Firm size and the use of export intermediaries

A replication study of Abel-Koch,

***The World Economy* (2013)**

WORKING PAPER

by

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Abstract:

This study replicates estimation results from Jennifer Abel-Koch, Who Uses Intermediaries in International trade? Evidence from Firm-level Survey Data, published in *The World Economy* (2013). In this paper she uses firm-level data from Turkey. The pure replication performed here that is based on a sample that differs only marginally from the sample used in the original study is successful. In addition to the pure replication I use firm-level data for Egypt from a highly similar survey. The most important result found by Abel-Koch for Turkey – a negative relationship between firm size and the intensity of use of intermediaries in exports – is found for Egypt, too. Results for the link between other firm characteristics and indirect exports via intermediaries, however, often turn out to be different.

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1.   Introduction

In 2013 Jennifer Abel-Koch (2013) published one of only few empirical papers that use firm-level data to investigate the intensity of the use of intermediaries in exports. At the core of her study is the link between firm size and the share of indirect exports via intermediaries in total exports of a firm. Her main hypothesis is stated as follows (Abel-Koch 2013, p. 1046): "There is a negative relationship between firm size and the share of indirect export sales in total sales."

Abel-Koch (2013) empirically tests this hypothesis with data from the *Productivity and the Investment Climate Private Enterprise Survey* carried out by the World Bank in Turkey in 2005. Like all other data from the World Bank's Enterprise Surveys these data are readily available from the web after registration as a user (see www.enterprisesurveys.org for details). Furthermore, data from very similar (but not identical) surveys conducted in other countries are available, too.

In this study I use the data for Turkey that were used by Abel-Koch (2013) for a pure replication in a first step. In a second step I use comparable data for Egypt for a replication study.

2.   Pure replication

The data from the Private Enterprise Survey carried out by the World Bank in Turkey in 2005 and the questionnaire used were downloaded from www.enterprisesurveys.org/portal/ . The description of the variables used in the original study in Abel-Koch (2013) is detailed enough to identify the respective variables in the questionnaire and in the data set. The only difficulty that occurred to me was that Abel-Koch (2013) does not report in detail how she selected the firms included in her study. She only states that she excluded "firms that are not in the manufacturing sector" (Abel-Koch 2013, p. 1047). However, according to the variable

`revenue_manufacturing` from the data set all firms included generate between 5 and 100 percent of their revenue from manufacturing. Using information from variable `q9a1` I excluded some firms that are based in industries outside manufacturing (i.e., in two-digit industries with identifiers larger than 36). This selection leads to an estimation sample that has 762 firms with complete information on all variables, while Abel-Koch (2013) uses only 760 firms.[1]

Summary statistics for the original sample and the replication sample are listed in Table 1. The differences are tiny. Estimation results for the complete model with all independent variables and two estimation methods (OLS and quasi-maximum likelihood method QMLE that explicitly takes care of the fact that the dependent variable is a percentage variable bounded between zero and one with a probability mass at zero due to firms not exporting indirectly at all) are reported in Table 2. Results are nearly identical for the original sample and the replication sample.

The bottom line, then, is that the pure replication of the study by Abel-Koch (2013) is successful.

3. Replication study with firm-level data from Egypt

In my replication study I use data from the *Productivity and the Investment Climate Private Enterprise Survey* carried out by the World Bank in Egypt in 2006. The data and the questionnaire were downloaded from www.enterprisesurveys.org/portal/ . While large parts of the surveys for Turkey (used in Abel-Koch (2013) and in the pure replication study reported in section 2) and Egypt are identical some information used in the study for Turkey is missing for Egypt. There is no information available telling whether a firm from Egypt is a multinational firm with a subsidiary in a foreign country

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[1] Note that the Stata do-file(s) used by Abel-Koch are not published or made available in a repository.

or whether the Egyptian firm is located in a free trade zone. Furthermore, there are a huge number of missings among the answers to question `q41a` that askes for the degree of contract enforceability, and information on the regional distribution of firms is coded rather differently in Turkey and Egypt. Therefore, these variables are left out from the models estimated in the replication study.

Summary statistics for the estimation sample for Egypt that has information on 352 firms are reported in the last column of Table 1. Results for identically specified empirical models based on the replication sample for Turkey and the estimation sample for Egypt are reported in Table 3.

Results for Egypt are in line with the main hypothesis from Abel-Koch (2013) and her results reported for Turkey - there is a negative relationship between firm size and the share of indirect export sales in total sales. The marginal effects estimated in the models fit by QMLE (which is much better suited to deal with a dependent variable that is a fractional variable with a probability mass at zero than OLS) are of the same order of magnitude for the two countries.

While the results for firm size are the same for both countries this is not the case for most of the other independent variables included in the empirical model. The link between firm age and the share of indirect in total exports is positive and highly statistically significant for Egypt but not for Turkey, while the opposite holds for the link between introducing a new product and indirect exports, and the share of indirect imports in all inputs and the share of indirect exports in total exports. Furthermore, the link between both having a quality certification and the share of employees with a university degree on the one hand and the intensity of using export intermediaries is negative and statistically significant in Turkey – but not so in Egypt. Only the share of direct imports in all inputs is statistically significant and negative in both the empirical

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models for Turkey and Egypt. Results from Turkey, therefore, were not replicated for Egypt for five out of eight firm characteristics included in the empirical model.

4. Concluding remarks

This study replicates estimation results from Abel-Koch (2013) based on firm-level data from Turkey. The pure replication that is based on a sample that differs only marginally from the sample used in the original study is successful. In addition to the pure replication firm-level data for Egypt from a highly similar survey are used for scientific replication. The most important result found by Abel-Koch (2013) for Turkey – a negative relationship between firm size and the intensity of use of intermediaries in exports – is found for Egypt, too. Results for the link between other firm characteristics and indirect exports via intermediaries, however, often turn out to be different.

References

Abel-Koch, Jennifer (2013): Who Uses Intermediaries in International trade? Evidence from Firm-level Survey Data. *The World Economy* 36 (8), 1041-1064.

Table 1: Summary statistics

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Variable	**Turkey** Original sample Mean (sd)	**Turkey** Replication sample Mean (sd)	**Egypt** Estimation sample Mean (sd)
Share of indirect exports In total exports	0.246 (0.375)	0.245 (0.375)	0.175 (0.368)
Firm size (number of employees)	186.162 (301.656)	186.04 (301.284)	668.89 (1,503.81)
Firm age (years)	17.428 (12.584)	17.407 (12.574)	24.634 (19.690)
New product (Dummy; 1 = yes, 0 = no)	0.413 (0.493)	0.412 (0.493)	0.327 (0.470)
Product upgrade (Dummy; 1 = yes, 0 = no)	0.686 (0.465)	0.686 (0.464)	0.460 (0.499)
Quality certification (Dummy; 1 = yes, 0 = no)	0.472 (0.5)	0.471 (0.499)	0.449 (0.498)
Share of employees with university degree	0.117 (0.131)	0.117 (0.131)	0.223 (0.176)
Share of direct imports in inputs	0.187 (0.27)	0.187 (0.27)	0.321 (0.331)
Share of indirect imports in inputs	0.078 (0.187)	0.078 (0.188)	0.064 (0.190)
Contract enforceability (scale from 1 to 6)	3.474 (1.688)	3.475 (1.686)	not available
Multinational firm (Dummy; 1 = yes, 0 = no)	0.147 (0.355)	0.147 (0.354)	not available
Free trade zone (Dummy; 1 = yes, 0 = no)	0.162 (0.369)	0.163 (0.369)	not available
Number of firms	760	762	352

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<u>Note:</u> Figures for Turkey / Original sample are taken from Abel-Koch (2013), Table 3; figures for Turkey / Replication sample and Egypt / Estimation sample are based on own calculations.

Table 2:   Estimation results – Turkey, original sample and replication sample

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Variable	Estimation method	Turkey Original sample		Turkey Replication sample	
		OLS	QMLE	OLS	QMLE
Firm size (log. number of employees)		-0.045 (0.013)***	-0.043 (0.012)***	-0.046 (0.013)***	-0.044 (0.012)***
Firm age (years)		0.000 (0.001)	0.000 (0.001)	0.0005 (0.001)	0.0001 (0.001)
New product (Dummy; 1 = yes, 0 = no)		0.120 (0.029)***	0.120 (0.030)***	0.117 (0.029)***	0.115 (0.029)***
Product upgrade (Dummy; 1 = yes, 0 = no)		-0.055 (0.032)*	-0.049 (0.030)	-0.056 (0.031)*	-0.048 (0.030)
Quality certification (Dummy; 1 = yes, 0 = no)		-0.068 (0.030)**	-0.059 (0.028)**	-0.068 (0.030)**	-0.057 (0.028)**
Share of employees with university degree		-0.234 (0.088)***	-0.271 (0.116)***	-0.236 (0.089)***	-0.269 (0.114)**
Share of direct imports in inputs		-0.158 (0.046)***	-0.179 (0.056)***	-0.159 (0.046)***	-0.179 (0.055)***
Share of indirect imports in inputs		0.289 (0.086)***	0.229 (0.067)***	0.291 (0.085)***	0.230 (0.066)***
Contract enforceability (scale from 1 to 6)		0.001 (0.008)	0.000 (0.007)	0.0002 (0.008)	-0.0008 (0.007)
Multinational firm (Dummy; 1 = yes, 0 = no)		-0.089 (0.028)***	-0.108 (0.027)***	-0.089 (0.028)***	-0.106 (0.027)***
Free trade zone (Dummy; 1 = yes, 0 = no)		-0.085 (0.041)**	-0.068 (0.032)**	-0.088 (0.041)**	-0.068 (0.031)**
Sector and region dummies		yes	yes	yes	yes
Number of firms		760	760	762	762

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Note: Figures for Turkey / Original sample are taken from Abel-Koch (2013), Table 4; figures for Turkey / Replication sample are based on own calculations. For OLS, coefficients are reported; for QMLE, marginal effects at the mean. Robust standard errors are reported in parentheses. All models include a constant, too. ***/**/* denote statistical significance at the 1/5/10 percent level.

Table 3: Estimation results – Turkey and Egypt

Variable	Estimation method	Turkey Replication sample		Egypt Estimation sample	
		OLS	QMLE	OLS	QMLE
Firm size (log. number of employees)		-0.050 (0.013)***	-0.048 (0.012)***	-0.085 (0.017)***	-0.042 (0.011)***
Firm age (years)		0.0002 (0.001)	0.0001 (0.001)	0.004 (0.001)***	0.002 (0.0005)***
New product (Dummy; 1 = yes, 0 = no)		0.122 (0.029)***	0.122 (0.030)***	0.013 (0.043)	0.0005 (0.027)
Product upgrade (Dummy; 1 = yes, 0 = no)		-0.049 (0.030)	-0.047 (0.030)	0.032 (0.040)	-0.018 (0.025)
Quality certification (Dummy; 1 = yes, 0 = no)		-0.071 (0.030)**	-0.064 (0.028)**	0.031 (0.038)	0.025 (0.026)
Share of employees with university degree		-0.232 (0.089)***	-0.272 (0.117)**	-0.107 (0.091)	-0.063 (0.068)
Share of direct imports in inputs		-0.166 (0.045)***	-0.189 (0.056)***	-0.172 (0.061)***	-0.134 (0.047)***
Share of indirect imports in inputs		0.307 (0.084)***	0.250 (0.064)***	0.187 (0.158)	0.042 (0.062)
Sector dummies		yes	yes	yes	yes
Number of firms		762	762	352	352

Note: Figures are based on own calculations. For OLS, coefficients are reported; for QMLE, marginal effects at the mean. Robust standard errors are reported in parentheses. All models include a constant, too. ***/**/* denote statistical significance at the 1/5/10 percent level.

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