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The Causality Issue in the Financial Openness and Economic Growth Nexus: Empirical Evidence from Selected Emerging Countries: 1975-2011

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Abstract

This paper investigates empirically the causal relationship between capital account liberalization and economic growth using the Toda and Yamamoto's approach for selected emerging countries during the period 1975-2011. The evidence seems to be supportive of a causality running from capital account liberalization to economic growth. This causality is found to be unidirectional in general with exception of Malaysia and South Korea where the causality in the other direction is also significant. Moreover this causality is found to be running through boosting capital accumulation rather than efficiency. This is particularly true in Malaysia and South Korea especially when we use the Chinn and Ito's financial openness index. All these findings relative to causality also seem to be corroborated by the generalized variance decomposition approach and especially in the case of Malaysia, Singapore and South Korea.

JEL classification numbers: F32, F36, O40
Keywords: Capital account liberalization, economic growth, causality, Toda and Yamamoto

1 Introduction

The relationship between capital account liberalization on economic activity has been subject of wide literature either theoretical or empirical for some years. The rationale behind such deep and complex reform is that it has important potential welfare-enhancing

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effects either for emerging or developing countries. Theoretical assumptions in favor of freeing cross-border capital flow highlight, *first* the efficient allocation of savings which allows capital to migrate from countries with high savings to countries with low resources; *Second*, the creation of more possibilities to risk diversification and; *Finally*, the development of the financial sector.

The empirical evidence unveil mixed results, at best, as it turns out that the results are rather sensitive either to the choice of quantitative measures of freeing capital movements or to sampling and methodology issues. In this context, the evidence has addressed the issue from the standpoint of the effect of freeing capital movements on economic growth. The debate remains still inconclusive as it pinpointed three major strands.

The first one insists on the beneficial effects of freeing capital movements on economic growth. Quinn (1997) was among the first to identify a positive association between capital account liberalization and economic growth using cross-sectional regressions for a sample of 58 countries and covering the period 1960-1989. Arteta, Eichengreen and Wyplocz (2001) tested the robustness of this latter result using pooled data of 51 to 59 countries and corroborated the Quinn's outcome on the positive effect of capital account liberalization on economic growth. Edison, Levine, Ricci and Slock (2002) also found strong evidence showing that financial liberalization leads to accelerated economic growth for a sample of 89 countries over the period 1975-1995. This outcome is found to be larger especially in developing countries compared to industrial ones.

The second strand of the literature finds, by contrast, no association between freeing cross-border capital movements and economic growth. Lane and Milesi-Ferretti (2006) found no relationship between capital account liberalization for a sample including 61 countries and covering the period 1966-1989. Rodrik (1998) used a larger sample of 100 countries over the period 1975-1989 and concluded that capital account convertibility is not correlated to long–run growth. The evidence presented by Rodrik is largely consistent with Kraay (1998) who found similar results for a sample of 117 countries over the period 1985-1997. Kraay's results are more comprehensive in the sense that they offer a verity of tests on the assumed effect of capital account liberalization and economic growth.

Finally, the last strand of literature focuses on the conditional nature of external financial liberalization. This means that any positive effect of freeing capital movements depends on the presence of pre-requisites in the economy. Klein (2005) found that the relationship depends on the prevailing institutional quality in the economy. Calderon, Loayza and Schmidt-Hebbel (2004) also found a significant non-linear relationship between financial openness and income growth with generalized method of moments (GMM) over the period 1970-2000 for a sample of 76 countries.

However, it is worth noting that all these results of the empirical literature mentioned above have to be treated with precaution for many reasons. In fact, the different samples of countries used in the investigations are not homogeneous. Furthermore, the study of cross-country regressions does not indicate too much about causation and the analysis should be extended to capture the dynamics of the relationship between capital account reform and economic growth. Specifically, the presence of positive and significant coefficient of capital account liberalization measure within a growth equation might not only mean a causality running from financial openness to economic growth, but also a causality running from economic growth to financial openness or even a bidirectional causality between the two variables. Because of that, the static cross-country regressions might not be enough to assess this causal relationship which places dynamic time series setting as a perfect tool to tackle such issue.

The studies of the causality issue in the financial integration and economic growth are not frequent across the literature. Honig (2008) argues that the absence of significant positive effects of capital account liberalization on economic growth in empirical investigations even after conditioning on the quality of domestic financial institutions might be accounted for by the reverse causation that exists between the two variables. Thus, there is a problem of endogeneity that might explain why in some studies financial reforms succeeded to enhance economic growth while in others we do not have such positive effect. To tackle such issue, an instrument is needed to resolve the nature of the bias. Honig used, as an instrument for liberalization in a given country, the average level of capital account openness of the countries in a particular region. Using such instrument to correct endogeneity, the empirical evidence carried out using data on 122 countries over the period 1970-2005, capital account liberalization is found to promote economic growth.

Yalta and Yalta (2012) tested the causal relationship between financial liberalization and capital flight. They investigate, specifically, whether capital account liberalization leads to lower capital flight. This latter measures the unrecorded accumulation of foreign assets by the operators of the business community. They use Granger causality for panel data and estimate a dynamic panel model following Arellano and Bover (1995) and Blundell and Bond (1998) for a sample of 21 emerging economies during the period 1980-2004. Yalta and Yalta's results do not display significant causal relationship between financial openness and capital flight. The authors pinpoint that to tackle the issue of capital flights financial liberalization per se might not be the relevant solution and what is required is *" …The use of mechanisms and strategies that can be more effective in preventing capital flights and encouraging capital repatriation."* (Pp: 98)

The aim of this paper is to shed more light on this issue by testing the direction of causality between capital account liberalization and economic growth using the approach developed by Toda and Yamamoto (1995). This approach does not require the testing for integration and co-integration as it is generally recommended in the econometric literature. The tests are carried out using the modified Wald test (MWALD) for a selected sample of emerging countries which are Argentina, Brazil, Chile, Malaysia, South Korea and Singapore for the period 1975-2010. The time span is considered as to be long enough to capture the long-run nexus between capital account reform and growth performance.

One of the major hallmarks of the Toda and Yamamoto's approach is that it does not require pre-testing for integration or cointegration properties in the VAR system and it avoids the potential biases linked to that, accordingly. The objective behind the inclusion of the investment ratio in the VAR is to test if the effect of freeing cross border capital flows on economic growth is achieved through improving productivity or enhancing capital accumulation.

We use specifically a vector autoregressive model that includes five variables which are the real GDP per capita, one measure of capital account liberalization, the investment ratio with respect GDP, one measure of financial sector development (the ratio of credit to the private sector to GDP), and finally, the trade openness measured by the ratio of exports plus imports to GDP. Since feeing capital movements is a very complex reform that is supposed to involve interactions between many stakeholders and institutions. This makes it difficult to measure it by a single proxy, and we use for that two measures that capture either the quantitative or qualitative impact of these reform. The first one is the de jure financial openness index of Chinn and Ito (2011) while the second one is the de facto ratio used by Lane Milesi-Ferretti (2011).

To test the validity of the causality findings, we use the generalized variance decomposition approach due to Pesaran and Shin (1998) beyond the sample period. The analysis is carried out over a time span of 20 periods that is considered long enough to provide a clear picture on the long-run relationship between capital account reforms and economic growth, knowing the fact that these reforms have been implemented at least two decades in the countries of the sample.
The remaining of the paper is organized as follows: section 2 presents the variables and data relative to the analysis. Section 3 is reserved to the empirical methodology while section 4 presents the outcome of the empirical investigation. Finally, section 5 concludes the paper.

2 Variables, Measurement and Data

2.1 Indicators of Capital Account Liberalization

The empirical literature suggested many indicators of capital account openness that could be classified into two types: de jure and de facto measures. The de jure measures are generally based on the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).* These indices convert qualitative information on restrictions reported by the countries into a quantitative database. One of the most used de jure indicators is the index developed by Chinn and Ito (2006) (henceforth *Kaopen*).
The index is based on binary dummy variables reflecting the restrictions on external accounts of a given country as reported in the IMF's *AREAER*. *Kaopen* is an index of four variables k_1, k_2, k_3 and k_4, where k_1 reflects the information on the existence of multiple exchange rates; k_2 and k_3 provide information on the transactions in the current and capital account; Finally, k_4 is informative of the requirement of the surrender of export proceeds. However, after 1996 and because of the disaggregation of these variables and in order to take into consideration the *financial openness* rather than *controls* the values of the binary variables have been reversed to take the value one (1) in the absence of restrictions on the capital account. Furthermore, for the variable k_3 reflecting the controls on capital account transactions, the authors use the share of five year window where controls on capital account were not into effect $SHARE\ k_{3,t} = \left(\frac{k_{3,t} + k_{3,t-1} + k_{3,t-2} + k_{3,t-3} + k_{3,t-4}}{5} \right)$. The resulting index of Chinn and Ito is therefore the principal component of k_{1t}, k_{2t}, $SHARE_{3,t}$ and k_{4t}. When the index $Kaopen_t$ takes high values this means that the economy is open to capital flows.

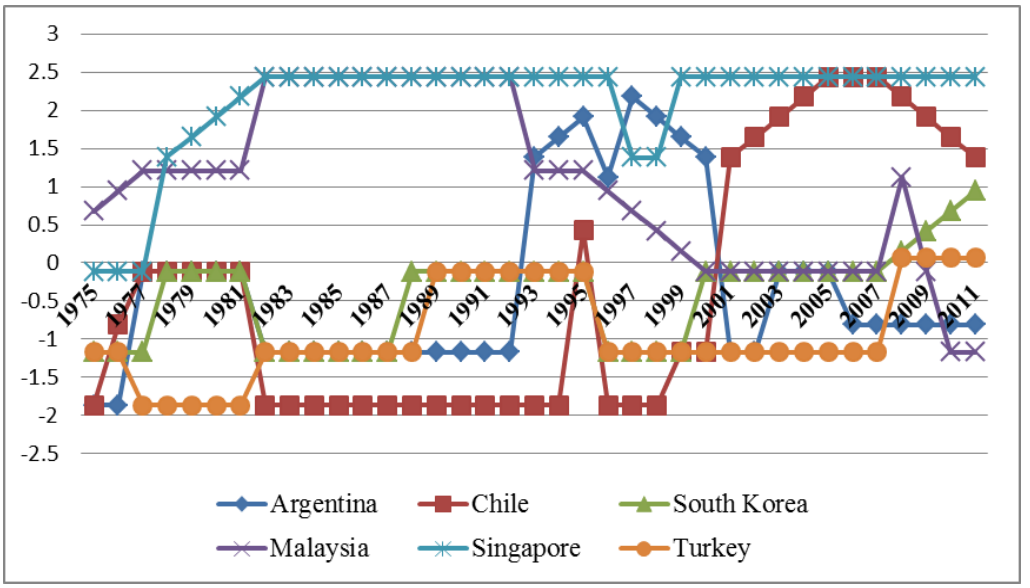

Figure 1: The evolution of Kaopen for selected countries, 1975-2011.
Source: Chinn and Ito (2011)

All in all, the index reflects whether the economy is moving toward greater financial openness as it measures the extent of openness in capital account transactions.
Figure (1) shows the evolution of the index in a selected sample of countries, and a close inspection of the figure reveals that Singapore maintained high financial openness since late seventies, like other countries in the region though the rate of financial opening witnessed a significant slowdown during the Asian crisis of 1997-1998. In Brazil and Chile, the evolution shows increasing efforts of opening up their financial markets during the last decade after a substantial decline during the eighties as a reaction to the debt crisis. However, in the case of Argentina the index displays decreasing levels during the last decade after the financial crisis of 2001 (Chinn and Ito (2006)).
Our second measure of financial openness is the ratio constructed by Lane and Milesi-Ferretti (2006) based on a sample composed of 147 countries (LMF). It is calculated as the ratio of the sum of total external assets and total external liabilities to GDP ((Assets + Liabilities)/GDP). This measure is considered by development economists as the equivalent to the trade openness indicator that is equal in empirical investigations to the sum of Exports and Imports to GDP. A high level of the Lane and Milesi-Ferretti's financial openness indicator means more capital mobility in the economy.

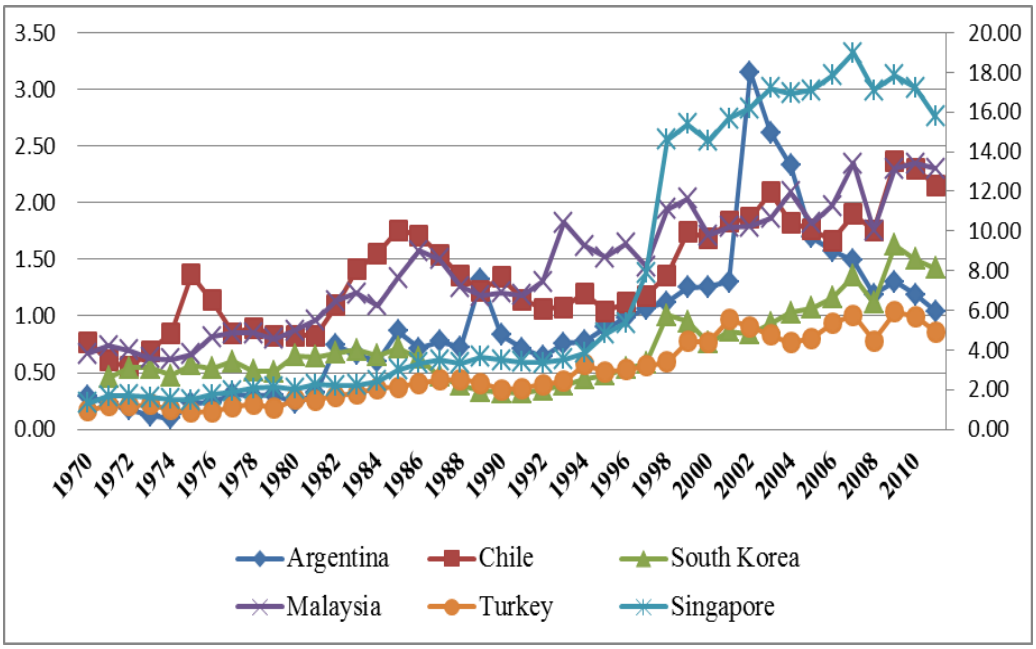

Figure 2: The ratio of financial integration of Lane Milesi-Ferretti in selected sample of countries, 1970-2011

Source: Lane and Milesi-Ferretti (2011)

The figure (2) displays the evolution of financial openness ratio for selected set of countries over the period 1970-1010. The evolution shows that the ratio has been increasing steadily over time for Malaysia and Chile to go beyond the level of 200% during the last decade. The pace of cross-border asset trade has been, however, much gradual in South Korea and Brazil to overcome the threshold of 100% only in early 2000's. In Argentina, the evidence shows a notable slowdown of the ratio in the aftermath of financial crisis the country experienced in 2001.

Since we are using a multivariate VAR structure for testing causality between capital account liberalization and economic growth, the first variable included in the VAR is the real GDP per capita as measure for economic growth. The second variable is one of the measures of capita account liberalization presented above. The third variable is the investment ratio equal to the ratio of gross investment to GDP and its inclusion is likely to allow the identification of the channel through which foreign capital causes economic growth. In other words, to assess if capital account liberalization causes economic growth through an increase in capital accumulation we carry out causality between capital account liberalization measures and investment and/or between investment and economic growth. The financial development is also included in the VAR given its robust correlation with either economic growth (De Gregorio and Guidotti (1995), Levine (1997), Demetriades and Hussein (1996) among others) or capital account reform (Klein and Olivei (2008)) and the retained measure is the ratio of credit to the private sector to GDP. Finally, the last variable included in the VAR is the trade ratio calculated as the ratio of exports plus imports to GDP.

All variables are expressed in national currencies and data are extracted from World

Bank's "World Development Indicators" World Bank (2012). The capital account liberalization proxies are extracted from Chinn and Ito updated dataset (2011)[3] and Lane and Milesi-Ferretti updated dataset (2011)[4]. The time span of the variables covers the period 1970-2010 for all countries of the sample. The countries are selected because of their experiences in terms financial reforms.

3 Econometric Methodology

In the cointegration analysis according to Engle and Granger's approach (1987), the fact that two variables or more are sharing a common trend (or cointegrated) means that there is at least one causal direction. To test for the direction of causality, we use the vector error correction model (VECM) that is derived from the vectors of cointegration.
In fact, if we consider the Johanson's (1988) methodology with a p-dimensional Gaussian vector autoregression VAR, the specification of the VECM could be derived as follows:

$$W_t = \mu + \Gamma_1 W_{t-1} + \Gamma_2 W_{t-2} + \ldots + \Gamma_p W_{t-p} + \varepsilon_t \quad (1)$$

Where W is a vector of integrated variables, μ is a $p\times1$ vector of constant terms, Γ_i are $p\times p$ matrices of time-invariant coefficients, ε is a $p\times1$ vector of identically and independently distributed errors (*IID*) and t is time.
In case of cointegration between the variables in the vector W (assumed to be non-stationary), equation (1) could be re-parameterized in its equivalent error-correction model (ECM) form as follows (See Hendry et *al*. (1984), Engle and Granger (1987) and Johansen (1988)):

$$\Delta W_t = m + \Gamma_1 \Delta W_{t-1} + \Gamma_2 \Delta W_{t-2} + \ldots + \Gamma_{p-1} \Delta W_{t-p+1} + \alpha(\beta' W_{t-1}) + e_t \quad (2)$$

Where Δ is a difference operator, α refers to the adjustment coefficients ($p\times r$), β represent the cointegrating vectors where $\beta' W_{t-1}$ represents the linear stationary processes. $\alpha\beta' = \Pi$ is a matrix of long run parameters that has a rank r that is equal to the number of co-integrating vectors.
In testing the direction of causality according the VECM, we distinguish between short-run and long-run Granger causality. We use the Wald test with the standard F statistic in testing the short-run causality, where we assume that the coefficients of the lags are equal to zero ($\Gamma_{ij}(L) = 0$) in the null hypothesis(H_0). In addition, if the null hypothesis relative to the adjustment coefficients is rejected (H_0: ($\alpha = 0$)[5]), we can conclude that there is a long run relationship between the variables,.
Nevertheless, the recent contributions to the econometric literature (Toda and Yamamoto (1995) and Pesaran et al., (2001)) on causality tests highlight the weak power of unit root

[3]Available at http://web.pdx.edu/~ito/Chinn-Ito_website.htm
[4]Available at http://www.philiplane.org/EWN.html
[5]It corresponds to the weak exogeneity test of Johansen and Juselius (1992) using standard *t*-statistic.

tests and the fact cointegration tests are not reliable in finite samples. Moreover, the Wald test may not have a standard distribution when the series are integrated or cointegrated and thus it may not be relevant for Granger causality tests.

Toda and Yamamoto (1995) suggest a new approach to test causality which does not require prior conventional tests of integration and cointegration. Specifically, the Toda and Yamamoto's (1995) test also called the Modified Wald test (MWALD) consists in estimating an augmented VAR that guarantees the asymptotic distribution of the Wald test statistic. It tests the linear restrictions on the coefficients of the unrestricted VAR through determining the relevant lag order of the unrestricted VAR (p) and the maximum order of integration of variables in the VAR (h). To test for the causality, we estimate the VAR system with an order a new order equal to ($p + h$).

Specifically the causality test between capital account liberalization and economic growth we estimate the following the system (S):

$$W_{1t} = m_1 + \sum_{k=1}^{p+h} b_{11,k} W_{1,t-k} + \sum_{k=1}^{p+h} b_{12,k} W_{2,t-k} + \sum_{k=1}^{p+h} b_{13,k} W_{3,t-k} + \sum_{k=1}^{p+h} b_{14,k} W_{4,t-k} + \sum_{k=1}^{p+h} b_{15,k} W_{5,t-k} + e_{1t}$$

$$W_{2t} = m_2 + \sum_{k=1}^{p+h} b_{21,k} W_{1,t-k} + \sum_{k=1}^{p+h} b_{22,k} W_{2,t-k} + \sum_{k=1}^{p+h} b_{23,k} W_{3,t-k} + \sum_{k=1}^{p+h} b_{24,k} W_{4,t-k} + \sum_{k=1}^{p+h} b_{25,k} W_{5,t-k} + e_{2t}$$

$$W_{3t} = m_3 + \sum_{k=1}^{p+h} b_{31,k} W_{1,t-k} + \sum_{k=1}^{p+h} b_{32,k} W_{2,t-k} + \sum_{k=1}^{p+h} b_{33,k} W_{3,t-k} + \sum_{k=1}^{p+h} b_{34,k} W_{4,t-k} + \sum_{k=1}^{p+h} b_{35,k} W_{5,t-k} + e_{3t}$$

$$W_{4t} = m_4 + \sum_{k=1}^{p+h} b_{41,k} W_{1,t-k} + \sum_{k=1}^{p+h} b_{42,k} W_{2,t-k} + \sum_{k=1}^{p+h} b_{43,k} W_{3,t-k} + \sum_{k=1}^{p+h} b_{44,k} W_{4,t-k} + \sum_{k=1}^{p+h} b_{45,k} W_{5,t-k} + e_{4t}$$

$$W_{5t} = m_5 + \sum_{k=1}^{p+h} b_{51,k} W_{1,t-k} + \sum_{k=1}^{p+h} b_{52,k} W_{2,t-k} + \sum_{k=1}^{p+h} b_{53,k} W_{3,t-k} + \sum_{k=1}^{p+h} b_{54,k} W_{4,t-k} + \sum_{k=1}^{p+h} b_{55,k} W_{5,t-k} + e_{5t}$$

To test the long-run causality between two variables W_i to W_j is carried out through testing the the null hypothesis that $\beta_{ji,1} = ... = \beta_{ji,p} = 0$, where $\beta_{ji,p}$ stands for to the coefficient of the p^{th} lag of the variable W_i in the equation of variable W_j is the j^{th} variable. If the null hypothesis is rejected this means the existence of a long-run relationship between the two variables W_i to W_j.

4 Empirical Investigation

To implement the causality tests mentioned in the previous section, we need to achieve, first, the integration tests for the different variables of the system using the Augmented Dickey–Fuller (ADF) (1979), the Phillips-Peron (PP) (1988) test and the Kwitkowski, Phillips, Schmidt, Shin (KPSS) (1992). We assume in the null hypothesis the existence of a unit root in the series. The results of these tests are indicating that the variables are

integrated of order 1 in levels and stationary in first differences. This means that the maximum order of integration in the system is equal to one (1) or (h = 1). Regarding the optimal lag length of the unrestricted VAR, we use the Akaike Information Criteria (AIC) with a maximum lag order equal to 4. It is worth noting also that the chosen lag length is modified whenever the null hypothesis of serial correlation is rejected.

The results of the MWALD tests are displayed in Table (1) and column (3) shows the Granger non-causality tests of the direct causality between capital account liberalization and economic growth. However, in column (5), we test the reverse causality tests from real activity to freeing capital movements using the same modified Wald test. Finally, in column (4) we present the indirect causality from liberalizing the cross-border capital flows to real per capita GDP through enhancing investment.

The empirical evidence in Table (1) uses the Shinn and Ito index (Kaopen) of capital account liberalization, and it reveals a significant and direct causal relationship running from capital account liberalization to real GDP per capita in four countries which are Argentina, Malaysia, Singapore and South Korea. Such result in not surprising, given the experience of these countries in implementing successful financial liberalization, that ended up establishing more open economies with free cross-border capital movements. Furthermore, only in Malaysia and South Korea out of the six countries of the sample we find evidence of reverse causality running from real economic growth to financial liberalization. Still, in Malaysia, South Korea and Turkey there is evidence of indirect causality that works through boosting investment. Finally, for Chile, the evidence does not show any causal relationship between capital account reform and economic growth.

Table 1: Granger Causality Test Results, 1970-2006

Capital account liberalization proxy = KAOPEN

	Lag	*KAOPEN → RGDPPC*	*KAOPEN → IY*	*RGDPPC → KAOPEN*
Country	*L*[(a)]*	*MWALD-stat[(b)]*	*MWALD-stat*	*MWALD-stat*
Argentina	1	19,02***[(c)]	1.17	0,003
Chile	1	0,01	0,04	2,24
Malaysia	1	4.26**	2.83*	7.53***
Singapore	2	2.81*	0.26	0.42
South Korea	1	2.56*	5,55*	4.26**
Turkey	1	0,70	3.57*	2.37

(*a*) *L** is the optimal lag length of the unrestricted VAR and it was determined using Schwarz criterion (SC), with maximum lags of 4 allowed for each variable in the system.
(*b*) MWALD-stat is the modified Wald statistic is asymptotically distributed χ^2_p*.
(*c*) *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

In Table (2), we re-run the causality tests using the second proxy of financial integration, namely the Lane and Milesi-Ferretti (LMF) ratio and the results are supportive of direct causality between external financial liberalization and economic growth in four countries of the sample i.e. Chile, Malaysia, South Korea and Turkey. The results displayed in Table (2) also reveal evidence of reverse causality running from economic development to capital account liberalization in in Chile Malaysia and South Korea. For the last two countries, this outcome is in line with the above results in Table (1) and reflects successful efforts in implementing external financial reforms since early nineties. Finally, three cases of indirect causality are detected in Argentina, Singapore and South Korea that

focuses on the investment channel in the rather than efficiency in dealing with freeing cross-border capital formation.

All in all, the empirical evidence of the causality tests shows support to a directional causality running from capital account liberalization to economic growth in many countries of the sample. This outcome for this specific sample of emerging countries "*seems to suggest that countries can benefit from capital account liberalization when their level of development is not too primitive (as they would lack the institutional structure necessary to fit liberalization in the growth engine) or too advanced (as they would have already reaped the benefits*", (Edison et al. (2004), Pp: 251).

Table 2: Granger Causality Test Results, 1970-2009.

Capital account liberalization proxy = LMF

	Lag	*LMF → RGDPPC*	*LMF → IY*	*RGDPPC → LMF*
Country	*L**	*MWALD-stat*	*MWALD-stat*	*MWALD-stat*
Argentina	1	0.01	5.15***	0.003
Chile	3	6.09***	1.32	5.73***
Malaysia	1	8.94***	1.20	12.64***
Singapore	3	0.45	3.47**	1.28
South Korea	1	3.46**	3.57**	8.62***
Turkey	1	5.45***	0.41	1.14***

(*a*) *L** is the optimal lag length of the unrestricted VAR and it was determined using Schwarz criterion (SC), with maximum lags of 4 allowed for each variable in the system.
(*b*) MWALD-stat is the modified Wald statistic is asymptotically distributed χ^2_p*.
(*c*) *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

4.1 Results of Variance Decomposition

The above empirical investigation provides results on granger causality using the Toda and Yamamoto's approach between capital account reforms and economic growth. The results provide support to direct causality running from freeing cross-border capital flows and real GDP per capita and also reverse causality in the case of Malaysia and South Korea. Nevertheless, since the MWALD tests indicate only causality within the range of time of the sample period, we use the variance decomposition approach which consists in decomposing the variance of the forecast error of each variable into proportions related to shocks of other variables in the VAR. The variance decomposition approach allows, therefore, giving indication of Granger causality beyond the sample period chosen in carrying out the MWALD tests.

The approach consists in applying a shock to the random innovations ε_{it} of the unrestricted VAR as specified in section 3. This supposed shock is would have an effect on all the variables of each equation of the system (*S*) because of its dynamic structure. Specifically, we achieve the breakdown of the forecast error variance of capital account liberalization measures, investment ratio, and GDP per capita in the future period to detect the percentage that each variable tends to account for. This is due to the fact that the innovation in each variable of the system has effects on their future values as well as the rest of the variables. Use the approach of Pesaran and Shin (1998) that is invariant to the ordering of the variables in the VAR and does not need the orthogonalization of the

different shocks.

In Table (3) we display the decomposition of the forecast error variances up to twenty periods ahead of *Kaopen*. The outcome shows that a shock to this latter variable tends to account for at least 28% of the forecast error variance of the real GDP per capita in Argentina Chile and Malaysia. Furthermore, it shows that only in Singapore, the shock to *Kaopen* explains a small percentage (16%) of the forecast error variance of real GDP per capita in long run. On the same level a Shock to real GDP per capita is found to explain at least 20% of the forecast error variance of the openness index in the same countries. In Table (4), we run the variance decomposition using the second proxy of capital account liberalization, namely Lane and Milesi-Ferretti index (*LMF*). The output shoes that a shock to *LMF* explains a percentage of the forecast error variance of the real GDP per capita ranging between 24% in Singapore and 50% in South Korea.

Table 3: Generalized variance decomposition.

Capital account liberalization proxy: *Kaopen*

	GDP response to a shock of capital flows			Investment response to a shock of capital flows			Capital flows response to a shock of GDP		
	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Argentina	**0.77**	**13.86**	**48.97**	13.06	9.74	1.81	**11.34**	**17.58**	**20.75**
Chile	**2.88**	**7.90**	**28.29**	9.98	9.04	6.40	**10.83**	**22.38**	**34.25**
Malaysia	**7.11**	**18.99**	**37.02**	9.04	12.03	12.08	**9.82**	**19.23**	**19.22**
Singapore	**8.97**	**11.00**	**16.13**	**25.31**	**24.24**	**24.30**	7.74	9.09	10.29
South Korea	3.88	3.99	10.17	3.63	3.51	3.82	3.91	9.28	14.03
Turkey	1.59	4.82	13.79	9.57	7.42	10.87	6.18	10.22	13.59

The numbers stand for the percentage of the forecast error variance of real GDP per capita and the investment ratio that is explained by a shock to energy and real GDP per capita after 5, 10 and 20 years.

Table 4: Generalized variance decomposition.

Capital account liberalization measure: *LMF*

	GDP response to a shock of capital flows			Investment response to a shock of capital flows			Capital flows response to a shock of GDP		
	5 years	**10 years**	**20 years**	**5 years**	**10 years**	**20 years**	**5 years**	**10 years**	**20 years**
Argentina	**5.94**	**5.94**	**40.50**	**26.05**	**26.93**	**16.8**	0.17	0.14	0.13
Chile	**30.31**	**38.20**	**41.44**	10.94	7.37	6.44	0.91	1.06	0.32
Malaysia	**7.44**	**16.86**	**27.80**	10.07	11.99	8.16	**28.06**	**30.87**	**33.42**
Singapore	**5.08**	**16.98**	**24.5**	7.10	6.76	10.72	3.52	8.71	10.18
South Korea	**34.47**	**33.20**	**50.46**	13.30	14.05	12.10	0.76	0.62	1.40
Turkey	15.25	10.83	6.55	7.31	5.23	10.16	5.65	10.28	5.35

The numbers stand for the percentage of the forecast error variance of real GDP per capita and the investment ratio that is explained by a shock to energy and real GDP per capita after 5, 10 and 20 years.

The results displayed in Tables (3) and (4) convey, all in all, significant support to a causality running from capital account liberalization to economic growth in these countries. They also seem to corroborate the results of the MWALD tests of Tables (1) and (2) as it is summarized by the following Table (5).

Table 5: Summary of tests

Countries	Tests	KAL → RGDPPC		KAL → IY		RGDPPC → KAL	
		Kaopen	LMF	Kaopen	LMF	Kaopen	LMF
Argentina	MWALD Tests	X[(a)]	-[(b)]	-	X	-	-
	Variance Decomposition	X	X	-	X	X	-
Chile	MWALD Tests	-	X	-	-	-	X
	Variance Decomposition	X	X	-	-	X	-
Malaysia	MWALD Tests	X	X	X	-	X	X
	Variance Decomposition	X	X	-	-	X	X
Singapore	MWALD Tests	X	-	-	X	-	-
	Variance Decomposition	X	X	X	-	-	-
South Korea	MWALD Tests	X	X	X	X	X	X
	Variance Decomposition	-	X	-	-	-	-
Turkey	MWALD Tests	-	X	X	-	-	-
	Variance Decomposition	-	-	-	-	-	-

(a) X means significant at 10% at least. (b) means non-significant.

5 Conclusion

The aim of the paper is to analyze of the causality between capital account liberalization and economic growth in selected sample of emerging countries (Argentina, Chile, Malaysia, Singapore, South Korea and Turkey) during the period 1975-2011.

We have used the Toda and Yamamoto's approach in carrying out the causality tests within a multivariate VAR framework where the variable are the real GDP per capita as a proxy for economic growth and Chinn and Ito's index (2011) (Kaopen) and Lane and Milesi-Ferretti index's (2011) as proxies for capital account reform. Other variables are

included in the Multivariate VAR which are the investment ratio which is equal to the ratio of gross investment to GDP; trade openness ratio equal to Exports plus imports to GDP; financial development proxy equal to the ratio of credit to the private sector to GDP; and the capital account liberalization proxy.

All in all, the evidence seems to be supportive of a causality running from capital account liberalization to economic growth. This causality is found to be unidirectional in general with exception of Malaysia and South Korea where the reverse causality is also significant. Of special importance is the fact that when we detect evidence of causality between freeing cross border capital flows and economic development, this causality is running through boosting capital accumulation. This is particularly true in Malaysia and South Korea especially when we use the Chinn and Ito's financial openness index. These findings seem to be corroborated by the generalized variance decomposition methodology and especially in the case of Malaysia, Singapore and South Korea.

In the light of these results, one can claim that the significant results are detected particularly in the case of the countries like Malaysia and South Korea that achieved successful external financial liberalization since two decades by approaching the liberalization of capital transactions through undertaking reforms to strengthen, first, certain preconditions like the fiscal consolidation and financial sector reforms. It was not the case in Chile for example where the freeing of capital movements was initiated much before the institution of other structural policy reforms which might account for the absence of pattern in this country.

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References

[1] M. Arellano and O. Bover, Another look at instrumental variables estimation of error-component Models. Journal of Econometrics, **68** (1), (1995), 29–51.

[2] C. Arteta, B. Eichengreen, and C. Wyplosz, *When does Capital Account Liberalization Help than it Hurts?* National Bureau of Economic Research Working Paper n 8414, (2001).

[3] R. Blundell and S. Bond, Initial conditions and moment restrictions in dynamic panel-data. *Journal of Econometrics*, **87**(1), (1998), 115–143.

[4] C. Calderon, N. Loayza, and K. Schmidt-Hebbel, *Openness,Vulnerability, and Growth*. Chile: Working Paper, Central Bank of Chile, 2004.

[5] M. Chinn, and H. Ito, What Matters for Financial Developmen? Capital controls, Instituions and Interactions. *Journal of Development Economics*, **81**(1), (2006), 163-192.

[6] M. Chinn, and H. Ito, *The Chinn-Ito Index- a de jure measure of financial openness*. Retrieved from http://web.pdx.edu/~ito/Chinn-Ito_website.htm, (2011).

[7] J. De Gregorio, and P. Guidotti, Financial development and economic growth. *World Develpment*, **23**(3), (1995), 433–448.

[8] P. Demetriades, and K. Hussein, Does Financial Development Cause Economic Growth? Time-series Evidence from 16 Countries. *Journal of Development Economics*, **51**(2), (1996), 387-411.

[9] D. A. Dickey, and W. A. Fuller, Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association,* **74**(366), (1979), 427–431.
[10] H. J. Edison, M. W. Klein, L. A. Ricci and T. Slok, International Financial Integration and Economic Growth. *Journal of International Money and Finance,* **21**(6), (2002), 749-776.
[11] H. J. Edison, M. W. Klein, L. A. Ricci and T. Slok, Capital Account Liberalization and Economic. *IMF Staff Papers,* **1**(2), (2004), 220-256.
[12] Engle, R., & Granger, C. (1987). Cointegration and error correction: Representation, estimation, and testing. Econometrica, **55**(2), 251-276.
[13] D. Hendry, A. Pagan, and J. Sargan, J. Dynamic Specification. *in Zvi* Chriliches *and Michael D. Intriligator (eds), Handbook of Econometrics*, (1984).
[14] A. Honig, Addressing Causality in the Effect of Capital Account Liberaization on Growth. *Journal of Macroeconomics*, **30**(4), (2008), 1602-1616.
[15] S. Johansen, Statistical Analysis of Cointegrated Vectors. *Journal of* Economic *Dynamics and Control,* **12**(2-3), (1988), 231-254.
[16] S. Johansen and K. Juselius, Structural hypotheses in a multivariate cointegration analysis of thePPP and UIP for UK. *Journal of Econometrics,* **53**(1-3), (1992), 211-244
[17] M. W. Klein, *Capital Account Liberalization, Institutional Quality and* Economic *Growth: Theory and Evidence.* NBER Working Paper Series, Working Paper No.11112, (2005).
[18] M. Klein and J. Olivei, Capital Account Liberalizaion, Financial Depth and Economic Growth. *Journal of International Money and Finance,* **27**(6), (2008), 861-875.
[19] A. Kraay, *In Search of the Macroeconomic Effects of Capital* Account *Liberalization.* Mimeo, World Bank, Washington DC, (1998).
[20] D. Kwiatkowski, P. C. Phillips, P. Schmidt and Y. Shin, Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *Journal of Econometrics,* **54**(1-3), (1992), 159–178.
[21] P. R. Lane and G. M. Milesi-Ferretti, *The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004.* IMF Working Paper WP/06/69, (2006).
[22] P. R. Lane and G. M. Milesi-Ferretti, *Updated and Extended "*External *Wealth of Nations" Dataset, 1970-2011*. Retrieved from http://www.philiplane.org/EWN.html, (2011).
[23] R. Levine, Financial Development and Economic Growth: Views and *Agenda*. *Journal of Economic Literature,* **35**(2), (1997), 688-726.
[24] H. Pesaran and Y. Chin, Generalized Impulse Reponse Analysis in Linear Multivariate Models. *Economics Letters,* **58**(1), (1998), 17-29.
[25] H. Pesaran, S. Yongcheo and R. Smith, Bounds Testing *Approaches* to the Analysis of Level Relationship. *Journal of Applied Econometrics,* **16**, (2001), 289–326.
[26] P. C. Phillips and P. Perron, Testing for a unit root in time series regression. *Biometrika,* **75**(2), (1988), 335–346.
[27] D. P. Quinn, The Correlates of Changes in International Financial Regulation. *American Political Science Revie,* **91**(3), (1997), 531-551.
[28] D. Rodrik, *Who Needs Capital Account convertibility.* A short paper for a Princeton International Finance Section symposium, (1998).

[29] H. Toda, and T. Yamamoto, Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, **66**(1-2), (1995), 225-250.
[30] World Bank. *World Development Indicators*, Washington: International Bank for Reconstruction and Development, (2012).
[31] A. Y. Yalta, and A. T. Yalta, Does financial liberalization decrease capital flight? A panel causality analysis. *International Review of Economics & Finance*,**22**(1), (2012), 92–100.