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The Determinants of Export Diversification at All Margins Case Study: South Korea

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ABSTRACT

Export diversification is an important lever for the economic growth due to its pivotal role in avoiding the shortfalls in export concentration. For instance, the sensitivity of export revenues to any shock may occur to a certain sector leading to underinvestment when investors avoid the risks. Thus, diversifying export items into different products within different sectors rather than concentrating on certain products in one sector may achieve the sustainability of export earnings.

The role of export diversification can be proved in the light of success of East Asian "Tigers" such as South Korea, where the export diversification has been adopted over the last five decades with fruitful economic returns. However, some Central American countries, such as Costa Rica, applied different diversification programs in the early of 1970s and lately 1990s without attaining the stability in their export earnings. Thus, this paper aims to investigate the reasons behind the successful implementation of export diversification policy in South Korea by exploring the determinants of export diversification at all margins through developing a composite index of both export product and geographical diversification using the most common measurement, Hir-schmann-Herfindahl index, and Vector Error Correction Model in order to analysis the time series data over the period (1970-2010) based on Eviews 7.0.

Keywords: *Export Diversification, Economic Growth, Trade Cost, and Trade Liberalization.*

1. Introduction

The globalization phenomenon and openness to trade under uncertain circumstances, such as the collapse of Second World War in 1950 and global financial crisis in the late of 2008, may introduce fluctuations in the export earnings which discourage the investment opportunities, thereafter leads to instability in export growth and economic growth. Most recent research has established that export diversification is the effective remedy for these uncertainties due to its pivotal role in avoiding the shortfalls in export concentration such as investment risks, and exchange rate volatility by diversifying the number of exporting commodities and exporting sectors and shifting from exporting primary commodities to manufacturing commodities (Al- Marhubi 2000, and Herzer and Nowak-Lehmann 2006).

The important role of export diversification can be proved in the light of East Asian “Tigers” -- China, Japan, Singapore and South Korea, where the export diversification has been adopted over the last five decades with fruitful economic returns. On the other side, Central American countries, specifically Costa Rica, and El-Salvador applied different diversification programs such as, nontraditional farm-raised shrimp, and textile in the early of 1970s and the middle of 1990s; however, they could not attain the stabilization in their export earnings (Stanley and Bunnag 2001). Thereby, increased levels of export diversification could not alone guarantee higher

levels of economic growth (Bebczuk and Berrettoni 2006). It would seem, therefore, that further investigations are needed in order to guarantee the successful of export diversification policy. Although the previous literature provided us with intensive debate on the tangible impact of export diversification strategy on economic growth, the determinants of export diversification, which are important for understanding the differences among the countries, have not explored abundantly. Even with few studies that explored these determinants, they have investigated export diversification margins separately. In that regard, this paper aims to fill the gap in the literature by exploring the macroeconomic and structural factors may affect export diversification at both margins: product and geographical diversification in South Korea during the period from 1970 to 2010.

2. Data and Methodology

2.1 Data: Export categories data classified by Standard International Trade Classification (SITC ver. 3) at 2- digit level according to Harmonized Commodity Description and Coding System (HS/K). Due to the data availability, the data were collected from two data sources: KOSIS covers the period from 1977 to 2010, and World Trade Flows dataset covers the period from 1970 to 1976. The later contains information of bilateral trade at the 4-digit (SITC rev. 2) level. Thereafter, the data related to exports were collected and aggregated by summing up the products at 2- digit level across importers.

The independent variables divided into two groups: The macroeconomic factors which mainly affect the export product diversification and consist of four main variables. The first two variables are Korean government expenditure on export of goods and services (GEXD) and the gross capital Formation (GCF), as a proxy of technological level, both valued in billions of Korean won. The third variable is macroeconomic stability represented by a composite index (ECOSTAB) developed from two major indicators of price fluctuations (annual inflation rate calculated from consumer price index and GDP deflator). The last variable is exchange rate volatility (EXVOL) was computed as standard deviation of monthly changes in nominal exchange rate over the entire four years involved in each observation. On the other side, the structure factors consist of three main variables. Geographical distance measured by Remoteness index (REMI), as a proxy of trade costs, was computed as the inverse of log GDP divided by the average log distances in kilometers from Korea to its major trading partners which has counted 206 states and areas[1]. Trade openness (TRDOP), as a proxy of trade liberalization, was computed as the ratio of sum of exports and imports to GDP. The third and last variable is the country's size measured by the number of population (POP).

2.2 Methodology and Analysis: In order to provide a comprehensive analysis for export diversification process in South Korea, both product and geographical diversification have been considered by developing a composite index of these two forms. First, we measured export concentration for each form, export product concentration (PHHI) and export geographical concentration (GHHI), by using Herfindahl-Hirschman index

[1] Visit http://www.timeanddate.com/ select calculators/ distance calculators and search the location from Korea to other countries (accessed on January 10, 2013).

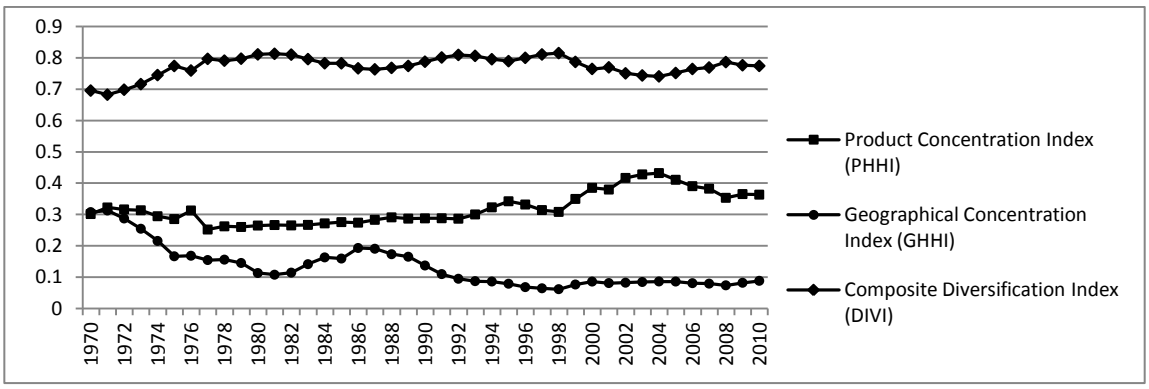
(HHI), the most commonly statistical measurement of export concentration which calculated by taking sum squared of export share for a certain product or country to total export as following (Meilak 2008):

$$\mathbf{HHIt} = \sum_{i=1}^{n} \left(\frac{\mathrm{Xit}}{\mathrm{Xt}}\right)^2$$

Where Xit is the value of export for category or country i in year t, Xt is the value of total exports in year t, and n the number of categories or countries.

The value of the concentration index ranges from one, indicates perfect case of concentration, and zero, indicates perfect case of diversification. Second, we establish the composite index (CHHI) from these two indices and gave them an equal weight. Then we calculate the diversification index (DIVI) by subtracting one from this composite index as DIVI= 1- CHHI (Agosin 2009).

Figure 2.1 Export Diversification and Concentration Indices



Source: calculated by the author

Figure 3.1 shows the Hir-schmann-Herfindahl indices for product and geographical concentration and the composite index of all forms of export diversification. As can be seen the downward trend of geographical and product concentration confirms its decreasing over the period. On the other hand the diversification composite index has upward trend which confirms its increasing over the period. Based on these basic statistical properties for the variables and prior to estimate these VEC models, a number of econometric testes should be examined related to the natural of time series data.

2.2.1 Stationary:

Examination the property of stationary in time series data should be checked before estimating the regression model, otherwise the result will show significant regression results from unrelated data which will be spurious regression (Hill et al. 2012). In this regard Augemented Dickey Fuller (ADF) test developed by Dickey and Fuller (1979) has been used to examine the stationary property and The results show that all the variables are nonstationary I(0) except LGXD, ECOSTAB, REMI, LTRDOP and GCFT. Moreover, all variables became stationary I(1).

Table 2.1 Augmented Dikcey-Fuller Test Result

Variables	Augmented Dickey-Fuller test statistic	
	Level	First Difference
DIVI	-3.335082	-3.352240

LGEXD	-4.874823*	-4.210383*
LGCF	-0.996362	-6.161021*
LEXVOL	-3.391988	-4.207546*
ECOSTAB	-4.064595*	-5.952749*
REMI	-4.301727*	-1.316566*
LTRDOP	-4.754775*	-4.222285*
LPOP	-1.190819	-2.728270

Note: The critical value at 90%, 95%, and 99% significant level is -3.196411, -3.529758, and -4.211868 respectively.
*denotes rejection of the hypothesis at 95% significant level.
Source: Calculated by the author using Eviews 7.0

2.2.2 Cointegration test:

Hill, Griffiths, and Lim (2012) stated that macroeconomic time series are nonstationary and cannot be used in the linear regression model, unless they are I(1) (or at least one of them) and cointegrated. Johansen (1988) developed the method of likelihood-based inference for testing the problems in the context of cointegration. This method has been applied and the results confirmed rejecting the null hypothesis of no cointegration among the variables.

Table 2.2 Johansen Cointegration Test Result

Series: DIVI LGEXD LGCF LEXVOL ECOSTAB REMI LTRDOP LPOP Lags interval (First differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Rank of No of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
0*	0.849997	256.4523	159.5297	0.0000
1*	0.717347	182.4654	125.6154	0.0000
2*	0.671280	133.1874	95.75366	0.0000
3*	0.604256	89.79807	69.81889	0.0006
4*	0.421507	53.64552	47.85613	0.0130
5	0.381855	32.29967	29.79707	0.0522
6	0.211677	13.53943	15.49471	0.0965
7*	0. 103554	4.263367	3.841466	0.0389

* denotes rejection of the hypothesis at the 0.05 level
**Mackinnon-Haug-Michelis (1999) p-value
Source: Calculated by the author using Eviews 7.0

2.2.3 Estimation procedure:

Since the cointegration relation among the variables has been proved, the regression models can be estimated without spurious results. The existence of cointegration among the variables, as above mentioned, commits the basic condition of implementing the VEC model (Toda and Yamamoto 1995). Using the VEC model helps to explore the short run and the long-run equilibrium relationship as well as the causality between the dependent variable and the independent variables. (Hill, Griffiths, and Lim 2012). The VEC model can be expressed in the following equation:

$$\Delta y_t = \alpha_1 + \alpha_2 \left(y_{t-1} - \beta_0 - \beta_1 x_{t-1}\right) + v_t^y$$

Where Δ represents the first difference, α is the cointegrated vector, α1 is the constant representing a liner trend, and α2 is the correction coefficient which shows how much the change in dependent variable (yt) and independent variable (xt) responses to the cointegrating error (vt).

Based on this choice, the models' equations can be formed as following:

$$\Delta \text{ DIVI}_t = \alpha_1 + \alpha_2 \text{ Z}_{t-1} + \sum_{i=1}^{p} \Delta \alpha_3 \text{ LGEXD}_{t-i} + \sum_{i=1}^{p} \Delta \alpha_4 \text{ LGCF}_{t-i} + \sum_{i=1}^{p} \Delta \alpha_5 \text{ LEXVOL}_{t-i} + \sum_{i=1}^{p} \Delta \alpha_6 \text{ ECOSTAB}_{t-i} + \sum_{i=1}^{p} \Delta \alpha_7 \text{ REMI}_{t-i} + \sum_{i=1}^{p} \Delta \alpha_8 \text{ LTRDOP}_{t-i} + \sum_{i=1}^{p} \Delta \alpha_9 \text{ LPOP}_{t-i} + \varepsilon_t$$

3. Results and Discussion

Export diversification composite index (DIVI) has been regressed on the macroeconomic and structural factors as explained in order to explore comprehensively the determinants of export product and geographical diversification in South Korea. The result is shown in table 3.1.

Table 3.1 Estimated Multiple Linear Regression Result based on Vector Error Correction Model

Dependent Variable: Δ(DIVI)

Lag order (Years)	(-1)			(-2)		
Variables	Coefficient	T-Statistic	Prob.	Coefficient	T-Statistic	Prob.
Δ(DIVI)	-0.485903 (0.212216)	-2.289669	0.0330**	-0.149678 (0.145631)	-1.027788	0.3163
Δ(LGEXD)	0.150362 (0.045492)	3.305278	0.0035***	0.068263 (0.031719)	2.152139	0.0438**
Δ(LGCF)	0.052745 (0.023369)	2.257067	0.0353**	0.086658 (0.025569)	3.389206	0.0029***
Δ(LEXVOL)	-0.023502 (0.005395)	-4.356163	0.0003***	-0.010675 (0.005750)	-1.856547	0.0782
Δ(ECOSTAB)	-0.061415 (0.021945)	-2.798672	0.0111**	-0.021397 (0.014806)	-1.445173	0.1639
Δ(REMI)	-21.50655 (11.15596)	-1.927808	0.0682	-30.517422 (10.32605)	-2.947481	0.0080***
Δ(LTRDOP)	-0.034631 (0.034787)	-0.995507	0.3314	-0.001711 (0.026730)	-0.063993	0.9496
Δ(LPOP)	3.3611465 (1.487704)	2.427543	0.0248**	1.741667 (1.519697)	1.146062	0.2653
ECT	0.106676 (0.022770)	4.684970	0.0001***			
R-Squared		0.872231		Adjusted R-Squared		0.763628
F-Statistic		8.031332		Prob. (F-Statistic)		0.000014
Durbin-Waston Stat		2.334056				

Symbols *, **, *** represent the significant levels 10%,5%,1% respectively

Source: Calculated by the author using Eviews 7.0

As can be seen in the table, the positive sign of the error correction term (ECT) confirms the change in export diversification composite index rises by meaning that export diversification increases over the time period. Moreover, having value less than one ensures that the model is stable and not explosive. The highly significant of this coefficient (at level 1%) indicates long run causality relationship between the explanatory variables and export diversification composite index. The examination of the R-squared, adjusted R-squared, and F-Statistics suggest that all variables in VEC model significantly explain the short run changes in DIVI except trade liberalization (LTRDOP).

The result presents a positive relation between export diversification and government expenditure on export of goods and services which can be generated from the pivotal role that Korean government played in promoting export diversification policy since the adoption of export-led growth strategy in the beginning of 1960s. This role embodied in the financial and fiscal incentives which have been provided to the exporters along with establishment of main trade institutions such as KOTRA and KITA to overcome the trade barriers

and facilitate the export movements. While the positive relationship between export diversification and gross capital formation can be explained through the link between export diversification and the technological level since the shifting from primary to manufacturing products which later reduces the dependence on primary products, and increases the technological knowledge and learning, also enhances the abilities to innovate new products and increases the diversification levels (Herzer and Nowak-Lehmann 2006). Along with increase country size in terms of number of population provides the economy with various skills able to apply the technological knowledge and encourages the opportunities of diversification by introducing new products (Dutt, Mihov, and Zandt 2011). On the other hand, the result shows that exchange rate volatility, induce more export concentration rather than diversification because it is associated with the trade costs, namely entry costs. Thereby, the uncertainty in the exchange rate value affects negatively the decision of firms to enter the international markets Similarity, Agosin el., (2012) emphasized that trade liberalization lead the exporters to specialize in products in which they have a comparative advantage. Therefore, it modifies the production pattern toward trade specialization (Chen and Chang 2006). Equally to most of researchers' findings, the larger the distance among the countries the more the trade costs which mainly are transportation costs. Thus, the geographical distance induces more geographical concentration rather than diversification (Dutt, Mihov, and Zandt 2011). Also, macroeconomic instability in terms of price fluctuations increases production costs, decrease investment, and leads to overvaluation of exchange rate in real terms which has a negative effect on export diversification (Meltiz 2003; Al-Kawaz 2008).

4. Conclusion

In conclusion, The study shed the light on the role of government in promoting the export diversification policy through its expenditure on exports, rational implementation of trade liberalization, and maintaining the stability in exchange rate as well as the export composition of technological products. Moreover, the study recommends the future research which will specialize in exploring the factors affecting export diversification process in Korea to measure the impact of other important factors such as human capital accumulation, tariff rates, institutional development, and trade facilitations.

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