

Korea's Growth, Trade and Energy Imports: New Evidence for Regional Comprehensive Partnership Analysis

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Abstract

The paper uses economic and energy data analysis and econometric modeling to study the prospects and challenges of Korea's 2003 FTA Roadmap (MOFAT 2013) in the form of potential comprehensive partnerships with its major trade and energy partners. It first reviews Korea's international economic and trade relations in recent years with a focus on its major merchandise export destinations and energy imports, and their association with the country's economic performance. A causal model of endogenous growth, gravity trade and energy imports for Korea in an economic integration theory framework (Tran 2012; Tran and Limskul 2013) is then developed to investigate the structural effects between these sectors. Empirical findings by system estimation are finally used to provide predictive policy implications for comprehensive partnerships between Korea and major resources-rich countries in the Middle East and potentially Iran.

Keywords: Korea's Economic and Trade Relations, Endogenous Growth and Trade Theory, Economic Modeling and Forecasts, Economic and Trade Policy.

JEL Classification: C51, C53, F14, F17, F31

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1. Introduction

The remarkable transformation of Korea, since the Korean War ended in 1953, into a global influential economic and political power has been often referred to as the 'Miracle on the Han River' in East Asia (Kim 2012), and one of the major 'miracle' economies in Asia in general in the past three decades. The paradigm for Korea's successful achievement has also been known as the East Asia Development Model (Harvie and Lee 2002) that can be adopted by other developing economies in their development process to pursue the well-known flying geese pattern of development especially in industrial development as spearheaded by Japan after World War II. As one of only two Organizations for Economic Cooperation and Development (OECD) member countries in Asia, Korea has also recently projected its international image as an innovative and dynamic country in not only industries and businesses but also in life-styles. In spite of the serious setbacks in recent years due to the regional and global financial crises with their damaging contagion (Tran 2000, 2011; Tran and Harvie 2000; Kim 2013), Korea's trajectory as a successful and innovative economy is likely to look set to continue, with a recent wealth report forecasting that Korea will be the 4th most affluent country in the world by 2050 (Kim 2012).

In the context of this perception and prediction and Korea's interest, since the establishment of its FTA Roadmap in 2003 (MOFAT 2013), in expanded regional economic and trade partnerships in an increasingly globalised economy, the paper is a rigorous study of Korea's international economic and trade relations in the specific growth-oriented areas of merchandise exports and energy imports in recent years and of how these structural relations, if empirically validated, will likely affect Korea, its main trading partners, and its major energy-supplying economies in the Middle East and possibly Iran. Based on the system estimation findings from a model of endogenous growth, trade and energy imports, the paper will also discuss major relevant arising challenges and opportunities for a potential regional comprehensive partnership or free trade agreement between Korea, the Middle East and potentially Iran.

The plan of the paper is as follows. Section

2 reviews Korea's trends and patterns of output growth against regional benchmarks, and its likely association with the country's major trade especially in its top-five international exports (markets) and top-five energy imports. Section 3 develops and describes the features of a macroeconomic multi-equation model of endogenous growth, trade and energy imports in an economic integration theory framework for Korea. Empirical findings from system estimation for the model are reported and their modeling performance critically evaluated for credible policy analysis in Section 4. Implications for economic and trade relations policies between Korea, its major merchandise export and energy import markets with relevance to Iran are discussed in Section 5. Conclusions are given in Section 6.

2. Korea's International Economic and Trade Relations and the Role of Energy Imports

Historical trends and patterns of output growth for Korea, its major trading (export) partners, the Middle East, and Iran during 1994-2011 are given in Figure 1, and their averages in Figure 2. The trends and patterns of Korea's selected principal growth determinants, as grouped by the Asian Development Bank (ADB 2013), namely top-five exports (China, the US, Japan, Hong Kong and Singapore), top-five energy imports (Saudi Arabia, United Arab Emirates, Qatar, Kuwait, and Indonesia), and total trade as GDP shares during 1994-2011 are given in Figure 3 and their averages in Figure 4.

From Figure 1, we note the high volatility of Korea's growth during 1994-2011 and especially the large negative impact of the 1997/98 Asian financial crisis (AFC) that Korea's major trading partners, the Middle East and Iran had largely avoided. Interestingly, because mainly of its political and financial isolation, Iran did not seem to have been affected much at all by the global financial crisis (GFC) of 2008/09 that has severely damaged the economies of Korea, the Middle East and Korea's major trading partners. In view of their relatively 'advanced' or high-income-and-low-growth development paths, Korea's major trading countries experienced, as expected, a low and stable growth during 1994-2011. Also from Figure 1, Iran appears

surprisingly to have achieved higher growth than the Middle East in early 2000s (during the 2001 terrorist attacks in New York) and late 2000s (during the GFC). All countries in focus suffered however a declining performance in 2011 reflecting to a large extent the lingering effects of the GFC and the contagion of the emerging European Union debt crisis. The data in Figure 1 confirm that the influence of the crises (and policy reforms) on economic performance is a crucial component of appropriate growth causality modeling, a feature lacking currently in many current growth and trade studies. In terms of their general economic performance, the average growth during 1994-2011 was highest at 4.99 per cent for Korea, followed by 4.34 per cent for Iran, 4.07 per cent for the Middle East, and only 2.02 per cent for Korea's major trading partners.

What has chiefly contributed to Korea's economic growth, Figures 3 and 4 show that Korea's openness (total trade/GDP) had been high (at 65.13 per cent on average) and

continuously rising during 1994-2011. The indicator shows however a slight decline in 1998 as a result of the AFC and a more severe fall in 2009 as a result of the GFC. Both Korea's top-five exports and energy imports (as a percentage of GDP) show however a much slower growth path for the whole period and with a much smaller decline as a result of the AFC and GFC. In terms of their relative importance in the economy, the averages were 17.26 per cent for Korea's top-five exports and 4.90 per cent for its top-five energy imports. From Figures 1 and 3, it appears that an association between Korea's growth and its trade (exports) and energy (oil) imports components is relatively weak and the influence of the AFC and GFC (and the country's economic and trade policy reforms) seems high.

In the section below, we develop an appropriate model to study more rigorously the causal relationships between these main indicators in focus and their driving economy-wide transmission mechanism.

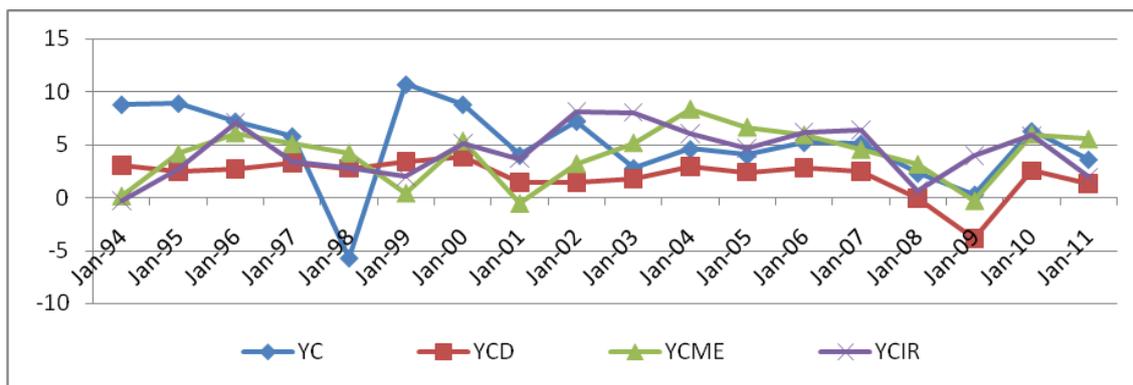


Figure 1: Growth in Korea, Major Trading Countries, the Middle East and Iran, 1994-2011

Source: Author

Note: In Figures 1-2, YC, YCD, YCME and YCIR=growth in Korea, major trading partners, the Middle East and Iran respectively. Sources of data to Figures 1-4: ADB (2013), USDA-ERS (2013).

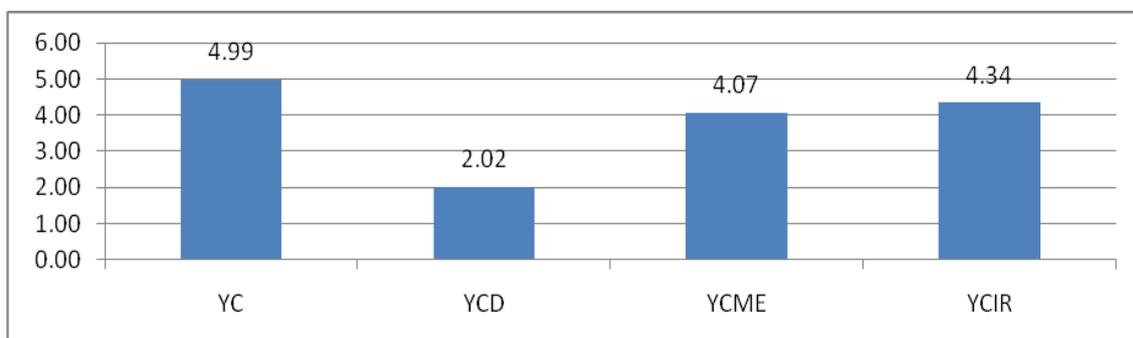


Figure 2: Average Growth in Korea, Major Trading Countries, the Middle East and Iran, 1994-2011

Source: Author

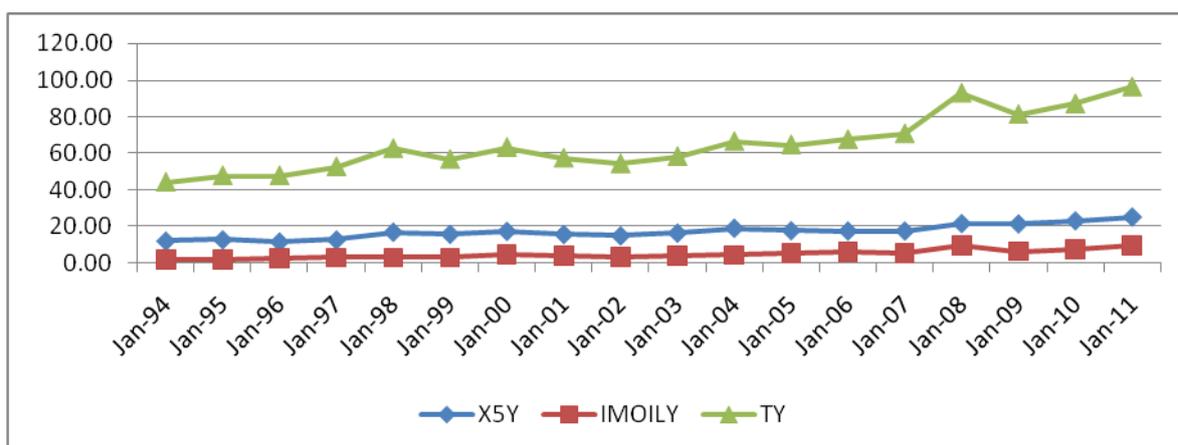


Figure 3: Korea's Top-five Export Destinations, Top-five Energy Imports, and Total Trade (% of GDP), 1994-2011

Source: Author

Note: In Figures 3-4, *X5Y*, *IMOILY* and *TY*=top-five exports/GDP, top-five energy imports/GDP, and total trade/GDP respectively.

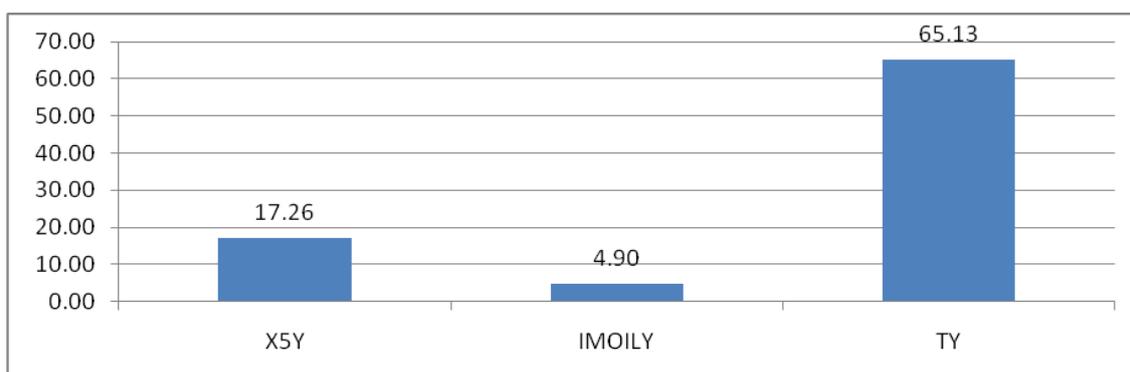


Figure 4: Korea's Top-five Export Destinations, Top-five Energy Imports, and Total Trade (% of GDP), Averages during 1994-2011

Source: Author

3. A Model of Endogenous Growth, Trade and Energy for Korea

In a number of recent papers, Tran (e.g., 2004, 2012) introduces a generic and flexible multi-equation modeling approach in an economic integration (EI) framework to empirically study trade and its causal link to growth in major developing countries in Asia. Conceptually, the approach combines essentially two current separate main streams of study, namely endogenous growth and gravity trade determination, in an EI framework for structural causal analysis. The major and novel features of a model based on this approach are briefly: unlike other popular modeling studies in this genre (eg, growth regression and gravity theory), (i) it incorporates explicitly the interdependence (reverse causality or

endogeneity) between trade and growth, and, (ii) significantly, major macroeconomic conditionality or activities affecting simultaneously both trade and growth in the trading economies (Krueger 2007); (iii) it assumes complex nonlinearity in the functional form; (iv) it incorporates explicitly major regional trade agreement (RTA) components, namely, merchandise trade, foreign direct investment or capital, services and labor, and other reform and non-economic events that have affected Korea's trade and growth in recent years (Johansen 1982; Tran 2001, 2002, 2004, 2012).

Other existing modeling approaches which have been used for this kind of study are inappropriate or not credible for policy uses because of their structural and econometric

limitations and, therefore, a lack of realism. For example, the computable general equilibrium (CGE) is essentially scenarios-based or confirmatory with its assumed causal relationships and given impact parameters (see Hertel et al. 2007 for an improvement). The gravity theory (Frankel and Romer 1999) has not been able to explicitly treat endogeneity and is also beset with serious cross-country heterogeneity bias. Growth regression is econometrically fragile (Levine and Renelt 1992) and lacks the well-known circular causality in the sense of Marshall or Haavelmo among economic (e.g., trade, growth, monetary, fiscal and industry policies) activities (see also Krueger 2007). The specification of a linear function for empirical trade-growth studies has been increasingly regarded as unsuitable (Minier 2007). Previous studies have also demonstrated the excellent modeling performance of the approach when this performance is assessed by the Friedman (1953) or Kydland data-model consistency (2006) and Theil mean-squared-errors (MSE) decomposition criteria. In addition, as the economic variables in the model are expressed simply as their rates of change (see derivation in Tran 1992), all parameters are simply the elasticities, the central concept in economic theory. Finally, the model has full dynamics interpretation: the model's findings can be regarded as short-run or Granger causality outcomes if all these variables are integrated of degree zero or $I(0)$, or they can be interpreted as long-run outcomes in the sense of Engle and Granger cointegration causality if all of these variables are $I(1)$.

4. The Model

A simple flexible causality model for Korea's endogenous growth, trade and energy (named GTE for convenience) is built on the work of Frankel and Romer (1999) and Tran (2004, 2012). Conceptually, it combines endogenous growth and gravity theories in an EI structure, and incorporates emerging developments on contemporary economy-wide policy modeling (Krueger 2007) and appropriate inferential analysis (Kilian 2009). More specifically, it contains testable determinant hypotheses of Korea's relations with its trading partners to study the causal links between growth, trade (merchandise exports) and energy (oil) imports

and with features relevant to Korea's development in the past 20 years or so (where data are available). The model and its major relevant variables (see conceptual justification below) can be written for illustration say for GDP, trade in goods (T), and energy imports (E) in system implicit form as $(GDP, GDPP, T, E, FDI, F, S, RXR, TT)=0$, or as three normalized implicit and related structural functions $GDP(\cdot)$, $T(\cdot)$ and $E(\cdot)$ [Other functions for other endogenized variables can be similarly specified]

$$GDP = GDP(T, E, FDI, F, S) \quad (1)$$

$$T = T(GDP, GDPP, RXR, TT, S) \quad (2)$$

$$E = E(GDP, GDPP, RXR, TT, S) \quad (3)$$

where FDI = foreign direct investment, F = financial services, S =crises, reform or RTA events, $GDPP$ =trade partner GDP, RXR =real exchange rates, and TT =terms of trade. As the model is implicit and can be highly nonlinear, it is not statistically estimable. For empirical implementation to derive the crucial elasticities, Tran (1992) has demonstrated that the model can be written mathematically equivalently, using Taylor's series planar approximations and invariant transformations (see Baier and Bergstrand 2008, for a more recent use), as three linear stochastic interdependent equations

$$Y\% = a_1 + a_2T\% + a_3E\% + a_4FDI\% + a_5F\% + a_6S + u_1 \quad (4)$$

$$T\% = b_1 + b_2Y\% + b_3YT\% + b_4RXR\% + b_5TT\% + b_6S + u_2 \quad (5)$$

$$E\% = c_1 + c_2Y\% + c_3YT\% + c_4RXR\% + c_5TT\% + c_6S + u_3 \quad (6)$$

where % indicates the rate of change, the u 's denote error terms or omitted variables, and the a 's and b 's are the elasticities (a_2 - a_5 , b_2 - b_5 , c_2 - c_5) or simply impact parameters (a_6 , b_6 , c_6). The model's theoretical rationale can be described briefly as follows. In (1) and (4), Korea's GDP growth ($Y\%$), in consistence with the RTA scope (WTO 2013) and non-steady-state political economy (McMahon et al. 2009), is assumed to be (or to be tested) as being dependent on its trade in goods with its trading partners (T), energy imports (E), other factors of production [such as capital (FDI) and financial services (F) or labour], crises, shocks, policy reforms or RTA events (S). But this trade (T)

and energy imports (E) are also causally affected by Korea's GDP and its trading partners' GDP (and indirectly FDI and F) as expressed in (2), (3), (5) and (6). In these equations, Korea's merchandise trade and energy imports are simply two derived demand equations for tradable goods as stipulated in standard microeconomic and international trade theory. The equations for endogenous FDI and services or other suitably endogenised variables in the more complete model can be similarly structurally specified.

As a simultaneous-equation model, the use of regression or maximum likelihood estimation methods will have to assume exogeneity in the RHS variables in (4)-(6) and, as a result, produce biased, inconsistent or unreliable findings, and a fortiori not credible policy outcomes. When all parameters in (4)-(6) are a priori assumed or given and the equations are made non-stochastic (ie, $u_1=u_2=u_3=0$), the model can be interpreted as a simplified time-varying macroeconomic version of the CGE analysis and its uses and policy recommendations can be simply regarded as scenario setting or confirmatory in nature.

As the multi-equation model (4)-(6) has jointly dependent variables and equations, an instrumental-variables (IV) system method such as the 3SLS or the generalized method of moments (GMM) is more appropriate statistically (in terms of the asymptotic parametric consistency criteria) and economic-theoretically (in terms of Marshall and Haavelmo economy-wide transmission mechanism reality, and the increasingly recognized influence of a country's economic 'conditionality' on its domestic and international activities) (Krueger 2007; Kilian 2009). Appropriate IVs for the model include exogenously determined variables affecting (relevant to) growth, trade and energy imports in Korea and its trading partners and satisfying their statistical exogeneity requirements. Assuming, for convenience and for lack of sufficient sampling sizes for the data, that GDP of Korea's trading partners is a proxy for all variables reflecting their own economic activities in addition to policies and shocks, then, the IVs for our GTE model for Korea potentially include the exogenous factors such as its trading partners' GDP (named YT), fiscal and monetary policy (FP and MP), real

exchange rates (RXR) – see Rose (2000), industry policy (IP) – see Otto et. al. (2002), population (POP), a gravity factor – see Frankel and Romer (1999), and structural change (S) – see Johansen (1982) and Tran (2004), in Korea. The tests for significant causality between Korea's trade and energy imports with its trading partners and their impact on the country's growth are then based on the estimation and testing of (4)-(6) above by the 3SLS/GMM, conventional diagnostics testing procedures, and, more importantly, the Friedman (1953)-Kydland (2006) model-data consistency, Theil MSE decomposition, or realism criteria.

4.1. The Data

Available trade, economic and 'conditionality' or IV data for the estimation were obtained from the available harmonized annual time-series of the databases of the United Nations, the Asian Development Bank, and the USDA-Economic Research Service for 1994-2011. While this sample size is fairly small due to harmonized data unavailability, we expect it will provide sufficient information to verify the main features of the model. Higher-frequency data were not used due to the unavailability of continuous time-series for the whole dataset. Korea's trade (T) consists of its total merchandise trade minus top-five energy imports from Saudi Arabia, United Arab Emirates, Qatar, Kuwait and Indonesia. For consistency with previous studies, all economic data (except GDP growth) are in current value. In our study, all original data are obtained as annual and then transformed to their ratios (when appropriate). The ratio variables include Korea non-oil trade (T) in goods (exports + imports), top-five energy imports, FDI, financial services (F), and money supply (M2), all divided by Korea's GDP. Other non-ratio variables include population (a gravity theory factor proxy, see Frankel and Romer 1999) and binary variables representing the occurrence of the economic, financial and other major crises, policy shifts or reforms over the period 1994 to 2011 (see their details in Table 1). All non-binary variables are then converted to their percentage rates of change. The use of this percentage measurement is a main feature of our GTE approach and avoids the problem of a priori known functional forms (see the

derivation in Tran 1992) and also of logarithmic transformations for negative data [such as budget (fiscal) or current account deficits]. In this paper, we have focused on a unidirectional direction of trade, oil imports and growth below in a 'dual' context, that is, Korea's trade (in goods and energy) with its trading partners and its possible causal impact on Korea's growth (the so-called Korea's perspective). The existence of this causality is the foundation of studies and policies on Korea's trade agreements or relations with its trading partners as discussed.

5. Empirical Findings and Their Policy Modeling Realism Properties

The empirical findings by the 3SLS estimation method for the structural growth (4), non-oil trade (5), and top-five energy import (6) equations in our GTE-based model of Korea's growth as a result of trade with its trading partners are given in Table 1 below together with their conventional R^2 and DW. The findings were obtained from the so-called final preferred equations of (4)-(6) after Kydland (2006)'s extensive computational experiments were carried out. In these experiments, various sample sizes, various combinations of relevant domestic reforms and RTA events (as observed in Section 2), the inclusion of FDI and F in the two trade equations, and the inclusion of lagged jointly dependent or exogenous variables in the three equations were specified and tested. In the system IV estimation of the model, we

acknowledge the impossibility of a unique and optimal set of 'relevant' and 'exogenous' IVs, due to the inherent simultaneity of all economic and non-economic activities in the economy in the sense of Marshall and Haavelmo. The findings are regarded however as statistically feasible and acceptable as they are based on the estimates say $b=Z'y/Z'X$ of β for the general structural equation $y=X\beta+u$, where X represents all RHS endogenous and exogenous variables and Z as the IVs.

Judged from Table 1, the standard statistical performance of the estimated GTE-based models for Korea's growth and trade (goods and energy) above appears acceptable in terms of the conventional R^2 and DW. The performance or realism of the models can also be more appropriately and accurately evaluated by the Kydland (2006) data-model consistency criterion where the trend gap and discrepancy between historical data and predictions have to be tight and small. The criterion was advocated earlier by Milton Friedman (1953) in the sense of model (theory) and reality (data) consistency and it seems to be overlooked by serious modelers and policy-makers alike in recent years. This observation-by-observation modeling performance is given in Figures 5-7 for Korea's growth, non-oil trade and energy imports respectively. The residuals from the three estimated GTE equations were also found to be stationary according to the tau and Dickey-Fuller tests.

Table 1: Korea's Growth, Trade and Energy Imports GTE Modeling in Flexible Structural Form 1994-2011-3SLS

	Growth	Non-Oil Trade	Energy Imports
Const	7.640**	-17.827**	-76.842**
Trade/GDP	0.003		1.904**
Energy Imports/GDP	-0.015		
Korea Growth		- 0.437	0.002
Trade Partners Growth		8.605**	
Real Exchange Rates		0.307	-1.088**
Reform 1995			85.616**
Asian Financial Crisis 1997/98	-13.554**	-1.690**	
Reform 1999	13.563**	-6.296*	
Reform 2000			15.862
Post-Terrorist Attacks 2002		11.932**	-32.139**
Iraq War 2003	- 3.311**		
Global Financial Crisis 2008/09		33.895**	43.819**
Post-GFC 2009	-4.536**		-38.477**
Pre-EU Debt Crisis 2010	5.432**	-26.121**	
R-Squared	0.839	0.771	0.874
DW	1.932	2.314	2.563

Source: Authors

Notes. **=Significant at 5%, *=Significant at 10%, DW=Durbin-Watson statistic.

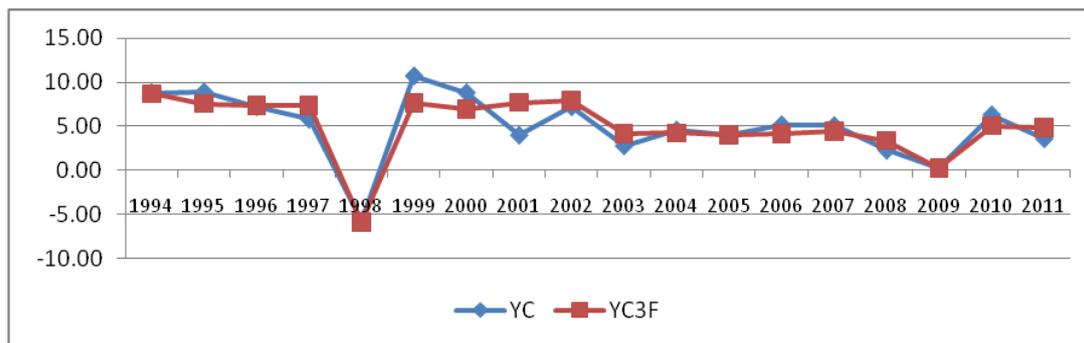


Figure 5: Korea's Growth Modeling Performance by GTE, 1994-2011

Source: Authors

Note: YC and YC3F= Actual and GTE predictions of Korea's growth.

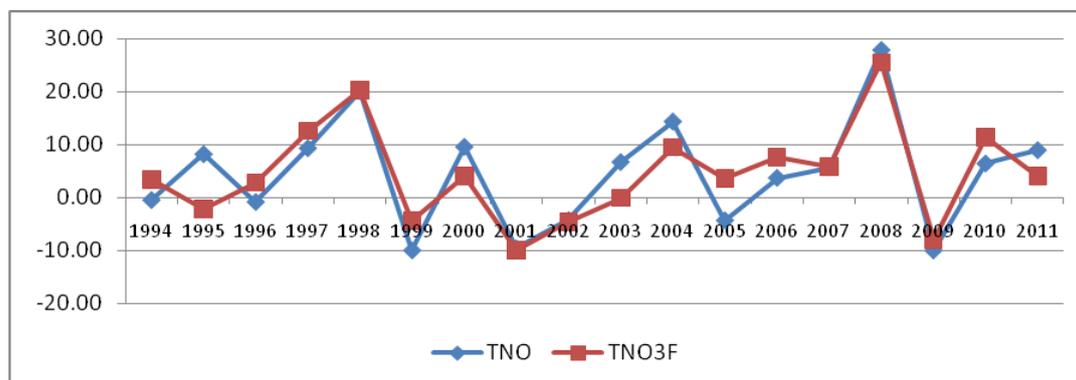


Figure 6: Korea's Non-oil Trade Modeling Performance by GTE, 1994-2011

Source: Authors

Note: TNO and TNO3F=Actual and GTE predictions of Korea's non-oil trade.

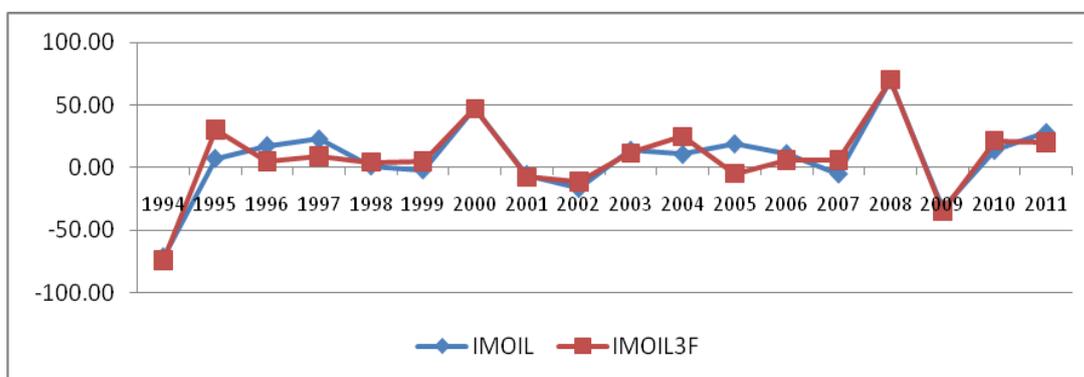


Figure 7: Korea Energy Import Modeling Performance by GTE, 1994-2011

Source: Authors

Note: IMOIL and IMOIL3F=Actual and GTE predictions of Korea's top-five energy imports.

A visual observation of model-data consistency indicates that the estimated GTE models emulate very well the troughs, peaks and turning points of Korea's growth (Figure 5) and its trade in goods (Figure 6) and energy (Figure 7) during 1994-2011. The modeling performance of Korea's growth is interesting as it accurately emulated the two major troughs attributable to the 1997/98 AFC and the

2008/09 GFC. This GTE model also predicts very well the continuously falling growth of Korea since the early 1990s and the lingering effects of the GFC and the European Union debt crisis in 2011. The GTE model of Korea's non-oil trade with all of its trading partners appears capable of tracking this trade's high volatility for the whole period (including the effects of the AFC and GFC), and especially the negative

impact of the 2001 terrorist attacks in New York. The GTE model of Korea's top-five energy imports accurately reflects the observed negligible impact of the AFC and the more severe effects of the 2001 attacks and the GFC on these imports. Statistical distribution characteristics in terms of Theil MSE

decomposition criterion of the GTE modeling of Korea's growth, non-oil trade and energy imports in comparison with their actual data are given in Table 2 where a zero bias, a very low variance and a high level of MSE covariance were observed for all three estimated GTE equations.

Table 2: Performance of the GTE Model – Theil's MSE Decomposition Criterion

	Growth		Non-Oil Trade		Energy Imports	
	Actual	Estimate	Actual	Estimate	Actual	Estimate
Mean	4.994	4.995	4.512	4.513	7.162	7.162
Variance	14.20	12.01	106.08	84.26	907.03	934.70
Um	0.000		0.000		0.000	
Us	0.040		0.052		0.002	
Uc	0.960		0.948		0.998	

Source: Authors

Note: Um, Us, Uc denote respectively fraction of MSE due to bias, different variation and covariance. In addition, $Um+Us+Uc=1$.

6. Implications for Korea's Economic and Trade Relations with the Middle East and Iran

In the preceding sections, we have developed the GTE model to empirically investigate the causality of Korea's economic performance in relation to its non-oil merchandise trade with all of its trading partners and energy imports from major Middle East (including Indonesia) countries in the framework of currently widespread EI and RTAs. The model's main hypotheses being tested would provide useful evidence to informed debate and analysis of Korea's focus on economic and trade relations expansion with its trading partners (MOFAT 2013) and how this would be transmitted through different sectors of the economy. We have also used the model to investigate the main determinants of this non-oil merchandise trade and energy imports to have a better understanding of Korea's trade relations and causal effects and their disparity. The model appears to satisfy conventional diagnostic tests and importantly fits the data well (see Tovar 2008 for a lack of this in current policy modeling studies). Some important implications of the findings given in Table 1 that are relevant to Korea's focus on expanding trade relations with its trading partners in the Middle East in general and Iran in particular in the form of regional comprehensive partnerships or free trade agreements (MOFAT 2013) in the context of the country 2003 FTA Roadmap for mutual economic benefits are described below. The challenges and prospects for this trade expansion, based on the findings, are also discussed.

First, from our modeling experiments (not

reported here), the expected RTA benefits from FDI and financial services on Korea's growth and trade were not plausible or significant. A reason for this may be the fact that FDI and financial services had been a very small part and with high volatility of the Korean economy for the period under study. Another reason is that Korea's national industrial development, domestic policy reforms and external financial crises (see Table 1) may be the country's stronger growth drivers.

Second, while non-oil trade and energy imports have some impact on Korea's growth, this impact is not statistically significant. The findings, while reflecting Korea's economic and trade structure during 1994-2011, are surprising and unexpected especially for energy imports, and they may have important implications for the effectiveness of Korea's trade, energy import and development plan policies. They may also explain to some extent the reluctance of Korea till recently (MOFAT 2013) to be actively involved in free trade agreements. The findings indicate however the strong dominance of regional and global crises and domestic reforms in driving Korea's growth and development during the period.

Third, the findings show, as expected, the importance of Korea's trading partner economic conditions (demand) on its non-oil trade, and as a result, serious adverse effects on the country's trade as the world economy slows down due to regional and global crises and contagion. Korea's growth or domestic demand is seen as having a small crowding-out effect (-0.437) on its international trade, and real exchange rates had only a small positive (0.307) impact on this trade. The impact of domestic demand and real

exchange rates on Korea's non-oil trade and energy imports is however weak or statistically insignificant. The findings also indicate the importance of regional and global crises and domestic reforms on non-oil trade.

Fourth, our study shows interestingly that there is a significant link (1.904) between non-oil trade and energy imports, and the latter were relatively unresponsive (0.002) to domestic demand. As a resources-poor economy, Korea's trade and trade-promoting policy are important not only to support its growth but also to meet growth-induced demand for energy. We noted earlier that the effects of non-oil trade on growth were only weak during 1994-2011. Real exchange rate depreciation did surprisingly have a strong and dampening effects (-1.088) on Korea's energy imports. This indicates to some extent that energy imports were sensitive to the real needs for energy in the country and not so much to the temporal fluctuations of the real exchange rates. Again, our study shows the importance of regional and global crises and domestic reforms on energy imports.

The above discussions are relevant to the issues of Korea's interest, since the establishment of its FTA Roadmap in 2003, in economic and trade expansion with its regional and global trading partners for mutual benefits via either comprehensive economic partnerships or regional trade agreements. The interest has been more prominent in recent years via the country's numerous FTAs in negotiation or under consideration (MOFAT 2013). As the period under study covers partly Korea's three important paradigm shifts in the economy, namely perspiration (1960-2000), aspiration (2001-2008) and inspiration (2009-present) (see Kim 2012), the findings may represent better the main features of first two shifts and may not be appropriate for the current shift in which Korea's pride in past achievements, improved sense of self-confidence, enhanced innovation, entrepreneurship and increased global competitiveness are more focused and in which several vulnerabilities are also emerging (Kim 2013). What the findings show however that are relevant to Korea's current economic and trade expansion policy with its trading partners especially from the resources-rich Middle East and potentially Iran are significant in several aspects. First, Korea's economic performance had been achieved to some extent more by the so-called East Asia Economic Model where industrial development and other domestic reforms had played an important role than regional and global trade engagements. Even in 2013, only a few of Korea RTAs with its trading

partners are in effect (MOFAT 2013). Second, there is scope to improve Korea's trade policy expansion and especially effectiveness when much of the country's trade depends crucially on its trading partners' economic conditions and on globalised contagion. Third, as this trade is also the most important economic factor in Korea's energy imports determination, trade promotion and expansion by means of comprehensive economic partnerships or RTAs with its trading partners in general and in the resources-rich Middle East economies and potentially Iran in particular would be desirable policy. As noted, the findings of our study confirm the benefits of Korea's domestic reforms or development model on its economic achievements; they also confirm the vulnerability of Korea's future growth and trade relations successes to the contagion of regional and global crises. Both Korea and its trading partners will have to face these opportunities and challenges in their economic and trade engagement discussions.

7. Conclusion

In the preceding sections, we have described Korea's economic and trade relations in recent years, and developed a model of endogenous growth, trade and energy in an economic integration framework to study the prospects and challenges of Korea's interest in economic and trade expansion in the form of comprehensive economic partnerships and RTAs especially with the resources-rich Middle East and Iran. The evidence lends support to improve Korea's economic and trade policy and effectiveness in its 'inspiration' stage under increasing globalisation. It also shows the vulnerability of this policy and effectiveness to the effects of regional and global crises.

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