Regulatory Quality, Financial Integration and Equity Cost of Capital

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Introduction

For an economy to grow, it is important for businesses to be able to invest and expand. Cost of capital is one of the most important factors that affects firms' investment decisions. A low cost of capital encourages existing firms to expand and enables new firms to enter the industry. It is therefore, imperative to examine factors that influence the cost of capital in an economy. In this paper, we investigate the role of two such factors that affect an economy's average equity cost of capital – *international financial integration* and the *regulatory quality* of the economy.

Integrating with the international financial market implies that the economy is financially open to foreign investments. This financial openness increases the availability of foreign capital, which reduces the domestic cost of capital (Bekaert, Harvey and Lundblad, 2005). Financial openness also allows domestic firms to invest abroad. The availability of foreign funds and the ability to invest abroad reduces the net risk due to risk pooling. This in turn reduces the cost of capital. Economies, especially developing economies, are therefore encouraged to integrate into the global financial markets. Availability of foreign capital enables them to undertake much needed development projects and smoothen their consumption inter-temporally. International financial integration would also make foreign capital available to the private sector and encourage domestic private investment (Alfaro and Hammel, 2007; Henry, 2000).

Foreign firms have to adhere to the local institutions of the host economy to succeed. One of the risks that foreign investors face is information asymmetry. Well-defined and less complex regulations make it easier for foreign firms to overcome this information asymmetry. Unfavorable business regulatory environment and lack of supervision fosters a lack of transparency, which increases the risk of doing business. Such regulatory conditions discourage foreign investment, (Hornberger et al, 2011) inhibit financial openness and therefore, increase the cost of capital.

On the other hand, excessive regulations, though well intended to protect consumers and investors, might actually lead to an increase in the cost of doing business. Complex and time-consuming procedures such as procedures to start a business, get electricity connections, and pay taxes tie up productive resources and could translate to a higher cost of capital.

We study the effect of financial openness on cost of capital in the presence of such regulatory differences between countries. An investigation into this relationship between financial integration, regulatory quality and cost of capital is not only valuable as an academic study but is also imperative for its contribution to policy, especially those intended for reforms and/or bilateral or multi-lateral negotiations.

Developing and emerging countries have large potential gains from international integration. While considering policies to open up to the international financial markets, they need to weigh in the costs and benefits of financial openness. However, emerging and developing countries- including those with a relatively open de jure regime- might find it difficult to integrate financially in the presence of poor institutional quality as foreign investors are discouraged by inadequate regulations. Such regimes will benefit from an investigation into this interaction between financial integration and regulatory quality on the cost of capital.

Advanced countries on the other hand are better integrated with the international financial markets and have a higher quality regulatory system. However, there is evidence of costly and time-consuming regulations affecting growth[3]. This is true for both Europe and the US and disparately affects small and medium size businesses. This study informs policy makers in such countries of the effects of regulatory quality on the average cost of capital.

Multilateral trade and investment agreements often require countries to commit to opening up of their capital accounts and to improve regulatory qualities. Not just the contentious TPP and T-TIP agreements but other agreements like the CAFTA also require countries to follow some international standards and regulatory procedures. The results of this study would aid in such trade negotiations by elucidating the effects (positive or negative) of regulations on domestic cost of capital and the relative importance of financial openness and regulatory quality.

A few scholars have examined the welfare effects of financial openness and of regulatory quality. Most of these studies have investigated the effect on growth of the economy (Bekaert, Harvey and Lundblad, 2005)[4]. Very few have analyzed the effect of regulatory quality on cost of capital even though a low cost of capital is essential for the growth of the economy. To our

[3] In a study by the Mercatus Center of the George Mason University, Coffey et al (2016) find that excessive regulations have reduced GDP growth by about 0.8 percent since 1980.
[4] Refer Edison et al, 2004 for a survey of this literature.

knowledge, this is the first study on the interaction of financial openness and regulatory quality on the cost of capital.

We examine the relationship between average equity cost of capital, financial openness and regulatory quality for 55 countries for the period 2002 to 2011. We measure the average cost of capital as an internal rate of return of firms in each country. Financial openness is measured as both de jure and de facto openness and the regulatory quality is obtained from the World Governance Index. Using panel data estimations, we find a negative relationship between financial openness and the cost of capital and a negative relationship between regulatory quality and cost of capital. We further find that economies with better regulatory quality have a positive relationship between de facto financial openness and cost of capital. Our estimation is robust to alternate definitions of financial openness. We address sources of endogeneity and control for size of the firms in the economy, bias in the estimation of cost of capital, macroeconomic variables like GDP growth rate and inflation and include year controls.

The paper is organized as follows. The next two sections discuss the theoretical background and the literature review respectively. The two sections thereafter, are the empirical strategy and the data section. That is followed by results and conclusion.

Theoretical Framework and Hypotheses development

Increase in financial integration opens up an economy to the global financial market. Economic theory suggests a number of potential benefits of financial integration, two prominent benefits being risk sharing and the availability of external finance to the domestic firms.

In an economy segmented from the global capital market, the domestic investor bears all the risk. When the economy is financially integrated with the rest of the world, foreign investors can invest in the domestic economy and the domestic investor can also invest abroad, thus reducing the net risk due to diversification (Obstfeld, 1994). Availability of external finance encourages domestic firms to undertake viable projects that were shelved for lack of financing. Therefore, financial openness improves the allocation of capital and reduces the net risk, which in turn, reduces the cost of capital for domestic firms (Stulz 1999, 2005).

The above discussion gives us our first hypothesis.

H_{01}: Greater financial openness leads to lower cost of capital

The above mentioned advantages of financial integration assumes a frictionless domestic financial market. In the presence of institutional and regulatory hurdles, investment in the domestic market and exposure to global business cycles might increase the risk or at best mitigate the risk sharing advantage. In such a scenario, the domestic firm might not be able to realize the benefits of international financial integration.

With growing complexity of conducting global business, regulations have become increasingly important. Regulations are mostly nation specific, though firms in an economy might be required to adhere to some international norms. Foreign firms doing business in an economy have to adhere to the local regulations to succeed. Regulations help reduce the information asymmetry among firms and level the playing field for all firms, especially foreign firms.

Regulations have been mostly examined in isolation. Most scholars tend to investigate the empirical effect of a particular regulation and often the effect is limited to a few industries. In practice though, regulations impact firms not only in an incremental and marginal fashion but also in a comprehensive manner. Every new regulation is an addition to an existing system of regulations and might be connected to regulations in other sectors as well. There are very few studies analyzing the effect of regulations at a cumulative level as regulatory quality (Coffey et al, 2016).

Regulatory quality measures the presence and scope of regulations that facilitate doing business. It includes regulations in various areas of conducting business for instance starting a new business, paying taxes, and investing. Sound policies that makes it easier for firms to conduct business, encourage foreign investment and promote financial openness. This relationship between regulatory quality and cost of capital gives us our second hypothesis.

H_{02}: Better regulatory quality leads to lower cost of capital

The presence of well-defined regulations makes it easier for the foreign firm to conduct business in the host economy and promotes the host economies integration with the rest of the world. Simple and well defined regulations can act as a catalyst to financial integration which in turn could lead to lower cost of capital. Opening up an economy's capital market to foreign capital has to occur in tandem with establishing a good regulatory environment. In the absence of proper

regulatory environment, financial integration could lead to unfavorable outcomes with capital not being allocated in the most efficient manner and exposing the economy to international risks leading to sudden reversal of flows (Mishkin, 2007).

It is also important to note however, that having better regulatory quality does not always mean that the cost of capital will reduce. While seemingly better quality regulations might reduce information asymmetry, excessive and redundant regulations could also increase the cost of doing business. (Bolaky and Freund, 2004; Ocampo, 2003; Van Stel et al, 2007). On the one hand market unfriendly policies and lack of adequate bank supervision increases the risk of doing business and on the other, excessive and onerous regulations increase the time, effort and cost of doing business. Better quality regulations therefore, could act as a threshold condition or a filter that generates different economic results of financial openness. Economies which surpass the threshold condition have a better outcome of financial integration as compared to the ones that do not.

In such a scenario, the filter might disperse the outcome into a spectrum with economies with very poor regulatory quality at one end and countries with excessive regulations at the other, both ends demonstrating a higher cost of capital.

We investigate the effect of financial integration on the cost of capital at two different levels of regulatory quality under our third hypothesis.

H_{03}: Greater financial openness and better regulatory index leads to lower cost of capital

Literature Review

Our study draws from three streams of literature. The literature on the outcomes of financial integration, the literature on the effects of institutional quality and lastly, the literature on the cost of capital.

The effect of financial integration has been investigated mostly on economic growth with conflicting results. Grilli and Milesi-Ferretti (1995) and Rodrik (2008) find no link while Quinn (1997) finds a positive relation. The effect on cost of capital has been studies to a lesser extent. Most studies however, address either allocative efficiency of capital or the amount of savings and investment. Cho (1998) studies the effect of financial liberalization on borrowing cost in

Korea. The effects of FDI on growth has been shown to depend on a number of factors such as development of financial markets, absorptive capacity etc. but regulations have not yet been studied.

Many scholars have studied the impact of a country's institutional quality, including regulatory quality, on economic growth, foreign direct investment and trade. Acemoglu and Verdier (1998) and North (1981, 1990) find a positive link between institutional quality and economic growth. Johnson et al (2002) and Rodrik et al. find that clear property rights increases investment and economic performance in developing countries. Rodrick (2002) and Anderson (2005), find that the risk of predation and imperfect enforcement of contracts increases the cost of trade and that ineffective legal systems reduce the quantity of trade and exports. Moen and Sekkat find that the absence of political violence has a positive impact on total exports. They also find that better rule of law and better regulatory increases exports. Aizenman and Spiegel (2006), Knack and Keefer (1995) and Lee and Mansfield (1996) all find that the enforcement of property rights helps in increasing FDI. In contrast, Wei (2000) finds that corruption greatly reduces FDI. Gani (2007) finds that the regulatory quality and government effectiveness and political stability all increase FDI. While Mauro (1995, 1998), Knack and Keefer (1995), and Wei (2000), find that better institutional quality increases the accumulation of capital, they do not examine the cost of that capital.

The relation between cost of capital and institutional quality has been studied mostly in the accounting literature. For example, according to Lombardo and Pagano (2002), better disclosures reduces monitoring cost by investors and decreasing the cost of capital. They suggest that well-functioning legal systems protect outside investors, in turn improving the firms' ability to raise external finance, which should reduce the risk premium demanded by investors and lower the cost of capital. Similarly, Hail and Leuz (2006) find countries with stronger securities regulation and extensive disclosure requirements and enforcement mechanisms have a significantly lower cost of capital. La Porta, Lopez-de-Sileves and Schleifer (2006) find that better legal institutions and security increase equity markets and better legal systems help to increase the protection of outside investors, which reduce fraud and therefore reduce the risk premium. Better Institutional quality enhances the responsiveness of growth in capital, the level of capital inflows and portfolio equity, creating more stability. Younas (2009) finds that the improvement of

institutional quality that strengthens the legal system (maintains rule of law and secures property rights) and democratic accountability increases capital mobility. He also finds that the presence of poor institutions makes investment more risky in developing countries as investors may chose a portfolio that guarantees security of their investment rather than the higher return.

Our paper aims to bring together these three literatures and study the effect of financial integration on cost of capital in the presence of regulatory differences for a large number of countries.

Empirical Strategy

Since we have a panel of large number of firms over ten years across multiple countries, we estimate our model with panel data regression. The main dependent variable is firm level annual average equity cost of capital[5].

We are interested in finding how financial openness influences cost of capital in the presence of heterogeneity in country level regulatory quality. Financial openness would most likely affect the equity cost of capital only after a lag. We therefore include financial openness with a one period lag[6]. Further, details of these measures are given in the data section. The initial specification can then be written as below.

The main reduced form equation for our estimation is given below.

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_1 Financial\ openness_{j,t-1} + \gamma X_{i,t} + \tau_t + \epsilon_{i,t} \ \ldots\ldots\ldots (1)$$

The above equation estimates the relationship for the firm i, in country j for the year t. We introduce firm and country level controls. We also control for time and industry.

Though the main dependent variable is financial openness, better regulatory quality in itself could lead to a reduced cost of capital. To verify that we first regress the regulatory quality index on cost of capital. This specification can then be written as below.

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_1 Regulatory\ Quality_{j,t} + \gamma X_{i,t} + \delta_j + \tau_t + \epsilon_{i,t} \ \ldots\ldots\ldots\ldots (2)$$

[5]Estimation using median cost of capital provides similar results.
[6] We did not find any significant result with a two period lag.

We estimate the relationship between financial openness and cost of capital with both the de jure and the de facto measure of financial openness. We expect the two measures to be related to the cost of capital differently. An economy being financially open de jure does not imply that foreign capital will flow into the economy. The institutional/regulatory quality of the economy will influence how much capital foreign investors will bring in. The realized foreign capital flow is the de facto measure. We estimate equation (1) with first the de jure measure and then with the de facto measure. As there is not much change in the regulatory quality over time, we are unable to include country level fixed effects in our estimation. Using fixed effects estimation would filter out the country regulatory quality effects. Hence, the firm level estimations are random effects specifications. The standard errors in all specifications are clustered on firms. Clustering renders the estimator robust to cross-sectional heteroskedasticity and within panel correlation.

The next few specifications include both financial openness and regulatory quality as independent variables. We introduce interaction between the two as well. To control for country fixed effects, we employ a two-step estimation as used by Hail and Luez (2006). In the first step, we regress cost of capital on all firm level controls and country fixed effects. In the second step, we regress the estimated country fixed effects on financial openness, regulatory quality and the interaction between the two. Our two-step estimation can now be written as given below.

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_1 Countryfixedeffects_{j,t} + \beta_2 Regulatory\ Quality_{j,t} + \beta_3 Financial\ openness_{j,t} * Regulatory\ Quality_{j,t} + \gamma X_{j,t} + \partial Size_{i,j,t} + \tau_t + \epsilon_{i,j,t}$$

$$\hat{\beta}_{1j,t} = \alpha_0 + \alpha_1 Regulatory\ Quality_{j,t} + \alpha_2 Financial\ openness_{j,t} + \alpha_3 Financial\ openness_{j,t} * Regulatory\ Quality_{j,t} + \epsilon_{j,t} \quad \ldots\ldots\ldots\ldots (3)$$

Financial openness and regulatory quality are likely to be correlated, in which case one might influence the coefficient of the other. We estimate the correlation coefficient between the two to verify the strength of the relationship between the two. To address this, we next define the regulatory quality variable as an indicator variable, which partitions the countries as high regulatory quality and low regulatory quality countries. This helps in comparing the financial openness- cost of capital relationship between highly regulated and less regulated countries. We use the mean and not the median of the index to partition the countries. Using the median would ignore the extremes - the most and the least regulated countries. Our two-step estimation can now be written as given below.

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_1 Countryfixed\ effects_{j,t} + \beta_2 Reg.Quality\ (=0/1)_{j,t} + \beta_1 Financial\ openness_{j,t} * Reg.Quality\ (=0/1)_{j,t} + \gamma X_{j,t} + \partial Size_{i,j,t} + \tau_t + \epsilon_{i,j,t}$$

$$\hat{\beta}_{1j,t} = \alpha_0 + \alpha_1 Financial\ openness_{j,t-1} + \alpha_2 Reg.Quality\ (=0/1)_{j,t} + \alpha_3 Financial\ openness_{j,t} * Reg.Quality\ (=0/1)_{j,t} + \epsilon_{j,t} \quad \ldots\ldots\ldots\ldots (4)$$

The measure of regulatory quality is an index combining a large number of indicators. The measure of regulatory quality across countries varies to a large extent in this index. However, the variation for any country year on year is not significant. Though we use a panel data estimator, the variation in regulatory quality comes mostly from country level differences.

One endogeneity concern in this reduced form estimation could be reverse causality. If a lower cost of capital leads to better regulations then our estimation would not be correctly identified. We do not see this as a concern for two reasons. One, there is not much year on year variation in the regulatory quality or financial openness of countries but there is significant variation in the year on year cost of capital. The mean year-on-year change in regulatory quality index and financial openness for countries is between zero and three percent whereas the average annual change in cost of capital is more than thirteen percent (Table 4). If cost of capital influences the regulatory quality, we would see more year on year change in regulatory quality. Second and more importantly, we do not have a theoretical reasoning to support the causality to flow from the cost of capital to regulatory quality. The same reasoning also extends to a possible reverse causality from cost of capital to financial openness.

Data and variable definition

We list below the measures of the three main variables - the proxy for the cost of capital, the measure for financial openness, and the index for regulatory quality. We explain how they are measured and the source of data. The definition of the controls follows the definition of the main variables.

Proxy for cost of capital

Technically, the cost of equity can be calculated using either CAPM based or implied cost of capital (ICC) based methods. However, as Hail and Leuz (2006, page 490) pointed out, realized stock returns calculated using international CAPM is less reliable as a proxy for unbiased expectation of cost of capital due to difficulty in filtering out shocks to firms' growth opportunities.

The ICC method, on the other hand, has been largely advocated by academics. The ICC can be defined as the internal rate of return that equates share prices to discounted analysts' cash flow forecasts. Although several assumptions have to be applied when using this method, it is more popular for country level analysis (Esterer and Schröder 2014).

We follow Francis *et al* (2005), Hail and Leuz (2005) and Li (2010) and use the *ex-ante* cost of capital implied in current stock price and analyst's forecasts of future earnings. There are four ways to estimate that[7]. However, Hail and Leuz (2006) suggest results generated from those models are similar when using international data. We follow Francis et al (2005) and employ price-earnings growth (PEG) ratio model (which is suggested by Easton, 2004) since "it requires less onerous data" (page 1146). Under this approach, firm- specific *ex ante* cost of equity capital is defined as the square root of the inverse of the price-earnings growth ratio (the detailed derivation in Easton 2004). Here, we provide some key results of their model.

$$P_t = \frac{\hat{x}_{t+2} + r_{PEG} \times \hat{d}_{t+1} - \hat{x}_{t+1}}{r_{PEG}^2}$$

in which

P_t is the market price of a firm's stock at time t

$\hat{x}_{t+1}$ and $\hat{x}_{t+2}$ denote the expected future earnings per share at time t+1 and t +2 respectively

$\hat{d}_{t+1}$ denotes expected net dividends per share during (t, t+1)

R_{PEG} represents estimation of cost of capital solved as internal rate of return

For a special case in which $\hat{d}_{t+1} = 0$, the above equation can be reorganized to

$$r_{PEG} = \sqrt{\frac{eps_2 - eps_1}{P_0}}$$

This methodology requires $eps_2 \geq eps_1 \geq 0$

[7] See Appendix in Hail and Leuz (2006, page 525)

We use I/B/E/S Summary Statistics to obtain analysts' earnings forecast and merge that with Company Identification to obtain country/industry/sector index. In line with our specification, we require one year ahead (eps_1) and two year ahead (eps_2) forecasts and the latter value must be greater than or equal to the former (i.e. $eps_2 \geq eps_1$) We use mean estimation to proxy for the expected return for each month and get 119,655 firm-year observations for the time period 1994-2014. However, the sample becomes smaller as we merge with other account data such as firm size, return on equity, etc. Lastly, we merge earnings forecast data with country/sector/industry ID from I/B/E/S Identification function. We drop countries that have less than five firms per year. This leaves us with 19731 firms over 55 countries.

Proxy for financial integration

In prior literature, scholars have used de jure measures, de facto measures or hybrid measures of financial openness. We use two measures - a de jure measure and a de facto measure of financial integration.

For the de jure measure we employ the indicator developed by Chinn and Ito (2006) which uses the AREAR database of the IMF and covers a large proportion of the global asset categories. This indicator is developed from IMF'S AREAER database. The AREAR database provides the rules and regulations that countries use to control current and capital transactions. These are then interpreted into binary variables for each regulation. KAOPEN uses these binary indicators to provide a comprehensive indicator of country level financial openness. It is an extensive indicator that uses principal component analysis on various categories of financial globalization. It has broad country coverage and is publically available. The index has been normalized to range between zero and one. This indicator is a point in time measure, usually around 31 December.

The de jure method does not provide the actual amount of capital flows between nations and might not reflect the actual degree of financial integration of the economy. Since the actual amount of capital flows responds to factors in addition to capital controls (regulatory quality for instance), we include a measure of de facto financial openness in the model. For the de facto measure, we use the Lane and Milesi-Ferretti's (2007) index. Their index measures a country's aggregate assets plus liabilities relative to its GDP and is a widely used measure of financial integration. The assets and liabilities include all categories of portfolio equity, FDI, debt and

financial derivatives. Since the measure is divided by the GDP, it corrects for the size of the economy.

The de jure and de facto measures of financial openness are largely uncorrelated in changes. This goes to show that the de facto indicator captures capital movements that are distinct from the capital account regulations covered under the de jure indicator.

Proxy for Regulatory Distance

The regulatory quality indicator we use comes from the World Governance Indicators (WGI) developed by Kaufmann et al (2007). WGI reports six indicators that define institutional quality one of which is regulatory quality. The index includes price controls, inadequate bank supervision, burdens imposed by regulation in foreign trade and business development. The composite indicator ranges from -2.5 to +2.5, higher values signaling better IQ. We use the percentile rank instead, which ranges from 0 to 100 where 0 is the lowest rank and 100 the highest. The percentile ranks are adjusted for changes over time in the composition of countries covered. The index shows significant variation between countries and captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. The data comes from various sources including surveys of firms and households, a variety of commercial business information, non-governmental organizations, multilateral organization and public sector bodies. The surveys include World Economic Forum's Global Competitiveness Report, the Institute for Management Development's World Competitiveness Yearbook, the World Bank / EBRD's Business Environment and Enterprise Performance surveys. It includes the views of country analysts at the major multilateral development agencies like the European Bank for Reconstruction and Development, the African Development Bank, the Asian Development Bank, and the World Bank. Nongovernmental organizations, such as Reporters Without Borders, Freedom House, and the Bertelsmann Foundation, are also included and so are commercial business information providers, such as the Economist Intelligence Unit, Global Insight, and Political Risk Services.

The indicator is constructed by isolating the unobserved governance component from each individual data source and optimally combining the data sources to get the best possible signal of governance in a country. Kaufmann et al use a statistical tool called Unobserved Components

Model (UCM) to do this. Some advantages of using this measure is that it is available for a long time period and that it is comprehensive.

Control variables

We control for four main factors – firm or country level risk, country level macroeconomic variables, country level differences in forecast bias, and industry and year fixed effects. The cost of capital is expected to be closely related to firm- or country- level risk. There are potentially three factors that could be used as proxy for risk – size of the firm, book to market ratio and return variability. As Fama and French (1992) elaborate, cost of capital is expected to be negatively related to firm size and positively related to the Book to Market (B/M) ratio and return variability. As Hail and Leuz (2006) documented, another reason to control for B/M ratio is that it ties to growth opportunities of each firm. We measure firm size as actual share price multiplied by outstanding shares. The data for book to market ratio and return variability is sparse. Only sixty percent of firm-years have data on these two variables. Therefore, we use only size as a measure of firm risk[8].

We control for cross-country macroeconomic variability with three main controls- - inflation, GDP growth and the standard deviation of annual earnings per share. The measure of cost of capital uses analyst forecast and share prices, which are both measured in nominal terms. It is therefore important to control for international differences in inflation rates. A higher GDP growth rate and a lower inflation rate will lead to a lower cost of capital. Hence, we expect a negative sign on GDP growth rate and a positive on inflation rate. To implement it, we calculate the standard deviation of annual earnings per share (EPS) scaled by total assets per share over past five years window.

We impute our cost of capital from analyst forecasts. The forecasting behavior differs across countries depending upon the accounting practices and the disclosure policies in various countries. We control for this bias by estimating it at the firm level and then aggregating it to get the country level forecast bias. We define firm-level bias as 1-year ahead forecast minus actual earnings. If the forecast is optimistic, we would get a positive coefficient on the forecast bias variable and negative otherwise.

[8] We estimate our specifications with these controls included even if the data on them is not rich. The results do not change when they are included. We do not report these results in the paper.

Finally, we include year and industry controls. I/B/E/S provides multiple levels of categorization such as sector, industry and group. We use sector level controls.

Results

The basic initial estimation of lagged financial openness on cost of capital shows a negative relationship between the two (Table 5). We regress all the controls on the cost of capital variable to verify the relationship between the controls and the dependent variable before we add our main independent variables. All the controls have the predicted sign on them and are mostly significant. As expected, firm size is negatively related to the cost of capital. GDP growth rate is negatively related and inflation has a positive and significant relationship with cost of capital. EPS variability and forecast error though significant have very small effect.

This specification reports both de jure and de facto measures of financial openness and only the de jure measure of financial openness, Ka_Open is negatively related to the cost of capital. The higher the degree of de jure financial openness in the previous period, lower the cost of capital. The de facto measure of financial openness however is not significantly related to the cost of capital in these specifications. Regulatory quality has no effect on the cost of capital in this specification.

Table 6 shows the estimation from the two-step estimation. Only the second step of the estimation is reported in the table[9]. All specifications include both financial openness and regulatory quality. In three out of four specifications, regulatory quality is negatively related to the cost of capital. Higher the regulatory quality, lower the cost of capital. Measured as de jure, financial openness remains negative and significant in both specifications – with and without the interaction with regulatory quality. The de facto measure of financial openness is negative and significant with the interaction term. The interaction between regulatory quality and de facto financial openness is positive and significant. That means a higher degree of openness and higher index of regulatory quality implies a higher cost of capital. However, the interaction between regulatory quality and de jure financial openness is negative and significant – a higher degree of openness in policy and higher index of regulatory quality leads to lower cost of capital.

[9] The estimation results from the first step can be provided upon request.

Measuring regulatory quality as a continuous variable and its interaction with financial openness is difficult to interpret. We re-estimate the above relationship with a dummy variable for regulatory quality, which sorts the country-years into two groups around the mean value of the regulatory index – low regulatory quality and high regulatory quality.

Table 7 shows the results of this estimation. As in the previous estimation, in three out of four specifications, regulatory quality is negatively related to the cost of capital. Again, the coefficient on the de jure measure of financial openness remains negative and significant. The more open the economy is the lower the cost of capital in the next period. The de facto measure of financial openness is also negatively related to the cost of capital though significant only in one of the specifications. These specifications clearly bring out the negative relation between financial openness and cost of capital. Hence, we accept the null in the first hypothesis.

The relationship between the regulatory quality indicator and cost of capital is clearly negative. That is, economies that are higher ranked in regulatory quality have lower cost of capital. The coefficient is significant in three out of the four specifications. Therefore, we accept the null in the second hypothesis.

The more interesting and informative result is the interaction between the financial openness variable and the regulatory quality variable. The interaction with de jure method is negative and significant when regulatory quality is measured as a continuous variable. When we partition the firm into higher and lower regulatory quality, the interaction loses significance while de jure financial openness becomes strongly negative and significant.

However, the interaction between de facto financial openness and the regulatory quality indicator is positive and significant. This implies that better regulated economies evince a higher cost of capital with an increase in de facto financial openness in the prior period. In spite of higher financial openness the firms in a better regulated economy face a higher cost of capital[10]. Therefore, the null in the third hypothesis is rejected for the de facto measure.

Limitations of our model

[10] As mentioned in the data section, the two measures of financial openness are not correlated. Hence, we also estimate a specification with both of them together. The result does not show any significant difference.

One limitation of our ICC model is that the model makes assumptions about firm growth, which might unduly impact the cost of capital measure. The ICC might not be able to capture long run growth assumptions, though the analysts forecast takes into account growth expectation for short horizons. Another limitation of our model is that it does not control for accounting standard differences across countries. One way to control for this is to add an indicator variable signaling the use of IFRS or local GAAP standards. However, there is considerable leeway in the use of IFRS and use of IFRS might incorrectly signal standard use of accounting standards by firms in the same country. Standard deviation of forecast errors across various countries controls for the difference in accounting standards to some extent and so does the use of book to market value ratio. However, as mentioned in the previous section our data on book to market value is sparse but does not affect the result when used. Additionally, our two-step estimation controlling for country fixed effects would control for these differences.

Conclusion and discussion of results

Financial openness and better regulatory quality should both lead to a lower cost of capital for an economy. Our analysis of fifty-five economies over ten years, shows the following four conclusions. First, financial openness plays a significant role in reducing the cost of capital in an economy. This is true for both de facto and de jure measures of financial openness. Second, regulatory quality reduces cost of capital. Third, the interaction between the two shows that for countries that rank higher in regulatory quality, a higher degree of de facto financial openness leads to a higher cost of capital.

The above mentioned results of this study is vital for its implication for policy making. The estimation result that de jure financial openness for better regulated countries is negatively related to the cost of capital shows the importance of being financial open for cost of capital. Even if better regulations mitigate information asymmetries, an economy needs to design policies to make sure that it allows free flow of capital. A combination of policies to regulate better and ensure that the economy remains financially open leads to a lower cost of capital.

However, our analysis clearly shows that regulations could have the effect of increasing the cost of capital for countries that have a high degree of de facto openness. Though we cannot empirically prove the cause for that here, we believe that the benefits of risk mitigation due to better regulations are probably lower than the cost of complying with the regulations in such

economies. Small and medium businesses in the US and in Europe have raised concerns about the myriad time- consuming and cumbersome regulations. Larger corporations too have pointed to the complex tax laws and other regulations that makes it difficult to conduct business. For instance, in a study of the effects of regulations on firms' decisions, Coffey et al (2016) find that cumulated regulations slow the growth of the entire economy by an average of 0.8 percent per annum.

The other reason for this outcome could be that better regulatory quality which attracts greater flow of foreign capital leads to the crowding out of investments, hence increasing the domestic cost of capital (Agosin and Machado, 2005).

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Table 1

Country	Firms per year (Av.)	Country Years	Av. Cost of Capital	Financial Openness Index	Capital Openness Index
Argentina	7.67	10	15.55	1.76	0.29
Australia	216.30	10	11.04	2.32	0.70
Austria	20.20	10	12.27	4.83	1.00
Belgium	39.80	10	10.65	8.70	0.99
Brazil	80.90	10	16.10	0.90	0.47
Canada	252.00	10	12.78	2.55	1.00
Chile	19.10	10	10.92	1.97	0.90
China	345.00	10	11.66	0.99	0.16
Colombia	2.78	10	15.83	0.87	0.39
Denmark	35.70	10	12.59	4.19	1.00
Egypt	7.40	10	13.81	1.07	0.94
Finland	53.10	10	11.91	4.71	1.00
France	200.40	10	11.22	4.72	1.00
Germany	165.60	10	12.53	3.75	1.00
Greece	38.50	10	11.19	2.41	1.00
Hong Kong	147.10	10	13.36	18.11	1.00
Hungary	6.90	10	12.28	3.35	0.96
India	162.30	10	13.89	0.66	0.16
Indonesia	43.10	10	16.50	0.88	0.67
Ireland	26.40	10	11.35	24.16	1.00
Israel	18.40	10	11.87	2.05	0.95
Italy	85.20	10	10.29	2.40	1.00
Japan	486.50	10	10.50	1.66	1.00
Jordan	13.17	10	14.14	3.01	1.00
Kenya	7.33	10	13.08	0.78	0.70
Korea	44.40	10	14.84	1.21	0.47
Kuwait	4.83	10	12.37	3.26	0.70
Malaysia	126.00	10	12.83	2.06	0.39
Mexico	37.40	10	11.94	0.90	0.65
Morocco	16.33	10	10.29	1.17	0.16
Netherlands	67.70	10	11.20	8.30	1.00
New Zealand	40.90	10	9.20	2.23	1.00
Nigeria	6.00	10	21.65	1.07	0.30
Norway	45.90	10	14.78	3.83	1.00
Oman	5.67	10	13.98	1.03	0.98
Pakistan	6.11	10	12.23	0.64	0.16
Peru	6.90	10	14.01	1.07	1.00
Philippines	25.10	10	12.71	1.16	0.39
Poland	26.40	10	11.89	1.20	0.45

Portugal	18.30	10	10.01	4.24	1.00
Qatar	5.83	10	12.75	3.94	1.00
Russia	35.30	10	13.58	1.46	0.45
Saudi Arabia	17.00	10	10.14	1.98	0.70
Singapore	86.20	10	13.03	17.22	1.00
South Africa	91.70	10	13.76	1.52	0.16
Spain	59.20	10	9.50	3.10	1.00
Sri Lanka	6.00	10	11.21	0.82	0.45
Sweden	85.70	10	11.90	4.56	1.00
Switzerland	106.80	10	10.71	10.10	1.00
Thailand	74.40	10	12.93	1.48	0.31
Turkey	35.70	10	14.31	0.89	0.28
United Arab Emirates	12.17	10	14.25	2.49	1.00
United Kingdom	407.00	10	11.03	10.17	1.00
United States	1680.80	10	10.54	2.42	1.00
Vietnam	7.00	10	15.40	1.13	0.26

Notes: Firms per year shows the average number of firms in that country per year, country years shows the number of years for which we have data for that country. Financial Openness index in this table is the de facto financial openness measured using the Lane and Milessi-Ferreti Index (LMFI) and is equal to (Total Assets + Total Liabilities)/GDP for each country. The Capital openness Index is a de jure measure of financial openness, that is, according to the policies of each country how open is their financial market. It is measured using the Ka_Open index developed by Chinn and Ito.

Table 2

Summary statistics

stats	size	Forecast Error	EPS Variability
mean	13.46	45.08	1111.24
min	6.28	0.003	0.002
max	21.45	9697.42	382576.8
Std. Deviation	2.73	458.05	17552.39
N	490	490	478

Ka_open is the de jure measure of financial openness and Finopen is the de facto measure. Size is the log of the size of the firm. Forecast Error is the country average of firm level forecast bias. The firm-level bias as 1-year ahead forecast minus actual earnings EPS variability is the standard deviation of annual earnings per share scaled by total assets per share over previous five year window.

Table 3

Correlation Coefficients

	Cost of Capital	**ka_open**	**Finopen**	**Reg Qlty**	**log_size**	**Ferror**	**EPS Var**	**GDP Growth**	**Inflation**
Cost of Capital	1								
ka_open	-0.1732*	1							
finopen	-0.0125*	0.3232*	1						
Reg Qlty	-0.1078*	0.8289*	0.4095*	1					
log_size	-0.1513*	-0.1221*	-0.005	-0.2367*	1				
ferror	-0.0002	-0.005	-0.0017	-0.0002	0.0014	1			
EPS Var	0.0064*	-0.1469*	-0.0638*	-0.0160*	0.1205*	0.0104*	1		
GDP Growth	0.0152*	-0.5183*	-0.0920*	-0.4839*	0.0631*	0.003	0.1450*	1	
Inflation	0.3391*	-0.3766*	-0.1302*	-0.3066*	-0.1648*	0.0001	-0.0019	0.1199*	1

Ka_open is the de jure measure of financial openness and Finopen is the de facto measure. Size is the log of the size of the firm. Forecast Error is the country average of firm level forecast bias. The firm-level bias as 1-year ahead forecast minus actual earnings EPS variability is the standard deviation of annual earnings per share scaled by total assets per share over previous five year window.

Table 4

Average Year on Year Percentage Change

	Mean
Regulatory Quality	-1.25
Finopen	3.122
Ka_open	-0.784
Cost of Capital	-13.938

Note: Ka_open is the de jure measure of financial openness and Finopen is the de facto measure.

Table 5

Panel regression of Cost of Capital on Financial Openness and Regulatory Quality

Column 2 and 3 are the estimation of the effect of de jure financial openness on cost of capital. That is

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_1 Financial\ openness_{j,t-1} + \gamma X_{j,t} + \partial Size_{i,j,t} + \tau_t + \epsilon_{i,j,t}$$

Column 4 is the estimation of the effect of Regulatory Quality on cost of capital. That is

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_2 Regulatory\ quality_{j,t} + \gamma_{i,t} X_{j,t} + \partial Size_{i,j,t} + \tau_t + \epsilon_{i,j,t}$$

	Cost of Capital	Cost of Capital	Cost of Capital	Cost of Capital
L.ka_open		-1.483		
		[5.67]**		
L.finopen			0.001	
			[0.06]	
RegulatoryQlty				0.006
				[1.88]
Log_size	-0.401	-0.337	-0.321	-0.430
	[20.65]**	[16.08]**	[15.51]**	[20.87]**
Ferror_country	-0.000	-0.000	-0.000	0.005
	[2.48]*	[4.47]**	[3.84]**	[10.87]**
EPSvar	0.000	0.000	0.000	-0.000
	[1.91]	[4.30]**	[4.41]**	[10.02]**
GDPgrowth	-0.054	-0.093	-0.054	0.006
	[3.39]**	[3.88]**	[2.65]**	[0.44]
Inflation	0.273	0.306	0.321	0.279
	[14.74]**	[13.80]**	[15.01]**	[14.44]**
Constant	11.824	11.970	11.105	12.207
	[9.62]**	[7.16]**	[6.71]**	[9.77]**
N	79,778	54,243	54,331	66,761

* $p<0.05$; ** $p<0.01$

Note: Ka_open is the de jure measure of financial openness and Finopen is the de facto measure. Size is the log of the size of the firm. Forecast Error is the country average of firm level forecast bias. The firm-level bias as 1-year ahead forecast minus actual earnings EPS variability is the standard deviation of annual earnings per share scaled by total assets per share over previous five year window.

Table 6

Cost of Capital on Financial Openness and Regulatory Quality (Country fixed effects)

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_1 Countryfixedeffects_{j,t} + \beta_2 Regulatory\ Quality_{j,t} + \beta_3 Financial\ openness_{j,t} * Regulatory\ Quality_{j,t} + \gamma X_{j,t} + \partial Size_{i,j,t} + \tau_t + \epsilon_{i,j,t}$$

$$\hat{\beta}_{1j,t} = \alpha_0 + \alpha_1 Regulatory\ Quality_{j,t} + \alpha_2 Financial\ openness_{j,t} + \alpha_3 Financial\ openness_{j,t} * Regulatory\ Quality_{j,t} + \epsilon_{j,t}$$

	x1	x1	x1	x1
L.ka_open			-2.004	0.426
			[5.86]**	[0.55]
L.finopen	0.051	-0.221		
	[2.34]*	[2.04]*		
RegulatoryQlty	-0.048	-0.052	-0.023	0.006
	[10.88]**	[11.17]**	[4.49]**	[0.62]
interact_ka_rq				-0.038
				[3.46]**
interact_fo_rq		0.003		
		[2.56]*		
Constant	5.931	6.288	5.734	4.083
	[19.06]**	[18.51]**	[19.54]**	[7.30]**
R^2	0.18	0.19	0.22	0.23
N	593	593	592	592

* $p<0.05$; ** $p<0.01$

Note: The above is the estimation results for the second equation mentioned on top of the table. The coefficients on the country fixed estimates are regressed on financial openness, regulatory quality and the interaction of the two. Col 2 and 4 include the interaction term between financial openness and Regulatory Quality. Ka_open is the de jure measure of financial openness and Finopen is the de facto measure.

Table 7

Cost of Capital on Financial Openness and Regulatory Quality (as an indicator variable) (Country fixed effects)

$$Cost\ of\ Capital_{i,j,t} = \beta_0 + \beta_1 Countryfixed\ effects_{j,t} + \beta_2 Reg.Quality\ (=0/1)_{j,t} + \beta_1 Financial\ openness_{j,t} * Reg.Quality\ (=0/1)_{j,t} + \gamma X_{j,t} + \partial Size_{i,j,t} + \tau_t + \epsilon_{i,j,t}$$

$$\hat{\beta}_{1j,t} = \alpha_0 + \alpha_1 Financial\ openness_{j,t-1} + \alpha_2 Reg.Quality\ (=0/1)_{j,t} + \alpha_3 Financial\ openness_{j,t} * Reg.Quality\ (=0/1)_{j,t} + \epsilon_{j,t}$$

	x1	x1	x1	x1
L.ka_open			-2.753	-2.527
			[11.32]**	[7.59]**
L.finopen	-0.015	-0.395		
	[0.75]	[4.45]**		
mnrq	-1.172	-1.945	-0.423	-0.203
	[6.83]**	[8.54]**	[2.59]**	[0.50]
x				-0.378
				[0.76]
z		0.386		
		[4.51]**		
Constant	3.300	3.858	4.826	4.698
	[26.38]**	[21.88]**	[27.22]**	[21.55]**
R^2	0.07	0.11	0.20	0.21
N	771	716	770	715

* $p<0.05$; ** $p<0.01$

Note: The above is the estimation results for the second equation mentioned on top of the table. The coefficients on the country fixed estimates are regressed on financial openness, regulatory quality and the interaction of the two. Col 2 and 4 include the interaction term between financial openness and Regulatory Quality. Ka_open is the de jure measure of financial openness and Finopen is the de facto measure. MNRQ is the regulatory quality indicator term. If MNRQ equals one, it implies that the country-year is a high regulatory quality data point. X is the interaction term between Ka_open and the indicator variable for regulatory quality. Z is the interaction between Finopen and the indicator variable for regulatory quality.