

The Compatibility of Capital Controls and Financial Development: A Selective Survey and Empirical Evidence*

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Abstract

This paper examines the relationship between capital controls and financial development, with an emphasis on the empirical aspects of the linkage. Financial development is interpreted broadly as increasing the efficiency of allocating financial resources and monitoring capital projects. In empirical terms, this translates into increasing volume of bank intermediation and an increasing role for equity capital. Hence, I investigate a substantially broader set of proxy measures of financial development than has heretofore been analyzed. Moreover, in addition to the IMF's exchange restrictions measures, the Quinn (1997) index of financial openness is used as a measure of capital controls. The econometric results suggest that the rate of financial development, as measured by private credit creation and stock market activity *is* linked to the existence of capital controls. However, the strength of this relationship varies with the empirical measure used, and the level of development. Equity market activity appears to be linked to capital controls in both the full sample, and a restricted sample of developing countries. The possibilities for work at a more disaggregate level on banking and equity markets are also discussed. The results pertaining to equity market development is of particular importance, as recent work suggests that new technologies may not be effectively supported by bank directed finance.

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1. Introduction

A number of recent studies have identified financial development as a key empirical determinant of growth. It is easy to forget how much of a sea change in received wisdom this finding represents. As recently as 1992, Levine and Renelt concluded that the only determinant of growth that not fragile was investment; and trade openness in turn was the only variable robustly related to investment. Now, after waves in interest in human capital, political factors and other variables, it appears that finance has reasserted its central role. However, this role appears to be significant only in the OECD countries, and not more generally (although the debate over this issue is far from over).¹

Capital controls have also taken on heightened significance in the recent few years, in the wake of the East Asian crises. Some have asserted that “soft” capital controls, of the Chilean genre, have served to transform the composition of capital inflows, thereby discouraging unstable hot capital. Little attention, in contrast, has been addressed to an equally interesting question – whether capital controls are compatible with financial development. In this paper I assess this issue. The centerpiece of my discussion will be based on an econometric analysis, using aggregate data on a large sample of countries over the 1970-1997 period.

The analysis in this paper departs from that found in much of the extant literature. First, the analysis skirts the financial development-growth versus capital liberalization-growth linkages, and restricts attention to the linkage between capital liberalization and financial development. Second, a larger set of financial development measures is used, including those

¹ See for instance Leahy, et al. (2001) for OECD-specific results. Klein and Olivei (2001) document the linkage for developed countries, and its absence for less developed countries. Spiegel (2001) examines an APEC sample, while Arteta, Eichengreen and Wyplosz (2001) document the fragility of many of these group-specific results. IMF (2001, Chapter 4) surveys both the growth and finance, and finance and liberalization literature.

pertaining to equity markets. Third, I use a larger set of measures on restrictions on international financial transactions. That translates into use of all the IMF's indicators of exchange restrictions, as well as the Quinn (1997) measure of international financial regulation.

After conducting the econometric analysis, I make some observations regarding issues in banking development and equity market development that cannot be easily addressed in the context of large cross-country regression analyses. Some directions for future research are outlined in these two sections.

The paper concludes with a speculation on why this issue of capital controls, and financial regulation more generally, is likely to take on heightened importance in the future. As noted in a recent study (APEC Economic Committee, 2001b), assimilation and development of high technology activities around the Pacific Rim may very well require differing modes of financing. Capital controls may directly or indirectly hinder development and use of those alternative modes. Even if capital controls themselves are not direct hindrances, they may signal a policy stance inconsistent with allowing market forces to work, thereby raising the risk associated with ventures with already uncertain payoffs.

2. Aggregate measures of financial development & capital controls

2.1 Literature review

There is a long line of papers investigating the link between finance and growth. However, there is a much smaller literature examining the link between capital controls and/or financial openness and financial development. One paper of interest is by DeGregorio (1998). He examines the related question of whether economies exhibiting greater financial *integration*

experience greater financial development. Integration in his context does not equate to financial restrictions of a regulatory nature. Rather, he investigates the effect of lack of integration characterized by deviations from two no arbitrage profits conditions, the international arbitrage pricing model (IAPM) of Levine and Zervos (1995), and the international capital asset pricing model (ICAPM) of Levine and Zervos (1998). These measures may reflect the effects of capital controls, but they could also be driven by imperfections in the capital markets of a non-regulatory nature. He also examines two other measures of capital market openness, namely the ratio of gross capital flows to GDP and a subjective, polychotomous variable based upon the gross capital flows/GDP ratio, the Feldstein-Horioka savings-investment correlation coefficient, Euler equation estimates, and UIP deviations, obtained from Montiel (1995).

De Gregorio uses four measures of financial deepening: total lending to the private sector, divided by GDP (by far the most commonly used measure), the value of listed shares to GDP ratio, the ratio to GDP of the total value of shares traded per year, and the volatility of the stock market, as measured by a rolling one year standard deviation.

After controlling for inflation rates and trade openness, De Gregorio finds that in a cross-section of developing and industrialized countries, the no-arbitrage profits conditions have a positive and statistically significant effect upon the lending stock market capitalization, and volatility measures of financial deepening. The total value of shares traded per year measure only appears to depend upon the ICAPM measure.

In these analyses, one important distinction is that between behavior in developed and developing countries. In the sample for which De Gregorio has data on the gross capital flows and composite measures, the observations are restricted to developing countries. In these samples, he finds only mixed evidence for any of these two measures having an effect. Gross

capital flows do appear to be correlated with the lending measure of financial deepening, an intuitive finding; at the same time, this is the least convincing measure of the variable of interest.²

In one of the more relevant papers in this literature, Klein and Olivei (2001) examine a cross-section of 87 industrialized and less developed countries over the 1976-1995 period. Their agenda actually includes both the link between financial development and economic growth, as well as the nexus of liberalization and finance we are interested. Here I merely recount the results pertinent to the question at hand. Their regressions take the form of:

$$(1) \quad FD_t^i - FD_{t-k}^i = \beta_0 + \beta_1 FD_{t-k}^i + \beta_2 KALIB_{t-k,t}^i + \beta_3 X^i + \varepsilon_t^i$$

where FD is the financial development variable, $KALIB$ is the capital account liberalization variable, and X is a set of control variables, including regional and time dummies.

Their measures of financial development include the ratio of liquid liabilities to GDP, the proportion of financial intermediates' claims on the private sector to GDP, and the ratio of private bank to private plus central bank assets. Each of these measures has strengths and weaknesses. The liquid liabilities measure is the most common measure of financial development; it consists of the sum of currency outside the banking system, plus demand and interest bearing liabilities of the banking system.³ This measure, however, does not distinguish between allocation to private and public sector entities, and hence could misleadingly indicate

² Unfortunately, De Gregorio (1998) does not report results for the no-arbitrage profits measures broken down by developing and developed countries. This is probably due to the small number of observations (there are about 24 observations per integration measure).

³ Hence, it is essentially the underlying series used in calculating "credit booms" in financial crisis models. See e.g., Chinn, et al. (1999).

that a country with directed lending to state owned enterprises actually had a advanced financial system, when in fact the banking system was failing in its role as project monitor. The private claims measure addresses this deficiency, and is similar to the series used by De Gregorio. Both of these data series are readily available. Finally, the commercial bank assets ratio is meant to focus on the development of those services that are most related to financial management.

For *KALIB*, Klein and Olivei use the most common measure of capital account liberalization – the IMF's indicator variable on capital account restrictions from the *Annual Report on Exchange Restrictions and Exchange Arrangements*, or for a subset of industrialized countries, the OECD measure of capital account liberalization.

Comfortingly, Klein and Olivei find a relationship between capital account liberalization and financial development. However, one marked and notable aspect of their results is that the identified correlation is driven entirely by the developed countries in their sample. In other words, there is no detectable relationship between liberalization and development for the less developed countries. Klein and Olivei conjecture that this result obtains because the less developed countries were latecomers to the liberalization game; hence it may merely be the case that the effects of liberalization have not yet been felt, and that time will tell.

2.2 Empirical analysis

The analysis that I conduct takes a broad view of financial development – that is it includes the lending measures typically used, but also incorporates various measures of the equity markets. In some respects, the development of equity markets may be a better measure of the ability of an economy to mobilize capital in an efficient manner; conventional measures of lending activity are susceptible to mis-characterizing government directed lending as market

driven lending. Hence, a variety of financial deepening measures are used, although results from only a subset of the measures analyzed will be reported.

2.2.1 Specification

In principle, one would like to estimate the long run equilibrium relationship in:

$$(2) \quad FD_t^i = \gamma_0 + \gamma_1 KC_t^i + X_t^i \Gamma + u_t^i$$

where KC is a measure of capital controls, and X is a vector of economic variables. The capital controls variables are described in greater detail in the data section. Here I focus on the economic rationale underpinning the other right hand side variables, in the X vector, which could in principle include a very large number of variables. In this analysis, the set is kept fairly small, so as to retain some interpretability of the correlations. The economic variables include log per capita income in PPP terms, the inflation rate, and trade openness, measured as the ratio of the sum of exports and imports to GDP.

Log per capita income is included as there is a long literature ascribing financial deepening, aside from the role of regulation, to the increasing complexity of economic structures associated with rising income. The inflation rate is included because it (or the volatility in the inflation rate)⁴ may cause distortions in decision-making regarding nominal magnitudes. In particular, moderate to high inflation may discourage financial intermediation, and encourage saving in real assets. Finally, trade openness is included as an ad hoc control; many empirical works find a correlation of trade openness with any number of economic variables.

It turns out that it is difficult to control for apparently secular trends in financial deepening in the context of the panel regression in levels (equation 2). This is most likely due to

⁴ Since in most cases, the volatility of inflation rises with the inflation rate, the inflation rate could be proxying for either or both of these effects.

the large cyclical variations in the financial deepening variables, along with trending behavior of the variables of interest. Hence, an alternative specification, akin to a panel error-correction model, is estimated:

$$(3) \quad FD_t^i - FD_{t-5}^i = \gamma_0 + \rho FD_{t-5}^i + \gamma_1 KC_{t-5}^i + X_{t-5}^i \Gamma + u_t^i$$

This regression carries with it the following interpretation: The *rate* of financial development depends inversely upon the *level* of financial development, negatively upon the extent of capital controls (or positively upon the degree of financial openness) and upon a series of economic control variables.

The use of the long horizon of five years (the average annual growth rate over a five year period) has two advantages. First, it serves to minimize the effect of correlations due to business cycle fluctuations. Second, relating the growth rate between period t-5 and period t to the level of variables dated at time t-5 serves to mitigate endogeneity problems. Specifically, in regressions of either the level or the growth rate of financial development on variables such as per capita income or more importantly capital controls, one could easily imagine two way causality at the annual frequency. For instance, increases in the ratio of M2 to GDP might cause more rapid GDP growth. Or increasing stock market capitalization might induce policymakers to have a less sanguine view of the effects of capital controls. Analyzing the data at five year horizons mitigates (but of course does not completely solve) this problem.

The drawback, of course, is that one is throwing away some data by using average growth rates, and sampling the “initial conditions” at every five years. The ideal solution would be to purge the data of cyclical fluctuations and instrument the right hand side variables; in a

large panel study of this nature, it is difficult to implement such appropriate econometric techniques in a manner that is appropriate, so I resort to simpler and more readily interpretable methods. In any event, this approach is common to the literature (and in my opinion is preferred to pure cross section regressions that examine growth over a very long horizon such as 20 years).

2.2.2 Data

The data are drawn from a number of sources, primarily the World Bank's *World Development Indicators*, the IMF's *International Financial Statistics*, the database associated with Beck, Levine, and Loayza (2000). The analysis is based upon data originally recorded at an annual frequency, over the 1970-1997 period, and covers 105 countries. Details are reported in the Data Appendix.

Financial development indicators. A large number of indicators were examined; only a subset that are actually used in the analysis, or discussed in the text, are described below (the remaining are described in the Data Appendix).

The first set is the most familiar: LLY is liquid liabilities to GDP ratio, while M2Y is the ratio of M2 (the sum of M1 and quasi money) to GDP. Finally, PCGDP is the ratio of private credit from deposit money banks to the private sector.

The second set is slightly less familiar, and apply to the equity markets. SMKC is the ratio of the stock market capitalization to GDP, SMTV is the ratio of total value of stocks traded to GDP, and SMTO is the stock market turn over ratio. EQTY is the equity issues to GDP ratio.

Finally, there are a series of measures that pertain to the bond markets. Unfortunately, the number of observations is quite small, and the cross-country coverage quite narrow.⁵ For

⁵ Data are available for the following series: PVBM, the private bond market capitalization to

instance, there are only about 140 annual observations on long term private debt issues, while there are over 1600 on the liquid liabilities measures. When the specification involves five year growth rates, the number of observations is so small that we are unable to obtain any interesting results for this particular aspect of financial development, even though long term financing through bonds is likely to be an important factor in economic development (See for example Herring and Cahtusripitak, 2000).

Figure 1 shows annual observations on three key measures of financial deepening (liquid liabilities, private credit, and stock market capitalization). There is a clear correlation between the two banking sector related measures, while the relationship with capitalization is less obvious. The top five rows of Table 1 report summary statistics for these variables, while Table 2 reports the correlation coefficients. (The correlation between liquid liabilities and M2 ratios is quite high, and the results do not differ substantially when using one or the other variable, so M2 will not be discussed further).

Capital controls. Almost all analyses of either effects of capital controls, or their determinants, rely upon the IMF's categorical enumeration, reported in *Annual Report on Exchange Restrictions and Exchange Arrangements*. k_1 is an indicator variable for the existence of multiple exchange rates, while k_4 is a variable indicating the surrender of export proceeds. Perhaps the most relevant capital controls are k_2 and k_3 . They indicate restrictions on current account and capital account transactions, respectively.

These restrictions on current account transactions limit the private sector's ability to obtain foreign exchange for payments related to imports and also to retain foreign

GDP ratio; PBBM, the public bond market capitalization to GDP ratio; and LTPD is the long

exchange earned through exporting. They also limit the ability of foreign direct investors to repatriate interest and profits. The argument for including them as a form of capital controls is that transactions on the current account have often been used to evade capital account controls. (Considerably ingenuity has been used in the past, involving timing of payments, over-/underinvoicing exports and imports). The more obscure provisions pertaining to surrender requirements, bilateral payments restrictions and multiple exchange rates, are typically included as a means of proxying for the intensity of controls explicitly aimed at capital transactions.

The sixth through ninth rows of Table 1 report summary statistics for these capital control measures. Restrictions on the capital account and the surrender of export proceeds appear to be the most pervasive. However, all of these capital controls appear to be decreasing in their use (although one cannot conclude that they are decreasing in terms of their restrictiveness).

Financial regulation. The deficiencies of these dichotomous measures of capital controls is well known. The most critical and obvious is that they do not measure the *intensity* of the controls, nor do they speak to the efficacy (in this regard, one might prefer the outcome-based measures De Gregorio uses). To illustrate this assertion, note that for instance, capital controls might be as stringent and command-and-control oriented as those imposed by the Latin American governments in the wake of the 1980's debt crises, or of a less dirigiste form such as the Chilean controls.⁶

Quinn (1997) has recently compiled a composite measure of financial regulation which ranges from 0 to 14, with 14 representing the least regulated and most open regime. The bulk of

term private debt issues to GDP ratio.

⁶ Specifically the unremunerated reserve requirements (URR), that sought to discourage short term capital inflows and hence outflows.

the index is based upon Quinn's coding of the qualitative information contained in the various issues of *Annual Report on Exchange Restrictions and Exchange Arrangements* pertaining to k_2 and k_3 , augmented by information regarding whether the country in question has entered into international agreements with international organizations such as the OECD and EU.

A complete tabulation for the OECD members exists, but the coverage for the less developed countries is much less extensive; values are reported only for certain years (1958, 1973, 1982, 1988).⁷ Figure 2 illustrates the index's behavior for Argentina and for the United States. The lack of observations on the developing countries is frustrating as one would be particularly interested in the role of financial liberalization in emerging economies.

As an expedient, I *estimate* a Quinn measure of financial regulation for the developing countries. The estimation of this "pseudo-Quinn" measure proceeds in the following manner. The entire sample is used to estimate the following relationship between the Quinn measure and the variables k_1 through k_4 .

$$(4) \text{Quinn}_t^i = \theta_0 + \sum_{j=1}^4 \theta_j k_j^i + v_t^i$$

When this regression is implemented over the entire sample of industrialized and less developed countries, all the coefficients entering with the expected negative, and statistically significant, sign (the k_i variables take a value of unity when a control is in effect, while the Quinn measure takes on a higher value the weaker the restriction). This is a very blunt instrument to use to estimate the Quinn variable, but remarkably these four variables explain a majority of the variation in the index; the adjusted R^2 is 0.71.

⁷ Personal communication from Dennis Quinn.

One might think that the relationship linking the Quinn measure and capital controls dummy variables differs over groups. One obvious distinction to examine is that between the industrialized and less developed countries. Equation (4) was estimated allowing for an intercept shift and differential slope coefficients. The intercept shift is statistically significant, but this may represent the fact that there are no observations on emerging market Quinn indices during the entire 1990's. The only differential slope coefficient that is significant is the capital account (k3) one, at the 7% marginal significance level. Since the evidence for differential effects is limited, the estimated measure is based upon the regression coefficients in equation (4), and closer investigation of this issue is reserved for further research.

A digression. There are a variety of alternative estimates of financial openness, some of which have been described above in Section 2.1. One set of alternatives relies upon cumulated net foreign assets or liabilities, an index analogous to trade openness. The IMF research staff (IMF, 2001) used this measure in their discussion of capital restrictions. However, it is obvious that these stock measures suffer from the same limitations as flow measures of openness – namely that they can be greatly influenced at the high to medium frequency by economic and policy influences besides capital controls.

Another approach attempts to measure intensity, akin to Quinn's approach. Montiel and Reinhart (1999) allow the capital control proxy to vary between 0 (no controls) and 2 (severe controls); unfortunately, they only tabulate figures for the 1990-96 period for 15 countries.

There are other variations: Kraay (1998) identifies major episodes of capital account liberalization as those episodes in which a control that has existed for at least five consecutive years is eliminated and *stays eliminated* for 5 consecutive years. This approach certainly has an intuitive appeal. Indices based upon the more finely detailed divisions of the IMF categories

have also been constructed by Miniane (2001); however, this index shares the limitation of the standard IMF based k_1 - k_4 variables, in that they can only take values of 0 to 1.⁸

2.2.3 Results

In a preliminary set of regressions, capital controls were proxied by k_1 through k_4 . It turns out that none of these capital control variables robustly exhibit any statistical significance (although they had the expected effect of depressing financial deepening regardless of the indicator). Hence, I will focus the entire discussion on the results using Quinn's measure of financial openness.

Figure 3 illustrates the correlation between private credit (PCGDP) and stock market capitalization (SMKC) on one hand, and the estimated Quinn measure of financial openness. Both of the financial development series appear to covary in the expected manner with the capital control proxy (positively in the case of the Quinn variable). Indeed, when equation (3) is estimated omitting X (per capita income, inflation, trade openness), *all* financial development variables appear to depend significantly upon the degree of financial openness. However, one has to recall that financial development *and* the absence of capital controls are both positively correlated with per capita income. Hence, the positive association visible in Figure 3 may not survive multiple regression analysis.

Table 3 reports the results estimating equation (3) including X , over the entire sample. Neither the change in liquid liabilities (column 1) or change in private credit (column 2) appears to be closely linked to financial openness. Per capita income enters in with the expected positive sign, as does trade openness. The results using the equity market measures are more promising.

⁸ See the discussion in Edison and Warnock (2001), and a comparison of various measures.

The growth rate of new equity issued (columns 3 and 6) responds to the financial openness measure at borderline significance level. More interestingly, stock market total value traded and stock market turnover (columns 4 and 5), better indicators of equity market activity than stock market capitalization, are both significantly affected by financial openness. The proportion of variation explained is also higher than in the cases using the bank credit measures.

It is possible that these observed patterns are being driven by the decision to pool both industrialized and less developed economies into one sample. This applies to both the apparent sensitivity of equity market indicators to financial openness, and the absence of any relationship of bank credit measures to financial openness. As mentioned earlier, some studies have identified sample-specific results pertaining to financial development. Hence, Table 4 presents the results for a developing country sample.

Bank credit indicators (columns 1 and 2) do not appear to be depressed by capital controls. Nor does stock market capitalization (column 3). However, the preferred measures of equity market development (value traded, turnover, and new equity issued⁹) all do appear to be significantly dependent upon financial openness.

Fixed effects regressions were also implemented (results not reported). In these estimates, the statistical significance of the financial openness variable is largely eliminated. This outcome is partly to be expected. The country fixed effects are highly correlated with the financial openness of an individual country.

The econometric analysis thus confirms what other studies have found – namely that the relationship between capital controls and bank credit measures of financial development does not hold for developing countries. On the other hand, equity market development does appear to be

⁹ The equity issue results have to be treated with caution, as the sample is fairly small.

linked to financial openness in a significant manner, thus yielding a perspective on the relationship between capital controls and financial development drastically different from that in the extant literature.

2.2.4 Caveats

Empirical work is always fraught with hazards. When estimating non-structural relationships, the challenges to interpretation of the statistical results are compounded. Here I flag two key issues.

Two way causality. In the simple two variable case, endogeneity will tend to bias the regression coefficients toward finding a non-zero relationship. In a multiple regression, the impact is not easily determined, but in principle will be an issue. In using the five year growth rates and the lagged initial conditions, I have attempted to mitigate the problem of endogeneity. However, to the extent that the right hand side variables, such as per capita GDP and the capital control measures, exhibit high serial correlation, then simultaneity bias may still be a concern.

Mis-attribution of influences. It might be the case that financial development and capital controls are influenced by a third factor – perhaps political stability, or the strength of the legal system (both the laws and the enforcement thereof). In that case, it would be inappropriate to attribute the financial development to the absence of capital controls per se.

3. Bank-Centered Financial Development: A Disaggregate Look

There is a limited amount that one can learn from these analyses at the aggregate level. In particular, one is analyzing the amount of bank credit extended when using, for instance, either LLY or PCGDP is the object of interest. But nothing guarantees that volume is a good indicator of increasing financial development in a deep sense. In order to examine such issues, one has to consider the efficiency with which resources are used to conduct financial intermediation. To take a stark example, in the years leading up to the Korean financial crisis, one would have witnessed increasing LLY measures. But at the same time the incremental capital to output ratios were declining (Chinn and Kletzer, 2001).

In order to examine the efficiency of the banking sector requires detailed microeconomic data; even then, one might not be able to measure the true economic efficiency with which resources are being used. Cross-country studies assessing banking efficiency are few and far between, and indeed the appropriate measures are in doubt. Beck, Demirguc-Kunt and Levine (2000) suggest overhead cost and net interest margin. The former is the accounting value of a bank's overhead cost expressed as a proportion of its overall assets; thus a lower figure suggests greater efficiency, assuming the accounting data accurately reflect the economic values. The latter measure is the net interest revenue to total assets, and suffers from similar limitations in relying upon accounting data. In a recent study, the APEC Economic Committee (2001a) compile these series for the 1990-97 period, and find that both indices are highly correlated, and further that they are generally lowest for the developed economies. However, the fact that the indices for the Korea and the People's Republic of China are lower than the corresponding figures for the United States gives one pause for thought.

In Figure 4, the correlation between overhead costs and the Quinn measure for 1988 is depicted, along with a nonparametric best-fit line.¹⁰ There does appear to be some sort of negative relationship – that is a more open capital account in 1988 is associated with a more “efficient” banking system over most of the 1990s. However, one would not want to make too much of the apparent relationship, given the above caveats. This finding, however, does suggest that it might be profitable to obtain better, economic, measures of bank efficiency, and to relate those measures to the prevalence of capital controls.

4. Equity Markets and an Alternative Measure of Capital Controls

The econometric results for equity markets in Section 2 are striking in that they suggest that the existence of controls are likely to exert a negative effect on the development of equity markets as well as on credit formation, although the effect is most pronounced for developed economies. This observation is important because there are some indications that equity markets are better equipped to finance the emerging technologies and business ventures of recent years than bank-oriented systems (Leahy, et al., 2001; U.S. President, 2001).¹¹ (Levine (2000) argues that the financing mode is less important than the enforcement of laws pertaining to property and finance when determining whether an economic environment is conducive to growth.)

Suppose that the capital control measures discussed earlier are not well suited to indicating whether markets are open. What are the alternative means of measuring, and hence

¹⁰ A nearest-neighbor fit with window size equal to 70 percent of total sample.

¹¹ There is a separate issue of whether equity markets are equally, or even more, susceptible to fads and bubbles, relative to banking systems, in the wake of the collapse of equity prices in 2000-2001. Even if there was some “irrational exuberance” in equity markets, the key issue remains whether equity financing was better able to foster high technology investment.

determining the influence of, capital controls? Bekaert and Harvey (2000) and Bekaert, Harvey and Lumsdaine (2001) have documented how to date the integration of equity markets with the global markets, using structural breaks in the correlations of returns. They then associate these breaks with observable changes in regulatory regimes. Using these breaks, they have been able to determine the impact upon capital flows, and the subsequent change in the behavior of asset prices. Similarly, Henry (2000) has found that the size of equity markets increases after discrete breaks. This work is definitely interesting; but like all work inferring breaks from behavioral changes, credulity is sometimes stretched when there are a plethora of regulatory breaks, and only a rare instance of observable changes occurs (e.g., Chinn and Maloney, 1998, for money market returns in Korea and Taiwan). Moreover, the difficulties are compounded by uncertainty over the correct model for equity returns, so that differing models yield differing conclusions regarding integration versus non-integration.

Recently, Ahearne, Grier and Warnock (2000) have proposed an alternative means of indicating the presence and extent of capital controls that impede cross-border equity market transactions. Specifically, they construct measures of capital controls based upon the proportion of the equity market open to international investors. To do this, they take advantage of the IFC's Investable index (IFCI), which is aimed at measuring that component of the equity market that foreigners can access. Dividing the capitalization of the Investable index by a measure of the overall market capitalization (the IFC's Global index),¹² and subtracting that ratio from unity, yields an index that is continuous, and can in principle indicate the *degree* of openness.

Edison and Warnock (2001) find that their liberalization breaks accord well with the ones identified by Bekaert and Harvey (2000). Interestingly, however, the "biggest" openings are not

¹² The IFC measure of capitalization does not measure the entire market capitalization (usually

always contemporaneous with the Bekaert-Harvey break. For instance, Bekaert-Harvey time the Taiwan break in 1991, while Edison and Warnock identify the largest decline in restrictiveness in late 1998. On the other hand, it is reassuring that the Edison-Warnock measures correlate quite well with the Quinn measure of openness for the 29 countries they examine. Relating this alternative measure of capital controls to equity market characteristics would seem to be an obvious direction for future research.

5. Concluding Thoughts

Thus far, I have laid out the empirical evidence, both from this panel study, and that in an (admittedly selective) survey of the literature. I have reserved until the end the main point of the paper – assessing the compatibility of capital controls with financial development. The basic results from the regression analysis conducted here indicate the following.

- If one's measure of financial development is the amount of "credit" being extended to the private sector, there appears to be a relatively weak relationship between the extent of capital controls and financial development.
- Financial development, as proxied by the capitalization of the equity market, does not appear to be closely linked to the extent of capital controls, and to the extent that a relationship exists, it does for the developed economies. A caveat is necessary, though. If the measure of financial market development is either total value traded or the turnover ratio (indicators of the level of equity market activity market rather than size), then financial development does appear to depend in a statistically significant manner on the

coverage is about 60-70%), but is designed to be representative of the entire market.

presence of capital controls. This relationship holds in both the aggregate sample, and in a sample of less developed economies.

This second point is important. It suggests that the potential costs of repressing development of the equity markets may be high; in that case a min-max criterion may suggest erring on the side of avoiding capital controls.

To extend this assertion, I will focus my argument on the Asia-Pacific countries, since it may be the case that the stakes are highest there. Many of the countries of East Asia have long relied upon bank directed financing, and for early to middle term industrialization, bank directed financing might have been most appropriate. However, as I have alluded to in my earlier discussion of equity markets, the changing economic environment, and emerging technologies, may be less amenable to bank directed financing. As the 2001 *Economic Report of the President* observed:

“The efficiency of capital markets in the United States has also contributed to the superior economic performance we have seen. The more widespread availability in this country of equity finance, including venture capital, facilitates business creation and propels the development of new technologies. In contrast, in Japan and some European countries, banks and other large financial institutions provide most business financing, hold some firm equity, and usually exert a measure of corporate control. These differences between the two systems give rise to different incentive structures. Returns to bank loans are limited by the interest rate; returns to equity investments are determined by profits and capital gains. This makes bank lending better suited to financing low-risk activities, whereas an equity-based system has the potential to generate greater capital investment in activities where expected returns are high but uncertain.

When most job creation and investment are undertaken by large and established firms, these differences in the mode of financing are not likely to be important, since such companies finance most investment out of their own retained earnings. However, it is likely that the performance of the two systems will diverge in sectors such as information and communications technologies, for

at least two reasons. In the telecommunications sector, the large outlays required to finance the emerging new technologies could well exceed the financing available from retained earnings and from banks. In other areas of information technology, banks have not been especially successful in supporting the new firms that play an important role in generating innovation. These considerations put the bank-centered systems of Europe and Japan at a relative disadvantage.” (U.S. President, 2000, p. 167).

It is tempting, in the wake of the bursting of the dot.com bubble and the deceleration in economic growth in the U.S. to dismiss the importance of new technologies. However, even the more skeptical observers do believe that some acceleration in trend growth has occurred in the U.S. (McKinsey, 2001), and if the economies of developing Pacific Asia are to sustain their trend growth rates, they will likely need to move up the quality ladders of production and export.

The fact that the East Asian economies are rapidly becoming more like the developed economies in terms of economic structure suggests that the relationships that previously associated with only the OECD countries may soon apply with some force to the newly industrializing countries. Hence, I believe financial development in the form of equity market development will become increasingly incompatible with capital controls. Although this is conjecture, it is apparently a conjecture shared by others:

“Research suggests that best practice in finance rebounds to benefit all users of financial transactions (that is, the whole economy benefits when the financial system works well). Thin non-bank financial markets (bond, stock, and venture) stymie the New Economy, particularly holding-back new firms. Transparent public listing requirements, along with strong accounting standards will help deepen financial markets. *Economies should give priority attention to, in an orderly way, liberalizing barriers to cross-border financial transactions and institutions* to bring in best practice.” (APEC EC, 2001b, p. 7). [*emphasis added by author*]

References

Ahearne, Alan, W. Grier and Francis Warnock, 2000, "Information costs and home bias: An analysis of U.S. holdings of foreign equities," *International Finance Discussion Paper* #691 (Washington: Board of Governors of the Federal Reserve System).

Arteta, Carlos, Barry Eichengreen and Charles Wyplosz, 2001, "When does capital account liberalization help more than it hurts?" *NBER Working Paper* #8414.

Asia-Pacific Economic Cooperation Economic Committee, 2001a, "Chapter 2: Financial development and efficiency: Relations with economic growth in APEC economies," *Economic Outlook 2001* (Singapore: APEC, October). <http://www.apecsec.org.sg/download/pubs/Ec2001.exe>

Asia-Pacific Economic Cooperation Economic Committee, 2001b, *The New Economy and APEC* (Singapore: APEC, and Washington DC: Institute for International Economics, October). <http://www.iie.com/apec/apec-report.htm>

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine (2000) "A new database on financial development and structure," *Policy Research Paper* No. 2147 (Washington, D.C.: World Bank).

Beck, Thorsten, Ross Levine, and Norman Loayza (2000) "Finance and the source of growth," *Journal of Financial Economics* 58: 261-300.

Bekaert, Geert, Campbell R. Harvey, 2000, "Capital flows and the behavior of emerging market equity returns," in *Capital Inflows to Emerging Markets*, ed. S. Edwards (Chicago: U. Chicago Press and NBER).

Bekaert, Geert, Campbell R. Harvey, and Robin Lumsdaine, 2001, "The dynamics of emerging market equity flows," *mimeo*.

Chinn, Menzie D. and William F. Maloney, 1998, "Financial and Capital Account Liberalization in the Pacific Basin: Korea and Taiwan," *International Economic Journal* 12(1) (Spring): 53-74

Chinn, Menzie, Michael P. Dooley and Sona Shrestha, 1999, "Latin America and East Asia in the Context of an Insurance Model of Currency Crises," *Journal of International Money and Finance* 18(4) (Aug. 1999): 659-681.

Chinn, Menzie and Kenneth Kletzer, 2001, "Imperfect Information, Domestic Regulation and Financial Crises," in Reuven Glick, Ramon Moreno and Mark Spiegel (editors) *Financial Crises in Emerging Markets* (Cambridge: Cambridge University Press).

De Gregorio, José, 1998, "Financial integration, financial development and economic growth," *mimeo* (Department of Industrial Engineering, Universidad de Chile, July).

Edison, Hali J. and Francis E. Warnock, 2001, "A simple measure of the intensity of capital controls," *International Finance Discussion Paper #708* (Washington: Board of Governors of the Federal Reserve System, September).

Henry, Peter B., 2000, "Stock market liberalization, economic reform, and emerging market equity prices," *Journal of Finance* 55(2): 529-564.

Herring, Richard J. and Nathporn Chatusripitak, 2000, "The case of the missing market: The bond market and why it matters for financial development," paper prepared for the ADB/Wharton seminar on "Financial Structure for Sustainable Development in Post-Crisis Asia," Tokyo, May 26, 2000.

International Monetary Fund, 2001, *World Economic Outlook* (September 2001).

Klein, Michael and Giovanni Olivei, 2001, "Capital account liberalization, financial depth and economic growth," mimeo (Tufts Univ. and FRB Boston, April).

Kraay, Aart, 1998, "In search of the macroeconomic effects of capital account liberalization," mimeo (Washington, DC: World Bank).

Leahy, Michael, S. Schich, G. Wehinger, F. Pelgrin, and T. Thorgeirsson (2001) "Contributions of financial systems to growth in OECD countries," *OECD Economic Department Working Papers* No. 280.

Levine, Ross, 2000, "Bank-Based or Market-Based Financial Systems: Which Is Better?" mimeo (Minneapolis: Carlson School of Management, U.Minn., June 12).

Levine, Ross, Loayza, Norman, and Beck, Thorsten, 2000, "Financial intermediation and growth: Causality and causes", *Journal of Monetary Economics* 46: 31-77.

Levine, Ross and David Renelt, 1992, "A sensitivity analysis of cross-country growth regressions," *American Economic Review* 82(4) (September): 942-963.

Levine, Ross and Zervos, Sara, 1995, "Capital control liberalization and stock market development," mimeo (Washington, D.C.: World Bank).

Levine, Ross and Zervos, Sara, 1998, "Stock Markets, Banks, and Economic Growth," *American Economic Review* 88(3) (June): 537-558.

McKinsey and Company, 2001, *Productivity in the United States* (October).
<http://www.mckinsey.com/knowledge/mgi/reports/Productivity.asp>

Miniane, Jacques, 2000, "A new set of measures of capital account restrictions," mimeo (Baltimore: Johns Hopkins University).

Montiel, Peter, 1995, "Capital mobility in developing countries: Some measurement issues and empirical estimates," *World Bank Economic Review* 8: 311-350.

Montiel, Peter and Carmen M. Reinhart, 1999, "Do capital controls and macroeconomic policies influence the volume and composition of capital flows? Evidence from the 1990s," *Journal of International Money and Finance* 18: 619-635.

Quinn, Dennis, 1997, "The correlates of change in international financial regulation," *American Political Science Review* 91(3) (September): 531-551.

Spiegel, Mark, 2001, "Financial development and growth: Are the APEC nations unique?" paper presented to the 2001 APEC Economic Outlook Symposium held in Hong Kong, June 28-29, 2001.

U.S. President, 2001, *Economic Report of the President* (Washington, DC: U.S. Government Printing Office, February).

Data Appendix: Definition of Variables

ry – GDP, real, local currency, units (line 99b), IMF-IFS

ny – GDP, nominal, local currency, units (99b), IMF-IFS

m1 – M1, Stock End of Period, units (34), IMF-IFS

qm – Quasi-money; M2, units (35), IMF-IFS

mqm – Money plus Quasi-money, units (M1 + M2), IMF-IFS

sprdl – Spread between average deposit and lending rates, %, (60p – 60l), IMF-IFS

cab – Current account balance (78al), IMF-IFS

opn – openness to trade, (nominal exports plus imports)/nominal GDP

exports = national currency (from national account, 90c), IMF-IFS

imports = national currency (from national account, 98c), IMF-IFS

gdp = nominal in national currency (ny, 99b), IMF-IFS

cpi – Consumer price index (64), IMF-IFS

bgd – budget surplus (+) or deficit (-), IMF-IFS

lly – Liquid Liability to GDP (LLY), currency demand and interest-bearing liabilities of banks and other financial intermediaries divided by GDP, Levine Database. NOTE: The data are available up to 1997.

pop – population, 99z, IMF-IFS

idc – idc = 1 if industrialized country, and 0, otherwise.

smkc – stock market capitalization ratio to GDP, Beck, Loazya and Levine data set (up to

smtv – stock market total value traded to GDP, Beck, Loazya and Levine data set

smto – stock market turn over ratio, Beck, Loazya and Levine data set

pvb – private bond market capitalization to GDP, Beck, Loazya and Levine data set

pbbm – public bond market capitalization to GDP ratio, Beck, Loazya and Levine data set

eqty – equity issues to GDP, Beck, Loazya and Levine data set

ltpd – long-term private debt issues to GDP, Beck, Loazya and Levine data set

bts – Deposit Money Bank Assets to Total Financial Assets, BLL, 1970 – 1997

dmcb – Deposit Money vs. Central Bank Assets, BLL, 1970 – 1997

dmgdp – Deposit Money Bank Bank Assets to GDP, BLL, 1970 – 1997

pcgdp – Private Credit by Deposit Money Banks to GDP, BLL, 1970 – 1997

m2y – Ratio of M2 to nominal GDP, IMF-IFS (1970 – 1999)

k1 – Multiple exchange rates, IMF-Mody

k2 – Restrictions on CA trans, IMF-Mody

k3 – Restrictions on KA trans, IMF-Mody

k4 – Surr. exp. Proceeds, IMF-Mody

openn – Quinn financial liberalization indicator, Quinn (1997)

cn – country code (1-105)

Country list (105 countries)

1	ARG	Argentina	55	KWT	Kuwait
2	AUS	Australia	56	LKA	Sri Lanka
3	AUT	Austria	57	LSO	Lesotho
4	BDI	Burundi	58	MAR	Morocco
5	BEL	Belgium	59	MDG	Madagascar
6	BEN	Benin	60	MEX	Mexico
7	BFA	Burkina Faso	61	MLI	Mali
8	BGD	Bangladesh	62	MLT	Malta
9	BHR	Bahrain	63	MRT	Mauritania
10	BHS	"Bahamas, The"	64	MUS	Mauritius
11	BLZ	Belize	65	MWI	Malawi
12	BOL	Bolivia	66	MYS	Malaysia
13	BRA	Brazil	67	NER	Niger
14	BRB	Barbados	68	NGA	Nigeria
15	BWA	Botswana	69	NIC	Nicaragua
16	CAF	Central African Republic	70	NLD	Netherlands
17	CAN	Canada	71	NOR	Norway
18	CHE	Switzerland	72	NPL	Nepal
19	CHL	Chile	73	NZL	New Zealand
20	CIV	Cote d'Ivoire	74	OMN	Oman
21	CMR	Cameroon	75	PAK	Pakistan
22	COG	"Congo, Rep."	76	PAN	Panama
23	COL	Colombia	77	PER	Peru
24	CRI	Costa Rica	78	PHL	Philippines
25	CYP	Cyprus	79	PNG	Papua New Guinea
26	DNK	Denmark	80	PRT	Portugal
27	DOM	Dominican Republic	81	PRY	Paraguay
28	DZA	Algeria	82	RWA	Rwanda
29	ECU	Ecuador	83	SAU	Saudi Arabia
30	EGY	"Egypt, Arab Rep."	84	SEN	Senegal
31	ESP	Spain	85	SGP	Singapore
32	FIN	Finland	86	SLE	Sierra Leone
33	FJI	Fiji	87	SLV	El Salvador
34	FRA	France	88	SWE	Sweden
35	GAB	Gabon	89	SWZ	Swaziland
36	GBR	United Kingdom	90	SYC	Seychelles
37	GHA	Ghana	91	SYR	Syrian Arab Republic
38	GMB	"Gambia, The"	92	TCD	Chad
39	GRC	Greece	93	TGO	Togo
40	GTM	Guatemala	94	THA	Thailand
41	HND	Honduras	95	TTO	Trinidad and Tobago
42	HTI	Haiti	96	TUN	Tunisia
43	IDN	Indonesia	97	TUR	Turkey
44	IND	India	98	TZA	Tanzania
45	IRL	Ireland	99	UGA	Uganda
46	IRN	"Iran, Islamic Rep."	100	URY	Uruguay
47	ISL	Iceland	101	USA	United States
48	ISR	Israel	102	VEN	Venezuela
49	ITA	Italy	103	ZAF	South Africa
50	JAM	Jamaica	104	ZMB	Zambia
51	JOR	Jordan	105	ZWE	Zimbabwe
52	JPN	Japan			
53	KEN	Kenya			
54	KOR	"Korea, Rep."			

Table 1
Descriptive Statistics
Full Sample

	Mean	Average Growth Rate (%)	S.D. of Avg. Growth Rate (%)	<i>n</i> =
Liquid Liabilities to GDP Ratio	0.6949401	0.011967	0.0107174	558
Private Credit to GDP Ratio	0.5642643	0.0237751	0.0201916	558
M2 to GDP Ratio	0.6377639	0.0106012	0.032067	541
Stock Market Capitalization To GDP Ratio	0.3449102	0.069905	0.1055967	393
Stock Market Total Value Traded to GDP Ratio	0.1626606	0.1920002	0.6132919	415
K1: Multiple Exchange Rates	0.0890756	-0.09	0.3013323	595
K2: Current Account	0.1129848	-0.0790598	0.3310367	593
K3: Capital Account	0.5234783	-0.0786266	0.1392699	575
K4: Surrender of Export Proceeds	0.4016807	-0.0953565	0.2522137	595
Estimated Financial Openness (Quinn)	10.9526	0.0127034	0.0194603	599
Per Capita Income (in PPP)	15102.67	0.0590587	0.0376519	464
Trade Openness	0.5993367	-0.0116554	0.1188412	591
Inflation	0.0700355	-0.0000891	0.2680427	597

Notes: Samples periods differ. Mean pertains to the untransformed variable. Growth rates calculated using log differences.

Table 2
Correlations of Selected Financial Deepening Measures
 Full Sample

	LLY	PCGDP	M2Y	SMKC	SMTV
Liquid Liabilities To GDP Ratio	1				
Private Credit To GDP Ratio	0.814	1			
M2 to GDP Ratio	0.8482	0.7752	1		
Stock Market Capitalization to GDP Ratio	0.4425	0.5063	0.3508	1	
Stock Market Total Value Traded To GDP Ratio	0.4759	0.538	0.3799	0.687	1

Notes: Correlation coefficients for common samples.

Table 3
Financial Development and Financial Openness
 Full Sample, Five year panels, 1972-97

	Pred sign	Liquid Liabilities [1]	Private Credit [2]	Stock Mkt Capital'n [3]	Stock Mkt Total Value [4]	Stock Mkt Turnover [5]	Equity Issued [6]
Financial Openness [t-5]	(+)	0.0009 (0.0045)	0.0055 (0.0044)	0.0043 (0.0124)	0.0245*** (0.0077)	0.0299* (0.0181)	0.0026¶ (0.0017)
Financial Deepening [t-5]	(-)	-0.0067 (0.0088)	-0.0022 (0.0090)	-0.0014 (0.0326)	-0.0804¶ (0.0573)	-0.1154*** (0.0304)	-0.0383* (0.0222)
Per Capita Income [t-5]	(+)	0.0026¶ (0.0018)	0.0033** (0.0015)	0.0062 (0.0060)	0.0046 (0.0038)	0.0109¶ (0.0082)	-0.0009 (0.0007)
Inflation [t-5]	(-)	-0.0034 (0.0110)	0.0152 (0.0130)	-0.0690** (0.0260)	-0.0347** (0.0164)	0.0176 (0.0669)	-0.0001 (0.0027)
Trade Openness [t-5]	(+)	0.0058* (0.0036)	0.0054* (0.0028)	-0.0208 (0.0171)	0.0022 (0.0073)	-0.0149¶ (0.0098)	-0.0006 (0.0006)
R-squared		0.04	0.09	0.20	0.26	0.35	0.16
N		299	297	148	154	150	54
RMSE		0.022	0.021	0.04	0.036	0.066	0.003

Notes: Point estimates from OLS, heteroskedasticity robust standard errors in parentheses. Dependent variable is the average annual growth rate over a five year period. Financial openness variable is Quinn's measure of financial openness, predicted using the IMF's individual capital control measures. N is the number of observations. RMSE is root mean squared error of the regression. Regressions include fixed time effects (estimates not reported). Observations of inflation rates in excess of 100% are dropped from the sample.

Table 4
Financial Development and Financial Openness
Less Developed Countries, Five year panels, 1972-97

	Pred sign sign	Liquid Liabilities [1]	Private Credit [2]	Stock Mkt Capital'n [3]	Stock Mkt Total Value [4]	Stock Mkt Turnover [5]	Equity Issued [6]
Financial Openness [t-5]	(+)	-0.0014 (0.0057)	-0.0009 (0.0044)	0.0014 (0.0018)	0.0178* (0.0094)	0.0282¶ (0.0217)	0.0047** (0.0022)
Financial Deepening [t-5]	(-)	-0.0226* (0.0130)	-0.0039 (0.0157)	-0.0091 (0.0442)	-0.0362 (0.1172)	-0.0929** (0.0401)	-0.0256 (0.0235)
Per Capita Income [t-5]	(+)	0.0046** (0.0019)	0.0019 (0.0014)	0.0111 (0.0094)	0.0019 (0.0049)	0.0142 (0.0118)	0.0002 (0.0009)
Inflation [t-5]	(-)	-0.0035 (0.0113)	0.0192** (0.0131)	-0.0643* (0.0374)	-0.0089 (0.0143)	0.035 (0.0714)	-0.0069¶ (0.0045)
Trade Openness [t-5]	(+)	0.0101** (0.0048)	0.0084** (0.0040)	-0.0253 (0.0241)	0.0102¶ (0.0078)	-0.0098 (0.0142)	-0.0026* (0.0013)
R-squared		0.09	0.15	0.16	0.12	0.26	0.40
N		227	225	85	91	87	31
RMSE		0.021	0.018	0.047	0.032	0.074	0.003

Notes: Point estimates from OLS, heteroskedasticity robust standard errors in parentheses. Dependent variable is the average annual growth rate over a five year period. Financial openness variable is Quinn's measure of financial openness, predicted using the IMF's individual capital control measures. N is the number of observations. RMSE is root mean squared error of the regression. Regressions include fixed time effects (estimates not reported). Observations of inflation rates in excess of 100% are dropped from the sample.

Figure 1
Selected Measures of Financial Deepening

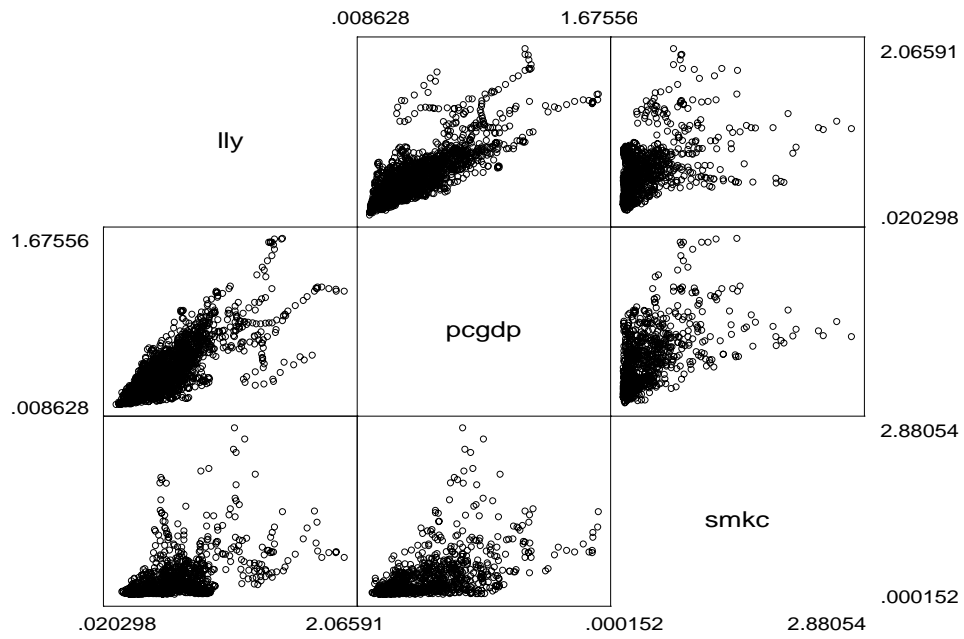


Figure 2
Financial Openness Measure (Quinn)
For USA and Argentina

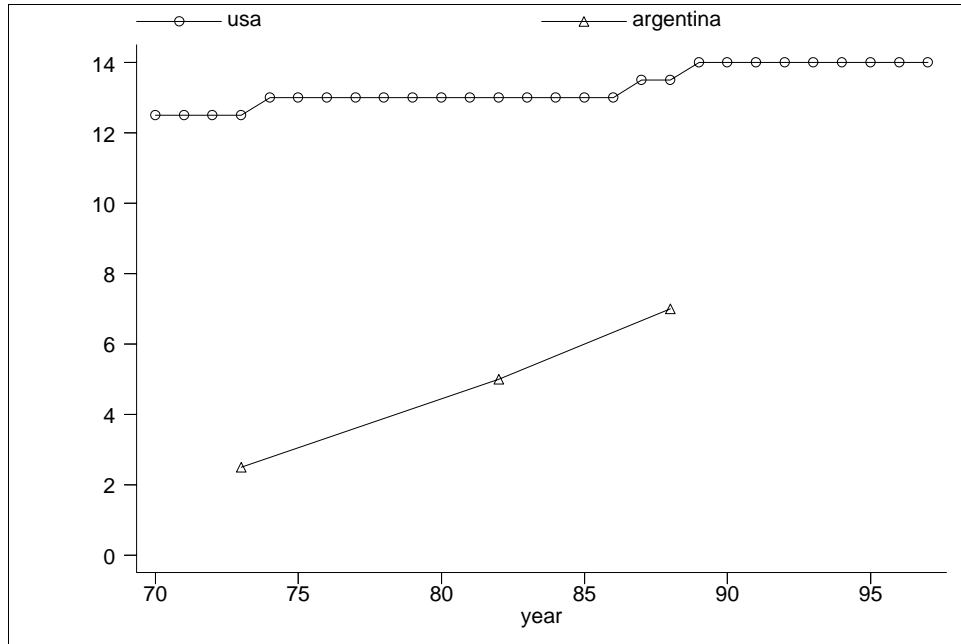


Figure 3
Selected Measures of Financial Deepening and
Quinn's Measure of Financial Openness

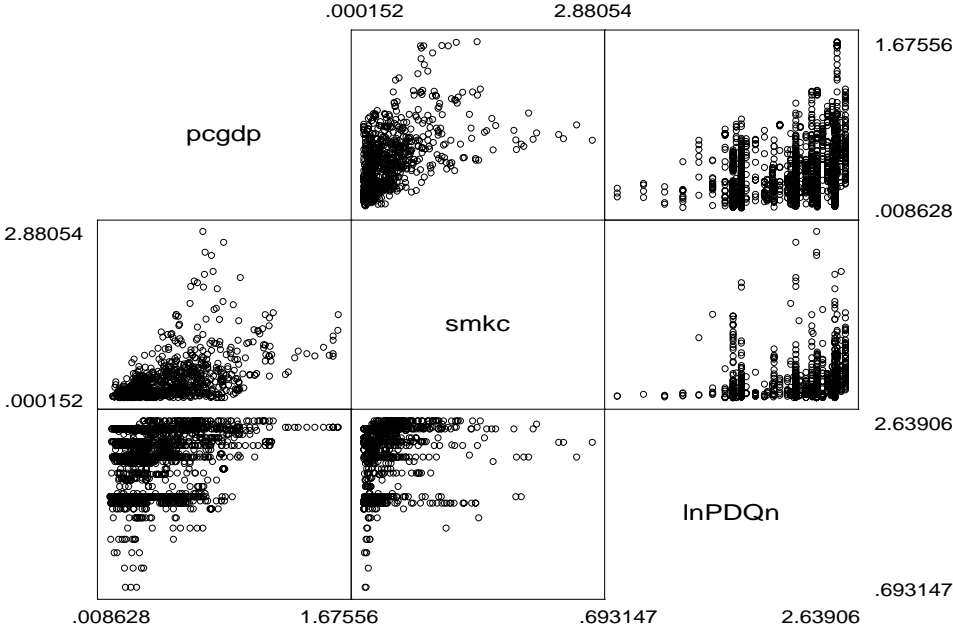
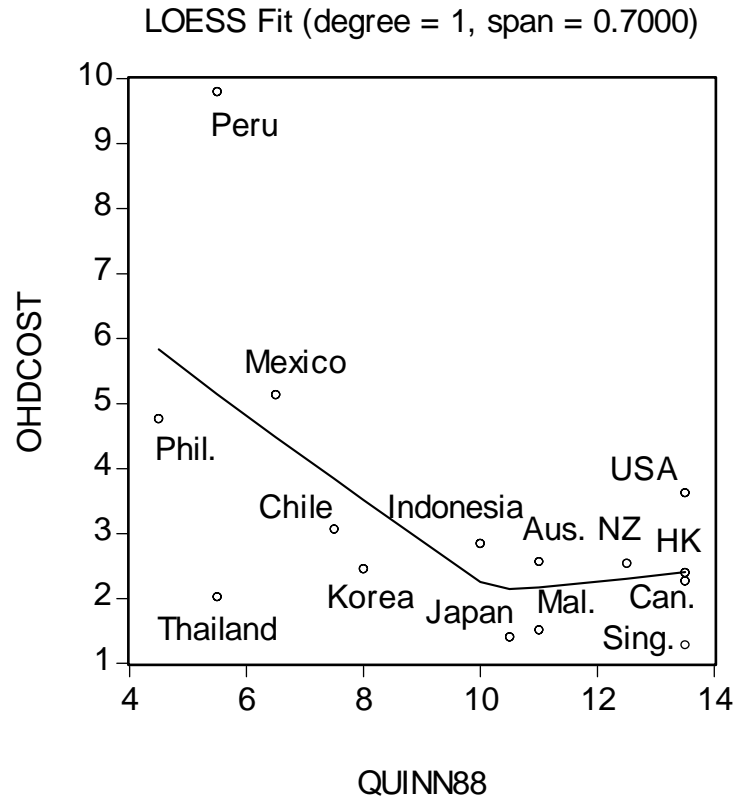


Figure 4
Bank Overhead Cost and Quinn Measure for APEC Economies



Source: APEC (2001a) and personal communication with Dennis Quinn.