 Companies from 20 industry in Tehran stock Exchange during 1999-2018. The firms in our dataset operate in the manufacturing sector. We excluded companies that changed the date of their accounting year-end by more than a few weeks, so that data refer to 12 month accounting periods. Firms that did not have complete records the relevant financial variables were also dropped.

3.1.1 Measure of Financial Constraints

Greenaway et al. (2007) used liquidity ratio and the leverage ratio as an indicator of financial health so that a higher leverage reduces financial health. Musso and Schiavo (2008) by using the average of the seven financial variables which are, size (total assets), profitability (return on total assets), liquidity (current asset over current liabilities), cash flow generating ability, solvency (own funds over total liabilities), trade credit over total assets, repaying ability (financial debt over cash flow) and Total Factor Productivity (TFP), have calculated the financial health index.

In this study, financial health index was estimated by principal component analysis (Pca) method. This method is based on linear algebra. In this method, the correlated variables are summarized as a set of uncorrelated components, each of which is a linear combination of the main variables. The obtained uncorrelated components are called the principal component derived from the special covariance matrix or correlation matrix of the main variables.

3.1.2 Propensity score

The propensity score is an alternative method, for estimating the effect of treatment on random selection and for comparing two groups of individuals for analyzing different treatment modalities. The concept of tendency rank adjustment (PSM) was first introduced by Rosenbaum and Rubin (1983) (Becker and Ichino, 2002).

While regression and matching approaches are both based on conditional independence for drawing casual inference, there are a few differences between the approaches that are more than cosmetic. First, matching does not rely on the type of functional form assumptions that regression typically does. Second, matching is more explicit in assessing whether or not comparable untreated observations are available for each treated observation (Eliasson etal, 2009).

Statistical concepts:

To estimate the tendency score $e(x_i)$ for a population of units (firm) denoted by i, $(i = 1, \dots, N)$, a conditional probability for a particular treatment is assigned by taking the observed variables:

$$e(X_i) = \Pr(z_i = 1|X_i)$$

$z_i = \{0,1\}$ is the indicator of exposure to treatment. x_i is the vector of control variables for sample i. The propensity score rating is between 0 and 1.

If the propensity score $e(X_i)$ is known, then the Average effect of Treatment on the Treated (ATT) can be estimated as follows:

$$\begin{aligned}\tau &= E\{Y_{1i} - Y_{0i}|Z_i = 1\} = E[E\{Y_{1i} - Y_{0i}|Z_i = 1, e(X_i)\}] \\ &= E[E\{Y_{1i}|Z_i = 1, e(X_i)\} - E\{Y_{0i}|Z_i = 0, e(X_i)\}|Z_i = 1]\end{aligned} \quad (1)$$

Where the outer expectation is over the distribution of $e(X_i)|Z_i = 1$ and Y_{1i} and Y_{0i} are the potential outcomes in the two counterfactual situations of (respectively) treatment and no treatment.

If the propensity score is practically unknown, the most common method for estimating it is using logit and probit regression models. In this model, the dependent variables are the same membership in the control group and the independent variables are the factors whose distribution is similar in the two groups.

IV. Summary statistic

4.1 Measuring financial Health

In this paper, the variables of asset return, Quick Ratio, financial leverage, equity ratio, sales return, cash ratio, working capital are used to calculate financial health index. In Table (1), the definition and method of calculating each of these financial ratios are described.

Table (2): Definition and Method of Calculating Financial Ratios

Financial Factor	Definition	Calculating
Asset Return	**The return on assets ratio measures how effectively a company can earn a return on its investment in assets.**	$\frac{Net\ Income}{Total\ Assets}$
Quick Ratio	**The quick ratio or acid test ratio is a liquidity ratio that measures the ability of a company to pay its current liabilities when they come due with only quick assets. Quick assets are current assets that can be converted to cash within 90 days or in the short-term. Cash, cash equivalents, short-term investments or marketable securities, and current accounts receivable are considered quick assets.**	$\frac{\text{Quick } Assets}{\text{Current Liabilities}}$
financial leverage	**The financial leverage ratio is an indicator of how much debt a company is using to finance its assets. A high ratio means the firm is highly levered (using a large amount of debt to finance its assets). A low ratio indicates the opposite.**	$\frac{Total\ Assets}{Total\ liability}$
ROA	**This ratio can also be represented as a product of the profit margin and the total asset turnover**	$\frac{Total\ Equity}{Total\ Assets}$
Return on sales	**Since the return on sales equation measures the percentage of sales that are converted to income, it shows how well the company is producing its core products or services and how well the management teams is running it.**	$\frac{Operating\ Profit}{Net\ Sales}$
Cash Ratio	**The cash ratio shows how well a company can pay off its current liabilities with only cash and cash equivalents. This ratio shows cash and equivalents as a percentage of current liabilities.**	$\frac{Cash + Cash\ Equivalent}{Total\ Current\ liabilities}$
working capital	**Obviously, a positive net WC is better than a negative one. A positive calculation shows creditors and investors that the company is able to generate enough from operations to pay for its current obligations with current assets.**	**Current Assets-Current Liabilities**

Source: https://maaw.info/

In order to use the principal component analysis (Pca) method, the above variables must be normalized in order to homogenize the data. The first step in investigating the relationship between variables is to examine their correlation matrix by Pearson's correlation coefficient. Table (3) shows a high correlation between all data. The results of the Bartlett's Test, which is zero hypothesis indicate no correlation for the data set, and also based on the research of Taherdoost et al. (2014) Kaiser-Meyer-Olkin Measure for the adequacy of the variables used in indexing varies from 0 to 1, and a value above 0.50 is suitable for indexing. Table (4) shows the results of this two test.

Table (3): Correlation Matrix

	Financial leverage	asset return	ROA	Quick Ratio	sales return	cash ratio	working capital
leverage Financial	**1**						
asset return	**-0.1915**	**1**					
ROA	**-0.312**	**0.2379**	**1**				
instant ratio	**-0.1777**	**0.2679**	**0.1763**	**1**			
sales return	**-0.0704**	**0.2344**	**0.0825**	**0.1393**	**1**		
cash ratio	**-0.0859**	**0.0283**	**0.0264**	**0.0491**	**0.0321**	**1**	
working capital	**-0.5815**	**0.2881**	**0.2763**	**0.3455**	**0.0588**	**0.0829**	**1**

Source: Base on estimation Stata 15

Table (4): Bartlett test of sphericity	
Chi-square	**2213.236**
Degrees of freedom	**21**
p-value	**0.00**
Kaiser-Meyer-Olkin Measure of Sampling	
kmo	**0.67**
Source: Base on estimation Stata 15	

As the Figure (1) shows, the first component is the best choice. The first vector, called FH 1, can be characterized as financial health. By choosing this vector, the share of each of the variables of financial leverage, asset return, equity ratio, instant ratio, sales return, cash ratio and working capital are: -0.47, 0.39, 0.38, 0.38, 0.19, 0.10 and 0.52.

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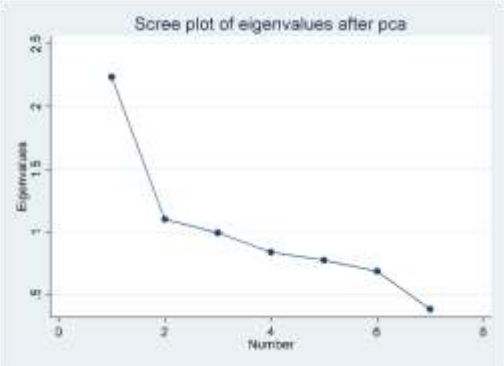
Figure (1): component



Source:Base on estimation Stata 15

4.2 Main Model

In this section, we first investigate difference in exporters and non-exporter. In so doing, we use a Propensity Score Matching approach that allows adjusting for potentially confounding firm characteristics. Here, the point is to match each exporters to non-exporters, whose observed characteristics as similar as possible. The logistic regression model was used to estimate propensity score for export and non-exporter. The dependent variable of this estimation is firms' exporting status, so that EXP DUM_{it} is a binary indicator variable equal to 1 for firms that are exporters:

$$\text{EXP DUMit} = \begin{cases} 0 & if\ Export\ Sales_{it} \leq 0 \\ 1 & if\ Export\ Sales_{it} > 0 \end{cases}$$

The results of Logit regressions to generate the propensity score are reported in Table (4), when simply using the export dummy as the treatment variable. In the baseline specification, we simply control for the employment, the firm's age, leverage, capital and loan.

Table(5): Estimation Result

ex	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Age	**0.043873**	**0.004874**	**9**	**0**	**0.03432**	**0.053426**
employment	**0.000114**	**0.000049**	**2.33**	**0.02**	**1.81E-05**	**0.00021**
Leverage	**-0.18979**	**0.168672**	**-1.13**	**0.26**	**-0.52038**	**0.140797**
capital	**1.16**	**0.3568472**	**3.26**	**0.001**	**0.4641985**	**1.863014**
Loan	**0.00063**	**0.000139**	**4.53**	**0**	**0.000357**	**0.000903**
_cons	**-1.31646**	**0.254254**	**-5.18**	**0**	**-1.81479**	**-0.81813**

Source: Base on estimation Stata 15

Table (5) show the difference between exporters and non-exporters. However, firms that export tend to hire more and are older than non-exporters. They rely heavily on loan and working capital to finance. In addition, non-exporters have more leverage ratio than exporters. According to propensity score matching, most estimated coefficients show the expected signs. As anticipated, we find that firms with higher levels employment and lower leverage are likely to be exporters. However, that the level of leverage can affect the likelihood of exporting in opposite directions.

The results on financial health differentials between exporters and non-exporters are reported in Table (6). We present the ATT and the derived export premium. In the baseline specification, the results strongly support the idea that exporting firms are healthier than their domestic firms. Table (6) shows the average effect of export (treatment) on financial health. Estimated results of the Average treatment effect on treated (ATT) of the sample using the scoring matching method showed that the treatment groups had an average financial health of 0.04, while other firms had an average financial health of - 0.28. Exports have a positive effect on the financial health of firms.

Table(6): Average Treatment Effect on Treated (ATT)

Variable	Sample	Treated	Controls	Difference	S.E.	T
Financial Health	Unmatched	0.043637	-0.09282	0.136454	0.055033	2.48
	ATT	0.043637	-0.2806	0.324235	0.081391	3.98

Source: Base on estimation Stata 15

After matching, it is necessary to check the quality of this estimate. The results of Table (7) show that the mean of the Covariate variable in both control group and treatment group before and after matching. The difference between the Covariate variables in the treatment and control group after matching decrease for the variable, age 96.7 percent, capital 17.4 percent, labor 59.8 percent, loan 66.3 percent but for leverage increase. Given the average amount of bias before and after matching based on Rosenbaum and Robin (1985) should be less than 5%, R2 is very close to zero after matching and its p-value after matching does not significant. After match, the average bias is 3.9, which is much less than 5, but before the match, it was 26.9. After many trials it is managed to find an overall good matching quality as indicated in table (8).

Table(7): output on matching quality(1)

Variable	Unmatched Matched	Mean	Treated Control		%reduct bias	t-test		V(T)/ V(C)
				%bias		t	p>t	
Age	U	33.355	25.07	60.3		9.85	0	0.99
	M	33.41	33.68	-2	96.7	-0.51	0.611	0.97
Capital	U	0.08882	0.04297	13.6		1.89	0.059	1.47*
	M	0.08859	0.0507	11.3	17.4	3.03	0.003	1.51*
Labor	U	1849.9	821.6	23.3		3.08	0.002	12.60*
	M	1835.2	1422	9.4	59.8	2.08	0.038	2.05*
Leverage	U	0.67198	0.673	-0.2		-0.02	0.981	1.75*
	M	0.67286	0.712	-11.5	-6985.4	-3.08	0.002	2.09*
Loan	U	759.47	591.7	35.5		5.8	0	1
	M	759.47	702.9	12	66.3	3.17	0.002	1.07

Source: Base on estimation Stata 15

Table(8): output on matching quality(2)

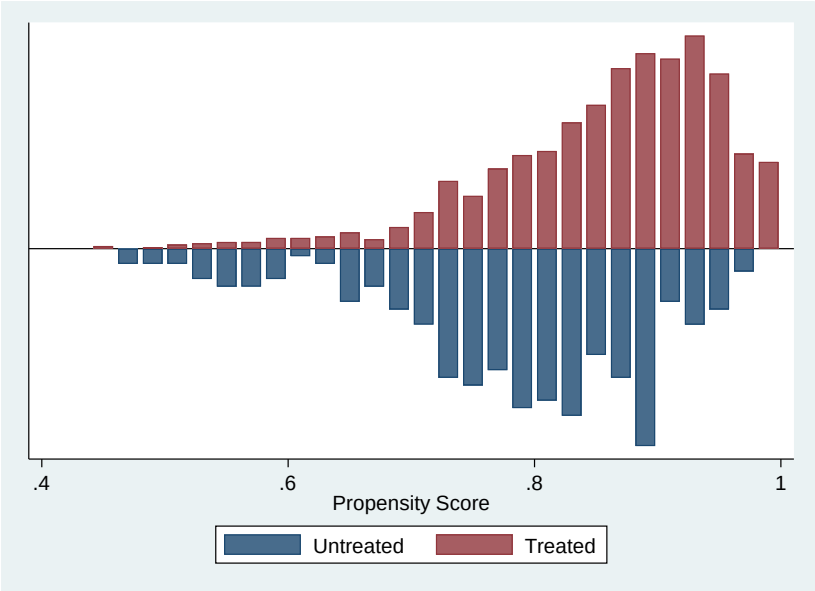
Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.123	204.84	0.000	26.9	23.3	86.2	1	57
Matched	0.003	10.88	0.144	3.9	2.5	12.7	1.9	71

Source: Base on estimation Stata 15

The next step is to verify the quality of the match by controlling the region of common support between the treatment and control group. A straightforward way to compares the density distribution of propensity score for a group of non-exporters versus a group of exporters, presented in Figure (3) and (4). This diagram

confirms that the density distribution function of the score for both groups after estimating the PSM model has a same trend, which means that the estimation of the PS model is valid.

Figure (2): PS Match



Source: Base on estimation Stata 15

V.Conclusion

Previous studies on the relationship between exports and financial constraint describe the superior financial health of exporters, as compared with non-exporters. This paper belongs to the recent stream of the literature that studies the links between exports and financial health. We use a new way to assess the degree of financial constraint, in a development of the multivariate index proposed by Musso and Schiavo (2008) and developed by Silva (2011). Our main goal is whether export has any positive effect on financial health. Methodologically, we present, a propensity score matching in order to evaluate the effects of export on the financial health of firms. We examine this relationship using data from the 94 Iranian manufacturing industry during 1999-2018. We find that exporters are healthier than their domestic firms. Treatment groups (exporters) had an average financial health of 0.04, while other firms had an average financial health of -0.28.

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