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SYSTEMATIC STUDY OF IMPORT AND EXPORT FOR INDUSTRIAL GOODS (CASE STUDY: METAL INDUSTRY IMPORT AND EXPORT IN IRAN)

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Abstract: *Since the steel industry is the mother one in the country economic development programs give a particular importance to it, so this study discuss about impact of important factors in import and export in period of 1979 - 2013 study short and long term impact of important variables like Real exchange rate, TFP, Trade Openness, GDP Excluding oil and human capital in this industry. In the following, by using of Bounds test approach and its application in Auto Regressive Distributed Lag, two different models were estimated. The results of the first model (Export) show the positive impact of all variables to export of steel industry in long term. Also, according to Granger causality test, short-term causal relationship between the real exchange rate to export steel industry accepted that, with consideration to it, is depend on the type sign of this relationship can be concluded that with increase in exchange rate in Iran, exports may arise. The results of the second model (Import), shows that economic openness and growth have positive impact and exchange rates, human capital and productivity have a negative one. Granger causality test results show, short-term relationship of exchange rate and trade openness in import of metal industry.*

Keywords: *metal industry, import, export, ARDL*

1. INTRODUCTION

Lately, numerous researchers have examined the relationship between import and export and economic development by utilizing financial hypothesis and econometric strategies. A number of them demonstrated the "fare driven development" theory regarded from hypothetical and observational points of view [1-7]. Nowadays, no state can eliminate their needs without other countries products and services, since it is not economically affordable. So, product and service exchange between countries, arise based on relative and absolute advantage. One of the criteria in assessment of economic vigor is trade balance. Import and export is two main pillar of this balance. Also, in analysis of macroeconomics and economic policy, checking demand of import and export have a special importance in understanding the macroeconomic model, effectiveness and efficiency trade

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policy. Thus, each change in imports can affect production process and its growth [8-10]. The involvement of a country in the global market represents industry dynamics and low cost of its products. In comparison with other countries usually those with dynamic industry have an advanced technology, good management and optimal scale; therefore, they represent profitable efficiency [11].Lately, statesmen pay particular attention to import efficiency. Therefore, it is important to adopt appropriate policy for import and export, but selecting the correct strategy to imports is subject to consideration of the factors affecting it. Given the major components of imports and exports, this review is based on imports and exports of industrial goods; especially metal industry [12]. Metal importance in human life is tangible. Iran's steel industry with an emphasis on protecting the environment, improving the quality and efficiency according to the requirements, is really active and effective [13-14]. Considering all existing conditions in the world and Iran, a model that can consider the variables of supply and demand of all final goods and intermediate metal industry, the future trend of the industry to emulate economic changes, can have an important role to help decision-makers in the country's metal industry. In this study, time series data and import Sadat Greg metals, real exchange rate, total factor productivity, openness of GDP excluding oil central bank has been used in the period of 1979-2012. Although, we have tried to use one source statistical data but unfortunately due to lack of information, needed to use various sources like the World Bank, The Central bank's balance sheet and UN site. Software that used to estimate the pattern is Microfit.

2. RESEARCH METHOD

The model chosen for the study of factors affecting the import and export of metal industry and estimated by ARDL method (with Microfit software), as follows:

EX= (RER, EF, OP, NGDP, HI)

EX= Manufactured exports in metal industry / RER= Real exchange rate

EF=TFP production / NGDDP= GDP excluding oil and gas

HI=Human capital in the country

D1=Permanent variable for 1981 to 1989.in these years there was a large sway in Iranian exports so the dummy variables for the period chosen.

D2=During 1992 to 1994,because of exchange rate increase in these years export increased so second dummy variable defined for this years

Empirical analysis of long-term relationships and interactions among the variables study, the model is estimated using Bounds test approach to integration. Estimating collective relationship by ordinary least squares method, when the number of intervals specified, model can be applicable. Bounds test consists of

two phases to estimate the long-term relationship. IN the first stage, long-term relationship between the variables in the equation was checked. Secondly, the ratios of long-term and short-term coefficients were estimated using ARLD and ECM models [15-16].

Due to the presence or absence, bound or unrestricted intercept, the origin and the five modes for error correction model have been introduced.

First mode: Without intercept and no trend. So ECM is as follows:

Second mode: With a bound intercept and without trend so ECM is as follows:

Third mode: unrestricted intercept and without trend so ECM is as follows:

Forth mode: unrestricted intercept and with a bound trend so ECM is as follows:

Fifth mode: unrestricted intercept and with unrestricted trend so ECM is as follows:

According to above equations the conditional ESM on this research for three molds is as follows:

Third mode:

Forth mode:

Fifth mode:

In above equations long term coefficients, is intercept and is white nose errors. First step in bound test is estimating the conditional ECM by ordinary least squares method to test the long-term relation between variables by testing F for significant coefficients of the variables delay, it means that; versus .for I(d) independent variables, two sets of critical values for the F-test and T-test were provided for the test bounds :low bank for I(0) regressors and high bank for I(1) regrresors were supposed. If the presumption of F-test is larger than the critical value above Bank regardless to the degree of integration of variables, the null hypothesis that there is no long-term relationship is rejected. Vice versa, if the statistical test is lower than the critical value low bounds, the null hypothesis can't be rejected. Finally, if the statistical test is between the upper and lower bounds, the result is uncertain. So, we can use Banerjee, Dolado and Master [17-18, 15]

Results:

The model estimation and analysis:

After defined research method by using appropriate tools, required data to test the hypothesis raised, finally the hypothesis of the research have led to put on test duty on them to be able find answers to research [20]. Now, it's time to use

appropriate statistical techniques, research methods, types of variables compatibility data collection and analysis to categorize.

The introduction of the models: (affected factors on exports and imports of the metal industry):

This section describes model variables .According to several studies in the field of estimated demands for import and export and their process in metal industry, model adapted to the realities of the Iran economy were considered, then estimated by ARDL method and Microfit software which is as follows:

1. Export model: EX= (RER, EF, OP, NGDP, HI)
2. Import model: IM= (RER, EF, OP, NGDP, HI)

EX: Manufactured exports in metal industry, IM: Imports of goods in the metal industry

RER=Real exchange rate, EF=TFP production

NGDP= GDP excluding oil and gas, HI: Human capital in the country

D1=Variable for years 1981-1989, there was fluctuations in exports and imports in these years .So for this period, dummy variable model is selected.

D2= by growth in currency rates in 1992-1994, increase in exports and reduce in imports was in country, second dummy variable for these years selected.

Due to empirical basis of past, in order to accomplished better fitness the intercept is used and also, there have been a real quantity for variables in this section. Since the logarithmic model indicates the stretch factor, it was used in this article [21-22]

The Results of Hypotheses Testing

In this section of paper we present analysis the results of research hypotheses. As mentioned before, for testing H2 and H4, we also use a sample of state companies. The following subsections provide analysis of results of hypotheses testing at total sample level, industrial group level, and year level.

3. MODELS ESTIMATION AND ANALYZE RESULTS:

The primary steps in estimating regression ensure stability variables to ensure the estimation of spurious regression is proven reliability of normal F &T statistics. In this study, test on the reliability of variables done by common test ADF and PP for import and export model. Table1 is the results of ADF and PP by using of Eviewse6 software for variables.

Table 1
Dickey Fuller and Phillips- Perron unit root test results

	EXPORT	IMPORT	EXPORT & IMPORT				
STATESTIC	**LEX**	**LEX**	**LRER**	**LEF**	**LOP**	**LNGDP**	**LHI**
τμ *(ADF)*	-.095(0)	-1.42(0)	-1.05(1)	-0.80(0)	*-2.65(1)	-1.44(0)	*6.31(0)
τT (A*DF*)	*-2.89(0)	*-2.12(0)	-1.42(1)	-1.53(0)	*-2.67(1)	-1.46(0)	*-3.22(0)
τμ *(PP)*	-0.95(0)	-1.45(0)	-0.95(0)	-0.93(3)	*-2.63(3)	-1.70(4)	*-5.21(3)
τ*T (PP)*	*-2.79(2)	*-2.36(2)	-1.24(0)	-1.66(3)	*2.44(3)	-1.68(4)	*-3.13(2)
	Δ LEX	**Δ LEX**	**Δ LRER**	**Δ LEF**	**Δ LOP**	**Δ LNGDP**	**Δ LHI**
τμ *(ADF)*	*−7.57(0)	*−4.58(0)	*-4.32(1)	*-6.44(0)	*-4.45	*-4.05(3)	–
τT (A*DF*)	–	–	*-4.41(0)	*-6.47(0)	*-3.71(0)	*-4.53(3)	–
τμ *(PP)*	*−7.58(1)	*−4.65(1)	*-4.96(0)	*-6.44(2)	*-4.19	*-5.74(4)	–
τ*T (PP)*	–	–	*-5.12(0)	*-6.47(1)	*-3.71(0)	*-5.73(3)	*-4.43

Point: L logarithm to base Napier. TU: Unit root test statistic for the model intercept and no trend. TT: Unit root test statistic for the model intercept and process.ADF the number of intervals are determined by criteria Schwartz. In pp Bartlett-kernel numbers in the test set.

* shows the stability of the variables at the level of10%.

The results of table 1 shows that for LRER, LEF, LNGDP variables, absolute Value of ADF is smaller MacKinnon critical values, so they named I (1) but LHI,LOP,LEX variables are I(0).Given all variables at the same time, not static so to estimate the model, Auto-Regressive Distributed Lag pattern (ARDL) used (2001)(14). The long-term is presented estimating model by ARLD at first. But as it turned out all static variables are not of a degree (15).

Table 2 shows the bounds test values. If the statistics obtained from the calculations compared with critical values, results shows that, statistic is larger than the high bound so there is Long-term relationship between the variables. The results shows the long-term relationship between the variables for both import and export model (2004 narayan).

After ensuring there is a long-term relationship between the variables and the absence of spurious regression, the estimation is carried out by using model(for

Table 2
Bank test results together (F-test) for a long-term relationship

90% percent of critical values (Narayan)		90% percent of critical values (pesaran)		The presumption of F-Test calculated regressor Mode 5	
I(0)	**I(1)**	**I(0)**	**I(1)**		
2.27	3.29	2.86	3.92	6.41	**Export**
2.27	3.29	2.86	3.92	5.07	**Import**

import and export) with intercept and non-bound process.Table3 show the results of long-term relationship and estimate its coefficients.

Table 3
Long-term relationship model

variable	*LHI*	*C*	*LRER*	*LNGDP*	*LOP*	*LEF*	*LHI*
Export	**coefficient**	8.027	2.013	2.787	3.210	1.083	2.153
	Probability(t)	45.25(0.00)	4.34(0.02)	1.31(0.41)	7.00(0.00)	4.58(0.00)	32.17(0.00)
Import	**coefficient**	-7.455	- 4.549	0.789	3.716	-1.598	-1.946
	Probability(t)	36.12(0.00)	6.02(0.00)	3.21(0.00)	4.98(0.00)	2.69(0.00)	17.65(0.00)

In long- term all coefficients are in 95% or 98% level confidence in terms of statistic except LNGDP in export model, since the model is logarithmic provided, coefficients show the export long-term stretch on each of the factors affecting.

In export model: Each one percent increase (decrease) in LRER cause 2.03 % increase (decrease) in export but this relationship is not strong enough concerning the relationship between exports and exchange rate, so it can't show the importance of metal industry and its role in development and growth of country. Also, according to results each one percent increase (decrease) in economic growth excluding oil LNGDP, cause 2.787% increase (decrease) in export of metal industry but in this model it is meaningless ,so regarding experimental studies in order to export the dual result of the impact of economic growth on export receipts excluding oil. First result: by increasing in economic growth, all economic sectors growth and their productivity and also export will increase, but in return with economic growth regardless of oil and gas, all economic sectors will grow and demands of the metals sector will increase. So economic growths regardless of oil and gas have a positive effect on metal export but it is meaningless. In degree of economic openness coefficient shows that for each one percent increase in trade relations with foreign countries 30% metal export will increase the impact of efficiency shows that for each one percent increase in efficiency of factors of production, metal export change 10%. The positive effect of human capital can be analyzed as; human capital provided conditions of innovation and improves efficiency. As a result, all factors have significant influence in metal exports [15, 17].

Import model: In export model every one percent increase (decrease) in LRER, 4.549 percent decrease (increase) is in import. This result is consistent with economic theory about the relationship between imports and the exchange rate. This relationship is so strong in our estimation model, and has the most impact on. Every one percent increase (decrease) in economic growth excluding oil LNGDP,

cause 0.789% increases (decrease) in import of metal industry. According to results, every1% improves in relation with foreign countries, metal processing industry import increase 37%. Also for every one percent increase in TFP, metal industry import decrease 15%. Negative impact of human capital can be analyzed like the followings, frequently capital resource provides the term innovation and it cause technological development within the country and increase exports. As a result, all factors have significant influence in metal exports.

Then to estimate the model, ARDL pattern used, the short-term dynamic model was shown in table4. Optimal variables due to Schwarz Bayesian criterion is ARDL(0,0,1,2,1)(for export) and ARDL(0,1,0,1,2) (for imports). As it can be clear short-term results are somewhat consistent with long-term results. Error correction factor is smaller than one and statistically is significant. Its negative was that any long-term imbalance in the balance moves. The error correction factor module is -0.25 for export and -0.17 in import. Statistic F=605.31 for export and F=19.7 for import is an evidence of significant regression.

Table 6 and 7 show the Granger causality test result based on VECM method. Regarding import and export, the metal industry is considered as explanatory variables. It's obvious that, the probability of F statistic in the first row for all variables except exchange rate in export and for currency variables and trade openness is significant. Also t-statistics, including the correction of errors related to exports, is significant. There can be indirect causality of independent variables to export the metal industry, was accepted at level 5.Also,given that t-statistics

Table 4
For export

ECM			Dynamic pattern of short-term		
Explanatory variables	**coefficients**	**T-statistics**	**Explanatory variables**	**coefficients**	T-statistics
D LRER	-0.016	-0.21 0.83	LEX (-1)	1.17	(0.042)0.063
D LEF	0.087	1.92(0.06)	LRER	5.044	(0.054)0.11
D LOP	0.194	0.00 3.08	LRER (-1)	0.242	(0.01)2.70
D LNGDP	1.269	0.68(0.49)	LRER (-2)	-0.487	(0.15)-1.47
DL HI	1.269	0.49 0.68	LEF	0.075	(0.00)2.03
C	0.020	0.82(0.41)	LEF (-1)	0.016	(0.00)3.33
ECM(-1)	0.253	3.62(0.00)	LNGDP	-1.95	(0.00)-3.33
R^2-0.75	1.82DW=	(0.00)9.77 F	LHI	0.255	(0.00)8.12
			C	10.157	(0.00)11.79
			-0.992R^2	DW=1.97	F-605.31(0.00)

Table 5
For Import

ECM			Dynamic pattern of short-term		
Explanatory variables	**coefficient**	**T-statistics**	**Explanatory variables**	**coefficients**	**T-statistics**
D LRER	-3.458	(0.18)-1.89	LIM (-1)	3.07	(0.06)3.042
D LEF	-4.652	(0.048)-2.45	LIM (-2)	0.42	(0.17)1.138
D LOP	1.041	(0.09)7.61	LRER	-3.037	(0.04)-0.16
D LNGDP	2.143	(0.46)1.17	LRER (-1)	1.341	(0.61)0.86
DL HI	1.712	(0.66)0.52	LEF	-2.642	(0.08)-2.74
ECM(-1)	17.104	(0.34)0.32	LNGDP	0.032	(0.00)3.684
$R^2 - 0.69$	DW=2.05	F-19.7(0.00)	LNGDP(-1)	-0.789	(0.00)-6.954
			LOP	1.114	(0.00)4.658
			C	-17.694	(0.00)15.32
			R^2-0.979	DW=1.99	F-482.17(0.00)

including the correction or errors in the third row up to fifth, there can be causal relationship between exports of metal and other variables and also metal exports and real exchange rate accepted [15, 17].

Table 7
Granger test results for export

	EX	**RER**	**OP**	**NGDP**	**HI**	**ECM**
EX	–	2.69(0.08)	0.54	0.67	0.21	-2.85(0.00)
RER	0.42	–	0.42	0.99	0.22	-0.78(0.43)
OP	0.42	0.61	–	0.23	0.11	0.85(0.40)
NGDP	0.97	0.68	0.44	–	0.76	0.05(0.95)
HI	0.84	0.14	0.62	0.85	–	-0.44(0.65)

Table 8
Granger test results for import

	IM	**RER**	**OP**	**NGDP**	**HI**	**ECM**
IM	–	-1.42(0.05)	0.84(0.00)	3.21	7.60	3.79(0.00)
RER	1.15	–	4.93	2.66	1.22	-1.14(0.08)
OP	1.97	4.12	–	7.13	1.09	1.16(0.44)
NGDP	1.53	12.19	2.17	–	3.66	0.07(0.90)
HI	0.14	0.95	0.36	0.74	–	-0.81(0.47)

4. CONCLUSION

Iran's metal industries development during a period of five economic developing years is of significant importance, and also considered as one of the main industries.

In this regard, it is specified that, based on estimated models on affecting factors concerning Iran's metal industries export and import during the past thirty-four years, every one percent change (decreasing or increasing) in basic variables, the real exchange rate, economic growth (without oil), improving relations with foreign countries and the productivity factors in production for metal exports makes 2.1, 2.8, 32 and 10 percent and imports 4.6, 0.79, 37 and 15 percent change respectively.

Thus, based on ARDL short-term dynamic model pattern, instability of import-export imbalances of metal industries respectively were removed 25% and 17% in each period.

In the other words, in order to correct the short-term equilibrium failure and return the model to long-term balance, four cycles for import and six cycles for export will be required.

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