Saving-Investment Dynamics and International Capital Mobility of N-11 Economies

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Abstract

This paper attempts to examine the degree of integration of NEXT-11 (N-11) nations into international capital market structure. We examine panel data series on trade openness and saving-investment dynamics during the period 1980-2012. Structural breaks are taken into accounts by taking 3 sub-periods pertaining to different country-specific and economic crisis, etc. While many developing nations have undergone financial sector reforms in last 50 years, but still it remains unclear how far financial liberalization affects both saving and investment patterns. Our analysis shows that the saving-investment puzzle remains the puzzle for the developing economies, not true like the cases reflected for OECD countries. Even though, saving-investment is indeed co-integrated, but with the onset of crisis, the model shows the structural instability and indicative huge capital mobility. Finally, we find that higher trade openness indicate higher cross-border capital flows of N-11 countries.

Note. This paper is a preliminary draft. So, the authors are solely responsible for the errors. The paper however needs lot of revisions. Due to the time constraints, we are unable to wind up in time. However, the authors will be thankful for receiving any useful suggestion during the time of conference.

1. Introduction

One of the contemporary macro-economic issues that draw special attention in developing economies is the saving-investment dynamics. Virtually, all the conceptual and quantitative research in this field has been done with respect to the developed world since its inception. Obviously, some of the best studied resources in this field can be traced from Feldstein- Horioka Puzzle. In a seminal study, Feldstein and Horioka (1980) examined the degree of association between saving and investment rates in 16 OECD nations. Their argument stated that in the presence of perfect capital mobility, there was hardly any correlation between the saving and investment rates. Additional savings in an economy would be channelized to the world capital markets to fund other economies having favourable investment climates (Ang, 2009). Following this controversial finding, the saving-investment dynamics and international capital mobility becomes a subject of intense research over the last two decades. On any reasonable ground of present context, it can be well evident that the increased global market integration is synonymous with the argument of increased capital mobility. Conversely, increased capital mobility may lead to financial turbulence (Ang, 2009).[1]

It has been observed from the Asian financial crisis and Mexican crisis. This fact has been compounded with a series of literature, as from Pholphirul (2009) with respect to Thailand. With a paradigm shift in the economic power from west to east, the evidences as taken from previous monocentric models of developed economies cannot be universally applied. Some key literature over the last decades has come to the forefront with respect to the developing

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[1] For further detailed discussion, see Ang (2009).

economies (Sinha, 2002; Payne, 2005; Kim et al., 2005; Ang, 2009; Rocha, 2009). Certain blocs like BRICS, G-15, CIVETS have produced sensational growth in all aspects despite undergoing fundamental flows in their domestic sectors. Aftermath of global financial downturn in 2006, the western economies have undergone rapid deceleration in the saving and investment rates and in growth pattern. Rapid growth in many emerging economies (EEs) both before crisis and since has witnessed positive externalities in form of rising share in world income, exports, and production as well. So the increasing prospect of EEs can be seen from various fronts at present juncture. But the change in the world economy is a complex issue in itself and the measurement of nature of shifts and volatility involved is quite tedious. EEs are also forming various initiatives in the form of blocs for co-ordination and restoring their economic viability by presaging a shift in global economic order.

This paper seeks to examine the international capital mobility and savings and investment dynamics of Next-11 (N-11) blocs.[2] The Next-11 nations are mainly Bangladesh, Pakistan, Iran, Egypt, Indonesia, Mexico, Turkey, Vietnam, South Korea, Philippines, and Nigeria.[3] It was identified by Goldman Sachs economist Jim O'Neill in his paper citing the reasons of reaching the capability of reaching level of BRICS. The parameters taken for the consideration are energy,

[2]The N-11 which comprises 7% of the world economy accounts for 9% of the world's energy consumption and an equal share of global CO2 emissions with that of BRICS. N-11 is already highly urbanized. Out of 11 nations, five countries have more than half of the population living in urban areas. Similarly, other countries of N-11 nations like Korea, Mexico, Iran, and Turkey have also more than half of the population living in urban areas. On the other hand, Vietnam and Bangladesh have still major population living in rural areas, that is, in these countries 75% of the population are in rural areas.
[3] See Lawson et al. (2007).

infrastructure, urbanisation, technology transfer, and health.[4] Furthermore, technology adoption and technology transfer are important parameters to sustained growth and having virtual connectivity.

Some of the N-11 nations are attractive destinations for infrastructure investment like South Korea, Mexico, Indonesia, and Turkey nearly attract $170 billion during the period 1970-2005. Human capital is a critical aspect of both short-and long-run growth stories. Life expectancy among the N-11 today (65 years) is in line with the BRICs but nearly a decade below the G-6 average. The UN projects states that life expectancy rates in the N-11 countries and the BRICS nations could converge to the current G-6 level life expectancy (75 years) by mid-century (2050).

This paper attempts to examine the long-run S-I relationship and evaluate FH coefficient using the recently developed panel co-integration techniques and the extent of international capital mobility of the N-11 nations from 1980 to 2012. The prospect of undertaking an analysis of N-11 nations is brighter with the inclusion of some promising economies like South Korea, Indonesia, Turkey, and Mexico. It is still unclear regarding the inclusion of certain economies like Pakistan, Iran, Bangladesh, and Vietnam because of their frequent victimisation to political destabilisation, growing militancy, low growth rates with handful share in world trade, and other internal factors, etc. However, the authors here are quite optimistic about the recent changes in political sphere, good investment climate, growing urbanisation and literacy rates, increasing participation in regional economic forums. Only few papers have explained the S-I relationship and evaluating the capital mobility in the context of developing and emerging blocs using panel

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[4]See Goldman Sachs (2005).

co-integration technique.[5] To the best of our knowledge, there is no research on FH coefficient and international capital mobility of the N-11 economies.

The paper is distinct from previous studies in several aspects. It applies the recently developed panel co-integration techniques to measure the long-run relationship between the saving and investment rates of the N-11 economies. Furthermore, the paper seeks to implement the fully modified OLS (FMOLS) and dynamic OLS (DOLS) estimators to estimate the co-integrated regression.[6]

The structure of this paper is as follows. Section 2 briefly reviews the previous literature. Section 3 highlights the trends of the saving and investment rates of N-11 economies. Section 4 deals with the econometric procedures and datasets. Section 5 interprets the estimation results. Section 6 contains the conclusion and policy implications of the study.

2. Brief review of literature

Numerous studies have examined the degree of association between savings and investment rates. There are various grounds to support this kind of facts and advancement over a period of time. The studies of saving-investment relationship have been made from different perspectives from 1980s to till date. Major literature in this field is primarily intertwined with the developed economies' experiences. During the last decade, large number of literature has been found out with respect to the developing blocs. The brief overview of literature is being discussed below.

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[5] See Kim et al. (2005), Kim et al. (2007), Sinha (2002), Mamingi (1997).

[6] See Asteriou and Hall (2005, P. 372).

Wong, (1990) study focused upon the idea of saving-investment relationship being dominated by the non-traded goods sector. His study argued that degree of capital openness could not be readily made on the basis of saving-investment relationship. Baxter and Crucini (1993) showed that the positive correlation between domestic saving and investment was possible within a quantitatively restricted equilibrium model with perfect capital mobility. It apparently refuted the F-H puzzle. Furthermore, previous studies have found that the saving-investment correlation could have also affected by the size of the countries, that is, the saving-investment correlations are larger for larger economies and smaller for smaller economies.

Coakley et al. (1996) found that in the presence of current account solvency, the saving and investment rates could be correlated irrespective of degree of capital mobility. Moreno, (1997) pointed out that a high long-run correlation between the saving and investment rates was better interpreted by incorporating the operation of an economy's inter-temporal budget constraint rather than the simple indicator of capital mobility. Using the post-war quarterly data for USA and Japan, his paper assessed the characteristics of saving-investment behavior under different regulatory environments and got mixed response to the change in short run saving-investment dynamics as the sole reason for increased capital mobility in 1980s.

Jansen, (2000) examined the saving-investment correlation with respect to OECD nations. He refuted Krol's analysis (1996) by stating that saving and investment were highly correlated for OECD nations. Behind this correlation, he found that inter-temporal budget constraint was solely responsible. Levy (2000) took the case of USA by incorporating the Bureau of Economic Analysis' data from 1929 to 1989 to undertake the study of saving-investment correlation and international capital mobility. He found that the saving and investment rates were

positively correlated particularly after the period of Second World War. Post war period also asserted that high international capital mobility could be correlated with high S-I trend. Wu-ho and Lin-Chiu (2001) studied the saving-investment correlation in 24 OECD nations by taking data from 1970 to 1997. He explored that within OECD economies, saving-investment trends were significantly different from nation to nation. Bigger economies in size of GDP were having high saving-investment retention coefficient particularly for USA, UK, France, Germany, and Australia. Narayan (2005) revisited the F-H puzzle in case of China by taking data from 1952 to 1994. He divided the period into two time segments-one when followed the fixed exchange pattern and other when pegged exchange rate regime. He found that irrespective of two periods, the Chinese economy was in conformity with F-H puzzle. Payne (2005) examined the saving-investment relationship for Mexico over the period from 1960 to 2002. Although his study found the cointegration between the saving and investment rates, but the error correction model exhibited the structural instability due to the heightened LDC debt crisis of 1982. Furthermore, he found that the Inclusion of dummy variable indicates the saving-investment retention coefficient to be negative in post 1982 period.

Mastrroyiannis, (2007) examined the F-H puzzle in case of Greece by taking data from 1960 to 2004. It is well acknowledged that after Greece's accession to European Union, the Greece Economy had been significantly influenced by international financial market. His research exhibited the opposite trend to the conventional F-H puzzle. Pelgrin and Schich (2008) interpreted the long-run relationship between the saving and investment rates for 20 OECD nations from 1960 to 1999. They found that the saving and investment rates had a long run cointegrating relationship. Over the period of time, S-I deviations from the long-run equilibrium relationship became more persistent, and it indicates the increasing trends of capital mobility.

Ang (2009) studied the saving- investment relationship with respect to India from 1950 to 2005. By applying the ARDL and ECM Co-integration techniques, the empirical finding reveals a fairly robust long-run relationship between the saving and investment rates. Even after the post financial liberalization period his analysis found that saving and investment were positively correlated.[7] Rocha, (2009) investigated the dynamics of national saving-investment dynamics to determine the degree of capital mobility across 12 Latin American economies. The results found the evidence of an intermediate degree of capital mobility across the economies. They also found that the short-run coefficient estimates are statistically significant, and indicates the capital mobility of the 12 Latin American countries.

Eslamloueyan and Jafari, (2010) analyzed the relationship between openness to trade and saving-investment relationship in Asian economies from 1990 to 2006. They applied Generalized Least Squares (GLS) technique to a balanced panel error correction models to identify short-and long-run relationship between the saving and investment rates. The estimation results indicated that there was a long-run relationship between the saving and investment rates irrespective of the trade openness indices of the economies. Table 1 summarizes the previous literatures of S-I relationship.

Table 1: Brief Survey of Previous Research

Author	Sample Period	Level of Aggregation	Econometric Procedure	Sample Country	Estimation Results

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[7] India has adopted the financial sector reforms in 1991, and attempted to reduce its tariff rates to attract the global investors. Ang (2009) study also found that after 1991, the saving and investment rates are highly cointegrated.

Kim et al. (2006)	1980-2002	Panel	GLS technique SUR model	East Asian nations	S-I relation consistent with cap. mobility
Taylor (2002)	1870-1990	Panel	VECM	15 nations	Supports F-H puzzle
Mamingi (1997)	1970-90	Time series	FMOLS	58 DCs	different
Ang (2009)	1950-2005	Panel	ARDL	India	+ ve relation
Sinha (2002)	1550-2000	Panel	Co-integration	10 Asian nations	Long run S-I in Japan and Thailand
Erden(2005)	1960-2002	Time series	VECM	Turkey	No stable long-run S-I after 1980s
Jafari (2010)	1990-2006	Panel	ECM	Asian nations	Long run S-I
Ranjan (2010)	1950-2006	Panel	ARDL	India	Long run S-I
Morneo (1997)	1947-1991 1965-1991	Time series	Co-integration	USA Japan	Long run S-I as budget constraint
Payne(2005)	1960-2002	Time series	Co-integration	Mexico	Negative S-I relation after 1982
Rocha (2009)	1960-1996	Time series	ECM	12 Latin American Nations	Long run negative S-I relation
Baharumshah et al (2002)	1960-1997	Time-series	ECM	5 fast growing Asian nations	Savings did not granger cause growth except Singapore
Tsoukis (2001)	1980s and 1990s	Time series	Granger-causality test	7 industrialized nations	Causality goes from S to I except Germany
Mastroyiannis (2007)	1960-2004	Time series	DF,ADF and PP tests	Greece	FH Puzzle does not work here

Source: Author's own collection from various previous studies.

Most of these previous papers have several shortcomings. Very few papers have often considered the heterogeneous coefficients. In addition, most of the previous studies do not take into account of the error correction modeling, and long-run relationship between the saving and investment rates during the different sub-periods. The paper attempts to fill this gap and tries to incorporate a good estimation technique to evaluate the international capital mobility of the so called Next-11 economies.

3. Saving-Investment Trends and Capital Mobility of the N-11 Economies

In late 2005, Goldman Sachs introduced the new framework of Next-11 nations (N-11 nations). The N-11 nations may not have achieved the success like BRICS a till date, but have the true potential of competing with G-7 nations. The economies in N-11 group may be put under different classifications based on the economic parameters but can optimise the conditions, if situations favour. Being persistently the hub of rising demand and sustained GDP growth, the group could surpass some of the major markets in the world by 2050. This group contains a galaxy of diversified nations in terms of saving-investment pattern, development paradigms, capital structures, population, per-capita energy consumption, rate of exploiting the natural resources and rates of urbanisation. Being hit by the deadly financial crisis, the prospect of world growth has been significantly contracted and focus has been shifted to the performance of the emerging economies. The rising commodity prices, low real interest rate, sound economic performance, and low market volatility are now the present features of emerging economies (Wilson and Stupnytska, 2007). To gauge these parameters, it is quite evident that N-11 must satisfy some conditions. Fundamentally, Goldman Sachs coined this term on the basis of macroeconomic stability, political maturity, quality of education, openness to trade, and investment policies.

To analyse the S-I trends of N-11 nations, this paper has resorted to the data collection from World Bank indicators. The data are being sequenced annually from 1980 to 2011. The selection of the countries was dictated by the availability of the data. In the meantime, we have also faced the problem of missing data in case of some economies due to obvious problems. Gross savings here are calculated as national income less total consumption, plus net transfers. Gross domestic investment consists of outlays on the additions to the fixed assets of the economy

plus changes in the level of inventories. Here saving and investment rates are defined as the percentage of GDP. Figure-1 represents the trends of saving and investment as the percentages of GDP of N-11 nations. In addition, another table has been incorporated stating the statistics of saving and investment (as % of GDP) from 1980 to 2012.

Source: Author's own compilation, Data taken from World Development Indicators.
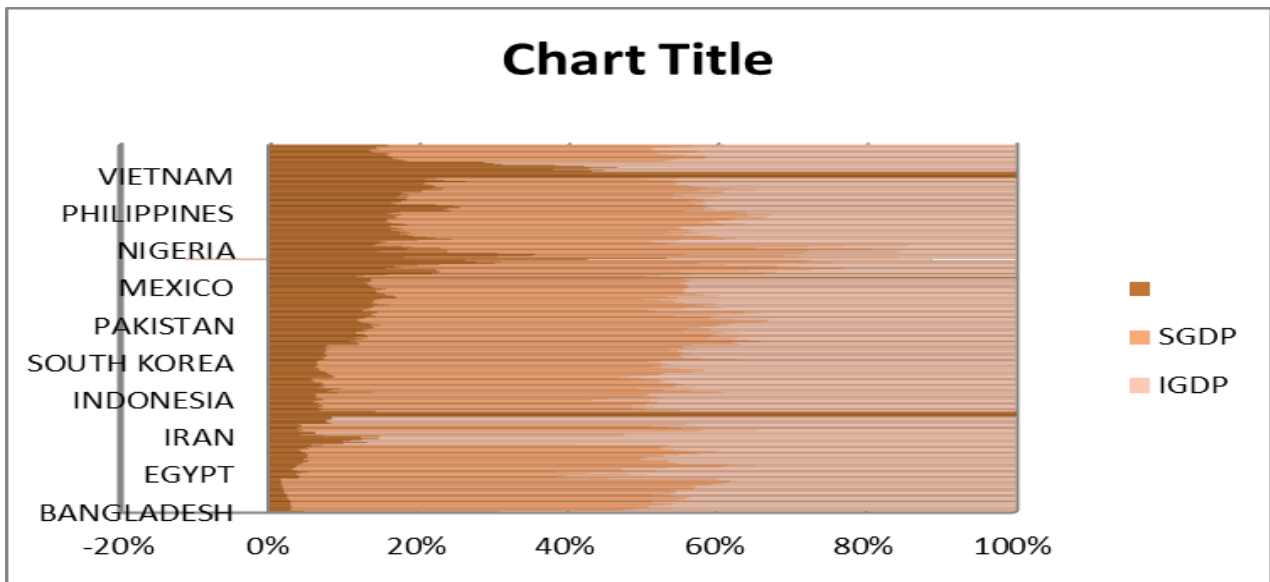
Most of the emerging economies have undergone the phase of economic reforms and crises from time period from late 1980s to late 2000s. Here among these economies, we can divide these nations into 3 categories based on the development parameters. In developed category, South Korea and Mexico would be placed. In emerging middle income category, Egypt, Indonesia, Vietnam, Philippines, Nigeria would be placed. In least developed category, Pakistan, Bangladesh, Iran would be there. Some notable exceptions happened in Iran because of disturbed historical background, political instability and domestic violence.

Table 3: Summary Statistics

	1980-2012 full		1980-90		1991-2000		2001-2012	
Country	S/Y	I/Y	S/Y	I/Y	S/Y	I/Y	S/Y	I/Y

Bangladesh	max	36.28	26.54	19	17.62	26.58	23.02	39.77	26.54
	min	16.38	14.43	5.43	14.43	19.31	16.89	25.92	23.08
	S dev	6.15	3.59	3.81	1.12	2.41	2.12	4.35	0.93
	mean	24.27	20.33	15.81	16.54	22.63	19.72	33.99	24.33
Egypt	max	34.18	34.91	29.16	35	34.18	21.61	26.10	22.38
	min	12.89	13.02	12.89	24	18.04	17.56	13.02	16.38
	S dev	5.28	5.23	5.86	2.99	5.99	1.35	3.74	1.73
	mean	21.94	22.18	22.72	28.81	23.42	19.96	20.04	18.48
Iran	Max	41.95	46.26	30.62	37.18	41.95	46.26	NA	36.28
	min	16.63	17.32	16.63	17.32	31,40	22.73	NA	32.55
	S dev	8.72	7.53	7.57	6.09	3.35	7.17	NA	1.64
	mean	33.78	30.32	22.33	24	38.18	34.43	NA	34.09
Indonesia	max	32.05	36.03	31.28	33	29.87	31.92	32.05	35.03
	min	13.20	11.36	24.29	24	13.20	11.36	16.68	21.40
	S dev	4.36	5.005	2.27	2.46	5.32	7.35	4.75	4.59
	mean	26.15	27.66	26.60	28.90	24.59	26.73	27.14	27.42
Pakistan	max	30.43	20.81	30.43	19	26.36	20.81	27.95	19.33
	min	16.88	14.11	21	18	18.37	15.56	16.88	14.11
	S dev	3.25	1.50	2.94	0.50	2.76	1.53	3.33	1.71
	mean	22.85	18.09	24.45	18.63	21.12	18.55	22.71	17.14
Korea	max	39.06	39.73	39.06	37.51	37.20	39.73	34.04	31.21
	min	22.61	24.99	22.61	29.11	33.01	24.99	30.34	26.27
	S dev	3.86	3.847	5.83	2.73	1.26	4.81	1.05	1.24
	mean	32.76	31.48	30.63	31.09	35.74	34.69	31.35	29.24
Mexico	max	24.99	27.38	24.99	28	20.48	23.32	22.80	24.40
	min	15.01	16.35	17.85	19	15.01	16.75	17.98	19.73
	S dev	2.23	2.30	1.80	2.76	1.93	2.21	1.49	1.25
	mean	20.44	21.77	21.36	22.36	18.23	20.47	21.32	22.35
Nigeria	max	31.23	34.02	31.23	34	26.06	13.79	41.00	12.09
	min	-2.09	5.46	11.08	10	-2.09	7.011	4.50	5.46
	S dev	7.93	6.25	6.20	1.08	8.28	2.86	11.60	1.93
	mean	16.93	11.75	20.30	17.4	12.80	9.68	19.93	8.78
Philippines	max	27.42	29.59	24.21	30	23.45	24.77	27.32	24.47
	min	13.41	14.34	13.41	14	18.51	18.36	23.89	16.59
	S dev	3.70	3.77	3.57	5.72	1.89	2.30	1.029	2.48
	mean	21.78	21.54	18.81	22.27	20.60	22.15	25.47	20.28
Turkey	max	25.77	26.61	25.77	26	24.20	26.61	18.33	23.55
	min	12.73	14.93	12.90	16	18.05	19.12	12.89	14.93
	S dev	3.82	3.37	5.02	3.92	1.75	2.35	1.70	2.70
	mean	17.79	20.72	17.63	20	20.90	23.11	15.47	19.44
Vietnam	max	35.60	39.56	NA	18	27.94	29.04	35.60	39.56
	min	20.42	12.56	NA	13	20.42	15.07	24.67	27.24
	S dev	4.04	7.96	NA	1.92	3.39	4.80	3.25	3.67
	mean	28.05	26.75	NA	14.80	24.31	25.01	29.61	33.26
		1980-2012	1980-2012	1980 90	1980-90	1991-2000	1991-2000	2001-2012	2001-2012
n-11		S/Y	I/Y	S/Y	I/Y	S/Y	I/Y	S/Y	I/Y
nations	max	41.95	46.26	31.07	37.18	34.18	46.26	41.002	36.28
	min	-2.09	5.46	5.43	14.43	18.04	7.011	4.502	16.38
	S dev	7.13	7.23	5.92	5.56	4.46	7.87	7.15	6.15
	mean	23.59	22.84	19.24	23.16	23.02	23.14	24.70	24.27

Here we have given a brief sketch of each economy in the group coupled with the respective descriptive statistics. Let us analyze these economies individually.

Bangladesh- The saving and investment trends are clustering around 16% to 36% rate and around 20% gap has been prevailed between saving-investment dynamics over period of time. During these last 30 years, the period under study reflected that saving rate was significantly greater than investment rate. Primarily, it is known for the textile hub and other primary products. Overall, it does not have large scale industrial and manufacturing sector. The poor performance trajectory is due to the poor macro-economic governance, rampant corruption, loose foreign investment policy, underdeveloped financial markets, and infrastructural bottlenecks.

Egypt- Egypt during 1990s to 2010, had more saving rate compared to the investment rate, while in 1980s, it was experiencing relatively opposite scenario. To be sure, some of the relationship between saving and investment rates had put positive impact on the growth rate for some years. This zig-zag pattern of saving-investment dynamics has called for some fundamental changes in the composition of public investment, increased private participation, tax reforms and in the openness segment particularly in capital market.

Iran- Iran among these economies in this group is comparatively closed economy. While it is not possible to derive a conclusion in 2000s due to the paucity of data, Iran was also having foreign direct investment because of saving less than investment. The picture of Iranian economy is quite controversial for last few years due to the economic sanctions imposed by the West. Its economic picture has created mixed reactions. On one hand, high oil revenue has led to the current account

surplus. But on the other hand, inflation has got worsened and unemployment rate is having double digit mark (Habibi, 2008).

Indonesia- it attracts considerable amount of foreign investment over the years. The period under study reflects the higher investment rates compared to the saving rates. It was affected by Asian financial crisis more compared to International financial crisis. In sub-period, the investment rate was also higher than saving rate. Thanks to a series of strong economic governance, policy reforms, and improved human capital efficiency, strong macro-economic performance has been observed since 1998 (OECD report on Indonesia, Sept, 2012).

Pakistan- it has experienced a considerable gap in the saving and investment rates throughout the period under study. Even in sub-sample period, investment rate was considerably less. Some analyses have featured in this context citing the reasons behind this. Nasir, 2004 has attributed three key reasons like low income, spendthrift nature of people and defunct government policy for low saving rates. Similarly, policy crunch, no separate investment policy, uncertain investment climate, and undue reliance on foreign resources are certain plausible determinants for low investment rate.

Mexico- it has a reasonably higher investment rates compared to its saving rate both in total and sub-sample periods. Mexico was more affected by LDC debt crisis in 1982. Again a worldwide recession slowed down its growth, still it managed to recover by signing North American Free Trade Agreement (NAFTA). By 1994, its market oriented policies and removal of trade restrictions by NAFTA had infused more foreign capital into the economy. Still some internal problems like drug war, political assassinations clouded its perspective. But till date, Mexico has managed to put sustainable growth pattern (Payne, 2005)

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South Korea- Remarkably Korean economy is an advanced economy in Asian region like Singapore. It has been severely affected by Asian and international financial crises. But It sailed through the 2008 crisis with remarkable aplomb. Its comparative advantage lies with quality human capital, rising productive capacity, strong R&D culture, strong macro-economic fundamentals .Its saving rates and investment rates tracked each other closely during the period under study**.**

Philippines- its savings and investment rates followed each other closely in first 2 sub-sample periods. But in 2001-12, investment rate fell short of savings rate. Overall under the period of study, Investment rate was higher than saving rate. In a recent report of ADB, it has been specified that inefficient bureaucracy and corrupt practices have resulted in decreasing foreign investment from 2010 onwards.

Nigeria- it has some sordid pictures like experiencing huge gap between saving and investment rate. Being the second fastest economy in Africa and an oil- rich economy, it is still unable to trash the corrupt government practice and other bottlenecks in their macro-economic pictures as well as fiscal imprudence. From 1980 to 2011, it has somewhat a little higher investment rate compared to saving rate but it has the nightmares in 2001-10 with drastic difference in the saving and investment rates.

Turkey- Being a regional hub of foreign investment in South-central, Eastern Europe and in west Asia, it has attracted more foreign capital since 1990s. Liberal government policy, investment friendly atmosphere and huge investment in infrastructure have put economy in a sound position. In 2001-12 periods, it has a greater investment rate compared to the saving rate. Overall its strategic locations, dynamic work force, strong and stable political environment have attracted

lot of foreign capitals. Turkey's 2000-01 banking crisis was a turning point for its own success. The event was followed by structural reforms as well as initiating medium term economic action plan, which ultimately fostered growth.

Vietnam- it has become a rising hub of foreign investment particularly after 2000. Throughout the period, it has a significant investment rate over the saving rate. It has been the most successful economy in Asia weathering both Asian and Global financial crisis (Abbott, 2008).Role of government in maintaining and channelizing the investment trend over the years is notably praiseworthy. To bolster the economy, government started restructuring its policy module especially towards the private players and attracting foreign investment (Abbott and Trap, 2008).

4. Econometric Procedures and Data Descriptions

The evolution of international capital flow to an economy is closely associated with the cycle of saving and investment mechanism. Inclusion of current account dynamics of-course has led to a different dimension. The degree of integration of capital flow is changing over the time, space, and distance. Number of factors is held responsible for the inter-regional capital flows. Conversely, countries with a high degree of barriers experience no incipient capital flows.

Many previous papers did apply empirical methods with time averaged data and related to the long term capital movement with saving-investment dynamics. (Kim *et al*. 2006). But cross-section is not always a solution because it never considers high frequency fluctuations in the dataset. The nations taken into consideration of N-11 group have had different economic policies and openness initiatives at different points of time. In some economies, the process of

liberalization was quite rapid. While in others, still it is not being started in full-fledged approach. So, time series can help researchers remove these characteristics (Kim *et al.* 2006).

Time series cases have certain limitations in form of endogeneity problems where the regressors are correlated with error terms and the probability of arising of spurious regression. Panel data analysis can overcome these fundamental issues by providing more efficient and consistent estimators. (Kim et *al.* 2006).

The sample used in this study consists of saving and investment data as a percentage of GDP of those respective economies covering time period from 1980 to 2012. The trade openness data of those 11 economies are also taken to find out the relative capital flows to the economies. All these databases are taken from United Nations Conference on Trade and Development (UNCTAD) dataset. In 11 nations group, there are potentially well performing nations, where the saving and investment rate scenarios are relatively better. More information will be deduced when we will go for group specific analysis as a whole and country specific analysis at individual level.

In our study, we deeply focus on examining the saving (s=S/Y), investment (i=I/Y) and capital mobility during different cycles of reforms phases and also during crisis time. We follow Jansen(1996), Jansen and Schultz (1996), Amirkhalkhali and Dar (2007), Pelgrin and Schich (2008) and use the following panel error correction model to study both short run and long run S-I relation of N-11 group of nations.

$$\Delta(IR)_{it} = \alpha + \beta\Delta(SR)_{it} + \mu\big((SR)_{it-1} - (IR)_{it-1}\big) + \gamma(SR)_{it-1} + u_{it} \qquad (1)$$

in which *IR* and *SR* are the ratios of investment and saving to GDP for country i ($i = 1,2,......,11$) at time t ($t = 1,2,..........,32$), respectively. Whereas, Δ denotes the first difference. Similarly, $\alpha, \beta, \mu, \gamma$ α, are the parameters. β measures the short-run relationship between saving and investment. However, it measures the contemporaneous co-movement of saving and investment in response to the shocks which have affected the economy in the past. $[(S/Y)_{it-1} - (I/Y)_{it-1}]$ measures the long run S-I relation as well as provide the intensity of co-integration between saving and investment. The γ measures the speed of adjustment in attaining the long run equilibrium. It also provides the insight of capital mobility measurement provided that savings and investment are co-integrated. If it will be lower, then it indicates higher capital mobility in the economy. If it will be higher, then it indicates lower capital mobility.

5. Estimation Results

The first step is to investigate the stationarity of the variables ny applying unit root properties of underlying variables. The underlying variables are measured by using 4 standard panel unit roots like Levin, Lin, Chu (LLC), Im Pesaran and Shin (IPS) test, ADF-Fisher chi square test and Philip, Perron Fisher Chi-square tests.

Table 4: Panel unit root estimation

	Without trend				With trend			
	variables	LLC	IPS	ADF FISHER	PP FISHER CHI-	LLC	IPS	ADF FISHER	PP FISHER CHI-

					SQUARE				SQUARE
1980-2012 full sample	IGDP	-0.665 (0.2527)	-2.967 (0.015)	-2.93 (0.017)	-2.8347 (0.0023)	-2.873 (0.0020)	-3.293 (0.0005)	53.40 (0.002)	34.025 (0.0488)
	SGDP	-0.497 (0.395)	-1.555 (0.059)	-1.79 (0.0366)	-3.9394 (0.0000)	-0.501 (0.308)	-1.85 (0.032)	36.60 (0.026)	46.657 (0.0016)
	Δ(IGDP)	-9.543 (0.000)	-10.06 (0.000)	137.04 (0.000)	197.198 (0.000)	-8.0306 (0.000)	-8.293 (0.000)	104.61 (0.000)	162.41 (0.000)
	Δ(SGDP)	-8.658 (0.000)	-9.907 (0.000)	136.83 (0.000)	231.28 (0.000)	-6.763 (0.000)	-8.154 (0.000)	99.82 (0.000)	451.13 (0.000)

Period in 1980-1990								
Without trend				With trend				
variables	LLC	IPS	ADF CHI-SQUARE	PP FISHER	LLC	IPS	ADF CHI-SQUARE	PP FISHER
I/Y	-3.267 (0.0005)	-1.40 (0.074)	35.22 (0.067)	45.816 (0.0027)	-2.83 (0.022)	0.833 (0.797)	19.39 (0.6207)	29.19 (0.139)
S/Y	-5.56 (0.000)	-2.413 (0.079)	33.98 (0.0127)	33.62 (0.140)	-5.582 (0.000)	-0.936 (0.174)	25.225 (0.0188)	38.592 (0.0032)
Δ(I/Y)	-6.995 (0.000)	-3.388 (0.004)	46.21 (0.019)	63.775 (0.000)	-6.997 (0.000)	-1.171 (0.0120)	34.102 (0.254)	66.358 (0.000)
Δ(S/Y)	-8.529	-4.769	57.608	85.843	-6.982	-1.842	40.93	86.01

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.0327)	(0.0016)	(0.000)

variables	Period from 1991-2000							
	Without trend				With trend			
	LLC	IPS	ADF CHI-SQUARE	PP FISHER	LLC	IPS	ADF CHI-SQUARE	PP FISHER
(I/Y)	0.444 (0.6718)	0.135 (0.553)	22.523 (0.423)	30.45 (0.1708)	-10.69 (0.000)	-1.47 (0.069)	43.72 (0.003)	33.114 (0.060)
(S/Y)	-2.417 (0.0078)	-0.0004 (0.4980)	19.63 (0.606)	20.93 (0.524)	-4.87 (0.000)	-0.156 (0.438)	22.99 (0.40)	39.45 (0.012)
Δ(I/Y)	-6.097 (0.000)	-2.734 (0.003)	45.32 (0.0024)	52.619 (0.003)	-10.59 (0.000)	-1.482 (0.068)	51.90 (0.003)	54.37 (0.001)
Δ(S/Y)	-7.279 (0.000)	-3.582 (0.002)	50.86 (0.006)	68.16 (0.000)	-8.489 (0.000)	-1.243 (0.1073)	41.86 (0.002)	54.23 (0.001)

	Period from 2001 to 2012							
	Without trend				With trend			
variables	LLC	IPS	ADF FISHER	PP FISHER	LLC	IPS	ADF FISHER	PP FISHER
I/Y	-0.889 (0.189)	-0.077 (0.465)	24.525 (0.341)	26.319 (0.238)	-2.793 (0.0026)	0.421 (0.633)	20.424 (0.565)	31.113 (0.093)
S/Y	-3.1286	-1.084	24.327	21.208	-4.312	-0.701	24.91	29.78

(0.009)	(0.1383)	(0.227)	(0.384)	(0.000)	(0.238)	(0.204)	(0.736)
Δ(I/Y)	-8.087	-4.765	54.723	85.955	-7.076	-1.757	45.880	87.994
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.0394)	(0.002)	(0.000)
Δ(S/Y)	-9.885	-6.512	73.907	91.411	-7.497	-3.066	49.918	82.040
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.011)	(0.0002)	(0.000)

(*Note. P*-values are reported in parentheses)

Out of these four tests, most of the variables are non-stationary at levels and stationary at the first difference. So, the null of unit root cannot be rejected for these variables. Now we can go for the testing of panel co-integration technique.

TABLE-5 (Panel Co-Integration test)

		Within Dimension				Between Dimension		
		Panel v-statistic	Panel rho-statistic	Panel PP statistic	Panel ADF stat	Group rho statistic	Group PP statistic	Group ADF statistic
1980-2012	Without trend	0.636	1.595	-2.970	-4.413	2.839	-3.141	-4.484
		(0.262)	(0.944)	(0.0015)	(0.000)	(0.997)	(0.0008)	(0.000)
	With trend	-1.549	-3.055	-2.692	-5.271	4.232	-2.083	-4.180
		(0.939)	(0.998)	(0.0035)	(0.000)	(1.000)	(0.0186)	(0.000)
1980-90	Without trend	-0.905	2.965	-1.35	-1.950	4.195	-3.503	-5.838
		(0.817)	(0.998)	(0.087)	(0.025)	(1.000)	(0.0002)	(0.000)
	With trend	-0.976	4.742	-0.950	-2.545	5.447	-3.150	-4.297
		(0.835)	(1.000)	(0.171)	(0.055)	(1.000)	(0.0008)	(0.000)

1991-2000	Without trend	-1.066 (0.855)	1.837 (0.967)	-1.195 (0.115)	-1.484 (0.689)	3.251 (0.994)	-0.335 (0.385)	-1.527 (0.633)
	With trend	-1.854 (0.968)	3.055 (0.989)	-0.834 (0.201)	-2.363 (0.009)	4.073 (1.000)	-1.195 (0.119)	-3.498 (0.002)
2001-2012	Without trend	0.728 (0.233)	-0.288 (0.386)	-0.971 (0.165)	-1.39 (0.816)	1.182 (0.881)	-0.770 (0.220)	-2.851 (0.0022)
	With trend	-0.890 (0.813)	1.645 (0.950)	0.394 (0.653)	0.714 (0.762)	2.554 (0.994)	-1.616 (0.0530)	-1.408 (0.0796)

(P values are reported in parentheses)

The above table shows the outcome of co-integration between saving and investment rates per GDP. We use Pedroni (2001) within dimension and between dimension statistics to check the co-integration between SGDP and IGDP of N-11 economies. Null hypothesis here states that there is no co-integration between saving and investment rates of N-11 economies. Overall from 1980 to 2012, it states the co-integration as a whole. In case of sub-period analysis, the period from 1980 to 1990 shows a significant relationship, while the rest two do not show it. The lack of relationship can be attributed to the crisis during those periods.

5.1 Fully Modified Least Square

The fully modified least square estimation has been adopted form *Christopoulos* and *Tsionas* (2004) for estimating the asymptotically efficient consistent in panel series where the method takes in to consideration of non-exogeneity, serial correlation and heterogeneity

(Pedroni, 1996). As all the explanatory variables are co-integrated with time trend , henceforth there is a existence of long-run equilibrium relationship among the variables through the panel unit root test (LLC, IPS, Fisher ADF & PP) and panel co-integration test (Pedroni, 1990). The study proceeds to estimate the Equation (1) by the method of fully modified OLS (FMOLS). The FMOLS allows consistent and efficient estimation of co-integration vector and at same time it addresses the problem of non-stationary regressors, as well as the problem of simultaneity biases in the heterogenous co-integrated panels. The OLS estimation is not as powerful as FMOLS and it yields biased results in regressors that are endogenously determined in the *I(1)* cases. The model can be written as:

$$Y_{it} = \alpha_{it} + x'_{it}\beta + \varepsilon_{it}$$

$$X_{it} = x_{i,t\ 1} + \varepsilon_{it}$$

Where $\xi_{it} = [e_{it}, \varepsilon'_{it}]$ is the stationary with covariance matrix Ω_i .The estimators will be consistent with the error process $\omega_{it} + [e_{it}, \varepsilon'_{it}]'$ statistics the assumption of co-integration between y_{it} and x_{it}. The limiting distribution of OLS estimator depends upon nuisance parameters. Following Phillips, and Hansen (1990), a semi- parametric correction can be made to the OLS estimators that elements the second order biases caused by the fact regressors are endogenous. Pedroni (1990 and 2000) follows the same principle in the panel data context, and allows for the heterogeneity in the short run dynamic and fixed effects. FMOLS Pedroni's estimator is constructed as follows

$$\hat{\beta}_{FM} \quad \beta = \sum_{i=1}^{N} \hat{\Omega}_{22}^{2}{}_{i} \ \sum_{t=1}^{T}(x_{it}\ \hat{x}_t)^2 \ \sum_{i=1}^{N} \hat{\Omega}_{11}i^{1} \ \hat{\Omega}_{22i}^{1} \ \sum_{t=1}^{T}(x_{it}\ \overline{x}_t)\ e_{it}\ T\ \hat{\gamma}$$

$$\hat{e}_{it} = e_{it}\ \hat{\Omega}_{22}^{1} \ \hat{\Omega}_{21i}, \quad \hat{\gamma}_i = \hat{\Gamma}_{22i} + \hat{\Omega}_{22i}^{0} \ \hat{\Omega}_{21i}\ (\ \hat{\Gamma}_{22i} + \hat{\Omega}_{22i}^{0}\ )$$

where the covariance matrix can be decomposed as $\hat{\Omega}_1 = \hat{\Omega}_1 + \hat{\Gamma}_i + \hat{\Gamma}_i$ where Ω_i^0 is the contemporaneous covariance matrix and $\hat{\Gamma}_i$ is a weighted sum of autocovariance. The $\hat{\Omega}_i^{0}$ represents an appropriate estimator of $\hat{\Omega}_i^{0}$.

This study has used panel group FMOLS test from Pedroni (1996, 2000). This test allows for greater flexibility in the presence of heterogeneity of the co-integrating vectors. The null hypothesis constructed for the test statistics of the panel group estimators is that H_o: $\beta_i = \beta$ for all i against the alternative hypothesis H_A: $\beta_i \neq \beta$, so that the values for β_i are not constrained to be the same under the alternative hypothesis. This is clearly an advantage. Another advantage lies with the interpretation of the point estimates in the event that the true co-integrating vectors are

heterogeneous. It can be interpreted as the mean value for the co-integrating vectors (Pedroni, 2001).

TABLE 6: Panel FMOLS and DOLS tests

	1980-2012	*1980-1990*	*1991-2000*	*2001-2012*
FMOLS	0.347 (0.000)	0.392 (0.004)	0.34 (0.085)	0.214 (0.001)
DOLS	0.545 (0.000)	0.448 (0.002)	0.910 (0.140)	0.238 (0.031)

Here we have checked the cases of FMOLS and DMOLS to trace the inter-country capital mobility. Being taken from 1980 to 2012, the low value of FMOLS has significantly specified greater capital mobility within the region. If we study across the 3 sub-sample periods, then the result is robust. Over the years, value of FMOLS has experienced a decreasing trend. It means the inter-economies capital mobility has increased significantly over the years. With the rising growth rate and sprawling opportunities, the region has a greater propensity to have the cross country capital mobility.

5.2 Panel vector error correction mechanism

The study has applied Engle and Granger (1987) suggests two-step procedure in order to examine the short-run and long-run dynamic relationships between savings rate and investment growth rate. In the first step the long-run model specified, is to be estimated and in the next step we have to define the lagged residual obtained as the error correction term (ECT). The estimation of dynamic vector error correction (VECM) model is as follow;

$$\Delta IGDP_{it} = \theta_{1i} + \sum_{j=1}^{q} \theta_{1,\,1ij} \Delta IGDP_{it-j} + \sum_{j=1}^{q} \theta_{1,\,2ij} \Delta SGDP_{it-j} + \lambda_{1i} ECT_{it-1} + \mu_{1it}$$

$$\Delta SGDP_{it} = \theta_{2i} + \sum_{j=1}^{q} \theta_{2,\,1ij} \Delta SGDP_{it-j} + \sum_{j=1}^{q} \theta_{2,\,2ij} \Delta IGDP_{it-j} + \lambda_{2i} ECT_{it-1+} \mu_{2it}$$

Where the ECT (Error correction term) is derived from the long-run FMOLS results

(PVECM)

Dependent Variable	Source of causation (Independent variable)		
	Short-run (F statistics)		Long-run (t-statistics)
	ΔIGDP	ΔSGDP	ECT
ΔIGDP	_____	0.0051 (0.5956)	0.033586[2.498] ***
ΔSGDP	0.00475 (0.5201)	_____	0.0410 [1.6941]

Lag lengths: 2, P-value listed in parentheses and t-statistic listed in brackets. ***, **& * indicates significance level of 1%, 5% and 10%.

The above table shows the dynamics of savings and investment rate in all the N-11 countries both in short-run and long-run. The panel vector error correction results are not in favor of long-run causality between investment growth rate and savings rate in all the countries where as there is short run casual effect detected from savings to investment. It is evident that in long-run there will be no such impact on investment due to savings rate. The results show bidirectional causality between investment and savings rate in short-run.

6. Conclusion

The region has the significant capability of overpowering some major economic blocs by 2040. It has truly been not subsided by a gamut of financial crises. The result overall has spelt a long run relation between saving and investment dynamics. In short run, during the two subsequent decades have shown negative result. But compared to other economies, these economies have been affected insignificantly and hence truly identified as next gen economic powerhouse.

Here the paper attempts to quantify the importance of saving and investment mechanism through the use of panel co-integration and FMOLS techniques for the year 1980 to 2012. Our findings provide the support for the view that investment is not unduly constrained by the domestic saving only. Greater capital mobility has opened up the idea for trade openness within

the economies of the bloc. All these results must be acting as the key parameters in deciding the fate of this economic bloc.

Despite these findings, it is difficult to infer whether the degree of capital mobility of individual economies because of frequent swings in policy changes, political conditions, cyclical shocks and unstable macroeconomic conditions. Owing to bigger international crisis, the capital mobility among the economies has increased significantly in the recent decade.

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