Capital Account Liberalization Indices: A Review of Literature

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Abstract: The complexities of the global financial system have been increasing and the same is managed by implementation of capital controls by the nations. Therefore, it is important to understand what controls are and how the nations implement them. The aim of this paper is to analyze and understand the capital controls indices developed so far to measure financial openness or liberalization. Broadly the measures developed so far are categorized into de facto, de jure and hybrid measures. Each measure constructed has used different scale and hence the intensity and description of each measure is different also they cover different countries.

Keywords: Capital Controls, Capital Account Liberalization, de jure, de facto and Hybrid measures.

1. INTRODUCTION

The complexities of the global financial system have been increasing with the development of different financial instruments, equity markets and the financial markets. The fundamental and the structural change in the economic system has increased the financial integration, which helps to reduce the domestic market competition and reduce the risk through diversification and increased investment opportunities. The AREAER report of 1990 by IMF analyze that 123 out of 153 member countries have restrictive capital accounts, and separate exchange rates for the different or all the capital account transactions [1]. The quantitative controls on the capital transactions, different exchange rates for different transactions and the taxes on exchange are the most common type of controls imposed on the international capital flows [2]. These controls help to design the regulations that are implemented over the international financial transactions. Currency controls are a stopgap measure adopted by the nations as a wall against economic crises [2]. The data on the capital controls is typically recorded in the International Monetary Fund **(IMFs)** *Annual Report on Exchange Arrangements and Exchange Restrictions* **(AREAER),** which enlist the rules and the regulations implemented on the international capital transactions in the different assets category [3].

Therefore it is important to understand what controls are and how the nations implement them. The aim of this paper is to analyze and understand the range of the capital controls used by the researchers for constructing the indices for measures of financial openness; capital account convertibility in particular. All these measures are constructed using separate phenomena and intensity as they cover different number of variables and also for different countries. Section 2 talks about the history of capital controls, section 3 narrates the construction of various forms of capital account liberalization indices and section 4 finally concludes the paper.

2. HISTORY OF CAPITAL CONTROLS

The evidence of the extensive use of the capital controls or the exchange controls[1] can be found since the World War I (1914-1918), when the nations directed and implemented restrictions on the capital outflows, for financially supporting the war effort. Major nations withdraw their support from the gold standard and maintained fixed exchange rates. Post War, policymakers put their efforts to restore the gold standard and banks started priority lending and reduced the supply of capital flows particularly debt in 1925. To control the rising bank rates, the controls were used, which were uplifted earlier.

During 1920s, there was a huge movement of capital in Europe because of fear among the investors and US was emerging stronger than Britain as its position as a lender was getting weak [4]. During the Great depression (1929-32) the new capital controls were introduced and implemented and are still followed by a huge number of economies, even if they started phasing out the controls and the liberalization of capital account from early 1980s. By early 1970s the Bretton Woods system completely collapsed and was replaced by the Floating Exchange Rate system, and the nations simultaneously started opening their capital account,

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[1]'Capital controls' and the 'exchange controls' are used interchangeably, but exchange controls are different from the capital controls as it accounts both the current account transactions and the financial or the capital account transactions.

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giving a new boost to financial integration. The exchange markets are very sensitive to the economic changes thus easily shift from equilibrium to disequilibrium, thus the governments need to intervene and contribute to the exchange market efficiency. As [5] says, " we need to throw some sand in the well-greased wheels" i.e. the risk still will persist as currency diversification leads to intercurrence movement of capital. The true comparative advantage of investment is movement of capital to efficient markets. Tobin in 1972 also proposed the internationally accepted uniform tax system for "moderating the swings in major exchange rates". The tax system would be administrated by the government over its jurisdiction and need to get the consent by IMF. In early 1990s many of the emerging economies were in great prosperity and the international capital inflows would help them perform even better. But with the Chilean experience of turmoil during 1982-83 (post deregulation of the capital account), the Mexican Peso crises in 1994, the Asian financial crises during 1997-98 and the Russian financial crises in 1998, all were transpired only after the liberalization of the financial account. But with the advent of the global turmoil in 2007-09 (which was very similar to the great depression of late 1920s) and the subsequent 'currency wars' intensified the pressure over the developed economies. In this situation the developed markets eased the monetary policies and the emerging economies either tightened their controls on the capital flows or introduced the new policies. The empirical test used for evaluating the capital account openness or measuring the financial liberalization faced various difficulties as the matrices for openness are more elusive.

3. FORMS OF CAPITAL ACCOUNT LIBERALIZATION INDICES

First Generation Models: AREAER Structure based De Jure Indices

Capital Controls Index [6]

The first binary indicator was developed for the period 1967-1986, for 16 OECD nations by compiling records and summary of **IMF** (International Monetary Fund) **AREAER** (Annual Report on Exchange Rate Agreement and Arrangement of Exchange Rate) by [6] on annual basis. They divided the controls into capital and exchange rate controls i.e. the restriction on payments and receipts of capital transaction and invisibles. Index value of 2 indicate restrictions on both; capital transaction and payments of invisibles for the given country and year, similarly index value 1 indicates restriction is present on one of the transaction for the given country and year and 0 indicates no restriction. At that time IMF AREAER didn't record direction and maturity of capital flow or indirect capital transactions. By using the Keynesian framework, they argue that capital controls improve autonomy of monetary policies which helps in generation of employment and enhances capacity utilization by controlling interest rates. Their study is an attempt to measure basically the Bretton woods debate on controls, and the impact of financial openness on the expansionary and redistributive economic policies. Countries who have controls in place on international capital mobility have helped them to maintain exchange rate stability.

CAPCON, CURRCON and MULTER [7,8]

Next contribution in the area was a study of 20 OECD countries for the period 1950-1989 to check presence of controls on capital transactions. Study shows that capital controls are imposed by strong governments which have grasped monetary policies to generate seigniorage revenue, keeping interest rates at a lower level artificially. Extending their study [9], used a panel of 61 developing and developed countries, and found controls to be beneficial for the countries which have low per capita income and government managed banking sector. Data on controls was developed from AREAER issued by IMF since 1950, where one indicate presence of restriction for the given country in that year and zero defines no restrictions over capital transaction, multiple exchange rate for the capital transaction or the payments and receipts of invisibles and current account transactions. Results reported in the above studies are in line with the previous study [7] that restrictions over capital account transactions are allied with increasing level of inflation, low per capita income and higher level of government intervention. Nations who impose controls on the capital flows are likely to introduce pegged or managed exchange rate. They stated that there is no effect of capital account restriction on growth of an economy but the stable political system and stable exchange rate system boost growth. But, no robust correlation was found between the capital and current account restrictions with the growth of the economy. Index ignores the impact in near policy change and does not portray imposition and amputation of controls as reform measure.

KALIB [10,11]

Using AREAER database [11] made the index KALIB for measurement of restriction on capital flows in two panels. Panel A, where the nations (9 OECD and 7

Non-OECD) had some experience of openness of capital account over the period of 1986-95 i.e. value of KALIB indexis not equal to zero. In Panel B, period was extended back from 1976-95, which includes nations that used capital restrictions as a tool and also imposed and removed restrictions on and off, to manage surge of flows, coded into zero and one format. Where value one represents no capital restriction and zero represents restriction on capital transaction. KALIB is calculated for each country, which embodies fraction of the years in those nations which had free capital mobility. If core of KALIB is 0.2, it indicates that, in the last two years 'capital restrictions have been uplifted. In another paper by [10], the K parameter represents fraction of years in which the nation had liberalized its capital account on a continuous basis from year 1976-95 according to the AREAER. Therefore, the index takes into account value of the nations that had not reemployed restrictions, once uplifted.

Drawbacks of the First Generation Models

They do not capture the extent of capital mobility in absolute terms neither any distinction is made on the basis of type of flows. The measures are on extremes: either absolute freedom or complete closeness, but the intensity of restrictions is not evaluated, nor the difference between actual and regulated capital mobility has not been taken into account. The extent to which domestic markets are assimilated to world markets is difficult to measure from economic point of view (Annexure 1).

Second Generation Models: The New AREAER Structure based De Jure Indices

CAPITAL [12–17]

[16] captures the change in international financial regulations associated with political and economic scenarios in two facets of fiscal and monetary policy. Quinn-Toyoda index [17] is a measure constructed for different form of capital flows (separately for inflows and outflows). Index provides intensity i.e. change of flows across space and time. Quinn index is one of the most referred measure, as period covered is long (1950-97) and index is constructed for 21 OECD and 38 Non-OECD nations, a total of fifty-nine nations. Index is built around the lines of AREAER and disaggregated in eight current account categories (0-8) and four capital account transactions (0-4) and two international agreements (0-2). As per extremity of government licensing or taxation, score is calculated into half integer units for each transaction category and each score is transformed into 0-100 scale, using the formula 100*(CAPITAL/4). The score ranges between 0-2 which is individually assigned to different flows in the import proceeds, export proceeds, payment and proceeds of invisibles in current account and capital account. Score for each country is calculated and summed in categories, under the headings of open, largely open, partially closed and largely closed economies. The benefits of Quinn index are; first, it is available in the panel format and, second, it is a scale based index capturing level of openness. But a major limitation of Quinn's index is that doesn't take into account direction of flows, nor it reports nature and type of capital flows.

FOI [18]

[18] measures the relationship between balance of payments, macroeconomic management, private markets and institutions along-with the prudential factors and capital controls. The study is the cross sectional research done for 45 developing/emerging countries for year 1996. Using IMF's AREAER data, they constructed disaggregated measure for capital controls, taking into account transactions from different categories. Inflows and outflows are recorded separately for residents and non-residents, considering money market instrument, credit operation, investments and securities etc. Basically it focuses on almost all the subcategories of IMF's AREAER 13 categories of transactions, and the binary value is assigned to all subsections (purchase & sale by residents and non-residents abroad or locally). Limitation of FOI index is that the data is available only for year 1996 and covers only 45 nations and treating non-availability of data as unregulated transactions.

CAOI [19], CAPMOBILITY[20]

The study focuses on cross border capital flows of labor intensive economies and left labor power. Research is taken for fifteen countries and using IMF AREAER data for period 1967-1990 and constructing regression for the restriction on capital account and bilateral payments for members and non-members along with cross border deposits [19] make a measure of CAC by exploring the factors that affect efforts of government directly to regulate international capital flows from year 1973 (Post Bretton woods) to 1999. They used AREAER and coded regulations for each category as 'Closed' or 'open' for 173 nations and developed CAOI. Index is established on the nine listed distinctive financial account transaction in AREAER 1998, namely; payments and proceeds of invisibles

inflow and outflow, capital and money market securities inflows and outflows, credit operation inflows and outflows, inward and outward direct investments in real estate by residents and non-residents and provision for commercial banks. Each of the above dimension was assigned with binary variable value of one when no restriction is imposed and zero when restrictions are imposed on the capital transaction. Higher score indicates more open economy and mobility of domestic savings abroad. All the transactions, where domestic savings are channelized into foreign projects or investments across all the countries in a given year are considered in the above index. Sum of score for each category is calculated to construct the CAO index and score can range between 0-9, zero being fully restrictive and nine means fully open. Overall correlation among the inflows and outflows of different nature in the above mentioned nine categories except the direct investment is very high.

FOI (Extended) [21]

Miniane also followed the [18] pattern of disaggregated AREAER measure, extending the years back to 1983 for 34 countries. The basic difference from previous second generation indices is that this study focuses only thirteen main disaggregated categories and without systematically differentiating between inflows and outflows of capital. Country selection was based on Miniane and Rogers's previous research and period covered is from 1983-2000. The rule followed for coding restrictions is; one: if at least one of the variables in that category has restriction and zero: if no restriction is imposed on any variable under the category. Study has focused on the severity of controls or their actual enforcements, tracking the change and implementation of controls.

KAOPEN [22]

This index takes into consideration both the intensity and the extent of capital controls for larger countries and time frame making it available from the year 1970-2013 for 181 countries. The KAOPEN index is a binary dummy variable assigned to four major dimensions i.e the various restrictions imposed on the international trade accounts and financial accounts. The variables are k1 (multiple exchange rate), k2 (transactions in the current account), k3 (transactions in the capital account), k4 (surrender of export proceeds). It's a reverse index in which the focus is on the financial openness unlike the previous accounts that focused on the controls implemented. So in the index they reversed the binary variables and measured the values as 1 if; Capital account restrictions are non-existent and 0 if Capital account restrictions are imposed. Moreover, this index uses the five year rolling average window for the k3 variable of the balance of payments and developed index using principal component analysis for each category of transaction mentioned in IMF AREAER.

Capital Mobility [23]

Edward developed a new index from the amalgamation of [12,24] indexes for measurement of openness of the capital account. Scale of both the indexes was transformed into 0-100 scale, to make them compatible and akin, where the score of 100 would mean a highly open economy and complete freedom for capital mobility. The new index was developed for 163 nations and from 1970-2000 divided into three groups on the basis of capital mobility, High, Intermediate and low mobility. There is a huge shift in the levels of mobility from low to high the developed, industrial nations have opened more than the intermediary and the less developed nations. Countries are divided with the levels of capital mobility and compared across the groups of nations. Main purpose of multi country study is to analyze external crises in relation to the restrictions on capital mobility. Detailed index is developed to study the extent of capital mobility and exposure of nation to the risk of external crises, both in terms of cost and depth of the same.

Even this index has no clarity between the restrictions on type of capital flows. Data is not completely available for all the countries over a period, also missing observations are calculated with impute function on the basis of trade openness which in actual situation differ from the financial openness.

KA Index [25]

De Jure restriction measure for international capital flows using a balanced panel from the year 1995-2005 for 91 countries (which includes 35 high income, 42 middle income and 14 low income countries) was developed. Index is more disaggregated at transactional level and constructed using AREAER, balance of payment (BOP) manual. Index takes into consideration various sub-indices, focusing on shares and securities, bond and the debt securities, money market instruments, collective investments, financial credits and direct investment. All these assets are further strewn according to inward/outward flows, purchase and sale, local/foreign residency investments. The binary coding for each asset is done; where 0 means unrestricted transactions, merely registration or the notification process is only present, or restriction is

imposed only on few industries and 1 means restricted transactions for capital mobility. Once all the categories are coded they are than averaged for the total number of transactions in above mentioned categories.

For the symmetry purpose direct investments are averaged for outward and inward investment, along with liquidation. In particular, capital account transactions are coded individually, which helps to construct sub-indices based on the asset categories. The benefit of this index is that, defined set of asset categories can be used for analysis by grouping them according to momentum and route of flows. Limitation of index is that data is available only for the period 10 years.

FKRSU [3]

FKRSU is one of the latest addition made in the second generation of De Jure models crafted on the data index of [26,27] and SHARE based on AREAER, having covered larger asset categories and longer time period; 1995-2013 for over 100 countries. The index is developed on an annual basis reporting the presence and absence of capital restrictions distinguishing on the direction of the flows (inflow controls and the outflow controls) for the ten assets categories of AREAER for actual transaction accounts (studying the 32 transaction categories) like in De facto indices. Pattern of scoring the transaction with binary score is; 1 if restrictions are present on capital transaction and 0 if no restriction are imposed on capital transaction. Rules set for the coding of transactions are the extension of [25], mere registrartion and notification to the authorities is not treated as control but if approval, authorization or clearences are required than it is treated as control. Any celing on any form of transaction is trearted as control. The controls are implemented on international flows of capital due to national securiuty and political reasons (Annexure 1).

The Non-AREAER Based De Jure Indices

The Non-AREAER based Indices take into account the type of flows and compare restrictions imposed and actual capital flow.

Equity Market Liberalization [28]

The index of financial openness is structured on equity market liberalization based on dating of equity market openness on annual basis. The various variables are binary coded and used for constructing the index. First factor is; Official Liberalization, an official equity market liberalization indicator is constructed to the corresponding incident of any change made in regulations relating to options for investment in equity securities in home markets. Where 1 means when the equity markets are officially liberalized and 0 means when the equity markets are restricted. First date or first sign means when policies of equity market are relaxed, the first of the three dates. 1 is announcement of first sign indicator, after first liberalized year and 0 is when the nations follow restriction on the equity markets and no sign of liberalization is present. Liberalization Intensity is the ratio of market capitalization of firms for IFC investible index to IFC global index for each nation [28]. Value of 1 indicates that foreign investor can invest in any of the stock and value 0 indicates that stocks are not open to foreign investors.

The merit of this study is that it only focuses on equity market liberalization and its impact on growth of economy. The equity market liberalization when tested along with the control variables, it leads to 1% increase in real GDP. The study lacks to significance of other type of flows to the economy.

IF (Investment Freedom) [29]

Economically free Country has no restrictions on the flow of capital for specific activities. Firms and individuals are free to invest both in a country and across borders seeking opportunities for better returns. The IF index range between the score of 0-100, where a score of 100 means; economy practices complete investment freedom (depending upon the level of restrictions a maximum of 25 points and minimum of 5 points are deducted). Rules are different for the domestic and international investment flows, or restriction on exchange flows. Restriction can vary according to actors or industries of nations, categorized into factors, namely; restrictions on capital account, controlled investment into different sectors, restrictions and procedure for foreign investment, code of investment, restriction on land ownership and fair compensation, etc.

DE FACTO INDICES: BASED ON THE ACTUAL FLOWS

Quantity Based Indices

NFA (Net Financial Assets) [30]

The index developed for period 1970-2004, to study foreign assets and liabilities of 145 economies. The countries included in the study have income above the

US$ 1 Billion in year 2000. After compiling the data from International Investment Position **(IIP)** of the IMF **Balance of Payments Manual**, capital gains and losses are measured and data is extended backward. International holdings and international transactions are classified into portfolio investment, foreign direct investment, financial derivatives and reserve assets. To measure of international financial integration is a volume based ratio of international flows (stock of external assets or liabilities) and GDP. The study focuses upon structure FII (foreign institutional investors) particularly portfolio investments in emerging nations, which have shown improvement in their position over past decade. Level of foreign reserves are more manageable and share of equity liabilities to total foreign liabilities have grown making a shift in risk profile of these nations in Balance of Payment Position (BOP).

Private Financial Openness Index [31]

Financial Flows are summation of stock of Foreign Assets adjusted for international reserves and Foreign Liabilities adjusted for outstanding development loans as a ratio of GDP, but excludes official claims and liabilities.

Price Based Indices

Law of One Price and Cross Market Premium [32]

The cross-market premium is defined as "percentage difference between the dollar price of the stock in the domestic market and the price of the corresponding depository receipt (DRs)". The two models are recommended by [32] for measuring law of one price. The model is based on the theory that "the high convergence speeds reflect a quicker convergence to LOOP and hence stronger financial integration". The second model is measured using a threshold lag model for calculating cross-market premium. Trade in stocks in international and domestic markets are used to measure the degree of financial liberalization and integration with the world. They concluded that for liquid assets integration is stronger and "extent that investors demand a liquidity premium to hold firms for which arbitrage is relatively expensive", liquid firms are majorly benefitted from internationalization process. Result of the study shows different angel from firm-level data capturing activities in globalized markets through exchange of goods and services and capital inflows and outflows in terms of investments and valuation.

HYBRID Indices

FORU [33]

They constructed an index for trading which is a monthly measure of capital controls for 29 emerging markets covering period from 1989 to 2006, in two variants. The first one is a global index (IFCG) representing the market and second one is for domestic equities available for the foreign investors named as investable index (IFCI). Market capitalization ratio is a quantitative measure of country's equities and when we subtract one from the ratio it gives intensity of imposed restrictions. At first stage, global stocks are studied which are opened to FII's (Foreign Institutional Investors) and then Industry foreign ownership is calculated finally measuring the overall openness factor FORU. The Binary value of FORU indicates 0 if market is completely open (No Restriction on investment in stocks) and 1 if market is completely closed (Restriction on investment in stocks).

FL: Financial Liberalization [24,34,35]

The financial integration index is based on the four categories of the AREAER from the year 1973-1996 for 35 countries. The index is formed by summing the variables used for six dimensions after assigning the binary coding (dummy variable) to capital account, current account, repatriation/ surrender of export proceeds, multiple exchange rate, restriction on credit, interest rate mechanism, entry restrictions, equity and securities market, opening of the banking sector for privatization. Then each dimension is assigned with a score from zero to three; 0 for fully restricted, 1 for partially restricted, 2 for mostly liberalized and 3 for fully liberalized. Any change in the policy leads to a change in the year score for respective dimension, if a sector is fully liberalized than, change or shift of dimension on the scale is more than one point. Similar process is followed for any large reversal of liberalization policy or as and when restriction is reemployed. Variable for capital account (CAP) has been further expanded and used by Chinn and Ito. After summing, higher score directs to a more restricted capital account.

KOF [36]

Dreher's index of globalization covers three aspects; Economic Integration, Social Integration and Political integration. Study includes panel of 123 countries and is analyzed for the period 1970 to 2000. Extent of economic liberalization is captured through two indexes. The first index accounts actual flows in

Annexure 1: Measures of Capital Account Openness

Code	Reference	Year of Study	Countries in Study	Scale	Description	Model	Merits	Demerits
de jure Indicators								
1st Generation Models (IMF -BINARY Group)# AREAER Based de jure Indices								
CCINDX	[6]	1967-1986	16 OECD Countries	0-1-2, where, each entry represents the number of the restrictive practices in each Country in that year (Maximum=2, Minimum=0), [6]	This is the First index constructed to study the "Political Economy of the Controls"	They analyse the Saving and the Investment patterns, and impacts of Domestic Nominal Interest rates, Foreign Real Interest Rates, Expected and Actual Exchange Rates and Changes in the Monetary Policy.	This is the First Index quantifying the IMFs classification of capital controls and then comparing across the 16 nations.	Firstly, a degree of arbitrariness can be noticed in IMFs classification of the capital controls. Secondly, it does not takes into account the intensity and impact of controls.
CAPCON	[7,8]	1966-1989	61 Countries	0-1, where the Binary variable is, 1=when capital controls are in place. 0= when no controls are placed. The study Takes into account three forms of restrictions: 1- Restrictions on Capital Account, 2- Separate Exchange Rate, 3- Restriction on the Current Account.	The Capital Controls had no robust relationship with the economic growth.	The study focuses on the relationship between the various aspects of Capital controls on the different variables like: Black Market Premium Regulated Monetary Policy Less developed Tax System Capital controls are majorly used in the closed economies		The Current account Transaction Dummy Variable is used as a proxy for the intensity of the controls.
KALIB/Share	[10,11]	Panel A:1986-1995 Panel B: 1976-1995	Panel A: 21 OECD and 74 Non-OECD Countries Panel B:9 OECD and 28 NON OECD Countries	The data used to generate the Index (KALIB) for the restrictions on capital account, is IMF's AREAER and coded into 0/1 format. (1= the value one represents no capital restriction, 0= the value zero represents the restriction on the capital transaction). The KALIB is calculated for each country, which embodies the proportion of the years in which countries had the free capital mobility.	The estimates in the study shows the positive relationship between the Capital Account openness and the financial development,	The study is the systemic association between the openness of the capital account and the financial depth leading to the growth of the nation, taking different cross sectional samples and the time period. Also the model focuses on clearly determining the components of financial depth.	The KALIB indicator defines the proportion of years in which countries had the free capital mobility.	Even this index does not reflect the timing of the capital account liberalization, nor does it measure the intensity of the controls.

2nd Generation Models (IMF -BINARY Group) The New AREAER Structure based de jure Measures								
CAPITAL	[12–17]	1949-2007 (The study was only open for the years: 1958, 1973,1982 and 1988)	122 Countries (Initially the data was available for the 63 countries, out of which 20 were developed and 43 were developing nations).	The transactions are recorded in capital receipts and capital payments and the Quinn's score in the Index are divided as follows Where 0 = if the transactions is completely restricted. 0.5= if the transaction is evaluated and then in certain conditions it is approved 1 = if the transactions can be made but after paying the applicable taxes 1.5 = if there is minimal approval or taxation process 2 = completely unrestricted transactions. The above score ranges between 0-2 and is assigned individually to different flows in the import proceeds, export proceeds, payment and proceeds of invisibles in current account and the capital account.	There are two form of indicators. The first is the index constructed from the historical AREAER and the second is the change in the initial index.	The model analysed in the paper is the cross-country growth regression, regressed over the different variables along with the openness of the Capital and the Current account. The other macroeconomic variables included in the model are: population growth, primary school enrolment, socio economic growth factors and the government share.	The distinct benefits of Quinn index are, Firstly, it helps the researchers to study in the panel formal as it provides data for both across the nations and over the time. Secondly, the index is not just a binary classification of the restrictions, instead it is a scale based index and the level of openness.	But Quinn's approach has certain limitations in context to the new AREAER format as the sub categories of international transactions do not have same policy. Also it doesn't take into account payments and proceeds of services, which are part of the capital account transactions.
CC	[18]	The data is available only for the year 1996	45 developing countries.	Basically it focuses on almost all the subcategories of IMF's AREAER 13 categories, and the binary value is assigned to all the subsections (purchase & sale by residents and non-residents abroad or locally)	The Scale is formed using the disaggregated measure of Capital controls based on the post 1996 classification in the AREAER of IMF. Each transactions are recorded separately and further bifurcated into inflows and the outflows.	The general single-equation model is used to measure the intensity of the capital controls and regressed upon the variables related to BOP, Macroeconomics, Institutional Environment and Prudential Factors.	The index cover the broadest range of the data, both cross-section and the time period of the study. The study uses the post 1996 classification of the AREAER capital controls and takes all the transactions into consideration. Also it distinguishes the transactions into Capital Inflow and Outflow.	The Main drawback of this index is that it is not published and the data is available only for one year. The restriction index only covers post 1996 period.

CAOI	[19]	From year 1973 to year 1999	173 countries	The various dimensions of the AREAER except provision for the commercial banks, there were two categories and each one was assigned with the binary variable value of 1 and 0. Where, 0 = restrictions are imposed on the capital transaction and 1 = when no restriction is imposed on the capital transaction. The sum of score for each category is calculated to create the CAO index and the range of the possible scores is 0-9, zero being fully closed and nine means fully open.	The study has five primary findings: 1. The nations with fixed exchange rate have less liberalized. 2. In the developing and less developed countries the CAO is near to zero. 3. The CAL boost integration with the world. 4. The nations with higher government spending are less open. 5. The democratic structure of the economy leads to integration and the openness of the economy.	In the equation the dependent variable capital account openness index was estimated against the lagged explanatory variables, which are, the dummy for the fixed exchange rate, the gross national product, the government consumption, level of countries integration into the world economy, dummy variable for the democracy and few other control variables.	The detailed structural features of the economy are regressed for the capital account openness, hence the extensive coverage of the controls. The index in detail discriminates between the inflows and the outflows of the capital.	The Index takes into account only the five categories of the capital account from the entire classification in the AREAER post 1996. Also the data is not publically available.
FOI (extended on the basis of new categorization of AREAER)	[21]	From year 1983- year 2000	34 Countries	The 13 dimensions of the capital controls given in AREAER are used in the index. Each Category is assigned a 0/1 dummy value. 1 = one if at least one of the variable in the category has restriction imposed and 0 = zero if no restriction is imposed on any variable under the category For the missing information about the variable between the two years is filled by default.	The data collected is the comparison of all the developed indices for the capital account liberalization and the correlation between the de jure and de facto measures is measured. The study gives the overview of all the available literature and benefits and demerits of using the available indices.	The dummy index is developed for measuring the restrictions on the capital account transactions. Across the study correlations are calculated and a special focus is laid in measuring the level of the liberalization of the countries based on de jure and de facto indices.	The coding is done through induction and all the 13 categories are used. The systematic coding is explained in detail and the across studies comparison is also done.	The countries included in the study are limited more to the European and Latin American nations. No distinction is made between the inflows and the outflows of the capital.
FL: Financial Liberalization	[24,34,35]	1973-2005	91 Economies	Each dimension of financial openness is assigned with a score from zero to three as following 0 = Fully restricted 1 = Partially Restricted 2 = Mostly liberalized 3 = Fully liberalized (the above given information changes in few transactions as per the licencing or restrictions and range from 0 to 5 but description remaining same).	The database is divided into seven dimensions of the financial sector policies.	The level of correlation among the components of financial liberalization is measured. Also the changes in the levels of openness is studied in details. The changes in policies related to reversals and reforms are also studied.	The diverse range of economies are included in the index for financial reforms.	The index lacks to provide a concrete index for the policy comparison and no comparison can be made for deciding whether to liberalize or not.

KAOPEN	[22]	From the year 1970 to year 2013.	181 Nations	The variables are k1 (multiple exchange rate), k2 (transactions in the current account), k3 (transactions in the capital account), k4 (surrender of export proceeds). It's a reverse index in which the focus is on the financial openness unlike the previous accounts that focused on the controls implemented. So in the index they reversed the binary variables and measured the values as: 1 = Capital account restrictions are non-existent 0 = Capital account restrictions are imposed Moreover, this index uses the five year rolling average window for the k3 variable.	This index is an extensive indicator developed from all the aspects of financial globalization, using data reduction system. Taking current account, multiple exchange rates and the capital account components separately. The greater the score of the component the higher is the openness of that Factor of BOP.	By using the index, the role of the budget balances, the institutional environment and financial development is measured in relation to the openness components.	The Major merit of using this indicator is that the data is readily and easily available, also the replica can be created. The index is relatively transparent, updated and available for the wide range of the countries.	The KAOPEN variable poses problem when used annually, as it is a five year rolling average calculation of the binary variable. Thus, the problem of endogenity can be seen when used with other independent variables.
Capital Mobility	[23]	Year 1970-Year 2000	163 countries	The nations are divided into regions and then the sample is divided into the equal-size groups (forming a total of three clusters). The capital mobility levels are divided into three categories of: High Mobility, Intermediate Mobility and the low mobility. The range of the index extends from very high mobility to very low mobility.	The main purpose of the multicounty study is to analyse the external crises in relation to the restrictions on capital mobility. The detailed index is developed to study the extent of capital mobility and the exposure of nation to the risk of external crises, both in terms of cost and depth of the same.	The index of capital mobility was divided into three groups on the basis of capital mobility, High, Intermediate and low mobility. The countries are divided into six groups according to the geographic regions to capture the effect of capital mobility in these groups in the last three decades. Also the capital controls are linked to the occurrence of the crises and the cost of the external crises to an economy.	The index is developed by taking into consideration the limitations of the previous studies and the division of the countries into different regions give a clearer picture of the fact that which region has gained the momentum of flows and which have suffered reversals in the previous three decades.	The index does not extricate between capital inflows and the capital outflows

KA Index	[25]	From 1995-2005	91 countries (which includes 35 high income, 42 middle income and 14 low income countries)	The following pattern was used for the purpose of the coding: 0 = unrestricted transactions, merely registration or the notification process is only present, or restriction is imposed only on few industries. 1 = Restricted transactions for the capital mobility.	Unlike the previous studies and the indices for the restrictions on the capital controls this study is the detail coding for each type of individual transaction in the balance of payment. For the purpose of the further study the transactions can be used into the subsets, by clubbing and aggregating the type of category of flow or asset required. The indices can be divided according to the assets, Residency Status, capital inflows and capital outflows or as per the residency status.	The index has been compared to the previous developed indices and detailed correlation analysis is done. Also the formula for clubbing the different type of transactions is provided.	The explanation and the methodology of coding is very clear and transparent. The construction of the index is such that is can be used in various studies and the sub-indices can be formed according to the need of the study as the extensive information is delivered.	The data cannot be replicated for the period earlier to 1995 and data is limited to 91 nations and the period of 10 years only. Whereas the major part of the world started liberalizing in later 1980's. Therefore the untainted concrete relationship and the impact on the economic growth can't be captured.
FKRSU	[3]	From the year 1995 to year 2013	100 countries	The pattern of scoring the transaction with the binary score is: 1 = restrictions are present on the capital transaction 0 = no restriction on the capital transaction is imposed	The data is an extension of (Schindler, 2009), adding the number of countries and increasing the time period and covering more asset category. This index more over watches the actual transaction accounts (studying the 32 transaction categories) like in the de facto indices but is different as it takes into account the restrictions employed on these flows by the government and regulatory authorities and recorded in AREAER.	The study is only the development of the new index	The study provides with the complete technical details of the construction of the index, therefore creating a replica becomes easy.	The study covers only the period after 1995, and the liberalization was done by various nations in 1980's.

Wang-Jahan Index	[39]	From the year 1996 to year 2013	164 countries	For the 12 sub-categories for financial account in IMFAREAER coded in Yes and No and for each type of transaction as per the residential status the index is scored as following: 0 = restrictions are present on the capital transaction 1 = no restriction on the capital transaction is imposed	The data is an extension of (Schindler, 2009), constructed for the low-income developing countries (LIDCs) for 12 asset categories, taking granularities into consideration for each form of flow recorded in AREAER.	The study is only conducted for the development of the new index and comparison of de jure and de facto index is done.	Extensive coverage for the low-income developing countries and details of each flows are taken into consideration, hence the index extensive in coverage of forms of cross-border flows and residential status.	It is highly correlated with the previous Indexes except Quinn's Index as the methodology is adopted from (Schindler, 2009) and the period covered is only between 1996-2013, whereas the process of liberalization has been initiated by various developing economies during 1980's and 1990's.
Non-AREAER Based de jure Indices								
Equity Market Liberalization	[28]	1980-1997	97 Countries	The first sign of liberalization of the equity market =1 for the year and onwards; 0= otherwise.	The first date of liberalization of the equity market denotes the earliest date of change in the following three cases: 1 official liberalization announcement, 2 the announcement of the first launch of ADR by the country and 3 first country fund launch	The index is used to study the equity market liberalization and the impact upon the economic growth and the study shows that the growth increases by 1 % annually in real terms using the controls.	The study provides a detailed analyses of the equity market liberalization and the investor's position in the international equity markets.	The study only focuses of the equity flows, ignoring the other regulated and unregulated flows which may prove the different situation.
IF_Heritage	[29]	1995-2017	186 Countries	A score of 100 for the investment freedom would mean the nation is completely liberal towards the investments and payments in the international markets and domestically.	The invest freedom index by the heritage organization is a categorical scale for the restrictions upon the investments and payments in the domestic and the international markets.	The intervals of the scale changed between2007-2010 and the index is the examination of the policies for different types of investment and payment flows.	The index is constructed taking into account various parameters for the restrictions over the capital flows and from the investment side in particular.	The methodology is completely different from the other de-jure measures and the IF index shows the countries being more restrictive after 1995.
de facto Indices (Based on the Actual Flows)								
Quantity Based Indices								
TOTAL Net Financial Assets	[30]	1970-2014 (extended)	211 Countries	International holdings and international transactions are classified into four broad categories and then the total financial assets and financial liabilities are divided by the GDP of the country.	The flows studied are the part of the report on nation's external assets and liabilities recorded in the International Investment Position (IIP) of the IMF Balance of Payments Manual. After compiling the data from IIP the capital gains and losses are measured and the data is extended backward.	The assets and the liabilities of a country is aggregated one the GDP of the country. It takes into account all type of flows under the financial account of the country.	The asset categories are listed and differentiated in detail and a wide number of countries are covered over the study period.	The nations with the strong banking sectors shows as an outliers.

Private Financial Openness Index	[31]	*	*	The Private Financial Flows are summation of stock of Foreign Assets adjusted for international reserves and Foreign Liabilities adjusted for outstanding development loans as a ratio of GDP	The index is developed to make a distinction between the official financial flows openness and private financial openness by excluding official claims and liabilities.	The index so developed is used to empirically analyse the difference between total flows and private flows. Than empirical analyses is conducted to study the impact of private flows upon growth and growth volatility.	The index draws the line between official flows and private flows and gives the clear picture of degree of integration of a nation into integrated foreign financial markets.	The openness is not limited to private investors and institution but also government and public institutions as well.
Price Based Indices								
Law of One Price and Cross Market Premium	[32]	The time frame is different for all the countries, depending upon the episodes of liberalization and crises	9 Countries	The β in the defined equations calculates the difference in the prices of the stock and the price of the depository receipt and estimates the change in the cross market premium.	Using ADF model they test the persistence of shocks in two models; one using the lagged differences & applying GARCH terms and the second using AR (threshold autoregressive model) component.	The study uses two models for capturing the financial integration and measuring the cross market premium with the stocks traded.	It's the only available index of integration for the price based data and a detailed analyses of firm level restrictions on trade and investment in the international markets.	The study is limited only for the 9 countries.
Hybrid Indices								
FORU	[33]	1989-2006	29 Countries	0= if the market is completely open and 1= if the markets are restrictive and closed	The market capitalization ratio is a quantitative measure of the countries equities and this ratio when subtracted from 1 gives intensity of restrictions.	Measures the degree of openness of the equity markets keeping restrictions in numerator and quantity traded in denominator.	The data set developed is based on monthly frequencies and focuses on capital markets in detail	Only specific to the integration of the equity markets and the sample countries are limited to 29 only
KOF	[36]	1970-2000	123 Countries	The economic integration index is developed taking into account the two categories: 1 the international flows from different transactions as the percentage of the GDP with total of 50% weightage and 2 the barriers and the taxes upon the international trade and capital account.	The index for the globalization is the sum of three broad categories, the economic, social and political integration.	This data set is used to analyse the relationship between the index of globalization as well as the sub-indices over the economic growth. The index for economic integration has a weightage of 35% in the total globalization index	It's good for the studies which want to see the overall i.e. the trade and the financial account's impact over the economic growth.	The index is developed for the total globalization, therefor is a broad measure for capital account openness.

Source: Authors Compilation (reference from [15]) * Not reported by the author
Almost all the de jure indices relies on the information provided in the AREAER published by IMF but the studies (indices) differ as to how and to what ambit & degree the researcher extracted the information.

percentage of GDP for trade flows, foreign direct investment and portfolio investment transactions. The foreign residents and foreign capital employed in a country are captured through a proxy of payments made in their respect. Second index records controls over trade and capital like restrictions on imports and average tax rates on cross-border trade in percentage of current revenue. Weights are assigned according to the total share of economic integration in the index of Globalization. Index ranges between zero and ten, where; zero means economy is not globalized and ten indicates economy is fully globalized. The results of the study stand true for assumption that higher is the globalization higher is the growth. Unlike the previous studies in this research economic globalization is significantly impacting the growth of nations (even for individual component of economic globalization variable only except restrictions) (Annexure 1).

4. CONCLUSION

The paper is an attempt to analyze and evaluate the various Measures which have been developed in past, majorly in the late 20th century. The various indices of CAO have been divided as per the different methods of measuring the level of openness in the different economies. Broadly the measures are divided into three categories: de jure, defacto and the Hybrid Indices. The dejure measures are regulations based indices whereas the defacto measures are the indices capturing the levels of actual flows. The Hybrid measures take both the regulations and the actual flows in and out of the economy to build the index.

Among the above discussed indexes to measure the level of Capital Account Openness, three indexes are used maximum in studies conducted to evaluate relationship between capital account openness and growth and capital account openness and crisis. Two de jure measure are; Kaopen index (developed by [37] and Capital Index (developed by [12-17]). De facto index used by studies in literature is constructed by [30,38]. These indices are used for the wide coverage of the countries and time period beginning from 1970's or 1980's. Chinn Ito index does not differentiate between flows, but other two indexes are intensive and differentiate between the type of flows and residential status.

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