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Capital Account Liberalization, Institutions and Economic Growth: Evidence from Selected Asian Countries

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ABSTRACT

The neoclassical growth model predict that capital account liberalization is beneficial for economic growth as capital diffuse from abundant country to those having scarcity. This study separately investigates the allocative and productivity channels of Capital account liberalization (CAL) through which it affects economic growth of a country. The study estimated three different dynamic models using GMM technique. The study utilizes panel data of 14 Asian countries for the analysis covering the period 1980 to 2019. Findings of the study reveal that pace of economic growth have a corresponding movement with capital account liberalization. Touching upon the role of institutions, results of the study shows that institutional quality enhances the positive impact of capital account liberalization and hence accelerate economic growth in the sample countries. The contribution of this study lies in two ways. Firstly, we develop a theoretical model based on neoclassical growth model that permit us to evaluate the effects of CAL on economic growth. Secondly, unlike existing empirical literature on the subject, the study investigates the moderating role of institutions in interlinked relationship between CAL and economic growth.

ملخص

يتوقع نموذج النمو الكلاسيكي الجديد أن تحرير حساب رأس المال يعود بفائدة على النمو الاقتصادي حيث ينتقل رأس المال من الدول التي تشهد وفرة إلى تلك التي تعاني من ندرة. تستقصي هذه الدراسة بشكل منفصل قنوات التخصيص والإنتاجية لتحرير حساب رأس المال (CAL) التي تؤثر من خلالها على النمو الاقتصادي في بلد ما. قامت الدراسة بتقدير ثلاثة نماذج ديناميكية

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مختلفة باستخدام تقنية طريقة اللحظات المعممة (GMM). تستخدم الدراسة بيانات لوحة تشمل 14 دولة آسيوية للتحليل الذي يغطي لفترة من 1980 إلى 2019. تكشف نتائج الدراسة أن وتيرة النمو الاقتصادي لها حركة مقابلة مع تحرير حساب رأس المال. وبالتطرق إلى دور المؤسسات، تُظهر نتائج الدراسة أن جودة المؤسسات تعزز الأثر الإيجابي لتحرير حساب رأس المال وبالتالي تسرع من النمو الاقتصادي في بلدان العينة. وتكمن مساهمة هذه الدراسة في ناحيتين. أولاً، قمنا بتطوير نموذج نظري يستند إلى نموذج النمو الكلاسيكي الجديد يسمح لنا بتقييم آثار تحرير حساب رأس المال على النمو الاقتصادي. ثانياً، وخلافًا للأدبيات التجريبية الموجودة حول هذا الموضوع، تبحث الدراسة في الوسيط للمؤسسات في العلاقة المترابطة بين تحرير حساب رأس المال والنمو الاقتصادي.

RÉSUMÉ

Le modèle de croissance néoclassique prévoit que la libéralisation du compte de capital est bénéfique pour la croissance économique car le capital se diffuse des pays abondants vers ceux qui sont en pénurie. Cette étude examine séparément les canaux d'allocation et de productivité de la libéralisation du compte de capital (CAL) par lesquels elle affecte la croissance économique d'un pays. L'étude a estimé trois modèles dynamiques différents en utilisant la technique GMM. L'étude utilise des données de panel de 14 pays asiatiques pour l'analyse couvrant la période de 1980 à 2019. Les résultats de l'étude révèlent que le rythme de la croissance économique a un mouvement correspondant avec la libéralisation du compte de capital. En ce qui concerne le rôle des institutions, les résultats de l'étude montrent que la qualité institutionnelle renforce l'impact positif de la libéralisation du compte de capital et accélère donc la croissance économique dans les pays de l'échantillon. La contribution de cette étude est double. Premièrement, nous développons un modèle théorique basé sur le modèle de croissance néoclassique qui nous permet d'évaluer les effets de la CAL sur la croissance économique. Deuxièmement, contrairement à la littérature empirique existante sur le sujet, l'étude examine le rôle modérateur des institutions dans la relation interdépendante entre l'accès aux marchés et la croissance économique.

Keywords: Capital Account Liberalization, Economic Growth, Institutional Quality

JEL Classification: O4, O19, F21, C23

1. Introduction

Economic liberalization broadly categories into current account and capital account liberalization (CAL). As for as the current account liberalization is concerned, opinions seem to generally converge around its positive effects on economic growth. However, in case of CAL, estimations are still ambiguous about its positive effects on economic growth. Works in favor of CAL explains their arguments in terms of both accumulation and productivity channels. Some studies argued for the allocation effects of CAL as it allows for risk diversification across countries (Obstfeld & Rogoff, 1994; Soto, 2003; Baltagi, Egger, & Pfaffermayr, 2007); reduce cost of capital (Bekaert & Harvey, 1995; Henry, 2007); generate international competition (Rogoff, 1999; Summars, 2000), and improve domestic financial system (Klein & Olivei, 1999; Levine, 2001; Soto, 2003; Samouel, 2008; Zenasani & Behabibi, 2012), hence, foster allocative efficiency. However, some other studies propose that capital CAL enhance economic growth not only by the enhancing of allocative efficiency but it also promote productivity growth (King & Levine, 1993; Acemoglu & Zilibotti, 1997; Beck et al., 2000; Acemoglu et al., 2001; Aghion, Bloom, Blundell, Griffith, & Howitt, 2005, Henry & Sasson, 2008; Bekaet et al., 2010). These studies argued that financial liberalization develop domestic financial system, which in turn minimize financial constraints and therefore provide incentive for invention, innovation, and technological development.

Similarly, works in against of the CAL also explains their arguments in the accumulation and productivity perspective. For instance, Lucas (1990) forwarded the claim that CAL cannot improve global allocative efficiency, and argued that less developed technology, low human capital, and weak institutions in developing countries overlap the positive affect of higher marginal productivity of capital, hence instead of capital inflow, CAL leads flight of capital from developing countries. In similar line, Stiglitz (2000) argued that due to weak macroeconomic policies of developing countries, CAL could exacerbate its financial crisis, creates vulnerability that in turn reduce investment and hence output growth in developing economies. Schmuckler (2001); Eichengreen & Leblang (2003); and Tornell, Westermann, & Martinez (2004) came with similar findings and argued that generally capital account would tend to aggravate investment and productivity growth because it may trigger financial risks and economic vulnerability. As stated earlier, the empirical literature is

still away from consensus. Conceivably, the one key reason is the lack of evidences on the allocative and productivity effects of CAL on economic growth.

In this study, we investigated separately the allocative and productivity channels of CAL through which it affects economic growth of a country. These channels are postulated from two groups of growth models. The allocation effect is hypothesized from the neo classical growth model of Solow (1956) and Swan (1956) predicted that because of the removal of restrictions from capital, it spillovers from capital abundance countries (developed) to capital scarce countries (developing), consequently affect global allocation of resources. The neo classical growth framework explains such movement of capital in terms of marginal productivity of capital, and put forward the claim that as marginal productivity of capital is higher in developing countries as compare to their developed counterpart. On the other hand, the productivity effect is postulated from the second generation of endogenous growth model, which based on creative destruction idea of Schumpeter (1934) and argued that endogenous technological change is the sole determinant of economic growth (Romer, 1990); (Grossman & Helpman, 1990); (Howitt & Aghion, 1998); (Lucas, 1993; Acemoglu et al. 2005; Aghion, et al. 2005b). According to this framework, financial liberalization minimizes financial constraints, consequently providing financial space for invention, innovation, and technological development that in turn enhance productive capacity.

To assess empirically both allocation and productivity effects of CAL on economic growth we develop a theoretical model, presented in section 2. Our theoretical model is mainly based on neo-classical growth model; however, some aspects of endogenous growth model have been incorporated. The end result of the model indicate that steady state growth rate of output is positively related with Total Factor Productivity (TFP) growth (technological progress), and proportion of output that is tended towards investment; whereas the margin of financial intermediation is negatively related to steady state growth of output. The allocative effect of CAL is captured though the proportion of output that tended towards saving, and the margin of financial intermediation. The basic depiction is that more liberalize capital account increases the accumulation of physical capital, and creates competition among financial intermediaries that in turn reduce margin of the financial intermediation. The productivity effect

is capture through the growth of TFP, the idea is that CAL minimize financial constraints and therefore provide incentive for invention, innovation, and technological development that sequentially enhances productive capacity.

The empirical analysis, carried out at country level on a panel of 14 Asian countries, covers the fundamental measures from 1980 to 2019[4], not like the prevailing investigations on the topic, that have explored the impact of CAL on simply pace of economic process. We estimate three entirely different dynamic models using generalized method of moments (GMM). The primary model investigates the impact of CAL on pace of economic process while the alternative models examine the impact of CAL on the sources of economic growth process particularly physical capital accumulation, and growth of total factor productivity (TFP). Secondly, unlike existing empirical literature on the subject, the study investigates the moderating role of institutions in interlinked relationship between CAL and economic growth.

After discussing introduction in section 1, this study is structured as follows. Section 2 presents the theoretical underpinning for the empirical model which shows that explain economic growth with the channel of the marginal productivity of capital and through financial intermediation. Section 3 illustrates empirical models. Section 4 presents methodology that covers detailed discussion about variables under consideration, data and data sources, sample and sample selection criteria, and estimation technique. Section 5 presents findings and discussions. Finally, study concludes in section 6.

2. Theoretical Framework

"Capital account liberalization (CAL) and pace of economic growth moves parallel" is the hypothesis that would be tested in this study. Before an empirical investigation of our hypothesis, we develop a theoretical underpinning for our empirical model. We start our model with the usual consumer's utility maximization problem (as specified by Ramsey (1928); Cass (1965); and Koopmans (1965)). We assume that an economy has identical consumers, that holds factors of production, and have infinite time horizon. The number of consumers in the economy is N_t, which

[4]See appendix A for the list of selected Asian countries.

increase over a time at an exogenous rate $n_{t,}$ therefore, $N_t = N_0 e^{nt}$. All these consumers own same unit of physical capital, have identical production ability and have same preferences about current and future consumption (saving). We assume no age limit for the labor market, hence population equal to labor supply $N_t = L_t$, L_t denotes labor supply.

Assuming constant relative risk aversion preferences (Iso-Elastic Utility Function) the utility maximization problem is to maximize the discounted aggregate utility, subject to aggregate resource constant in the economy,

$$MaxU_0 = \int_{t=0}^{\infty} \frac{C_t^{1-\sigma} - 1}{1-\sigma} e^{\theta t} dt\sigma > 0 \qquad (1)$$

Where $U(.)$ is the instantaneous utility function, which gives each member utility at a given date. θ is the discount rate, $e^{-\theta t}$ is the value of consumption at t in term of consumption at time zero. $U(C_t) = \frac{C_t^{1-\sigma}}{1-\delta}$ is constant relative risk aversion utility. We assume perfect foresight, where σ determines the consumer willingness to shift consumption between different periods.

The budget constraint for this utility maximization problem is,

$$\int_{t=0}^{\infty} e^{-Rt} V_t d_t + \int_{t=0}^{\infty} e^{(n+g)t} W_t d_t - \int_{t=0}^{\infty} e^{-Rt} e^{(n+g)t} C_t d_t \leq 0 \qquad (2)$$

V_t is financial intermediation, r_t is the rate of interest, one unit investment of financial intermediary at time zero should yield e^{-rt} is the present value of continuously compounding interest over the time. W_t is the labor income, and C_t is consumption that accumulating over the period at constant rate. With Hamiltonian,

With Hamiltonian,

$$H = e^{-\theta t}\left(\frac{C_t^{1-\sigma}-1}{1-\sigma} + \lambda\left[\int_{t=0}^{\infty} e^{-rt}V_t d_t + \int_{t=0}^{\infty} e^{(n+g)t}W_t d_t - \int_{t=0}^{\infty} e^{-Rt}e^{(n+g)t}C_t d_t\right]\right) \quad (3)$$

The first order conditions,

$$\frac{\partial H}{\partial C_t} = 0 \Longrightarrow e^{-\theta t}C_t^{-\sigma} = \lambda e^{-rt}e^{(n+g)t} \quad (4)$$

Taking log,

$$-\theta_t - \delta ln C_t = ln\lambda - r_t + (n+g)_t \quad (5)$$

Taking derivate with respect to t,

$$-\theta - \delta\frac{\dot{C}_t}{C_t} = -r_t + (n+g) \quad (6)$$

$$-\delta\frac{\dot{C}_t}{C_t} = -r_t + (n+g) + \theta$$

$$\frac{\dot{C}_t}{C_t} = -\frac{1}{\delta}(-r_t + (n+g) + \theta)$$

$$\frac{\dot{C}_t}{C_t} = \gamma_{c_t} = -\frac{1}{\delta}(-r_t + (n+g) + \theta \quad \forall\, t \quad (7)$$

Consumption will grow if $r_t(\text{return}) > (\text{n} + \text{g}) + \theta, \text{decreasing otherwise.}$

Next, we introduce firms; we assume that an economy has identical firms, that produce output with three inputs of production, labor, capital, and knowledge. The production function takes the following form:

$$Y_t = F(A_t, K_t, L_t) \tag{8}$$

Where, Y_t is the level of an output produced, A_t is knowledge, K_t is stock of physical capital, and $L_t$is the size of labor force. In Cobb-Douglas specification it appears as:

$$Y_t = (A_t K_t)^{\alpha}(L_t)^{1-\alpha} \tag{9}$$

Population $N_{(t)}$ is growing with a constant "n" rate.$L_t = N_t \Longrightarrow L_0 e^{nt} = N_t e^{nt}$. Similarly, technology "A_t" is assumed to grow at constant rate"g_t", i.e. $g_{t=} A_t e^{nt}$.

In per worker terms equation 9 can be written as;

$$\frac{Y_t}{L_t} = \left(\frac{A_t K_t}{L_t}\right)^{\alpha}\left(\frac{L_t}{L_t}\right)^{1-\alpha} \Longrightarrow\ y_t = (A_t k_t)^{\alpha} \tag{10}$$

Equation 10 denotes that output per worker is a function of capital per worker. The accumulation of physical capital can be depicted as;

$$\frac{dK_t}{dt} = I = S = s.Y_t \quad \Longrightarrow \dot{K}_t\ = s.Y_t \tag{11}$$

Further, we introduce financial sector in the economy. Financial sector mobilize consumers' saving and advancing the loans to firms in the form of capital that firms use and invest. We assume that liberalization of financial sector (capital account) enhances mobilizing capacity of financial sector that in turn increases proportion of saving funded towards investment thus increase the accumulation of physical capital. In order to analyze the impact of CAL on the dynamic of physical capital and hence on growth rate of output we have to derive marginal productivity of capital. As the growth of knowledge and labor are constant, hence the

dynamic of the economy depends on the dynamic of capital (k). In per capita from equation 11 follows as:

$$\frac{\dot{K}_t}{L_t} = s.\frac{Y_t}{L_t} \implies \frac{\dot{K}_t}{L_t} = s.y_t \qquad (12)$$

Taking derivative of the left hand side with respect of t, we get:

$$\frac{d\dot{K}_t}{L_t}/d_t = \dot{k_t} + nk_t$$

Putting the values in equation 12, we get:

$$\dot{k_t} + nk_t = s.y_t \qquad (13)$$

Solving the equation for $\dot{k_t}$ and put$y_t = f(k_t)$, equation 6 take the following form:

$$\dot{k_t} = sf(k_t) - nk_t \qquad (14)$$

At the steady state, equation 14 implies $sf(k_t) = nk_t$ and $k_t = \frac{Sf(k_t)}{n}$ where 's' is the portion of output that is save; as we assume that population grow at constant rate (i.e. $n = 1$), hence k_t equal to $k_t = sf(k_t)$, put the value of k_t in equation 10 and take first derivative with respect to k_t.

$$\grave{f}(k_t) = \alpha.A.(s.f(k_t)^{\alpha-1} \qquad (15)$$

Equation 15 states that portion of output that is save $'sf(k_t)$ and technological progress A explains marginal productivity of capital. As we assume that producers operate in a perfectly competitive environment, hence the rate of return to capital $'R_t'$ is equal to marginal productivity of capital. Therefore, equation 15 takes the following form;

$$R_t = \acute{f}(k_t) = \alpha.A.(s.f(k_t)^{\alpha-1} \qquad (16)$$

As earlier discussed, that R_t represents net marginal productivity of capital and equal to $R_t = r_t(1 + i_t)$. Whereas r_t represent the real interest

rate and i_t is the financial intermediation. Incorporating these information equation 16 take the following form:

$$r_t(1+i_t) = \alpha.A.(s.f(k_t)^{\alpha-1} \tag{17}$$

Solve equation 17 for r_t.

$$r_t = {\alpha.A.(s.f(k_t)^{\alpha-1}}\Big/{(1+i_t)} \tag{18}$$

Put the value of r_t in equation 7

$$\frac{\dot{C}_t}{C_t} = -\frac{1}{\delta}\left[-\frac{\alpha.A.(s.f(k_t)^{\alpha-1}}{(1+i_t)} + (n+g) + \theta\right] \tag{19}$$

Since at the steady state $\frac{\dot{c}}{c} = \frac{\dot{k}}{k} = \frac{\dot{y}}{y}$, hence;

$$\frac{\dot{y}_t}{y_t} = -\frac{1}{\delta}\left[-\frac{\alpha.A.(s.f(k_t)^{\alpha-1}}{(1+i_t)} + (n+g) + \theta\right] \tag{20}$$

Equation 20 implies that at steady state growth of output is positively related to technological progress A_t and proportion of output that tended towards to saving $s.f(k_t)$. Whereas; the margin of financial intermediation $'i'$ is negatively related to steady state growth of output. In this framework capital account liberalization, affect steady state output growth through i_t. The idea is that a more liberalize capital account creates competition among financial intermediaries and hence reduce margin of financial intermediation i_t and thus affect positively growth of output.

3. Model Specification and Estimation Strategy

As mentioned earlier that this study aims to investigate how CAL affect long run growth process through its effects on accumulation of capital and productivity growth. In this context, we estimate two empirical models. The first, empirical model capture the impact of CAL on long run economic growth process that measures with growth of GDP per capita. The second model capture the impact of CAL on the sources of economic growth that is total factor productivity growth. Our empirical approach is based on a dynamic panel data of 14 Asian countries with annual observations spanning from 1980-2019. To get the purposed research exercise, following base line models have been empirically tested:

$$\mathrm{GPCI_{it}} = \beta_0 + \beta_1 \mathrm{GPCI_{it-1}} + \beta_2 \mathrm{CAL_{it}} + \acute{\beta}_3 \mathrm{X_{it}} + \mu_i + \alpha_t + \varepsilon_{it} \qquad (21)$$

$$\mathrm{GTFP_{it}} = \beta_0 + \beta_1 \mathrm{GTFP_{it-1}} + \beta_2 \mathrm{CAL_{it}} + \acute{\beta}_3 \mathrm{X_{it}} + \mu_i + \alpha_t + \varepsilon_{it} \qquad (22)$$

Where in our first empirical model (eq.21) the outcome variable is growth of GDP per capita $\mathrm{GPCI_{it}}$ observed at time t in country i. Among the explanatory variables $\mathrm{GPCI_{it-1}}$ is the lag of GDP per capital growth and CAL_{it} is our variable of interest. $\mathrm{X_{it}}$ is "vector of control variables"[5]. μ_i is the country-specific fixed effect that captures heterogeneity in the determinants of productivity specific to country i. α_t is the time-specific intercepts, which captures those changes in productivity that are common

[5]See appendix B for the definition and construction of variables while appendix C presents summary statistics

to all countries, ε_{it} is residual error term[6]. In our second empirical model (eq. 22) the outcome variable is the growth of total factor productivity $\mathrm{GTFP_{it}}$, where, $\mathrm{GTFP_{it-1}}$ is lag of dependent variable, the variable of interest is capital account liberalization $\mathrm{CAL_{it}}$ and $\mathrm{X_{it}}$ is vector of control variables.[7]

3.1 Estimation Methodology

In order to use appropriate estimation technique, we used the serial correlation test to ascertain whether serial correlation exists. In each specification "the results of the serial correlation check suggest the rejection of the null hypothesis of no serial correlation". Keeping visible the results of all specifications, we tend to safely conclude that our model is dynamic in nature. To estimate a dynamic panel model, the appropriate estimation technique is GMM. Roodman (2007) argued that GMM developed by Arellano and Bond (1991) and Arellano and Bover (1995) is the estimation technique that is acceptable for dynamic model estimation. In case of panel data, GMM estimators has advantage over other estimators from three different aspects. First, GMM estimators handle the issues of serial correlation, and heteroskedasticity, hence provides efficient estimation than the simple Pooled OLS or 2SLS estimators (Soderbom, 2009). Second, GMM estimators capture the unobserved effects through regression differences or though instruments, therefore overcoming the problem of omitted variable bias. Third, it also utilize internal instruments using lag of dependent and previous observations of explanatory variables, and hence

[6] $\mu_i, \alpha_t, and\ \varepsilon_{it}$ holds same interpretation in all our empirical models.
[7] Both empirical models have their own control variables.

avoiding endogeneity problem. Equations 21 and 22 can be written as follows after accounting for time specific effects:

$$GPCI_{it} = \alpha GPCI_{it-1} + \eta' CAL_{it} + \gamma' X_{it} + \text{ɳi} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (23)$$

$$GTFP_{it} = \alpha GTFP_{it-1} + \eta' CAL_{it} + \gamma' X_{it} + \text{ɳi} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (24)$$

The process of estimation evolves by taking first differences which will remove the unobserved period and country specific effects, hence ruling out the possibility of omitted variable biasness therefore equations 23 and 24 take the following form;

$$GPCI_{it} - GPCI_{it-1} = \alpha(GPCI_{it-1} - GPCI_{it-2}) + \eta'(CAL_{it} - CAL_{it-1}) + \gamma'(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (25)$$

$$GTFP_{it} - GTFP_{it-1} = \alpha(GTFP_{it-1} - GTFP_{it-2}) + \eta'(CAL_{it} - CAL_{it-1}) + \gamma'(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (26)$$

We assume that the new error term $(\varepsilon_{it} - \varepsilon_{it-1})$ is not serially correlated and the GMM dynamic panel estimator have the following moment conditions

$$E[GPCI_{it-2} . (\varepsilon_{it} - \varepsilon_{it-1})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (27)$$

$$\mathrm{E}[GTFP_{\mathrm{it-2}} . (\varepsilon_{\mathrm{it}} - \varepsilon_{\mathrm{it-1}})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots \dots . (28)$$

$$\mathrm{E}[CAL_{\mathrm{it-2}} . (\varepsilon_{\mathrm{it}} - \varepsilon_{\mathrm{it-1}})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots \dots . (29)$$

$$E[X_{it-2} . (\varepsilon_{it} - \varepsilon_{it-1})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (30)$$

For $t = 1 \dots \dots . . T$ as we have a short sample size of cross-sectional, hence we have restricted our moment conditions to three only. Roodman (2007) argued that so many moment conditions should create over fitting bias. The GMM estimators based on equations 4, 5, and 6 are called the difference GMM estimators, however the difference GMM estimator has some important shortcomings as specified by Alonso-Borrego and Arellano (1999), and Bond et.al (2001). That are, in case of difference regression equation lagged level of variables are weak instruments that in turn causes biasness and inefficiency in the estimated regressions. Hence, to reduce the potential pitfall in difference estimator, we use the system GMM. The moment conditions for the regression in levels are given as:

$$E[GPCI_{it} . (\eta i + \varepsilon_{it})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots (31)$$

$$E[GTFP_{it} . (\eta i + \varepsilon_{it})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots (32)$$

$$E[GL_{it} . (\eta i + \varepsilon_{it})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots \dots . (33)$$

$$E[X_{it} . (\eta i + \varepsilon_{it})] = 0 \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (34)$$

Using moment conditions presented in equations 27 to 34 we can generate GMM estimates by the following formula developed by Arellano and Bond (1991), and Arellano and Bover (1995).

$$\widehat{\theta} = (X' Z \hat{\varphi}^{-1} Z' X)^{-1} X' Z \, \hat{\varphi}^{-1} Z' \bar{S} \ldots\ldots\ldots\ldots\ldots\ldots (35)$$

Where θ is the vertor of parametes to be estimated, $\acute{X}$ is the matrix of explanatory variables including lag of dependent variable Z is the matrix of instruments, φ is the constant estimate of the variance-covariance matrix of the moment conditions. $\bar{S}$ is the dependent variable fixed both in differences and levels. To test the validity of instruments, we sue use two specification tests suggested by Arellano and Bover (1995). The first is the Sargan test to check validity of all instruments used. The Sargan test examines the "null hypothesis of validity of over identifying instruments against its invalidity". The second test is the test of serial correlation to test whether error terms are second order serial correlated or not.

4. Empirical Findings

As we have two empirical models, therefore we approach the empirical findings with different subsections. The first subsection 5.1 presents findings of our first empirical model where growth of GDP per capita is our dependent variable. The second subsection 5.2 presents findings of our second empirical model where the dependent variable is growth of TFP. Finally, subsection 5.3 presents robustness of proposed empirical models.

4.1 Capital Account Liberalization and Growth of Real GDP Per Capita

Table 1 shows the estimated results of our purposed empirical model 1, where we regressed growth of GDP per capita ($GPCI_{it}$) on capital account liberalization (CAL_{it}) along with a set of control variables. Table presents

estimated results of different specifications of our extended growth equation. Among the explanatory variables, lagged dependent variable ($Lag\ Dep.$), physical capital ($PHYC_{it}$), human capital (HC_{it}), inflation (INF_{it}) and population growth ($POPG_{it}$) are common to all specifications. Whereas, capital account liberalization(CAL_{it}) is our variable of interest, institutional quality (IQ_{it}) is channel variable, and $(CAL * IQ)_{it}$ is the interaction term, which show the conditional effect of capital account liberalization on dependent variable i.e. growth of GDP per capita.

The estimated results show that in all specifications the variable of interest capital account liberalization (CAL_{it}) holds positive sign that is statistically significant, which indicates its beneficial impact on economic growth of the sample countries. The following reasons may explain why. First, capital account liberalization should carry allocation effects as specified in received literature on the subject, such as it allows for risk diversification across countries indicated by (Obstfeld & Rogoff, 1994); (Soto, 2003); (Baltagi, Egger, & Pfaffermayr, 2007); reduce cost of capital (Bekaert & Harvey, 1995); (Henry, 2007); generate international competition (Rogoff, 1999); and (Summars, 2000), improve domestic financial system (Klein & Olivei, 1999); and (Levine, 2001); (Soto, 2003); (Samouel, 2008); (Zenasani and Behabibi, 2012), hence fostering allocative efficiency. Second, capital account liberalization should prove beneficial for economic growth in the sample countries as it develop domestic financial system, which in turn minimize financial constraints providing incentive for invention, innovation, and technological development, hence promote productivity growth (King & Levine, 1993); (Acemoglu & Zilibotti, 1997); (Beck et al., 2000); (Acemoglu et al., 2001); (Aghion, Bloom, Blundell, Griffith, & Howitt, 2005), (Henry & Sasson, 2008); (Bekaet et al. 2010). Third, comparable with standard neoclassical theory of investment, liberalization of capital account shrink cost of capital, ease private investment and therefore stimulate growth process (Arteta et al., 2001); (Bussiere & Fratzscher, 2008); (Rehman & Hayat, 2017); (Obstfeld, 2007); (Rodrik, 1998).

Table 1: Estimated Results of Empirical Model 1 (Dependent Variable is Growth of GDP Per Capita)

Variable	Spec_1	Spec_2	Spec_3
Lag Dep.	-0.1155***	-0.1443***	-0.1118***
	(0.006)	(0.001)	(0.004)
$PHYC_{it}$	0.0151***	0.0158***	0.0185***
	(0.000)	(0.000)	(0.000)
HC_{it}	0.0085**	0.01152*	0.0103***
	(0.041)	(0.060)	(0.000)
INF_{it}	-0.0014***	-0.0025***	-0.0017***
	(0.000)	(0.000)	(0.000)
$POPG_{it}$	-0.0094***	-0.0118***	-0.0136***
	(0.001)	(0.000)	(0.000)
CAL_{it}	0.0046***	0.0052***	0.0063***
	(0.001)	(0.000)	(0.000)
IQ_{it}	------	0.0017***	0.0094***
		(0.001)	(0.000)
$(CAL * IQ)_{it}$	------	-------	0.0571**
			(0.021)
No of Obs.	546	546	546
No. of Inst.	126	126	124
P. Value of Auto-Corr.	0.33	0.94	0.78
Sargan Test	323.41	292.93	305.21
P-value	0.33	0.39	0.38

Note: P-value is in parenthesis, ***, **, * shows level of significance at 1%, 5%, and 10% respectively

In specification 2 (column 3), we include institutional quality (IQ_{it}) as an explanatory variable, which have positive sign and statistically significant. The results indicate that country having own relatively sound institutions enjoy higher economic growth. Touching the role of institutions in the capital account liberalization and economic growth nexus, in specification 3 (column 4) the interaction term of capital account liberalization and institutions $(CAL * IQ)_{it}$ used as a regressor. The basic motivation behind the conditional effect is to check Lucas (1990)

paradox, which forward the claim that capital account liberalization cannot improve global allocative efficiency, and argued that weak institutions in developing countries overlap the positive affect of higher marginal productivity of capital, hence instead of capital inflow, capital account liberalization leads flight of capital from developing countries. However, in our case the interaction term enters the model positively and significantly, indicates that in the sample countries capital account liberalization can do best in the rise of the growth of GDP per capita when the country holds strong institutions. The results of interaction term point toward the inference that in the existence of strong institutions, developing countries adores marginal productivity of capital, as a result of capital account liberalization capital influx instead flight from developing countries.

Control variables physical capital ($PHYC_{it}$), human capital (HC_{it}), inflation (INF_{it}) and population growth ($POPG_{it}$) are common to all specifications. Results presented in table 1 reveals that in all specifications physical capital ($PHYC_{it}$) is statistically significant with expected positive sign which substantiate the fact that physical capital plays a significant role in the growth process of the selected Asian countries. Similarly, human capital (HC_{it}) also enters the model significantly and with positive sign, indicate that country enjoy higher economic growth that holds higher level of human capital. Our next control variable inflation (INF_{it}) holds negative sign that is statistically significant. This implies that economic growth of the sample countries gets shrink as inflation surges. The variable population growth ($POPG_{it}$) which is significant with expected negative sign is according to the neoclassical growth model that higher the population growth lower would be the steady-state value of per capita income. This result is also in line with extended neoclassical growth model of Mankiw et al. (1992).

In all specifications, the coefficient of lag dependent variable ($LagDep.$) is negative and statistically significant. This implies that in the sample countries there is a tendency for poor countries to grow faster on average than their rich counterparts.

4.2 **Capital Account Liberalization and Growth of TFP**

As discussed prior in the introductory section that along with the effect of CAL on economic growth, the study is devoted to analyze its impact on

sources of economic growth. In this context, the section of the study presents estimated results and interpretation of our second empirical model, where dependent variable is growth of TFP. Table 2 presents estimated results of our second empirical model, in the table among the explanatory variables, lagged dependent variable($Lag\ Dep.$), Imported Technology ($IMPTECH_{it}$), Human Capital (HC_{it}), Financial Sector Development (FD_{it}), Infrastructure ($INFRAS_{it}$) and Capital Intensity Deeping ($CADEEP_{it}$) are control variables that are common to all specifications. Whereas, capital account liberalization (CAL_{it}) is our variable of interest, institutional quality (IQ_{it}) is channel variable, and $(CAL * IQ)_{it}$ is the interaction term, which show the conditional effect of capital account liberalization on dependent variable, growth of TFP.

Table 2: Estimated Results of Empirical Model 2 (Dependent Variable is TFP Growth)

Variables	Spec_ 1	Spec_2	Spec_ 3
Lag Dep.	0.6272*** (0.000)	0.5502*** (0.000)	0.5574*** (0.000)
HC_{it}	0.0424** (0.041)	0.0160 (0.391)	0.0074 (0.684)
$IMPTECH_{it}$	0.0002** (0.034)	0.0037** (0.031)	0.0036** (0.042)
FD_{it}	0.0025* (0.057)	0.0028** (0.012)	0.0026** (0.022)
$INFRAS_{it}$	0.0039** (0.000)	0.0025** (0.024)	0.0025** (0.021)
$CADEEP_{it}$	0.0041*** (0.000)	0.0045*** (0.000)	0.0049*** (0.000)
CAL_{it}	0.0014** (0.024)	0.0038** (0.022)	0.0053*** (0.001)
IQ_{it}	-------	0.0014*** (0.001)	0.0076*** (0.008)
$(CAL * IQ)_{it}$	--------	------	0.0513*** (0.000)
No of Obs.	412	394	394
No. of Instruments	128	129	128
P. Value of Auto-Corr.	0.87	0.42	0.55
Sargan Test	260.52	240.61	241.91
P-value	0.61	0.52	0.51

Note: P-value is in parenthesis, ***, **, * shows level of significance at 1%, 5%, and 10% respectively.

The estimated results presented in Table 2 show that in all specifications the variable of interest capital account liberalization (CAL_{it}) holds positive sign that is statistically significant, which indicates its beneficial impact on the growth of TFP in the sample countries. The result should be justified with productivity channel as stated in the existing literature (Acemoglu et al., 2001); (Aghion et al., 2005); (Henry & Sasson, 2008); Bekaet et al. 2010). Such as (Acemoglu et al., 2001) and (Aghion et al., 2005) argued that financial liberalization develop domestic financial system, ease invention, innovation, and technological development that in turn enhance growth of TFP. Similarly, (Henry & Sasson, 2008) argued that capital account liberalization minimize financial constraint and therefore encourage production units to rotate reasonable resources towards R&D and human capital accumulation that sequentially boost productivity growth.

In specification 2 (column 3), we include institutional quality (IQ_{it}) as an explanatory variable, which have positive sign and statistically significant. The result indicates that country having own relatively sound institutions enjoy higher growth of TFP. Touching the role of institutions in the capital account liberalization and TFP growth nexus, in specification 3 (column 4) the interaction term of capital account liberalization and institutions $(CAL * IQ)_{it}$ use as a regressor. The interaction term enters the model positively and significantly, indicates that in the sample countries capital account liberalization can do best in the rise of the growth of TFP when the country holds strong institutions. The result of interaction term indicate that institutional quality play a complementary role in the capital account liberalization and economic growth nexus. The result point towards the fact that sample countries can reap potentially the positive impact of capital account liberalization in the TFP growth process by improving quality of its institutions.

Control variables Human Capital (HC_{it}), Imported Technology ($IMPTECH_{it}$), Financial Sector Development(FD_{it}), Infrastructure ($INFRAS_{it}$)and Capital Intensity Deeping ($CADEEP_{it}$) are control variables that are common to all specifications. Results presented in table 2 reveals that in all specifications Imported Technology ($IMPTECH_{it}$), holds positive sign which is statistically significant. The result indicate that country exercising trade policies that encourage import of technology can improve growth of TFP. Similarly, domestic financial sector development (FD_{it}) also enters the model significantly and with positive

sign, point toward the outcome that country enjoy higher TFP growth that holds sound financial sector. Similarly, our next control variable infrastructure ($INFRAS_{it}$) enters the model positively that is statistically significant. This implies that in the sample countries growth of TFP increase as infrastructure developed. Lastly, the significant and positive coefficient of the lag dependent variable ($LagDep.$) indicates that growth of TFP is positively associated with its lag value.

4.3 **Robustness Checks**

Keeping in view nature of our empirical models that are dynamic in nature, hence we used GMM estimation technique for our empirical estimations. We use Sargan test to check the validity of instruments. As the null hypothesis of Sargan test is *"over identifying restrictions are valid".* In all specifications of both empirical models (Table 1 and 2) the P values of Sargan test shows that null hypothesis is not rejected, implies that in all specifications the instruments are correctly specified. Moreover, the P value of second-order serial correlation presented in Tables1 and 2 indicates that the null hypothesis *"no serial correlation"* is not rejected. Hence we cannot reject the validity of the proposed instrument (one lag of dependent variable is valid instrument) and cannot allow for higher order lags of the dependent variable.

5. Conclusion

Lorem Key objective of the study is to explore the impact of capital account liberalization on the pace of economic growth. Unlike the received literature on subject, the contribution of this study lies in two ways. Firstly, we develop a theoretical model grounded in the neoclassical growth framework, allowing us to assess the effects of CAL on economic growth. Secondly, unlike existing empirical studies, we examine the impact of CAL on both economic growth and its underlying sources. In both estimates, findings of the study reveal that in the sample countries that growth of GDP per capita and growth of TFP moving parallel with CAL. This indication moved toward our result that in both empirical models the variable of interest (CAL) holds positive sign that are statistically significant.

Touching upon the role of institutions, results of the study shows that in the sample countries institutional quality enhance the positive impact of

CAL on the pace of economic growth and TFP growth. This signal catches up on the findings that in both empirical models, the interaction term enters the model significantly and with positive sing. The positive and significant coefficients of interaction terms validate the complimentary role of institutional quality in the growth effectiveness of capital account liberalization in case of selected Asian countries. Define it alternatively, country that own relatively sound institutions can potentially reap the benefits of CAL in the form of high pace of economic growth and TFP growth.

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Appendices

Appendix A: List of Selected Asian Countries

Bangladesh	Indonesia	Nepal	Sri Lanka
Bhutan	Korea, Rep	Pakistan	Thailand
Hong Kong	Malaysia	Philippines	
India	Maldives	Singapore	

Appendix B: Definitions and Constructions of Variables under Consideration

Variables	Description	Definition and Construction	Source
Dependent Variable	GDP per capita growth ($GPCI_{it}$)	In our first empirical model "the dependent variable is growth of GDP per capita which is measured with Log differences of real GDP per capita"	Penn World Table 9.0
Dependent Variable	Total Factor Productivity ($GTFP_{it}$)	In our second empirical model the dependent variable is growth of total factor productivity. TFP generally estimated with two different methods. One is Solow residual approach that is statistically calculated by the decomposing of the variance of output into that referable to the conventional factors of production and that attributable to others factors See for example Kelewow&Ridrugyez-Clare (1997). Second, is the "Hall and Jones (1999) approach of the decomposition of output that made some assumptions about the production function and its parameters Assume constant returns to scale and perfect competition. In this study, we used the second method to estimate TFP. Assume the Cobb-Douglas production technology	Authors' own collocation using Penn World Table 9.0 data set.

		with two factors of production, physical capital stock K, and human capital augmented labour HL". The production function takes the following form. Y $= \varphi(K^{\alpha}HL^{1-\alpha})^{\beta}$ Where"φ is TFP, $\alpha, \text{and } 1-\alpha$ measure the share of physical capital stock and human capital augmented labor respectively.βmeasure of returns to scale in this we assume constant returns to scale. Taking log and differentiating equation 1 with respect to time". We get. LnY $= \text{Ln}\varphi$ $+ \beta[\alpha \text{lnK}$ $+ (1$ $- \alpha)\text{LnHL}]$ $\frac{\text{dLnY}}{\text{dt}} = \frac{\text{dLn}\varphi}{\text{dt}} + \beta\left[\alpha\frac{\text{dlnK}}{\text{dt}} + (1 - \alpha)\frac{\text{dLnHL}}{\text{dt}}\right]$ $\text{gY} = \text{g}\varphi + \beta[\alpha \text{gK} + (1-\alpha)\text{gHL}] \quad (3)$ $\text{g}\varphi = \text{gY} - \beta[\alpha \text{gK} + (1-\alpha)\text{gHL}] \quad (4)$ Where $\text{g}\varphi$ is growth of TFP (Solow residual) which is equal to growth rate of output gYminus the weighted growth rates of capital stock gK and human capital augmented labor gHL.	
Independent Variable	Capital Account Liberalization (CAL_{it})	"Chinn and Ito (2006) developed an index to measure a country's degree of capital account openness". The index is de-jure in nature as it based on reported	The updated index of Kaopen is available at http://web.pdx.edu/~ito/Chinn-Ito_website.htm

		restrictions. The index value is normalized between zero and one, value closer to one indicates more openness of a country to cross border capital transactions. Updated by Chinn and Ito (2017).	
Control Variable	Population Growth ($POPG_{it}$)	Adjusted Population growth rate with technological progress rate and deprecation rate.	Population annual (%) is taken from WDI, World Bank (2017) and adjusted with technological progress (2%), and depreciation (5%).
Control Variable	Human Capital (HC_{it})	Index of average years of schooling and the return to education.	Data on human capital is taken from Penn World Table 9.0 data set developed by
Control Variable	Inflation (INF_{it})	Inflation is measured by the Consumer Price Index (CPI)	The data of CPI is taken from WDI, World Bank (2019)
Control Variable	Institutional Quality (IQ_{it})		World Governance Indicators, World Bank
Control Variable	Financial Sector Development (FD_{it})	Composite index of Money supply (M3), Bank credit to private sector, and Stock market capitalization	Author own calculation, using principal component analysis
Control Variable	Imported Technology ($IMPTECH_{it}$	Imports of machinery and transport equipment as a percent of total imports.	UN COMTRADE Statistics
Control Variable	Capital Intensity Deeping ($CADEEP_{it}$)	Capital per GDP or Investment Rate	WDI, World Bank
Control Variable	Physical Infrastructure ($INFRAS_{it}$)	Composite index of different indicators of transport and telecommunication	WDI, World Bank

Appendix C: Descriptive Statistics of Variables under Consideration

Variables	Mean	Std. Dev	Min	Max
$GPCI_{it}$	.0566	.0379	-.1407	.2727
TFP_{it}	.89936	.14202	.523137	1.2460
HC_{it}	1.93945	.58336	1.0444	3.5936
INF_{it}	7.9089	6.974	-23.822	58.3870
IQ_{it}	57.9146	20.6275	20	100
FD_{it}	-.10914	1.3748	-3.5585	4.33306
$POPG_{it}$	.64438	.51047	-1.5767	1.6848
CAL_{it}	.40968	.29480	.16480	1
$CADEEP_{it}$	4.90512	6.1572	-7.699	33.9548
$PHYC_{it}$	28.09148	10.1780	.79419	60.7819
$IMPTECH_{it}$	13.777	14.537	.35389	57.3961
$INFRAS_{it}$	.04406	1.85605	-4.5201	5.4146