Financial Policies and the Aggregate Productivity of the Capital Stock: Evidence from Developed and Developing Economies

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1. INTRODUCTION

The creation of a single global financial market is perhaps the most important component of the globalisation process. One important prerequisite for the creation of the global financial market is the harmonisation of financial regulations between national financial markets. In terms of policy prescription, the harmonisation of regulations has usually been perceived to be equivalent to dismantling controls on financial market activity. Thus, financial liberalisation, which is aimed at removing regulations on financial market activity, has become a central part of the financial globalisation process.

During the last two decades, financial systems all over the world have undertaken extensive financial liberalisation programmes. In the case of the EU, the creation of the Common Market led to the abolition of all remaining controls in the late 1980s. For emerging market economies, financial liberalisation programmes were usually implemented with the encouragement of the World Bank and the IMF, in many cases as part of a broad structural adjustment programme. Prior to the East Asian crisis, it was widely believed that these liberalisation efforts would bring substantial benefits by enhancing the efficiency of the financial sector, especially in terms of allocating resources towards the most productive investment projects. However, the reality has been much more complex, especially given the informational asymmetries which accompany financial transactions of any kind. These asymmetries have meant that where prudential regulation has been weak, moral hazard-type problems resulted in excessive risk-taking by financial institutions or investors, which then led to financial fragility or banking crises.

While the medium-term costs of financial liberalisation and greater integration into international financial markets in terms of heightened fragility of the financial system are now recognised, its longer-term benefits, albeit widely accepted, remain the subject of an ongoing debate. Earlier empirical literature, which attempted to capture

these benefits by focusing on the cross-country relationship between the real interest rate and economic growth or the efficiency of investment (e.g. Gelb, 1989), is now believed to have been flawed. In this respect Stiglitz (1998) argues that these regressions suffer from simultaneity and mis-specification problems. Arestis and Demetriades (1997) reinforce these criticisms focusing on the causality and heterogeneity issues. On the basis of available empirical literature, it can safely be concluded that there remains considerable scope for further research into the channels through which financial policies of various types, including financial liberalisation, may affect economic performance.

This paper provides a comprehensive empirical assessment of the effects of financial policies, including financial liberalisation, on the average productivity of capital in fourteen economies. A broad literature has established that the financial sector in an economy can be important in determining the average productivity of capital, itself being one of the main channels of economic growth. Specifically, the screening and monitoring of investment projects, which the financial system routinely engages in, are likely to help boost the efficiency of investment (Pagano, 1993). A growing empirical literature in fact demonstrates that the development of the financial system has positive effects on (i) the long-run rate of economic growth or (ii) the volume or efficiency of investment (Fry, 1995). However, the causal nature of this relationship is now known to exhibit considerable variation across countries (Demetriades and Hussein, 1996). This indicates that institutional factors or policies may play a critical role in determining how the process of financial development affects economic growth (Arestis and Demetriades, 1997). The importance of institutional factors is confirmed by Demirgüç-Kunt and Detragiache (1998), who demonstrate that institutional quality is inversely related to the incidence of financial fragility that usually follows episodes of financial liberalisation. The relevance of financial liberalisation policies is highlighted by Demetriades and Luintel (1996, 1997, 2001) and Arestis et al (2002) who demonstrate that the direct effects of financial repression in some developing countries are much larger than, and in some instances opposite to, those emanating from changes in the real interest rate.

In order to assess the impact of financial policies on capital productivity, we constructed a new data set on financial policies. A summary of financial policies used to construct the new data set is appended (Table 1). These were collected either directly from central banks or from official publications for a period of forty years. This exercise itself constituted a major research effort. Specifically, we collected data from central banks on several types of financial restraints, including restrictions on interest rates and capital flows, reserve and liquidity requirements and capital adequacy requirements. We estimate the effects of these policies on the aggregate productivity of the capital stock using modern econometric methods that exploit both the time-series and cross-section dimensions of our data set. We find that financial development has positive effects on productivity while the effects of financial policies vary considerably across countries. Our findings demonstrate that financial liberalisation is a much more complex process than has been assumed by earlier literature and its effects on key macroeconomic aggregates are ambiguous.

The rest of the paper is organised as follows. Section 2 provides an outline of relevant literature and draws its implications for the effects of various types of financial policies on the productivity of capital. Section 3 outlines our econometric methodology. Section 4 discusses the measurement of variables and their sources and provides a summary of the financial policies data set. Section 5 presents the empirical results. Section 6 summarises and concludes.

2. FINANCIAL POLICIES AND THE PRODUCTIVITY OF CAPITAL: CONCEPTUAL ISSUES

There are valid reasons why financial policies, including financial restraints, can have important real effects, not only on financial development but also on the efficiency of investment and, ultimately, the productivity of the capital stock. To start with there are the seminal contributions of McKinnon (1973) and Shaw (1973), which predict that interest rate controls and directed credit programmes impede the process of financial deepening, reducing both the volume and productivity of investment. These types of models also predict that financial liberalisation policies have positive effects on the volume and efficiency of investment (Fry 1995, 1997). In

contrast, there is a growing literature, which emphasises financial market imperfections, including asymmetric information and imperfect competition, that reaches conclusions contrary to the financial liberalisation hypothesis (Stiglitz, 1994; Caprio, 1994; Hellman, Murdock and Stiglitz, 1996a, 2000).

Besides these macroeconomic approaches, there are also models that investigate the effects of financial regulation, especially capital adequacy requirements, on risk taking by banks (Kim and Santomero, 1988; Keely and Furlong, 1990; Gennotte and Pyle, 1991). While these models do not explore the wider macroeconomic implications of these types of policies, all the recent episodes of financial fragility (e.g. Japan, East Asia) have vividly demonstrated that excessive risk-taking by financial institutions can trigger severe macroeconomic downturns.

The empirical literature on the effects of financial policies is still in its infancy. The banking literature tends to focus on the effects of capital adequacy on the behaviour of US banks (Shrieves and Dahl, 1992; Hancock, Laing and Wilcox, 1995; Peek and Rosengren, 1995). The few macro-econometric studies that exist, which focus on a handful of Asian economies, reveal that the effects of financial restraints may be very large but vary considerably across countries (e.g. Demetriades and Luintel, 1997; Demetriades, Devereux and Luintel, 1998). Cross-country growth regressions indicate that financial restraints, with perhaps the exception of controls on capital outflows, may hamper economic performance (Rossi, 1999).

In the rest of this section we explore the likely macroeconomic effects of four broad types of financial policies, namely interest rate restraints, restrictions on capital flows, reserve and liquidity requirements and capital adequacy requirements. The first three types of restraints are typically the primary focus of financial liberalisation programmes, which usually aim at removing or relaxing them. The fourth policy was in many cases introduced independently from financial liberalisation policies but has nevertheless been widely considered to be crucial in reducing the risks associated with banking. As a result it constituted an important ingredient of banking reforms, especially in the 1980s.

Interest Rate Restraints
In McKinnon (1973) and Shaw's (1973) framework, interest rate restraints affect adversely the quality of investment by allowing low productivity projects to remain profitable. Hence, in this framework, interest rate liberalisation, by improving the allocation of credit towards more productive projects, will affect positively the average productivity of capital. However, some authors have suggested that in the presence of information asymmetries, liberalisation of interest rates may not necessarily lead to efficiency gains (Schiantarelli et al, 1994). In the presence of implicit deposit insurance, interest rate liberalisation may encourage banks to take excessive risks (McKinnon and Pill, 1997). This form of moral hazard may manifest itself in loans to highly risky, even speculative, activities such as real estate acquisitions and stock purchases, which may distort the allocation of resources away from productive activities (Caprio, 1994). In such circumstances, interest rate liberalisation will not only reduce the average productivity of capital but may also lead to an increase in bad debts. Equally important, financial liberalisation, if accompanied by increased competition, may erode the franchise value of banks (Caprio and Summers, 1994). This exacerbates the problems of moral hazard in the banking system and encourages looting behaviour in banking, hence increasing the probability of financial crisis (Akerlof and Romer, 1993).

In contrast, some types of financial restraints, including interest rate ceilings, can in fact reduce the problems of moral hazard and adverse selection (Stiglitz, 1994). In doing so, they may enhance the soundness of the domestic banking system, which in turn may result in better allocation of resources (Arestis and Demetriades, 1997). Hellman et al (1996a, 1996b, 2000), argue that 'financial restraint' policies create rent opportunities in the financial sector, which enhance incentives for financial deepening. These ideas are applied to deposit mobilisation, which is crucial to many developing countries. By limiting deposit rates at below competitive equilibrium rates, governments create rent opportunities, which the banking sector could utilise for what is termed `educational advertising campaign', a tool of non-price competition which facilitates the mobilisation of

deposits, thereby enhancing financial deepening in a system of low financial depth. The outcome of financial restraints under these conditions is shown to be superior than under a free market laissez-faire market system.

A related point is that interest rate restrictions generate scope for rationing credit in accordance to national priorities through directed credit programmes. While in many countries directed credit programmes failed to achieve efficiency gains, some governments have been successful in channeling credit towards projects with high social returns, which may have been unprofitable to finance with the higher interest rates that usually prevail in liberalised credit markets (Calomiris and Himmelberg, 1994). For example, in some East Asian countries the willingness to adapt credit policies to changing circumstances and the use of contests based on export performance to guide direct credit programmes are believed to have contributed significantly to the effectiveness of these programmes (World Bank, 1993).

Restrictions on Capital Inflows

The impact of foreign investment restrictions on the average productivity of capital is expected to vary depending largely on their nature. Restrictions on foreign direct investment flows are likely to have a negative impact on the average productivity of capital. Other than the fact that they may deter foreign investors, reducing the flow of ideas and technology transfer, restrictions aimed at prohibiting capital from flowing to certain sectors may lead to a misallocation of resources. As to short-term capital inflows, it is now widely recognised that there may be more costs than benefits associated with them. While short-term capital inflows may, in principle, supplement domestic savings and lead to higher levels of investment and growth rates, this benefit is likely to be small in economies with already high savings and investment ratio. The recent financial crisis in East Asia has demonstrated that where it is not possible to invest short-term capital inflows in productive activities, they could end up creating asset price bubbles, especially when they are channelled into the stock market or the property market. During the early stages of this process capital inflows lead to unsustainable asset price increases, fuelling the euphoria of investors and leading to incorrect investment decisions (Arestis, Demetriades and Fattouh, 2001). Relative price distortions and resource mis-allocations of this type are likely to impact negatively on the average productivity of capital; consequently restrictions on short-term capital flows may well prevent this occurrence.

Reserve and Liquidity Requirements

Reserve and liquidity requirements are usually designed so as to ensure that banks are sufficiently liquid in order to be able to meet day-to-day withdrawals by depositors. Minimum reserve and liquidity requirements are particularly useful when money markets are not sufficiently deep or developed, which is frequently the case in developing countries. But even in developed markets, reserve and liquidity requirements can play a useful role, especially when there is imperfect information about a bank's solvency. In principle, a bank that is solvent, and may face an imbalance between short-term payments and short-term income, can borrow through the inter-bank market to close this liquidity gap. However, frequent liquidity shortages may create solvency constraints. As a result, wholesale banks may refuse to provide an illiquid bank with the necessary funds. Consequently, the illiquid bank may be forced to sell long-term assets at distress prices, lowering the value of its assets. Hence, what starts as a problem of liquidity may well be translated into a problem of insolvency (Dewatripont and Tirole, 1993).

In contrast, advocates of financial liberalisation consider reserve and liquidity requirements as a tax on financial intermediation, which widens the spread between deposit and loan interest rate and reduces the size of the financial system (Fry, 1995). Hence, the abolition of reserve requirements, by increasing the size of financial intermediation and removing the distortionary effects of the tax, is likely to result in a more efficient allocation of financial resources, which could help to increase the average productivity of capital. This argument is implicitly based on the assumption that government revenue from reserve and liquidity requirements is used unproductively, probably to finance government consumption. If these resources are instead used to finance productive public investment, then this conclusion may not follow. Much of the literature on infrastructure, in fact, demonstrates that investment in public capital has large positive effects on the productivity of private

capital (Aschauer, 1989; Lynde and Richmond, 1993; Nadiri and Mamuneas, 1994; Demetriades and Mamuneas, 2000)[1]. If this is the case then reserve and liquidity requirements may well help enhance the average productivity of capital.

Capital Adequacy Requirements
Regulators expect capital adequacy requirements to reduce bank insolvency risk or default; second, to reduce the scope for moral hazard behaviour by banks thereby containing their tendency to take excessive risks; and finally to reduce the losses of depositors in the event of bank failure (Wall and Peterson, 1996; Blum and Hellwig, 1995). In terms of achieving the first and second objectives, the theoretical literature is not unanimous (Berger et al, 1995). Using a mean-variance framework, Kim and Santomero (1988) suggest that capital regulation may in fact increase a bank's portfolio risk and hence lead to an inefficient allocation of assets. Specifically, an involuntary reduction in leverage can be met by a change in the composition of a bank's portfolio towards more risky assets. Keeley and Furlong (1990) argue, however, that the mean variance approach is inadequate to address the impact of capital adequacy requirements. This is because the mean-variance framework fails to recognise that the bank does not have full liability and that the value of deposit insurance will increase as the bank's leverage increases. When the model is adjusted to take this feature into account, Keeley and Furlong (op. cit.) show that higher capital requirements would always result in lower risk-taking on behalf of the bank. However, in a different approach that incorporates Keeley and Furlong's suggestion concerning the value of deposit insurance and under the assumption that bank investments are subject to decreasing returns, Gennotte and Pyle (1991) show that capital requirements increase the risk of banks' portfolios. This offsets the benefits from higher levels of capital, which may increase the probability of default and impair the efficiency of bank lending.

There are also other unintended consequences of capital requirements, which may have adverse implications for the average productivity of capital. Blum and Hellwig (1995) develop a model in which capital requirements amplify macroeconomic fluctuations by increasing lending activity in good times and reducing it in bad times. Other studies have shown that capital adequacy ratios may contribute to a credit crunch by reducing the amount of new loans to businesses (Hancock et al, 1995). Finally, others have argued that capital regulations may lead to allocative inefficiency by shifting the use of traditional bank loans to off-balance sheet assets (Berger et al, 1995).

3. ECONOMETRIC METHODOLOGY

Model Specification
Our methodology builds on recent work modelling the sources of productivity (see, for example, Demetriades, Devereux and Luintel, 1998, for a relevant application in East Asia), and involves a number of empirical novelties. Instead of measuring TFP as a residual, we estimate it directly by modelling its sources. To this end we assume that TFP, among other things, can be ascribed to financial development and financial policies. Another empirical novelty is the utilisation of recent econometric techniques, which respect the time series properties of the data while at the same time exploit the cross section dimension of the data set. Our method allows us to address the problem of inconsistent estimates in dynamic heterogeneous panels identified by Pesaran and Smith (1995).

We estimate the following equation, in which some of the variables are lagged one period in order to avoid possible simultaneity:

$$Log(Y_t/K_t) = \beta_0 + \beta_1 \log K_{t-1} + \beta_2 \log L_{t-1} + \beta_3 \log F_{t-1} + \gamma Z_t + \varepsilon_t \qquad (1)$$

where Y, K and L stand for output, capital and employment respectively, F is an indicator of financial development and Z is a vector of financial sector policies, including interest rate restraints, reserve and liquidity

requirements, capital adequacy requirements and capital account restrictions. This formulation essentially represents a generalised Cobb-Douglas production function, in which TFP is modelled explicitly and is attributed to financial development and financial policies. It nests the AK model as a special case in which $\beta_1 = \beta_2 = 0$. In general β_1 is expected to be negative, as it is equal to the capital elasticity minus unity, while β_2 is expected to be positive, as it stands for the elasticity of employment. The degree of returns to scale is therefore given by $1+\beta_1 + \beta_2$.

Tests for the Order of Integration in a Series
We first carry out unit root tests on each of the variables for the different countries $i = 1,..., N$ using the Augmented Dickey-Fuller (ADF) procedure to examine orders of integration of the series. The ADF regression (here including a time trend) is:

$$\Delta x_{it} = \alpha_i + \beta_i t + \gamma_i x_{i,t-1} + \sum_{j=1}^{k} \rho_{ij} \Delta x_{i,t-j} + \varepsilon_{it} \qquad (2)$$

Lag length (p) is set at a level to ensure that errors are white noise.

We then use panel unit root tests following the procedure proposed by Im, Pesaran and Shin (1996, IPS thereafter). This method allows for heterogeneity in the panel dynamics and error variances across the N groups. IPS propose the use of a group mean ADF t-test which is distributed as a standard normal under the unit root null hypothesis. Specifically, the group mean ADF t-test is used to test the null hypothesis that all the series in the panel have a unit root ($Ho: \gamma_i = 0$ for all i) against the stationary alternative that only a fraction N_1/N of the series are stationary ($H_1: \gamma_i < 0$, $i=1,2,..., N_1$, $\gamma_i = 0, i =N_i +1, N_1 +2,..., N$). If the null hypothesis cannot be rejected, then it is possible to conclude that the panel data series are $I(1)$.

The group mean ADF t-bar statistics is given by

$$Z = \sqrt{N} \left(\bar{t}_{NT} - E(\bar{t}_{NT}) \right) / \sqrt{Var(\bar{t}_{NT})}$$

where

$$\bar{t}_{N,T} = N^{-1} \sum_{i=1}^{N} \bar{t}_{i,T}(\gamma_i, \theta_i)$$

where N is the number of groups, T is the number of periods, and $\bar{t}_{i,T}(\gamma_i, \theta_i)$ is the individual t-statistics for testing $\gamma_i = 0$ for all i. The relevant mean ($E(\bar{t}_{NT})$) and variance $\sqrt{Var(\bar{t}_{NT})}$ for a selection of sample sizes and lag structures for models including intercepts and time trend are tabulated in IPS (1996). IPS show that $Z^{\bar{t}}$ statistic converges weakly to a standard normal distribution. Hence, in order to test whether a series in a panel contains a unit root, we compare $Z^{\bar{t}}$ statistics to the critical values from a $N(0,1)$ distribution.

Estimation Method
Equation (1) is estimated using the Dynamic OLS/GLS (DOLS) single equation cointegration estimator (Phillips, 1991; Phillips and Loretan, 1991; Saikkonen, 1991), generalised by Stock and Watson (1993) to cases where regressors are not integrated of the same order. Thus, DOLS estimation allows variables integrated of order d, for d>1, to be combined with I(1) variables in the cointegrating vector. Under these more generalised conditions, Stock and Watson show that DOLS/DGLS are asymptotically efficient, having an

asymptotic distribution that is a random mixture of normals and producing Wald test statistics with asymptotic chi-squared null distributions. Furthermore, Stock and Watson provide evidence from a Monte Carlo simulation showing that DOLS and DGLS perform well in finite samples relative to other asymptotically efficient estimators. In practical terms, the estimation of the average productivity equation by DOLS involves adding leads and lags of the first [second] differences of the I(1) [I(2)] regressors to equation (1). Thus, all the nuisance parameters, which represent short-run dynamics, are I(0) and are, by construction, uncorrelated with the error term of the equation (Stock and Watson, 1993). This procedure corrects for the possible endogeneity of the non-stationary regressors, and gives estimates of the cointegrating vector which are asymptotically efficient.[2]

The equation is estimated simultaneously for all the countries in our data set by the Seemingly Unrelated Regression (SUR) method (Zellner, 1963). Thus, we exploit any contemporaneous correlation of the error terms across equation, which would reflect productivity shocks common to all countries. All variables and nuisance parameters corresponding to the dynamic terms, are allowed to vary across countries. The SUR system is estimated using Feasible GLS. Using the estimates from the SUR estimation, we then perform unit root tests on the cointegrating vector (excluding the nuisance parameters). The lag lengths for the ADF tests are chosen to ensure that the error terms are white noise. Finally, we construct the panel cointegration statistic and compare it to the critical values given by Pedroni (1998).

This method of exploiting the cross-section dimension of the data set while respecting the time series properties of the data, without aggregating or pooling, allows us to address the problem of inconsistent estimates in dynamic heterogeneous panels identified by Pesaran and Smith (1995). There are also clear advantages over the cross-section growth regressions where all long run and dynamic parameters as well as the intercept are assumed identical across countries. Finally, the use of DOLS as opposed to other cointegration estimators is justified by recent work by Kao and Chang (1997) which shows that it performs better than other single-equation cointegration estimators in panels of up to size N=20.

4. FINANCIAL POLICIES DATA SET

The financial policies data set used for this analysis has been uniquely constructed from information available in the Central Bank annual reports from each country for the period 1955 to 1996. The data we gathered comprise controls and regulations concerning the operation of domestic financial intermediaries as well as restrictions on inward and outward flows of capital. Specifically, we extracted information relating to interest rate restraints, reserve and liquidity requirements, regulations on capital adequacy and restrictions on the flow of capital. The details on capital flow regulations were further enhanced by the IMF annual report on Exchange Controls and Capital Flows.

The choice of countries was driven by the objective of covering a broad spectrum of experiences in relation to economic development. We initially collected data on the financial policies of twenty-four countries. However, for ten of these countries the data is fragmented and/or limited and cannot, therefore, be used for time-series estimations. Consequently, these data constraints limited the number of countries that could be used for estimation purposes to fourteen, of which six could be considered developing. Specifically, the developed countries in our sample are Australia, Finland, France, Germany, New Zealand, Sweden, US and UK. The developing countries comprise Greece, Turkey, Philippines, Thailand, Korea and India.

Table 1 summarises the main financial policies for our sample of countries. It also provides the basis for the construction of four quantitative summary measures of financial policies. Below we provide a descriptive account of these policies.

Interest Rate Restraints
Table 1 suggests that developed countries have different experiences when it comes to interest rate

liberalisation. The UK is the only country in our sample that did not resort to interest rate controls. United States resorted only to deposit rate controls, while Finland imposed controls on lending rates. The rest of the countries in our sample imposed both types of controls. The timing of liberalisation also differs substantially across countries. While Germany abolished controls on lending and deposit rates in the late 1960s, it is not until the late 1970s and mid-1980s that the rest of the countries underwent financial liberalisation which indicates that this is a relatively recent phenomenon, even in developed countries. Financial liberalisation was also not homogenous across countries. In Germany and New Zealand controls on lending and deposit rates were abolished simultaneously. In Australia and Sweden, deposit rates were liberalised first and then lending rates, while in France it was the other way around. The pace of liberalisation also differs considerably across countries. While countries such as New Zealand and Australia opted for rapid financial liberalisation, other countries such as France and Sweden resorted to a more gradual approach. In the developing world, the experiences across countries also differ substantially. In Turkey, Thailand and Philippines, financial liberalisation occurred fast while it was much slower in Korea and Greece. It is interesting to note that in few countries (New Zealand, Turkey and India), financial liberalisation did not run smoothly and there were few episodes of reform reversal.

Liquidity Requirements
The countries in the sample have different experiences regarding liquidity requirements. In Finland, United States, and New Zealand, there were no formal liquidity ratios throughout the sample period. At the other end of the spectrum, Germany and France until recently applied very high liquidity ratios. By the early 1990s, however, as Table 1 shows, most countries in our sample had abolished liquidity ratios with the exception of France, where credit institutions are required to cover their liabilities by at least an equivalent amount of liquid assets, and Australia, where banks must maintain a high quality of liquid assets and government securities equivalent to 12% of total liabilities. In the second group of countries, Philippines, Korea, and Turkey did not impose any formal liquidity ratios. On the other hand, India increased significantly its liquidity ratios and in the 1980s and the 1990s these ratios were as high as 38.5%. Greece also resorted heavily to liquidity requirements in the 1980s; banks there were required to invest certain fraction of their total deposits in short term government bonds. However, these requirements were abolished in 1993.

Reserve Requirements
All the countries in our sample have used reserve requirements for the conduct of monetary policy at some stage. However, it is interesting to note that in few countries such as Sweden, New Zealand and UK, cash reserve requirements were completely abolished in the mid 1980s and early 1990s. In France and Australia, reserve requirements were reduced to very low levels (1%). This raises some interesting questions about the ability of a country to conduct monetary policy without reserve requirements and the impact of such developments on short-term interest rates (Sellon and Weiner, 1996). In the group of developing countries, reserve requirements were in general higher than those imposed on banks in the group of developed countries. Until 1995, Turkey, Greece, Philippines, Korea and India imposed very high reserve requirements although recently Greece and Korea have lowered their reserve requirements considerably. The only exception is Thailand, where reserve requirements were set at very low levels throughout the sample period.

Restrictions on Capital Inflows
Table 1 indicates that many developed countries in the early 1980s had controls on capital inflows. The only two exceptions were Germany, which lifted most controls in 1973, and United States, which in 1974 abolished the limited controls imposed in the 1960s. In the UK, capital controls were relaxed in 1979. For the rest of the economies in the sample, capital account liberalisation efforts did not take place until the mid 1980s and were only completed in the 1990s. For instance, in Finland capital controls were abolished only during 1991-1993. In Sweden and France, capital controls were relaxed only in 1990. These examples clearly suggest that abolition of restrictions on capital inflow is a very recent phenomenon in the developed world. In the developing countries group, most restrictions on capital inflows were also relaxed in the 1990s, except for India where few restrictions are still in place.

Capital Adequacy Requirements

By 1993, all countries in the sample had adopted the Bank for International Settlements (BIS) capital requirements. It is interesting to note though that it is not until the 1980s that monetary authorities in the developed world embarked on setting specific guidelines for banks' capital ratios. For instance, until 1983, the Australian monetary authorities did not have any statutory power to set specific guidelines for capital ratios. In New Zealand, the Reserve Bank's role in prudential regulation was formalised only in 1986. In the US, UK and France, the informal system of monitoring capital ratios was replaced by a more formal system only in the early 1980s. In Finland, capital adequacy requirements were in place, but banks were granted temporary exemption which reduced capital ratios to very low levels. The only exceptions to this general trend are Germany and Turkey, which enforced strict rules regarding banks' capital adequacy. Throughout the sample period, the German authorities required that a bank's loans and participation should not exceed 18 times its liable capital. In Turkey, capital adequacy requirements were in operation since 1962. The only country in the sample where there are still no formal capital adequacy requirements is the Philippines.

5. MEASUREMENT AND DATA SOURCES

In this section we explain the construction of each of the variables used in the estimation of equation (1). These variables comprise the average productivity of capital, capital stock, employment, financial development and a vector of financial policy variables. The number of policy variables included in this vector was determined through a combination of statistical criteria and economic reasoning. Statistical criteria included the prevention of multicollinearity, which suggested keeping the number of policy variables as low as possible. Economic reasoning allowed lumping together (i) controls on deposit and lending rates, and (ii) reserve requirements on different types of bank deposits. Strong positive correlations between variables suggested lumping together (i) various types of restrictions on capital flows, and (ii) reserve and liquidity requirements. We were thus left with four summary measures of financial policies, with relatively low correlations between them.

The macroeconomic variables were constructed from data available from *International Financial Statistics* (IMF) and from the World Bank data set compiled by Nehru et al (1993). These data sources allow us to construct the average productivity of capital and the financial development variable (the ratio of nominal claims on the private sector to GDP). We measure the average productivity of capital by the ratio of the flow of current output to capital stock. We construct it using the real GDP and capital stock series available for the period 1963-1990 and were obtained from the World Bank Database as compiled by Nehru and Dareshwar (1993). Capital stock figures from 1991 to 1995 were constructed, following the perpetual inventory method assuming a depreciation rate of 4% and uprating the price of capital goods in line with the GDP deflator. Investment and GDP data were obtained from *International Financial Statistics* (CD-ROM, 1998:6). Data on employment were obtained from the *International Labour Statistics* (various issues)[3]. Financial development is measured by the ratio of nominal claims on private sector to nominal GDP. The data source for both these variables is *International Financial Statistics* (CD ROM, 1998:6).

We construct four summary policy variables, namely interest rate restraints (IRC), reserve and liquidity requirements (RR), capital adequacy requirements (KAD) and restrictions on capital inflows (CC). The first policy variable - interest rate restraints - is an unweighted average of lending rate and deposit rate control dummies (which take the value of 1 if a control is present, 0 otherwise). The second policy variable-reserve and liquidity requirements-is a weighted average of the first two principal components of reserve requirements on demand, saving and time deposits and liquidity ratios[4]. The weights chosen correspond to the relative variance of each component. For each country, the resulting index is positively correlated with the underlying variables.

The third policy variable-capital adequacy requirements-is constructed from data collected mainly from central bank reports. In years when there were no formal minimum capital adequacy standards in effect, the variable

takes the value of zero.[5] It is important to note that the regulatory definition of capital has changed over the years in many countries. This would have implications for capital adequacy even during periods when there have been no changes in capital adequacy requirements.[6] However, the lack of relevant data did not allow us to adjust the series to changes in the regulatory definition of capital.

The fourth policy variable is an arithmetic average of the dummy for restrictions on inward portfolio investment and the dummy for inward foreign direct investment. These dummies are constructed by collecting information on these policies from various sources, mainly the *IMF Annual Report on Exchange Restrictions* (various issues).

6. EMPIRICAL RESULTS

We report unit root tests for the various variables for the two groups of countries: developed and developing ones. The unit root tests on the level of the series show clearly that the null of a unit root in the level of the series cannot be rejected for any of the fourteen countries (Table 2), while the same hypothesis is strongly rejected for the first differenced level series at the 1% level of significance, except for capital stock where we cannot reject the null of a unit root in the first difference of the capital stock series (Table 3). The panel statistic clearly confirms that all variables are integrated of order one, except for the capital stock series which was found to be I(2).

The next step in our empirical investigation involves applying the DOLS estimator to estimate the average productivity equation. The equation is estimated separately for each country and the residuals of the regression are subjected to a test to ascertain whether the SUR technique, which assumes dependence among the equations, should also be utilised. We therefore formally test the null hypothesis that the covariance matrix is diagonal. If we accept the null hypothesis, OLS is efficient and there are no efficiency gains in using SUR. We use the Lagrange multiplier test suggested by Breusch and Pagan (1980) which is composed of the sum of the squared correlation coefficients multiplied by the number of observations. This statistic is asymptotically distributed as chi squared with *M(M-1)/2* degrees of freedom where *M* is the number of countries included in the panel. According to this statistic, the hypothesis that covariance matrix is diagonal can be rejected at the 1% level.[7] This indicates that significant efficiency gains can be achieved from exploiting the contemporaneous correlation across countries using SUR.

The results of the DOLS regression using the SUR technique are presented in Tables 4 and 5. According to the ADF statistic, individual cointegrating vectors show a high degree of cointegration with the exception of Finland in the developed economies group and Turkey in the developing economies group. When considering the panel as a whole, the evidence of cointegration is very strong in the developed economies group, but weaker in the developing economies group for which we cannot reject the null of a unit root.

Tables 4 and 5 also report the estimated coefficients in each cointegrating vector. The estimated coefficients of the logarithm of the capital variable are reasonable and are precisely estimated, as indicated by the low standard errors. The implied capital stock elasticities take plausible values, ranging from 0.47 for the UK to 0.91 for Finland. With perhaps the exception of India, the estimated employment elasticities are also sensible, even though they are imprecisely estimated in the case of Turkey and Philippines. These elasticities range from 0.03 for Finland to 0.80 for India. The weaknesses in some of the developing country estimates probably reflect the poor quality of the employment data. Nonetheless, partly because the implied capital stock elasticities are plausible, the implied degree of returns to scale takes reasonable values, ranging from 0.62 for France to 1.44 for India. Most of the developed countries exhibit returns to scale that are below unity. For example, the implied degree of returns to scale for the UK is 0.68 and 0.93 for the US. On the other hand, New Zealand and Sweden's are 1.22 and 1.09 respectively. The developing economies besides India exhibit implied returns to scale in the range of 0.86-1.12, which appear reasonable.

Tables 4 and 5 also reveal that the financial development indicator enters significantly with the expected positive sign in most countries. The exceptions are France and New Zealand in the developed group and Greece and India in the developing group, where although the financial development indicator has the expected sign it is not significant at the conventional levels.

As to financial policies, the results are generally mixed. Starting with interest rate restraints, these are insignificant in the case of Finland and Sweden. Importantly, in Australia, Germany, New Zealand and US, interest rate restraints enter with a positive sign and are statistically significant. On the other hand, in France they appear to have a negative impact on the average productivity of capital. It is important to note here that interest rate restraints in France were more severe than in other developed countries, which may be a factor that helps to explain why they had a negative impact. The effects of interest rate restraints are also mixed in the developing economies group. Specifically, we find that interest rate restraints have a negative impact on average productivity of capital in Greece, India, and Thailand, while they have a positive impact in Turkey and Philippines.

The impact of reserve and liquidity requirements also varies across countries. Reserve requirements enter significantly with a positive sign in almost all countries except for New Zealand where the impact is negative, and UK and US where reserve requirements were found to have no significant impact on the average productivity of capital. Interestingly, reserve requirements are insignificant in all countries of the developing economies group. The impact of capital adequacy requirements is also not homogenous across countries. In many countries such Australia, Finland, France, Sweden and Turkey, capital adequacy requirements seem to have contributed positively to the average productivity of capital. On the other hand, in countries like New Zealand, Greece, and Germany capital adequacy affected adversely the productivity of capital. In the case of Germany, this result can be partly explained by the excessive requirements that were imposed in 1974 on banks as a reaction to the crash of the Herstat Bank. Interestingly, in the UK and US, capital adequacy ratios are not significant. As to the impact of capital inflow restrictions on average productivity, the evidence is again mixed. In the UK, Sweden, Germany, and Australia, the dummy for capital inflows enters significantly with a negative sign. On the other hand, in Finland, New Zealand, and France, this indicator enters positively. In the developing group, the evidence is also mixed. The indicator enters negatively in Korea, India, and Turkey, but positively in the case of Philippines and Thailand. In the latter country, this result is not surprising since most of the restrictions were imposed on short-term flows whereas FDI flows were liberalised from the early 1970s.

Taken together these results suggest quite clearly that the impact of financial policies varies considerably across countries. This is confirmed by testing for the equality of coefficients across equations using the Wald statistic. As Table 6 clearly suggests, in the case of developed countries, we reject the null hypothesis that coefficients are equal across equations. In the developing group, we obtain similar results, except for reserve requirements where the null hypothesis that coefficients are equal across equations cannot be rejected at conventional levels. The differences in the effects of financial policies probably reflect institutional differences across countries, including the strength of banking supervision and regulation, the structure of the banking system and its relations to industry and government. These institutions are likely to influence the implementation of financial policies, which may be a decisive factor in policy effectiveness. In many developing countries, for example, financial restraints may be imposed but not enforced - or enforced selectively - in the sense that any penalties imposed on institutions that do not adhere to them are ineffective. In developed economies, there are important differences between bank-based and capital-market-based financial systems, which may well account for why certain policies work differently (Arestis, Demetriades and Luintel, 2001).

Finally, it is important to note that our findings fail to provide adequate support for the financial liberalisation thesis. Specifically, interest rate restraints and reserve requirements, which tend to be the focus of financial liberalisation programmes, are found to have positive effects on the productivity of capital in many countries. Furthermore, restrictions on capital inflows are found to have positive effects in five countries and negative

effects in seven. These findings provide considerable empirical support to the argument that some form of financial restraints may indeed enhance economic efficiency. Stiglitz (1998) is, thus, justified when he argues that "...there are a host of regulations, including restrictions on interest rates or lending to certain sectors (such as speculative real estate), that may enhance the stability of the financial system and thereby increase the efficiency of the economy. Although there may be a trade off between short-run efficiency and this stability, the costs of instability are so great that long run gains to the economy more than offset any short term losses..." (p.33).

7. SUMMARY AND CONCLUDING REMARKS

This paper provides a novel assessment of the effects of several types of financial policies on the average productivity of capital in fourteen countries. Specifically, it uses a new data set on financial restraints, capital adequacy requirements and restrictions on capital flows in these countries, for a period of forty years, the collection of which represented a major research effort. It utilises modern panel-time series methods to examine the effects of these policies on the productivity of capital, controlling for financial development, employment and capital. Our empirical findings suggest that the effects of these policies vary considerably across countries, probably reflecting institutional differences. They also demonstrate that the main predictions of the financial liberalisation literature do not receive adequate empirical support, a result which may reflect the prevalence of financial market imperfections. In contrast, our findings provide significant support to the thesis, currently gaining increasing support among international policy makers, that some form of financial restraints may indeed have positive effects on economic efficiency.

Several fruitful avenues for further research emerge from our findings. One plausible conjecture is that financial restraints have positive effects on productivity where institutional quality, such as prudential regulation and supervision, is weak. To test this conjecture one would require data on the quality of the regulatory regime, a challenging but worthwhile endeavor. Other institutional quality indicators, such as the quality of legal rules and law enforcement, have been used successfully in relation to the development of capital markets (e.g. La Porta et al, 1997). There are further under-researched theoretical aspects to be explored with respect to the relationship investigated in this study, the most promising of which relates to the interaction between prudential and monetary control. Consequently, further work on these, and related issues, is likely to produce useful insights into the effectiveness of financial liberalisation. This in its turn would be invaluable to the debate on financial globalisation.

NOTES

1. The precise estimates of these effects vary considerably depending on methods and data used.
2. We thank Pentti Saikkonen for clarifying this point.
3. Due to data unavailability in few countries (Thailand, Sweden, India, Turkey), the labour series was extrapolated using the number of workers from the Penn World Table Data set adjusted for by the ratio of number of workers obtained from ILO to the number of workers obtained from Penn World Table Data set.
4. An exception is France where liquidity ratios were found highly correlated with capital adequacy requirements rather than reserve requirements.
5. Even when there were no formal capital adequacy requirements, in most of these countries there were some regulations aimed at assessing the riskiness of an institution's loans and other assets.
6. We are grateful to Fred Daniel of the Bank of Canada for this remark.
7. The test statistic is 100.66 for the group of developed countries. The critical value for 1% level of significance is 48.28. The test statistic is 71.56 for the group of developing countries. The critical value for 1% level of significance is 30.58.

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Table 1 - A Summary of Financial Policies in Developed and Developing Countries

	Interest Rate Controls	**Reserve Requirements**	**Liquidity Requirements**	**Capital Adequacy Requirements**	**Restriction on Capital Inflows**
Australia	Deposit rates liberalized in 1980; Lending rates completely liberalized in 1985	In 1988, the SRD system, by which banks used to maintain 7% of deposits in low interest rate Statutory Reserve Deposit, was abolished and replaced by a new-noncallable requirement of 1% of bank assets	In 1985, the Prime Asset Ratio was introduced which requires that banks maintain a high quality of liquid assets and government securities equivalent to 12% at total liabilities	Prior to June 1983, the Bank had no statuary power to set specific guidelines for banks' capital ratios. In 1986, banks were expected to maintain capital ratios in the vicinity of 6%. BIS capital requirements introduced in 1990	Most Restrictions on capital inflows liberalized in 1984

Finland	Controls on lending rates were abolished in 1986	Bank of Finland imposed relatively high cash reserve requirements on banks. In June 1993, existing cash reserve requirements were replaced by a minimum reserve system where banks were required to hold 2% of their liquid deposits as non-interest bearing minimum reserves at BOF.	No formal liquidity ratios were in place.	In the 50s, capital adequacy requirement was set at 7%, but banks were granted a temporary exemption under which the capital adequacy was set at 4%. In 1969, the basic limit was reduced to 4%, but banks were granted again a temporary exemption which reduced the ratio to 3%. In 1998, the BIS ratio of 8% was imposed	Capital controls eased significantly in 1989. During 1991-1993, remaining capital controls abolished.
France	Lending rates deregulated in 1967, while deposit rates were kept under tight control. Interest rate ceiling on many types of deposits abolished in 1986	Required reserve ratios lowered in 1987. Reserve requirements set at 1% from 1993 onwards	In 1988, new liquidity ratios replaced the former which required that banks maintain at all times liquid assets equal to at least 60% of their short term liabilities. The new rule requires that credit institutions cover their liabilities by at least equivalent amount of liquid assets	In July 1979, rules that stipulate that banks must maintain a minimum ratio of 5% between net own funds and the risks arising from their business. The BIS ratio was imposed in 1991.	Liberalization efforts in the period 1986-1988. Liberalization was completed in 1990.
Germany	Controls on lending and deposit rates abolished in 1967	Use of variable reserve requirement for the conduct of monetary policy	1950-1960, liquidity ratios set at 20%. 1969-1984, liquidity ratios were set at 100%. In 1984, formal liquid ratios were abolished.	Throughout the period, the loans and participation of a bank must not exceed 18 times its liable capital. BIS capital ratios were imposed in 1993.	Most capital controls abolished in 1973

New Zealand	Interest rates liberalized in 1976. Ceilings on lending and deposit rates were re-imposed in 1981and 1982 respectively. Interest rate liberalized in 1984	In 1985, the reserve asset ratio system which requires banks to maintain a minimum percentage of their deposits was abolished.	No formal liquidity ratios were in place.	In 1986, Reserve Bank's role in prudential supervision was formalized. Registered banks were required to have capital equal to 7.25% of risk-weighted assets by end of 1990 and 8% by the end of 1992.	In 1985, restrictions on FDI and portfolio investments and repatriation of profits eased. Restrictions eased further in the 1990s
Sweden	In 1978, ceilings on bank deposit interest rates were abolished. In 1985, ceilings on bank loans were lifted.	Cash reserve requirement imposed on banks were reduced to zero	Requirements on banks to hold government and housing bonds to meet liquidity requirements were abolished in 1983. The use of liquidity ratios to guide bank lending was also discontinued.	In 1990, new rules for capital adequacy were applied. In preparation to implementation of BIS capital requirements, banks were required to meet requirement of 7.25% in 1991 and 1992. BIS ratio was implemented in 1993.	Capital controls eased in 1975. Further relaxation of controls in 1985 and 1989. Most of the remaining restrictions lifted in 1990.
United Kingdom	No official controls on banks' interest rates	In 1971, the 8% cash ratio and the 28% minimum liquidity ratio were replaced by a 12.5% reserve asset ratio. In 1981, the minimum cash reserve ratio and minimum reserve requirements were abolished	In 1971, the 8% cash ratio and the 28% minimum liquidity ratio were replaced by a 12.5% reserve asset ratio.	The Banking Act of 1979 required that deposit-taking institutions achieve such levels of liquidity and the Bank of England considers net assets as adequate. The informal system was replaced by BIS capital requirements in 1989.	Capital Controls abolished in 1979.

United States	No restrictions on lending rates. Deposit rates were completely removed in 1986	Use of Variable reserve requirement for the conduct of monetary policy	No formal liquidity ratios were in place.	Since 1981, the federal banking agencies have set a minimum capital standard of 5% applying to ratio banks. In 1990, banks were obliged to observe a minimum ratio of Tier 1 capital to total assets of 3%. In 1992, the 8% ratio was imposed.	Limited controls imposed in the 60's and abolished in 1974.
Turkey	Interest rate on loans and deposits were liberalized in 1980. After the 1982 crisis, the central bank was authorized to fix interest rate on deposits which continued until 1987	Reserve requirements were quite high through the period	Liquidity ratios were high throughout the period	Capital adequacy requirements were in operation since 1962. The banking law of 1985 introduced a provision for a minimum capital base for banks. The ratio was set at 5% in 1989, 6% in 1990, 7% in 1991 and 8% in 1992	Most capital flows liberalized in 1989
Greece	In 1987, interest rate on various deposits and on most categories of short and long term loans were deregulated. In 1989, the setting of saving deposit rates were liberalized, but they were still subject to minimum rate established by the Bank of Greece which was abolished in 1993.	Required reserve ratios were quite high until the early 90s.	In 1970s and 1980s, banks were required to invest a certain fraction of their total deposits in short-term government bonds. These requirements were reduced in 1990-1993 and abolished in 1993.	In the 80s, banks were asked to meet capital requirements. BIS capital requirements were enforced in 1992.	Capital controls eased considerably in the early 90s. Most capital controls abolished in 1994

Thailand	Ceilings on lending rates liberalized in 1992. Interest rate on deposits completely liberalized in 1990	Reserve requirements were set low. Variation in the reserve requirement were also low	In 1991, the Bank of Thailand relaxed the constraint on commercial banks' portfolio management by replacing the reserve requirement ratio with the liquidity ratio	In the early 90s, the conventional capital risk asset ratio (used since 1962) was replaced by BIS guidelines on capital adequacy. BIS capital requirement of 8% imposed in 1994.	Under the Investment Protection Act of 1977, sectors for foreign investment were liberalized. Further liberalization occurred in the mid 1980s and by 1992 most control on capital flows eliminated.
Philippines	In 1980, ceilings on deposit rates for deposits with maturity >2 years were removed and shorter maturities were subject to ceilings of 14%. In 1981, remaining ceilings on deposit rates were abolished and loan rate ceilings were raised. In 1983, remaining ceilings on short-term loan rates were removed.	Reserve requirements increased significantly in the mid 80s and again in the early 90s.	No formal liquidity ratios in place.	There are no formal capital adequacy requirements	Capital controls eased in 1983. During 1992-1995, most of remaining capital controls were abolished.
Korea	Ceilings on lending rates abolished in 1979. Ceilings on deposit rates liberalized in 1988	Reductions in reserve requirements in the mid 90s.	No formal liquidity ratios in place.	BIS capital adequacy ratios imposed in 1993	Most capital controls abolished in 1992.

| India | Ceilings on lending rate imposed in 1963-1968 and then re-imposed in 1975-1987. Ceilings on deposit rate imposed since 1969 | Reserve requirements increased considerably in the mid 80s and continued to be high in the 90s. | Liquidity ratios increased significantly in the 80s and by the 90s ratios were as high as 38.5% | BIS capital adequacy ratios imposed in 1993 | Restrictions on capital inflows eased in the early 90s. |

Sources: Annual reports of central banks; IMF Annual Report on Exchange Restrictions (various issues); Caprio, Atiyas, and Henson (1994 eds), *Financial Reform;* Pecchiolli, R.M. (1987), *Prudential Supervision in Banking,* Cheng, H., (1986), *Financial Policy Reform in Pacific Basin Countries;* Williamson, J., and M. Mahar (1998), *A Survey of Financial Liberalisation;* Boissieu, Christian de , ed (1990), *Banking in France;* Chapple, S. (1991), *Financial Liberalisation in New Zealand, 1984-1990;* Lim, J. Y. (1991), *The Philippine Financial sector in the 1980s;* Bank of Thailand (1994), *Thailand's Financial System: Structure and Liberalisation;* Johnston, B., S. Dorbar, and C. Echeverria (1997), *Sequencing Capital Account Liberalisation: Lessons from the Experiences in Chile, Indonesia, Korea, and Thailand;* Demetriades, P.O. and B. Fattouh (1999), *Unproductive Credit and the South Korean Crisis;* Hall, M. (1993), *Bank Regulation and Supervision: A comparative study of the UK, USA, and Japan;* Welch, J. (1981), *The Regulation of Banks in the Member States of the EEC;* Klein, D. (1995), *The Banking Systems of the EU Member States;* Demetriades, P, and K.B. Luintel (1997), *The Direct Costs of Financial Repression: Evidence from India;* Markstrom, G. (1990), *New Rules for Capital Adequacy in Swedish Financial Institutions.*

TABLE 2 - Unit Root Tests For Level of Series (1955-1996)

Developed Countries	LK	LL	LFD	IRC	RR	KAD	CC
Australia	-0.033	-1.416	-0.934	-1.813	-1.521	-1.481	-2.464
Finland	2.300	-0.048	-1.115	-1.742	-1.450	-0.983	-1.943
France	-1.66	-1.840	-0.943	-2.426	-1.454	-2.092	-0.785
Germany	-1.801	-2.018	-2.567	-1.592	-1.597	-2.177	-1.917
New Zealand	-0.853	-2.660	-0.328	-3.803	-2.679	-0.936	-1.754
Sweden	-0.864	-0.266	-2.122	-2.028	-1.194	-2.448	-2.028
UK	-1.476	-2.551	-1.644	-------	-2.093	-1.507	-2.294
US	-1.205	-2.692	-3.713	-2.002	-2.131	-1.979	-2.053
Panel Statistic	**-0.699**	**-1.686**	**-1.670**	**-2.200**	**-1.764**	**-1.700**	**-1.904**

Developing Countries	LK	LL	LFD	IRC	RR	KAD	CC
Greece	-1.855	-1.902	-0.210	-1.322	-0.841	-1.908	-0.995
Turkey	0.177	-1.867	-2.668	-2.98	-0.624	-0.162	-3.057
Philippines	-2.601	-3.207	-2.338	-1.577	-2.329	-----	-1.239
Thailand	-2.953	-2.982	-2.969	0.096	-2.403	-----	-0.523
Korea	0.105	-1.517	-1.275	-2.238	-----	-----	-0.873
India	-3.082	-0.307	-3.693	-1.374	-2.444	-----	-1.491
Panel Statistic	**-1.701**	**-1.963**	**-2.192**	**-1.565**	**-1.728**	**-1.035**	**-1.363**

Notes:

1. LK=logarithm of the capital stock employed; LL=logarithm of the number of workers employed; LFD= logarithm of the ratio of nominal claims on private sector to nominal GDP; IRC= is the index of interest rate controls; RR= is the index of liquidity and reserve requirements; KAD= is an index of capital adequacy requirements; CC= is an index of restrictions on capital inflows.
2. Critical values of Panel Statistic with time trend for the developed countries group: 1% = -2.90 , 5% = -2.68; 10%= -2.57 (Source: Im, Pesaran and Shin, 1996)
3. Critical values of Panel Statistic with time trend for the developing countries group: 1% = -2.93 , 5% = -2.69; 10%= -2.57 (Source: Im, Pesaran and Shin, 1996)

TABLE 3 - Unit Root Tests For Differences of Series

Developed Countries	LK	^{2}LK	LL	LFD	IRC	RR	KAD	CC
Australia	-0.894	-5.221	-5.833	-4.420	-6.573	-6.503	-6.476	-6.349
Finland	-1.559	-3.999	-3.340	-2.877	-6.403	-4.118	-6.340	-6.695
France	0.559	-4.528	-6.059	-5.334	-6.538	-6.689	-6.553	-5.791
Germany	-1.019	-6.063	-5.673	-6.057	-6.403	-6.664	-6.527	-6.043
New Zealand	-2.354	-4.782	-4.788	-4.343	-5.712	-8.614	-6.437	-5.811
Sweden	0.208	-4.230	-4.453	-5.543	-6.573	-6.573	-8.473	-6.960
UK	-0.645	-4.687	-4.656	-4.257	-----	-6.472	-6.547	-6.759
US	-2.677	-5.875	-5.603	-6.108	-6.403	-7.040	-6.503	-6.245
Panel Statistic	**-1.047**	**-4.923**	**-5.050**	**-4.867**	**-6.372**	**-6.584**	**-6.732**	**-6.331**

Developed Countries	LK	^{2}LK	LL	LFD	IRC	RR	KAD	CC
Greece	-0.897	-5.131	-5.846	-4.065	-5.789	-4.078	-5.855	-5.534
Turkey	-0.105	-5.337	-5.975	-4.673	-5.595	-5.365	-5.142	-7.236
Phillipines	-1.276	-3.681	-5.551	-3.396	-4.140	-4.255	-----	-5.814
Thailand	-1.381	-4.442	-6.161	-3.505	-5.000	-7.869	-----	-4.827
Korea	-2.350	-3.867	-4.590	-3.100	-5.361	-----	-----	-6.198
India	-1.792	-4.714	-3.694	-9.217	-5.082	-5.847	-----	-5.855
Panel Statistic	*-1.300*	*-4.528*	*-5.302*	*-4.659*	*-5.161*	*-5.482*	*-5.498*	*-5.910*

Notes:

1. LK=logarithm of the capital stock employed; LL=logarithm of the number of workers employed; LFD= logarithm of the ratio of nominal claims on private sector to nominal GDP; IRC= is the index of interest rate controls; RR= is the index of liquidity and reserve requirements; KAD= is an index of capital adequacy requirements; CC= is an index of restrictions on capital inflows.
2. Critical values of Panel Statistic with time trend for the developed countries group: 1% = -2.90 , 5% = -2.68; 10%= -2.57 (Source: Im, Pesaran and Smith, 1996)
3. Critical values of Panel Statistic with time trend for the developing countries group: 1% = -2.93 , 5% = -2.69; 10%= -2.57 (Source: Im, Pesaran and Smith, 1996)

Table 4- Cointegration Analysis for Developed Countries (1955-1996)

Country	Cons	LK	LL	LFD	IRC	RR	KAD	CC	ADF
Australia	4.716*	-0.256*	0.126*	0.038*	0.032*	0.018*	0.006*	-0.068*	-5.110
	0.422	0.024	0.034	0.021	0.010	0.005	0.002	0.013	
Finland	0.769	-0.087*	0.031	0.105**	0.005	0.008*	0.006**	0.100*	-2.761
	0.578	0.028	0.103	0.059	0.015	0.003	0.003	0.022	
France	11.796*	-0.451*	0.068*	0.002	-0.169*	0.008*	0.026*	0.105*	-3.878
	0.495	0.017	0.007	0.012	0.017	0.001	0.003	0.014	
Germany	10.018*	-0.416*	0.118*	0.325*	0.062*	0.036*	-0.011*	-0.097*	-3.477
	1.093	0.041	0.023	0.048	0.008	0.002	0.001	0.022	
New Zealand	5.219*	-0.431*	0.648*	0.028	0.030*	-0.021*	-0.006*	0.339*	-4.034
	0.712	0.062	0.128	0.024	0.007	0.001	0.002	0.024	
Sweden	8.058*	-0.488*	0.581*	0.081*	-0.016	0.041*	0.005*	-0.088*	-3.979
	0.624	0.040	0.085	0.025	0.009	0.016	0.002	0.021	
UK	11.672*	-0.533*	0.214*	0.086*	-----	-0.003	-0.014	-0.058*	-5.721
	1.113	0.022	0.103	0.009	0.003	0.014	0.028		
US	7.464*	-0.417*	0.347*	0.413*	0.033*	0.003	-0.002	-0.032	-4.350
	3.129	0.163	0.176	0.105	0.013	0.005	0.002	0.051	
Panel Statistic									**-4.163**

Notes:

1. (1) LK=logarithm of the capital stock employed; LL=logarithm of the number of workers employed; LFD= logarithm of the ratio of nominal claims on private sector to nominal GDP; IRC= is the index of interest rate controls; RR= is the index of liquidity and reserve requirements; KAD= is an index of capital adequacy requirements; CC= is an index of restrictions on capital inflows.
2. (2) The method of estimation is DOLS(Stock and Watson, 1993). Given the small number of observations, to avoid over-parameterization we only retain significant lags and leads (Inder, 1995).
3. (3) ADF is the augmented Dickey Fuller test on the residuals of the cointegrating vector excluding the nuisance parameters.
4. (4) Critical values for the panel cointegration statistic without time trend is -3.795 (Pedroni,1998) *significant at the 1% level; ** significant at the 5% level

Table 5 - Cointegration Analysis for Developing Countries (1955-1996)

Country	Cons	LK	LL	LFD	IRC	RR	KAD	CC	ADF
Greece	2.053	-0.321*	0.449**	0.073	-0.065*	-0.005	-0.098*	0.007	-3.802
	4.139	0.019	0.276	0.033	0.024	0.005	0.021	0.030	
Turkey	6.145*	-0.269*	0.167	0.200*	0.100*	0.010	0.773*	-0.102*	-2.002
	0.977	0.047	0.138	0.060	0.024	0.006	0.064	0.051	
Philippines	4.833*	-0.243*	0.107	0.085*	0.181*	0.002	----	0.088*	-3.460
	0.984	0.061	0.104	0.022	0.032	0.008	0.048		
Thailand	9.332*	-0.504*	0.445*	0.160*	-0.233*	-0.015	----	0.795*	-3.371
	1.577	0.064	0.108	0.068	0.053	-0.015	0.304		
Korea	6.145*	-0.514*	0.565**	0.084*	0.007	----	----	-0.176*	-3.442
	0.755	0.106	0.342	0.040	0.164	0.055			
India	2.001*	-0.363*	0.801*	0.002	-0.139*	-0.013	----	-0.126*	-3.679
	0.827	0.067	0.179	0.011	0.024	0.010	0.045		
Panel Statistic									**-3.292**

Notes:

1. LK=logarithm of the capital stock employed; LL=logarithm of the number of workers employed; LFD= logarithm of the ratio of nominal claims on private sector to nominal GDP; IRC= is the index of interest rate controls; RR= is the index of liquidity and reserve requirements; KAD= is an index of capital adequacy requirements; CC= is an index of restrictions on capital inflows.
2. The method of estimation is DOLS(Stock and Watson, 1993). Given the small number of observations, to avoid over-parameterization we only retain significant lags and leads (Inder, 1995).
3. ADF is the augmented Dickey Fuller test on the residuals of the cointegrating vector excluding the nuisance parameters.
4. Critical values for Panel Cointegration statistic without time trend is -3.531 (Pedroni,1998)
   *significant at the 1% level; ** significant at the 5% level

Table 6 - Restriction Tests for Equality of Coefficients Across Equations

	Developed	Developing
LK	191.137	14.010
	0.0000	*0.0000*
LL	69.252	15.308
	0.0000	*0.0091*
LFD	71.049	31.785
	0.0000	*0.0000*
IRC	164.591	88.058
	0.0000	*0.0000*
RR	371.087	5.910
	0.0000	*0.2059*
KAD	140.165	162.577
	0.0000	*0.0000*
CC	337.806	30.6523
	0.0000	*0.0000*

Notes:

1. LK=logarithm of the capital stock employed; LL=logarithm of the number of workers employed; LFD= logarithm of the ratio of nominal claims on private sector to nominal GDP; IRC= is the index of interest rate controls; RR= is the index of liquidity and reserve requirements; KAD= is an index of capital adequacy requirements; CC= is an index of restrictions on capital inflows.
2. The null hypothesis: coefficients are equal across equations. We use the Wald statistic to test the null hypothesis.
3. p-values of the Wald statistic in italics.