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FINANCE, INSTITUTIONS AND ECONOMIC GROWTH

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Finance, Institutions and Economic Growth

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Abstract - Using data from 72 countries for the period 1978-2000, we find that financial development has larger effects on growth when the financial system is embedded within a sound institutional framework. This is particularly true for poor countries, where more finance without sound institutions is likely to fail in delivering more growth. For these countries, we find that improvements in institutions are likely to deliver much larger direct effects on growth than financial development itself. They are also likely to have positive indirect effects through the financial system, particularly when the latter is already providing large amounts of credit to the private sector. We also find that financial development is most potent in delivering extra growth in middle-income countries. Its effects are particularly large when institutional quality is high. Institutional improvements can also deliver more growth in these countries, especially when the financial system is well developed. Finally, we find that while the effects of financial development in high-income countries are much smaller than in middle-income countries, even in these countries financial development has larger effects on growth when institutional quality is high.

JEL Classification: G1, O1, O4

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I. Introduction

It is now widely accepted that factor accumulation (including human capital) and technological change alone cannot adequately explain differences in growth performance across countries. Institutions and finance are separately emerging as the key fundamental determinants of economic growth in recent literature.

Institutions are the rules of the game in a society by which the members of a society interact and shape the economic behaviour of agents. They may be treated as "social technologies" in the operation of productive economic activities, which involve patterned human interaction rather than physical engineering (Nelson and Sampat, 2001). When the rules change frequently or are not respected, when corruption is widespread or when property rights are not well defined or enforced, markets will not function well, uncertainty would be high, and the allocation of resources would be adversely affected. A number of recent papers provide empirical evidence that confirms the importance of institutional quality for economic performance[1]. Rodrik *et al* (2002) find that quality of institutions overrides geography and integration (international trade) in explaining cross-country income levels. Hall and Jones (1999) show that differences in physical capital and educational attainment can only partially explain the variation in output per worker. They find that the differences in capital accumulation, productivity and output per worker across countries are driven by differences in institutions and government policies. Knack and Keefer (1995) find a positive and significant relationship between institutional indicators such as quality of bureaucracy, property rights, and political stability and economic growth utilising cross-country data. Mauro (1995) demonstrates that the countries that have a higher corruption index tend to have persistently lower growth. Rodrik (1997) finds that an index of institutional quality does exceptionally well in rank-ordering East Asian countries according to their growth performance. Pistor *et. al* (1998) point out that law and legal systems were important in promoting Asian economic growth, even though they have been largely ignored by previous literature.

[1] Aron (2000) provides an excellent review of a large body of empirical literature that tries to link quantitative measures of institutions with economic growth across countries and over time.

Financial intermediaries perform an important function in the development process, particularly through their role in allocating resources to their most productive uses. The increased availability of financial instruments reduces transaction and information costs while larger and more efficient financial markets help economic agents hedge, trade, pool risk, raising investment and economic growth (Goodhart, 2004). Levine (2003) provides an excellent overview of a large body of empirical literature that suggests that financial development can robustly explain differences in economic growth across countries. However, as Levine acknowledges, establishing that the relationship is causal in cross-country studies is not straightforward. Zingales (2003) questions the extent to which cross-country relationships of this type can be utilised for policy purposes, especially since there is a bunch of variables, all positively correlated with growth, which are also highly correlated among themselves. These difficulties have prompted a number of authors to examine the relationship using time-series data for individual countries in the hope of a better understanding of the causality between finance and growth[2]. Within individual countries the evidence on the relationship between financial development and growth over time is broadly consistent with that obtained from cross-section studies in the sense that it is usually a positive and significant one. However, an important difference with cross-country studies is that causality is typically found to vary across countries. For example, Demetriades and Hussein (1996), in their examination of the time-series relationship between finance and growth in 16 less developed countries find that causality frequently runs from growth to finance and not vice-versa. It is, therefore, not sensible to draw out any policy implications from the positive association obtained between finance and growth obtained from cross-country studies that would be applicable to every country in the world. More finance may mean more growth in some cases but not in others. Knowing where it does and where it doesn't is critical for policy makers. Understanding why there is such variation across countries is an important next step for both policy makers and academics, since this knowledge may hold the key to successful financial development.

[2] This is to some extent because the nature of Granger causality tests requires time-series data but also because other conditioning variables which may vary considerably across countries, such as human capital will only vary slowly, if at all, within countries. Thus, time-series methods could, in principle, be better able to unveil the causal pattern between finance and growth.

The variation in causality between finance and growth detected in time-series studies suggests that there are important differences in the way in which finance influences economic growth across countries. Arestis and Demetriades (1997), for example, suggest that it may reflect institutional differences across countries[3]. This idea is developed further in Demetriades and Andrianova (2004), who argue that varying causal patterns may reflect differences in the quality of finance, which are, in turn, determined by the quality of financial regulation and the rule of law. For example, an increase in financial deepening, as captured by standard indicators of financial development, may not result in increased growth because of corruption in the banking system or political interference, which may diverts credit to unproductive or even wasteful activities. While this is a plausible conjecture, there is as yet no hard empirical evidence to suggest that institutions make a difference to the way in which finance affects economic growth. Such evidence is clearly the logical next step in the evolution of the literature on finance and growth.

This paper tests the hypothesis that the interaction between institutional quality and financial development – i.e. a financial system embedded in good institutions – has a separate positive influence on economic growth, over and above the effect of the levels of financial development and institutional quality. Testing this hypothesis within individual countries requires, however, data on institutional quality that span many decades, since institutions usually change very slowly. Such data are only available for the last twenty years or so, which makes time-series analysis not possible. However, we have been able to obtain institutional quality indicators for 72 countries for the period 1978-2000. We, therefore, utilise both cross-section and panel econometric methods to test our hypothesis. Additionally, we also examine whether the estimated relationship varies in accordance to the stage of economic development.

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[3] An alternative possibility, which has emerged in recent literature, is that the differences in causality across countries may reflect different stages of development. Rioja and Valev (2002) demonstrate that financial development is most effective in promoting growth in middle-income economies and has positive, albeit smaller effect in high-income economies, and is ineffective in low-income countries. Our approach is to some extent consistent with Rioja and Valev, given that institutional quality varies with the stage of development. Additionally, our approach provides a plausible explanation why the stage of economic development may matter for this relationship. We also go a step further and examine whether, once we have accounted for the interaction between financial development and institutions, the relationship continues to exhibit additional variation with respect to the stage of economic development.

The paper is organised as follows. Section 2 lays down the empirical model, introduces the econometric methodology and summarises the data. Section 3 presents and discusses the empirical findings. Section 4 summarises and concludes.

II. Empirical Model, Methodology and Data

Empirical Model

In order to test the effects of financial development and institutions on economic growth, this study adopts the framework introduced by Mankiw *et al*. (1992), Knight *et al*. (1993) and Ghura and Hadjimichael (1996). Consider the following Cobb-Douglas production function:

$$Y_t = K_t^{\alpha} H_t^{\beta} \left(A_t L_t\right)^{1-\alpha-\beta} \quad (1)$$

where Y is real output, K is the stock of physical capital, H is the stock of human capital, L is the raw labour, A is a labour-augmenting factor reflecting the level of technology and efficiency in the economy and the subscript t indicates time.

It is assumed that $\alpha + \beta < 1$, i.e. decreasing returns to all capital. Raw labour and labour-augmenting technology are assumed to grow according to the following functions:

$$L_t = L_0 e^{nt} \quad (2)$$

$$A_t = A_0 e^{gt+P\theta} \quad (3)$$

where n is the exogenous rate of growth of the labour force, g is the exogenous rate of technological progress, P is a vector of financial development, institutions and other factors that can affect the level of technology and efficiency in the economy, and θ is a vector of coefficients related to these variables.

In this model, variable *A* depends on exogenous technological improvements, the degree of openness of the economy and the level of other variables. It is obvious that *A* in this study differs from *A* used by Mankiw *et al.* (1992). This modification is more likely to be particularly relevant to the empirical cases of the link between financial development, institutions and economic growth. The technological improvements are encouraged by developments in financial markets, which tend to increase the productive sector's efficiency or increase the productivity of investment (Pagano, 1993) and also efficient institutions (North, 1990, Nelson and Sampat, 2001).

In the steady state output per worker grows at the constant rate *g* (the exogenous component of the growth rate of the efficiency variable *A*). This outcome can be obtained directly from the definition of output per effective worker as follows:

$$\frac{Y_t}{A_t L_t} = (k_t)^{\alpha}(h_t)^{\beta}$$

$$\frac{Y_t}{L_t} = A_t (k_t)^{\alpha}(h_t)^{\beta} \tag{4}$$

Let $y_t^* = \left(\frac{Y_t}{L_t}\right)^*$

Taking logs of both sides of Equation (4) and dropping time subscripts for simplicity, we get:

$$\ln\left(\frac{Y}{L}\right)^* = \ln A + \alpha \ln k^* + \beta \ln h^*$$

Utilising equation (3) we obtain:

$$\ln\left(\frac{Y}{L}\right)^* = \ln A_0 + gt + \theta \ln P + \frac{\alpha}{1-\alpha-\beta}\ln s^K + \frac{\beta}{1-\alpha-\beta}\ln s^H - \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) \tag{5}$$

Equation (5) determines steady state output per worker or labour productivity, where a vector of financial development and institutions policy proxies (P) exist.

Largely because of data limitations, this study assumes that s^H and *gt* do not vary over time but s^K and *n* can be assumed to vary over time. This means that ln A_0, *gt* and s^H can be considered as a constant term A_0 in Equation (6). Then, the steady-state output per worker or labour productivity (y^*) grows according to the following equation:

$$\ln\left(\frac{Y}{L}\right)^* = A_0 + \theta \ln P + \frac{\alpha}{1-\alpha-\beta}\ln s^K + -\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) \qquad (6)$$

where P consists of financial development and institutions. Rearranging Equation (6), it yields an estimation equation for the relationship between financial development, institutions and output per worker as follows:

$$\ln RGDPC = A_0 + A_1 \ln FD + A_2 \ln INS + A_3 \ln K - A_4 \ln(n+g+\delta) \qquad (7)$$

where $RGDPC$ is real GDP per capita, FD is a financial development indicator, INS is institutions, K is the stock of capital investment or physical capital accumulation, $(n + g + \delta)$: n is the rate of labour growth, g is the rate of technology growth or technological progress and δ is the rate of depreciation. g and δ are assumed to be constant across countries and over time and their sum equals 0.05, following Mankiw *et al*. (1992). A_0 is constant term and A_1, A_2 and A_3 are the parameters to be estimated.

In order to examine the interaction between financial development and institutions on growth, Equation (7) is extended to include a multiplicative interaction term as follows:

$$\ln RGDPC = \beta_0 + \beta_1 \ln FD + \beta_2 \ln INS + \beta_3 \ln(FD \text{ x } INS) + \beta_4 \ln K - \beta_5 \ln(n+g+\delta) \qquad (8)$$

Equations (7) and (8) provide the basis for the empirical models that are estimated in this paper.

Econometric Approach

Cross-Sectional Estimation

Numerous studies have examined the determinants of economic growth using cross-section data, including classic papers such as Barro and Sala-i-Martin (1992, 1995) and Mankiw *et al*. (1992). In these studies the dependent and independent variables are averaged over a fairly long period (usually 20 or move years), which is meant to capture the steady-state relationship between the variables concerned. Our first set of estimations utilises cross-sectional estimations, which enables us to gauge our results against literature benchmarks. In order to estimate Equations (7) and (8) using cross-section analysis, we use country averages for each variable over the full 23-year period (1978 – 2000). Regional dummies for Latin America, East Asia and sub-Saharan Africa are also included in both equations. Three diagnostic tests are carried out in order to check the robustness of cross-sectional analysis, namely the Jarque-Bera normality test, White's heteroscedasticity test and Ramsey's RESET functional form test.

Panel Data Estimation

Equations (7) and (8) provide the basis for estimations using panel data techniques. A time trend is also included[4] to partially capture the influence of human capital, which due to data limitations could not be included in the model specification. A time trend is a good proxy for human capital because the average number of years of schooling for many countries has increased steadily over time. In their analysis of human capital and growth in OECD countries, Bassanini and Scarpetta (2001) find that the time trend variable is only statistically significant when human capital is omitted. Thus, the two equations to be estimated are modified as follows:

[4] The estimation results without the time trend variable are available upon request.

$$\ln RGDPC_{i,t} = A_{0,i} + A_{1,i}\ t + A_{2,i} \ln FD_{i,t} + A_{3,i} \ln INS_{i,t} + A_{4,t} \ln K_{i,t} - A_{5,i} \ln(n+g+\delta)_{i,t} \qquad (9)$$

$$\ln RGDPC_{i,t} = \beta_{0,i} + \beta_{1,i}\ t + \beta_{2,i} \ln FD_{i,t} + \beta_{3,i} \ln INS_{i,t} + \beta_{4,i} \ln(FD \text{ x INS})_{i,t} + \beta_{5,\text{i}} \ln K_{i,t} - \beta_{6,i} \ln(n+g+\delta)_{i,t} \qquad (10)$$

where t is the time trend variable and subscript i refers to the i^{th} country. The empirical analysis of the growth model in Equation (9) and Equation (10) above generally involves a system of N x T equations (N countries and T time observations) that can be examined in different ways. In this study, the main econometric approaches employed include different forms of pooled cross-section time series regressions, which are discussed below.

While cross-sectional estimation methods may, in principle, capture the long-run relationship between the variables concerned, they do not take advantage of the time-series variation in the data, which could increase the efficiency of estimation. It is, therefore, preferable to estimate the growth model using panel data techniques, which, however, require careful econometric modelling of dynamic adjustment. The static panel data technique based on either pooling or fixed effects, which could be applied to Equation (9) [or (10)], makes no attempt to accommodate heterogeneous dynamic adjustment around the long-run equilibrium relationship (Pesaran and Smith, 1995; Pesaran *et al*. 1999). Careful modelling of short-run dynamics requires a slightly different econometric modelling approach. We, therefore, assume that equation (9) [or (10)] holds in the long-run but that the dependent variable may deviate from its equilibrium path in the short-run.

The parameters estimates of Equations (9) and (10) are obtained using two recently developed methods for the statistical analysis of dynamic panel data, namely the mean group (MG) and pooled mean group (PMG) estimators proposed by Pesaran and Smith (1995) and Pesaran *et al*. (1999), respectively. These methods are well suited to the analysis of dynamic panels that have both large time and cross-section data fields. In addition, both estimations have the advantage of being able to accommodate both the long run equilibrium and the possibly heterogeneous dynamic adjustment process. So far these methods have been applied to studies of money demand, energy demand, economic growth and convergence.

Following Pesaran *et al*. (1999), we base our panel analysis on the unrestricted error correction ARDL (p, q) representation:

$$\Delta y_{it} = \phi_i y_{i,t-1} + \beta_i^{'} x_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_{ij}^{'} \Delta x_{i,t-j} + \mu_i + u_{it} \qquad (11)$$

$$i = 1,2, \ldots N; \; t = 1,2, \ldots T.$$

where y_{it} is a scalar dependent variable, x_{it} is the k x 1 vector of regressors for group i, μ_i represent the fixed effects, ϕ_i is a scalar coefficient on the lagged dependent variable, $\beta_i^{'}$'s is the k x 1 vector of coefficients on explanatory variables, λ_{ij}'s are scalar coefficients on lagged first-differences of dependent variables, and γ_{ij}'s are k x 1 coefficient vectors on first-difference of explanatory variables and their lagged values. We assume that the disturbances u_{it}'s in the ARDL model are independently distributed across i and t, with zero means and variances $\sigma_i^2 > 0$. Further assuming that $\phi_i < 0$ for all i and therefore there exists a long-run relationship between y_{it} and x_{it} defined by:

$$y_{it} = \theta_i^{'} x_{it} + \eta_{it} \qquad i = 1,2, \ldots N; \; t = 1,2, \ldots T. \qquad (12)$$

where $\theta_i^{'} = -\beta_i^{'} / \phi_i$ is the k x 1 vector of the long-run coefficients, and η_{it}'s are stationary with possibly non-zero means (including fixed effects). Since Equation (11) can be rewritten as

$$\Delta y_{it} = \phi_i \eta_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_{ij}^{'} \Delta x_{i,t-j} + \mu_i + u_{it} \qquad (13)$$

where $\eta_{i,t-1}$ is the error correction term given by (12), hence ϕ_i is the error correction coefficient measuring the speed of adjustment towards the long-run equilibrium.

Under this general framework, Pesaran *et al*. (1999) propose the Pooled Mean Group (PMG) estimator. This estimator allows the intercepts, short-run coefficients and error variances to differ freely across groups, but the long-run coefficients are constrained to be the same; that is, $\theta_i = \theta$ for all i. The group-specific short-run coefficients and the common long-run coefficients are computed by the pooled maximum likelihood estimation. These estimators are denoted by

$$\hat{\phi}_{PMG} = \frac{\sum_{i=1}^{N}\tilde{\phi}_i}{N},\ \hat{\beta}_{PMG} = \frac{\sum_{i=1}^{N}\tilde{\beta}_i}{N},\ \hat{\lambda}_{j\,PMG} = \frac{\sum_{i=1}^{N}\tilde{\lambda}_{ij}}{N},\ \text{j} = 1, \ldots, p-1, \tag{14}$$

$$\hat{\delta}_{j\,PMG} = \frac{\sum_{i=1}^{N}\tilde{\delta}_{ij}}{N},\ \text{j} = 0, \ldots, \text{q} - 1,\ \hat{\theta}_{PMG} = \tilde{\theta}$$

On the other hand, the mean group (MG) estimates proposed by Pesaran and Smith (1995) allows for heterogeneity of all the parameters and gives the following estimates of short-run and long-run parameters:

$$\hat{\phi}_{MG} = \frac{\sum_{i=1}^{N}\hat{\phi}_i}{N},\ \hat{\beta}_{MG} = \frac{\sum_{i=1}^{N}\hat{\beta}_i}{N},\ \hat{\lambda}_{j\,MG} = \frac{\sum_{i=1}^{N}\hat{\lambda}_{ij}}{N},\ \text{j} = 1, \ldots, p-1, \tag{15}$$

$$\hat{\delta}_{j\,MG} = \frac{\sum_{i=1}^{N}\hat{\delta}_{ij}}{N},\ \text{j} = 0, \ldots, \text{q} - 1,\ \hat{\theta}_{MG} = \frac{1}{N}\sum_{i=1}^{N} - (\hat{\beta}_i / \hat{\phi}_i)$$

where $\hat{\phi}_i, \hat{\beta}_i, \hat{\lambda}_{ij}$ and $\hat{\gamma}_{ij}$ are the OLS estimates obtained individually from Equation (11). In other words, the mean group (MG) approach consists of estimating separate regressions for each country and computing averages of the country-specific coefficients (e.g. Evans, 1997; Lee *et al*., 1997). This estimator is likely to be inefficient in small country samples, where any country outlier could severely influence the averages of the country coefficients.

The MG estimator provides consistent estimates of the mean of the long-run coefficients, though these will be inefficient if slope homogeneity holds. Under long-run slope homogeneity, the pooled estimators are consistent and efficient. The hypothesis of homogeneity of the long-run policy parameters cannot be assumed a priori and is tested empirically in all specifications. The presence of heterogeneity in the means of the coefficients is examined by a Hausman-type test (Hausman, 1978) applied to the difference between the MG and the PMG. Under the null hypothesis the difference in the estimated coefficients between the MG and PMG estimators is not significant and PMG is more efficient.

Data

The data set consists of a panel of observations for 72 countries[5] for the period 1978 – 2000. The sample countries are grouped into three groups: high, middle and low-income based on the World Bank classification[6]. Annual data on real GDP per capita, real gross capital formation, total labour force, and three alternative financial development indicators (liquid liabilities, private sector credit and domestic credit provided by the banking sector, all expressed as ratios to GDP) are collected from World Development Indicators (World Bank CD-ROM 2002). All these data are converted to US dollars based on 1995 constant prices.

The data set on institutional quality indicators employed in this study was assembled by the IRIS Center of the University of Maryland from the International Country Risk Guide (ICRG) – a monthly publication of Political Risk Services (PRS). Following Knack and Keefer (1995), five PRS indicators are used to measure the overall institutional environment, namely: (i) *Corruption*, which reflects the likelihood that officials will demand illegal payment or use their position or power to their own advantage; (ii) *Rule of Law*, which reveals the degree to which citizens are willing to accept established institutions to make and implement laws and to adjudicate dispute. It can also be interpreted as a measure of 'rule obedience' (Clague, 1993) or government credibility; (iii) *Bureaucratic Quality*, which represents autonomy from political pressure, strength, and expertise to govern without drastic changes in policy or interruptions in government services, as well as the existence of an established mechanism for recruitment and training of bureaucrats; (iv) *Government Repudiation of Contracts*, which describes the risk of a modification in a contract taking due to change in government priorities; and (v) *Risk of Expropriation*, which reflects the risk that the rules of the game may be abruptly changed. The above first three variables are scaled from 0 to 6, whereas the last two variables are scaled from 0 to 10. Higher values imply

[5] The list of countries is presented in Appendix I.

[6] The World Bank classifies economies as low-income if the GDP per capita is less than US$755; middle-income if the GDP per capita is between US$755 until US$9265 and high-income economies if the GDP per capita is more than US$9265.

better institutional quality and vice versa. The institutions indicator is obtained by summing the above five indicators[7].

According to Knack and Keefer (1995), these measures reflect security of property and contractual rights, and convey additional information about the institutional environment that is not captured by other institutional proxies, such as the Gastil political and civil liberties indexes. Numerous studies have employed this data set in the empirical analysis, among others, Knack and Keefer (1995), Easterly and Levine (1996), Hall and Jones (1999), Chong and Calderon (2000) and Clarke (2001).

Descriptive Statistics and Correlations

Table 1 reports summary statistics of the variables used in the analysis for the whole sample and grouped by high-income, middle-income and low-income countries. As shown in this table, the high-income countries have the highest level of real GDP per capita, financial development and institutional quality compared to the middle-income and low-income countries. This implies that higher income is associated with more developed financial markets and greater institutional quality. These differences prompt us to examine whether finance and institutions have different channels for influencing economic performance at various levels of development. Table 2 reports the correlation results and this table shows that all three financial development indicators exhibit a positive relationship with real GDP per capita for all three sub-samples. The correlation between institutions and real GDP per capita is positive for high-income and middle-income countries, whereas the correlation is negative for the case of low-income countries.

Figures 1 – 4 present the scatter plots between real GDP per capita against financial development indicators and institutions and real GDP per capita from individual observations across the 72 countries and over the past two decades. As shown in these figures, there is a

[7] The scale of corruption, bureaucratic quality and rule of law was first converted to 0 to 10 (multiplying them by 5/3) to make them comparable to the other indicators. For robustness checks, we also used different weights for each indicator to construct the aggregate index. The estimates are similar and are available on request.

positive relationship between real GDP per capita and financial development indicators and institutions. The figures also indicate that there is no outlier in the scatter plots.

III. Estimation Results

We first estimate equations (7) and (8) on the full sample of countries using the OLS cross-country estimator[8]. The results are reported in Table 3, where Models 1-6 are estimates of Equation (7), utilising alternative proxies for financial development. Similarly, Models 7-12 are estimates of Equation (8), which includes the interaction term between financial development and institutions.

To start with, it is important to note that the signs of the estimated coefficients on physical capital and labour growth are consistent with theory. It is also worth noting that the Jarque-Bera statistic suggests that the residuals of the regressions are normally distributed in all twelve models. The White test indicates that the residuals are homoskedastic and independent of the regressors, in all twelve models. The Ramsey RESET test results also demonstrate that there is no functional form error, again, in all models. Thus, the results of the diagnostic tests suggest that the models are relatively well specified. In addition, the adjusted R-squared suggests that these models explain about 72 – 83 percent of the variation in real GDP per capita.

In Models 1 - 3, all three financial development indicators, as well as the institutions variable are positive and statistically significant, as expected. When the regional dummies are included, as shown in Models 4 - 6, the institutions variable remains highly significant.

[8] The equations were also estimated using 2-Stage Least Squares (2SLS), to check for possible endogeneity of the financial development and/or the institutional quality indicators. The instruments utilised were as follows: (i) financial development: legal origins and initial income; (ii) institutional quality: mortality rates and initial income; mortality rates were sourced from Acemoglou *et al* (2002); legal origins from the World Bank Group homepage. The 2SLS estimations, which required a slightly different sample period because the instruments were only available for the 1985-2000 sample period, enabled us to carry out 3 sets of Hausman exogeneity tests. The latter could not reject the hypotheses that: (i) the financial development indicators are exogenous; (ii) the institutional quality variables are exogenous; (iii) both the financial development and the institutional quality variables are exogenous; for any of the six models (i.e. in total we carried out 18 Hausman exogeneity tests). The results are reported in an Appendix (not intended for publication).

However, of the three financial development indicators only the private sector credit remains statistically significant at the conventional level. In Models 7 - 9, the newly included interaction term is highly significant, while the significance of the institutions variable is reduced to the 10% level. All three financial development indicators remain significant at conventional levels except for domestic credit. In Models 10 - 12 where the regional dummies are also included, the interaction term and financial development remain highly significant, and the coefficients of the interaction term are larger than those of the financial development indicators. However, the institutions variable is not significant. These findings seem to indicate that both the quantity and the quality of finance matter for economic growth, while institutions matter only in so far as they can improve the quality of finance.

Table 4 reports estimates of Equation (9) that utilise three alternative panel data estimators: mean group (MG), which imposes no restrictions; pooled mean group (PMG), which imposes common long-run effects and static fixed effect models. This table presents estimates of the long-run coefficients, the adjustment coefficient, log-likelihood (LR) and joint Hausman test statistics[9]. The comparison between MG and PMG is based on the Hausman test. The lag order is first chosen in each country on the unrestricted model with lagged one for the independent variable[10]. Because the time span of the panel data is only 23 years (1978 – 2000), the MG estimator suffers from too few degrees of freedom. The Hausman test statistic fails to reject the null hypothesis which indicates that the data do not reject the restriction of common long-run coefficients. Hence, the MG estimator is not as informative as the PMG estimator and we therefore focus on the PMG results. These results reveal that the signs of the long-run coefficients remain similar to those obtained by OLS and are consistent with theory. The coefficients of physical capital, financial development and institutional quality are positive and statistically significant. The static fixed effect estimator also demonstrates that there are significant financial development and institutional effects.

Table 5 reports the three alternative panel data estimators of Equation (10) when the interaction term is included in the growth model. The Hausman test indicates that the data do not reject the restriction of common long-run coefficients, therefore, only the PMG estimator

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[9] These tests are carried out by using the GAUSS program written by Shin, Y (Department of Economics, University of Edinburgh).
[10] The lag structure is (1,0,0,0,0,0) and the order of variables is as follows: dependent variable, K, $(n+g+\delta)$, financial development, INS and Time Trend.

results are discussed. The results reveal that both financial development and institutional quality are statistically significant determinants of long-run growth. In addition, we find an economically large and statistically significant effect of the interaction term on real GDP per capita, which is similar to that obtained with the cross-section OLS regression. However, an important difference now is that the institutional quality variable remains significant at the 5% level or lower in all 3 Models. This suggests that the marginal effects of both finance and institutions on growth are higher than has been suggested by earlier literature. Financial development has both direct and indirect effects on growth, which broadly speaking reflects the effects of financial deepening (size effects) and the influence of institutions (quality effects). Similarly, institutional development has both direct and indirect effects on growth, with the latter depending on the size of the financial system. In other words, institutional development has a greater payoff in terms of growth when the financial system is more developed.

We now turn to examine the extent to which the above findings vary with the stage of economic development, by re-estimating the models utilising panels of high-income, middle-income and low-income countries. The results are reported in Tables 6, 7 and 8, respectively. Only the pooled mean group (PMG) estimation results are reported since the Hausman test indicates that the null hypothesis of no difference between the MG and PMG estimators cannot be rejected.

Table 6 presents the pooled mean group (PMG) estimation results for high-income countries. Both the financial development indicators and institutional quality retain their positive sign, but they are no longer statistically significant in all models. Two of the financial development indicators, namely liquid liabilities and private sector credit, remain statistically significant, while domestic credit is no longer significant. Institutional quality is no longer statistically significant in any of the six models at the 5% level – it is, however, significant at the 10% level in the first three models. The interaction term, however, performs better. It is statistically significant at conventional levels in two out of three models and significant at the 10% level in the third. The coefficients on the financial development indicators in models 4 - 6 in Table 6 are much lower than those in the corresponding models in Table 5. The interaction terms in Table 6, however, are slightly higher than in the corresponding models in Table 5. These findings seem to suggest that even within high income countries financial development, as measured by liquid liabilities or private credit, has positive, albeit smaller direct effects on growth, than in the entire sample. Its indirect effects, which depend on the quality of institutions, are, however, if anything, somewhat larger than in the entire sample. Given that institutional quality is higher in high-income countries, financial development may overall still have large positive effects on economic growth. The same cannot be said for institutional quality, the effects of which are now largely through the financial system. Thus, while institutional improvements appear to display diminishing returns, financial development remains an important engine of growth even for developed countries.

The pool-mean group results for middle-income countries are reported in Table 7. The direct effects of financial development on economic growth are larger and more significant than in the high-income group in all of the corresponding six models. This finding is consistent with Rioja and Valev (2004), who also find a much stronger growth-enhancing effect of financial development in middle-income countries compared to high-income countries. Institutional quality also has a positive and highly significant effect on economic growth in all six models. Thus, our findings provide support to the argument that good institutions are more important for growth in less developed countries (Rodrik, 1997). In addition, the estimated coefficient of the interaction term in Models 4 - 6 is both large and highly significant. These findings seem to suggest that both finance and institutional quality have large direct and indirect effects on growth. Improving both finance and institutional quality in middle-income countries is, therefore, likely to boost economic growth, much more than in high-income countries.

Table 8 reports the results for low-income countries. Financial development is found to have very small direct effects on growth. The estimated coefficients are not only small but they are also statistically insignificant for two of the three indicators. Only the private credit indicator is significant but its coefficient is only 0.10 compared to 0.40 for middle-income countries and 0.20 for high-income countries. Institutions, however, have a large positive and significant direct effect on growth in these countries. The estimated coefficients on institutional quality are roughly twice the size those obtained for middle or high-income countries. The estimated coefficients of the interaction terms are positive and highly significant, however, they are almost half the size of the corresponding ones obtained for the middle-income group. Our findings suggest that policy makers in low-income countries should primarily be focussing on improving institutional quality, which is likely to have both direct and indirect effects on growth. Financial development, especially if it boosts credit to the private sector, is also likely to have significant payoffs in terms of growth, but even these to a large extent depend on the presence of good institutions.

IV. Conclusion

Our findings suggest that financial development has larger effects on growth when the financial system is embedded within a sound institutional framework. We found this to be particularly true for poor countries, where more finance may well fail to deliver more growth, if institutional quality is low. For poor countries, improvements in institutions are likely to deliver much larger direct effects on growth than financial development itself. They are also likely to have positive indirect effects, through the financial system, particularly when the latter is providing large amounts of credit to the private sector.

Our findings also suggest that financial development is most potent in delivering extra growth in middle-income countries. Its effects are particularly large when institutional quality is high. Institutional improvements can also deliver more growth, especially when the financial system is developed. The effects of financial development in high-income countries are smaller than in middle-income countries; however, even in these countries its effects appear to be much larger when institutional quality is high. It is also worth noting that institutional improvements in these countries are only likely to deliver benefits when the financial system is large.

To conclude, it does appear to be the case that the interaction between financial development and institutional quality, a variable that has been neglected in previous studies, is very important in terms of economic growth at all stages of development.[11] Thus, 'better finance, more growth' seems to be a much more widely applicable proposition than 'more finance, more growth'.

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[11] One possible interpretation of this variable is 'quality-adjusted finance' – since more of it is tantamount to a better functioning financial system.

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TABLE 1 – DESCRIPTIVE STATISTICS

	RGDPC	(n+g+δ)	K	LIA	PRI	DOC	INS
All Countries (n=72)							
Mean	8.8573	-2.6423	3.0419	3.7492	3.5310	3.9456	3.4318
Maximum	11.3355	-2.4336	7.5959	5.1575	5.1667	5.5288	3.9005
Minimum	5.7332	-2.9180	2.2625	1.8976	1.1824	2.0370	2.5680
Standard Deviation	1.5678	0.1451	0.6111	0.5678	0.8213	0.6550	0.3308
High Income (n=24)							
Mean	10.5968	-2.7898	3.2372	4.0553	4.1170	4.3231	3.7785
Maximum	11.3354	-2.4824	7.5958	5.1574	5.1666	5.5287	3.9004
Minimum	9.1869	-2.9180	2.8770	1.8975	1.9580	2.0369	3.3322
Standard Deviation	0.5461	0.1211	0.9348	0.6299	0.6575	0.6798	0.1726
Middle Income (n=24)							
Mean	8.6365	-2.5565	3.0174	3.6919	3.4428	3.8636	3.2928
Maximum	9.9175	-2.4336	3.4666	4.6754	4.5353	4.7142	3.6438
Minimum	7.2212	-2.7785	2.6230	3.1173	2.1079	2.9841	2.8605
Standard Deviation	0.6737	0.0871	0.2248	0.4166	0.6269	0.5446	0.2313
Low Income (n=24)							
Mean	7.0350	-2.5682	2.8369	3.4506	2.9336	3.5910	3.1825
Maximum	8.1132	-2.4572	3.4305	4.4594	4.4130	4.5882	3.5369
Minimum	5.7332	-2.7230	2.2625	2.6548	1.1824	2.6483	2.5680
Standard Deviation	0.6143	0.0685	0.3233	0.4797	0.7486	0.5232	0.2080

Note: RGDPC = real GDP per capita; (n+g+δ) = labour growth; K = real gross fixed capital formation/GDP; LIA = liquid liabilities/GDP; PRI = private sector credit/GDP; DOC = domestic credit/GDP and INS = institutional quality.

TABLE 2 - CORRELATIONS

	RGDPC	$(n+g+\delta)$	K	LIA	PRI	DOC	INS
All Countries (n=72)							
RGDPC	1.0000						
$(n+g+\delta)$	-0.7111	1.0000					
K	0.2446	-0.1036	1.0000				
LIA	0.5272	-0.3612	0.0563	1.0000			
PRI	0.7076	-0.5039	0.1446	0.8300	1.0000		
DOC	0.5634	-0.4083	0.0829	0.8909	0.8209	1.0000	
INS	0.8098	-0.6878	0.1396	0.4658	0.6455	0.5099	1.0000
High Income (n=24)							
RGDPC	1.0000						
$(n+g+\delta)$	-0.5555	1.0000					
K	-0.2762	0.1297	1.0000				
LIA	0.2008	-0.0095	-0.3433	1.0000			
PRI	0.3729	-0.1574	-0.3388	0.9303	1.0000		
DOC	0.3661	-0.1109	-0.2447	0.9320	0.9737	1.0000	
INS	0.8515	-0.5583	-0.5419	0.2403	0.4055	0.3327	1.0000
Middle Income (n=24)							
RGDPC	1.0000						
$(n+g+\delta)$	-0.4957	1.0000					
K	0.1898	0.1210	1.0000				
LIA	0.3724	-0.3468	0.5278	1.0000			
PRI	0.5651	-0.5407	0.2279	0.5614	1.0000		
DOC	0.3212	-0.2069	0.4021	0.7990	0.7110	1.0000	
INS	0.5733	-0.2668	0.4770	0.3260	0.5067	0.4088	1.0000
Low Income (n=24)							
RGDPC	1.0000						
$(n+g+\delta)$	-0.0087	1.0000					
K	0.6693	0.0911	1.0000				
LIA	0.6226	-0.0684	0.7220	1.0000			
PRI	0.6600	0.0890	0.7969	0.8360	1.0000		
DOC	0.6232	-0.1941	0.4342	0.8067	0.5748	1.0000	
INS	-0.0271	0.2381	0.4705	0.1637	0.2875	0.0659	1.0000

Note: RGDPC = real GDP per worker; $(n+g+\delta)$ = labour growth; K = real gross fixed capital formation/GDP; LIA = liquid liabilities/GDP; PRI = private sector credit/GDP; DOC = domestic credit/GDP and INS = institutional quality.

TABLE 3 – RESULTS OF OLS ESTIMATION
Dependent Variable: Real GDP Per Capita
(72 Cross-Country, 1978 – 2000)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Constant	-10.35	-8.41	-9.94	-3.16	-2.49	-2.60	-15.55	-8.57	-10.22	16.43	6.69	11.47
	(-5.49)***	(-4.49)***	(-5.27)***	(-1.21)	(2.37)	(-1.05)	(-1.83)	(-1.50)	(-1.26)	(1.98)	(1.26)	(1.70)
$(n+g+\delta)$	-0.69	-0.67	-0.62	-0.57	-0.54	-0.50	-0.58	-0.60	-0.57	-0.55	-0.45	-0.48
	(-3.13)***	(-3.04)***	(-3.05)***	(2.33)**	(-2.60)***	(-2.71)***	(-3.18)***	(-2.88)***	(-2.98)***	(1.34)**	(-2.16)**	(-1.73)*
K	0.34	0.30	0.33	0.37	0.33	0.36	0.33	0.29	0.33	0.30	0.36	0.39
	(2.07)**	(1.87)*	(2.01)**	(2.18)**	(2.33)**	(2.04)**	(1.96)*	(1.81)*	(1.96)*	(2.56)**	(2.67)***	(2.17)**
INS	0.45	0.46	0.44	0.40	0.42	0.39	0.64	0.50	0.50	0.42	0.24	0.37
	(5.54)***	(4.51)***	(5.44)***	(3.35)***	(2.87)***	(3.40)***	(1.70)*	(1.95)*	(1.86)*	(1.20)	(0.15)	(0.71)
LIA	0.49	-	-	0.21	-	-	0.35	-	-	0.26	-	-
	(2.46)**			(1.80)*			(2.17)**			(2.37)**		
PRI	-	0.53	-	-	0.33	-	-	0.48	-	-	0.39	-
		(3.45)***			(2.54)**			(2.52)**			(2.22)**	
DOC	-	-	0.42	-	-	0.28	-	-	0.40	-	-	0.30
			(2.41)**			(1.36)			(1.88)*			(2.05)**
LIA x INS	-	-	-	-	-	-	0.45	-	-	0.58	-	-
							(2.82)***			(2.48)**		
PRI x INS	-	-	-	-	-	-	-	0.57	-	-	0.83	-
								(2.29)**			(1.33)**	
DOC x INS	-	-	-	-	-	-	-	-	0.43	-	-	0.55
									(2.42)**			(2.23)**
Latin America	-	-	-	0.72	0.66	0.70	-	-	-	0.65	0.73	0.66
				(2.72)***	(2.92)***	(2.87)***				(2.54)**	(3.26)***	(2.79)***
East Asia	-	-	-	-0.30	-0.49	-0.30	-	-	-	-0.49	-0.57	-0.42
				(-0.88)	(-1.53)	(-0.93)				(-1.45)	(-1.58)	(-1.31)
Sub-Saharan Africa	-	-	-	-0.62	-0.50	-0.68	-	-	-	-0.82	-0.52	-0.80
				(-2.03)**	(-1.91)*	(-2.32)**				(-2.71)***	(-2.06)**	(-2.75)***
Adj R^2	0.73	0.74	0.72	0.78	0.82	0.81	0.72	0.74	0.72	0.80	0.83	0.83
Jarque-Bera	5.29	3.88	3.65	3.58	3.44	3.39	5.06	3.94	3.67	5.07	4.77	3.67
(χ^2-stat)	(0.07)	(0.14)	(0.16)	(0.17)	(0.18)	(0.18)	(0.08)	(0.14)	(0.16)	(0.08)	(0.09)	(0.16)
White Test	11.32	13.03	14.72	11.35	16.78	12.04	11.03	16.62	14.99	12.05	17.22	11.39
(χ^2-stat)	(0.18)	(0.11)	(0.07)	(0.18)	(0.08)	(0.15)	(0.35)	(0.08)	(0.13)	(0.15)	(0.07)	(0.19)
Ramsey RESET	1.09	0.37	0.92	2.24	1.43	1.76	2.00	0.87	0.95	1.06	0.27	0.54
	(0.36)	(0.77)	(0.44)	(0.09)	(0.24)	(0.16)	(0.12)	(0.46)	(0.42)	(0.37)	(0.85)	(0.65)

Notes: Figures in parentheses are t-statistics except for Jarque-Bera normality, White heteroscedasticity and Ramsey RESET tests, which are p-values. Significance at 1%, 5% and 10% denoted by ***, ** and * respectively.

TABLE 4 – ALTERNATIVE PANEL DATA ESTIMATIONS FOR ARDL
Dependent Variable: Real GDP Per Capita (72 countries, 1978 – 2000)

Liquid Liabilities/GDP (LIA)	MG Estimators	PMG Estimators	Static Fixed-Effects Estimators
(n+g+δ)	-0.60	-0.48	-0.62
	(-1.52)	(-1.72)	(1.54)
Capital	1.41	0.40	0.43
	(1.25)	(10.32)***	(5.87) ***
LIA	0.24	0.30	0.20
	(1.43)	(2.35)**	(10.12) ***
INS	0.85	0.35	0.24
	(2.14)**	(2.88)***	(2.87)***
Time Trend	0.03	0.02	0.02
	(2.49)**	(3.07)***	(2.34)**
Adjustment	-0.35	-0.16	-1
	(-8.15)	(-4.86)***	(N/A)
Log-likelihood	3042.57	2626.03	1056.33
H Test for long-run homogeneity	8.34 (0.08)		

Private Sector Credit/GDP (PRI)	MG Estimators	PMG Estimators	Static Fixed-Effects Estimators
(n+g+δ)	-0.61	-0.50	-0.63
	(-1.35)	(-1.62)	(-1.37)
Capital	1.03	0.42	0.38
	(1.19)	(8.24)***	(4.76)***
PRI	0.34	0.37	0.29
	(2.50)**	(3.50)***	(8.46)***
INS	0.43	0.42	0.36
	(1.82)*	(6.15)***	(4.47)***
Time Trend	0.03	0.01	0.02
	(2.44)**	(2.87)***	(2.13)**
Adjustment	-0.38	-0.14	-1
	(-7.99)***	(-3.48)***	(N/A)
Log-likelihood	3004.29	2544.16	991.59
H Test for long-run homogeneity	8.32 (0.08)		

Domestic Credit/GDP (DOC)	MG Estimators	PMG Estimators	Static Fixed-Effects Estimators
(n+g+δ)	-0.60	-0.49	-0.58
	(1.52)	(-1.60)	(-1.30)
Capital	1.15	0.45	0.34
	(1.28)	(7.56)***	(5.14)***
DOC	0.25	0.33	0.30
	(1.56)	(2.42)**	(2.37)**
INS	0.47	0.40	0.38
	(1.89)*	(5.37)***	(1.95)*
Time Trend	0.02	0.02	0.01
	(2.31)**	(3.01)***	(2.41)**
Adjustment	-0.35	-0.17	-1
	(-7.86)***	(-4.05)***	(N/A)
Log-likelihood	2631.07	3058.72	994.28
H Test for long-run homogeneity	3.36 (0.50)		

Notes: All equations include a constant country-specific term. Figures in parentheses are t-statistics except for Hausman tests (H), which are p-values. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. N x T = 1656.

TABLE 5 – ALTERNATIVE PANEL DATA ESTIMATIONS FOR ARDL
(with Interaction term between Financial Development and Institutions)
Dependent Variable: Real GDP Per Capita (72 countries, 1978 – 2000)

Liquid Liabilities/GDP (LIA)	MG Estimators	PMG Estimators	Static Fixed-Effects Estimators
(n+g+δ)	-0.50	-0.36	-0.58
	(-1.36)	(-1.44)	(1.53)
Capital	1.38	0.34	0.40
	(1.55)	(2.29)**	(4.52)***
LIA	0.32	0.25	0.27
	(1.25)	(2.36)**	(8.32)***
INS	0.68	0.20	0.29
	(0.99)	(2.28)**	(2.49)**
LIA x INS	0.60	0.35	0.31
	(1.71)	(3.62)***	(5.55)***
Time Trend	0.03	0.02	0.02
	(2.14)**	(2.98)***	(2.36)**
Adjustment	0.32	-0.14	-1
	(-6.98)***	(-4.42)***	(N/A)
Log-likelihood	3141.33	2631.92	1075.78
H Test for long-run Homogeneity	4.11 (0.53)		
Private Sector Credit/GDP (PRI)	MG Estimators	PMG Estimators	Static Fixed-Effects Estimators
(n+g+δ)	-0.47	-0.34	-0.62
	(1.48)	(-1.50)	(1.54)
Capital	0.82	0.32	0.37
	(1.29)	(2.32)**	(4.08)***
PRI	0.30	0.32	0.27
	(1.52)	(2.14)**	(6.38)***
INS	0.71	0.22	0.20
	(1.14)	(2.33)**	(2.12)**
PRI x INS	0.53	0.36	0.32
	(1.80)*	(2.95)***	(4.90)***
Time Trend	0.02	0.03	0.02
	(2.31)**	(3.02)***	(2.28)**
Adjustment	-0.36	-0.16	-1
	(-7.25)***	(-4.29)***	(N/A)
Log-likelihood	3169.64	2631.39	1050.96
H Test for long-run Homogeneity	5.82 (0.32)		
Domestic Credit/GDP (DOC)	MG Estimators	PMG Estimators	Static Fixed-Effects Estimators
(n+g+δ)	-0.48	-0.29	-0.54
	(-1.53)	(-1.56)***	(-1.53)
Capital	0.74	0.30	0.35
	(1.33)	(2.45)**	(4.16)***
DOC	0.25	0.22	0.12
	(0.14)	(2.21)**	(1.47)
INS	0.84	0.24	0.21
	(1.56)	(3.46)***	(2.18)**
DOC x INS	0.33	0.30	0.39
	(1.86)*	(4.14)***	(2.19)**
Time Trend	0.01	0.02	0.02
	(2.46)**	(3.21)***	(2.36)**
Adjustment	-0.40	-0.18	-1
	(-6.23)***	(-4.39)***	(N/A)
Log-likelihood	3166.85	2648.85	996.59
H Test for long-run Homogeneity	3.44 (0.63)		

Notes: All equations include a constant country-specific term. Figures in parentheses are t-statistics except for Hausman tests (H), which are p-values. *** and ** indicate significance at the 1% and 5% levels, respectively. N x T = 1656.

TABLE 6 – POOLED MEAN GROUP ESTIMATIONS OF HIGH-INCOME COUNTRIES
Dependent Variable: Real GDP Per Capita
(24 countries, 1978 – 2000)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
$(n+g+\delta)$	-0.50	-0.47	-0.55	-0.53	-0.56	-0.51
	(-1.01)	(-1.07)	(-1.14)	(-1.25)	(-1.34)	(-1.39)
K	0.42	0.45	0.44	0.45	0.48	0.46
	(1.86)*	(1.77)*	(1.89)*	(1.87)*	(1.93)*	(1.84)*
INS	0.12	0.15	0.20	0.10	0.12	0.15
	(1.69)*	(1.88)*	(1.92)*	(1.58)	(1.62)	(1.54)
LIA	0.24	-	-	0.18	-	-
	(3.09)***			(3.10)***		
PRI	-	0.20	-	-	0.17	-
		(2.79)***			(2.38)**	
DOC	-	-	0.14	-	-	0.11
			(1.51)			(1.45)
LIA x INS	-	-	-	0.36	-	-
				(3.15)***		
PRI x INS	-	-	-	-	0.38	-
					(2.47)**	
DOC x INS	-	-	-	-	-	0.32
						(1.89)*
Time Trend	0.02	0.03	0.02	0.01	0.02	0.03
	(2.44)**	(2.59)***	(2.38)**	(2.23)**	(2.50)**	(2.34)**
Adjustment	-0.09	-0.11	-0.08	-0.06	-0.07	-0.09
	(-2.05)**	(-2.47)**	(-1.92)*	(-2.52)***	(-2.43)**	(-2.61)***
H test for long-run homogeneity	1.68	3.27	1.65	8.09	3.90	4.39
	(0.79)	(0.51)	(0.80)	(0.08)	(0.14)	(0.35)

Notes: All equations include a constant country-specific term. Figures in parentheses are t-statistics except for Hausman tests (H), which are p-values. Significance at 1%, 5% and 10% denoted by ***, ** and * respectively.

TABLE 7 – POOLED MEAN GROUP ESTIMATIONS OF MIDDLE-INCOME COUNTRIES
Dependent Variable: Real GDP Per Capita
(24 countries, 1978 – 2000)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(n+g+δ)	-0.30 (-2.77)***	-0.36 (-2.33)**	-0.33 (-2.44)**	-0.27 (-2.59)***	-0.30 (-2.40)**	-0.28 (-2.37)**
K	0.35 (4.67)***	0.41 (4.65)***	0.38 (4.24)***	0.30 (3.77)***	0.32 (2.85)***	0.33 (3.32)***
INS	0.20 (5.57)***	0.22 (5.36)***	0.24 (5.00)***	0.17 (2.41)**	0.18 (2.49)**	0.21 (2.52)**
LIA	0.35 (3.15)***	-	-	0.30 (2.43)**	-	-
PRI	-	0.40 (4.57)***	-	-	0.42 (3.59)***	-
DOC	-	-	0.27 (3.53)***	-	-	0.36 (1.88)*
LIA x INS	-	-	-	0.49 (4.26)***	-	-
PRI x INS	-	-	-	-	0.53 (4.48)***	-
DOC x INS	-	-	-	-	-	0.45 (5.30)***
Time Trend	0.01 (2.58)***	0.02 (2.45)**	0.01 (2.35)**	0.02 (2.40)**	0.02 (2.39)**	0.02 (2.53)**
Adjustment	-0.15 (-4.62)***	-0.18 (4.32)***	-0.20 (-4.89)***	-0.21 (-3.58)***	-0.25 (-3.59)***	-0.24 (-3.82)***
H test for long-run homogeneity	8.14 (0.09)	4.41 (0.35)	1.74 (0.78)	8.10 (0.08)	3.96 (0.33)	8.33 (0.08)

Notes: All equations include a constant country-specific term. Figures in parentheses are t-statistics except for Hausman tests (H), which are p-values. Significance at 1%, 5% and 10% denoted by ***, ** and * respectively.

TABLE 8 – POOLED MEAN GROUP ESTIMATIONS OF LOW-INCOME COUNTRIES
Dependent Variable: Real GDP Per Capita
(24 countries, 1978 – 2000)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
$(n+g+\delta)$	-0.45 (-2.22)**	-0.43 (-2.35)**	-0.47 (-2.55)**	-0.48 (-4.36)***	-0.46 (-3.16)***	-0.50 (-2.15)**
K	0.28 (5.88)***	0.31 (6.30)***	0.33 (6.52)***	0.30 (2.87)***	0.33 (3.71)***	0.32 (2.75)***
INS	0.38 (2.16)**	0.40 (2.29)**	0.36 (2.89)***	0.34 (2.38)**	0.36 (2.27)**	0.32 (2.41)**
LIA	0.17 (1.32)	-	-	0.18 (1.56)	-	-
PRI	-	0.10 (2.33)**	-	-	0.20 (2.14)**	-
DOC	-	-	0.08 (0.98)	-	-	0.13 (1.38)
LIA x INS	-	-	-	0.26 (2.45)**	-	-
PRI x INS	-	-	-	-	0.28 (2.30)**	-
DOC x INS	-	-	-	-	-	0.23 (2.27)**
Time Trend	0.01 (2.14)**	0.02 (2.39)**	0.02 (2.22)**	0.02 (2.41)**	0.03 (2.36)**	0.03 (2.50)**
Adjustment	-0.13 (-3.25)***	-0.16 (-3.69)***	-0.10 (-3.55)***	-0.17 (-2.87)***	-0.19 (-2.36)**	-0.15 (-2.39)**
H test for long-run homogeneity	5.39 (0.25)	4.40 (0.35)	5.65 (0.23)	3.15 (0.68)	10.75 (0.06)	4.07 (0.54)

Notes: All equations include a constant country-specific term. Figures in parentheses are t-statistics except for Hausman tests (H), which are p-values. Significance at 1%, 5% and 10% denoted by ***, ** and * respectively.

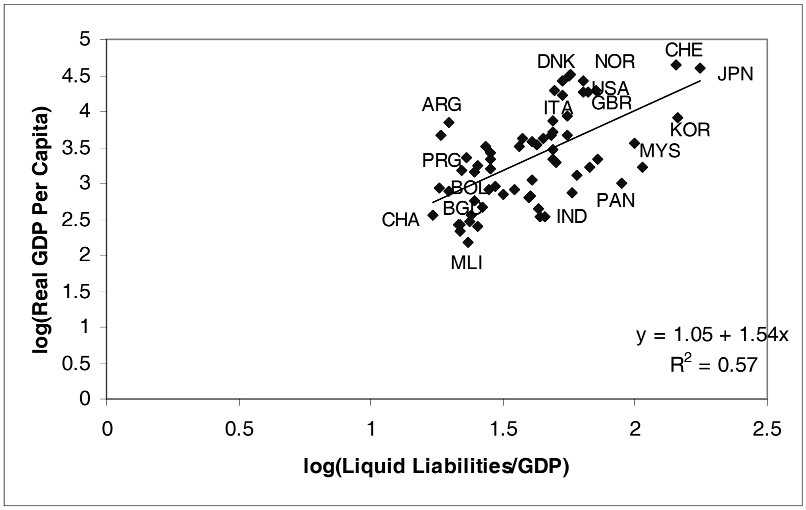

Figure 1: The Relationship between Real GDP Per Capita and Liquid Liabilities

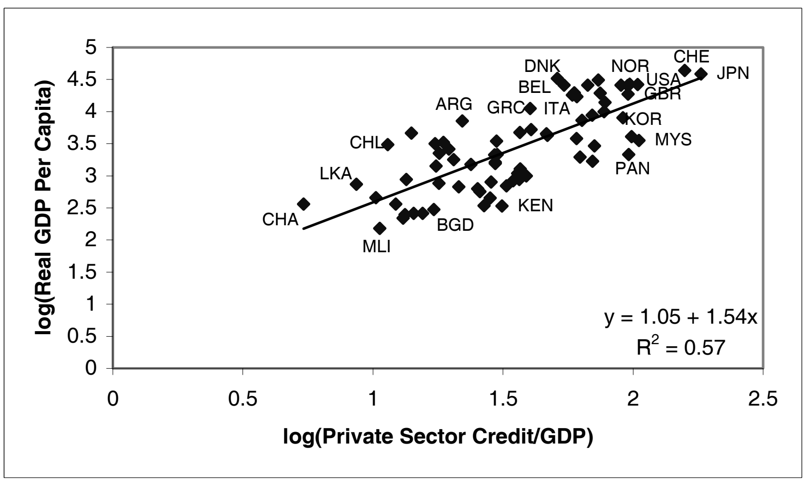

Figure 2: The Relationship between Real GDP Per Capita and Private Sector Credit

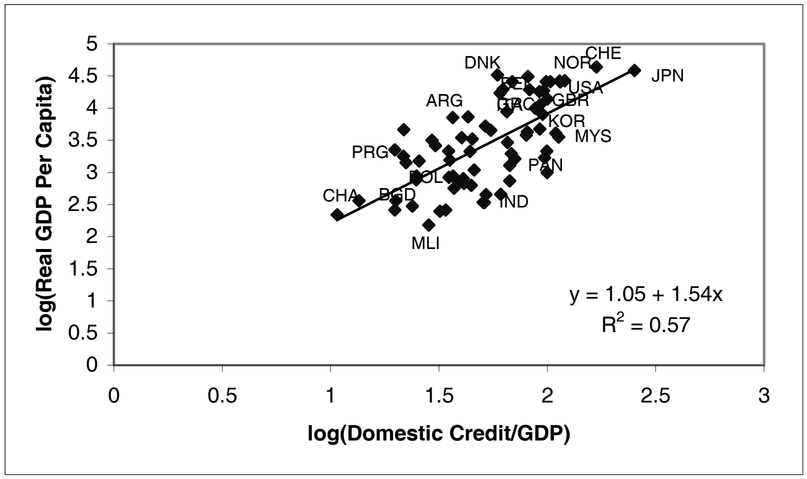

Figure 3: The Relationship between Real GDP Per Capita and Domestic Credit

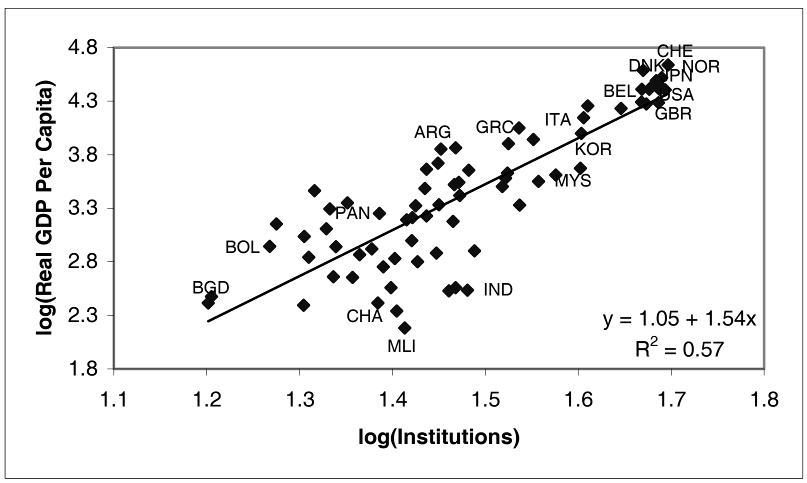

Figure 4: The Relationship between Real GDP Per Capita and Institutions

APPENDIX I
List of Countries Used in the Estimation Categorised the World Bank

High Income		**Middle-Income**		**Low-Income**	
Australia	AUS	Argentina	ARG	Algeria	DZA
Austria	AUT	Bolivia	BOL	Bangladesh	BGD
Belgium	BEL	Brazil	BRA	Cameroon	CMR
Canada	CAN	Chile	CHL	Egypt	EGY
Denmark	DNK	Colombia	COL	Gambia	GMB
Finland	FIN	Costa Rica	CRI	Ghana	CHA
France	FRA	Cyprus	CYP	Haiti	HAI
Germany	GER	Dominican Republic	DOM	Honduras	HND
Greece	GRC	Ecuador	ECU	India	IND
Iceland	ICE	El Salvador	ESL	Indonesia	IDN
Ireland	IRE	Guatemala	GTM	Kenya	KEN
Israel	ISL	Iran	IRN	Malawi	MWI
Italy	ITA	Jamaica	JAM	Niger	NIG
Japan	JPN	Korea	KOR	Pakistan	PAK
Netherlands	NEL	Malaysia	MYS	Philippines	PHL
New Zealand	NZL	Mexico	MEX	Senegal	SEN
Norway	NOR	Nicaragua	NIC	Sierra Leone	SIL
Portugal	POR	Panama	PAN	Sri Lanka	LKA
Singapore	SIN	Papua New Guinea	PNG	Tanzania	TAN
Spain	ESP	Paraguay	PRY	Thailand	THA
Sweden	SWE	Peru	PER	Togo	TOG
Switzerland	CHE	South Africa	ZAF	Tunisia	TUN
United Kingdom	GBE	Syria	SYR	Zimbabwe	ZWE
United States	USA	Uruguay	URY	Zambia	ZMB

APPENDIX II (Not intended for publication)

Table AI: OLS ESTIMATION
Dependent Variable: Real GDP Per Capita
(Sample Period: 1985 – 2000)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	-4.33	-2.36	-4.35	-4.43	-2.35	-4.37
	(-1.02)	(-0.60)	(-1.11)	(-1.03)	(-0.60)	(-1.10)
$(n+g+\delta)$	-0.36	-0.47	-0.69	-0.39	-0.47	-0.70
	(-0.23)	(-0.33)	(-0.47)	(-0.24)	(-0.32)	(-0.47)
K	0.39	0.29	0.32	0.39	0.29	0.32
	(1.82)*	(1.46)	(1.59)	(1.81)*	(1.45)	(1.58)
INS	0.58	0.42	0.48	0.31	0.33	0.35
	(2.93)***	(3.12)***	(2.89)***	(3.20)***	(2.97)***	(3.50)***
LIA	0.32	-	-	0.26	-	-
	(3.32)***			(2.04)**		
PRI	-	0.35	-	-	0.28	-
		(3.98)***			(2.15)**	
DOC	-	-	0.29	-	-	0.23
			(2.59)***			(2.05)**
LIA x INS	-	-	-	0.44	-	-
				(2.23)**		
PRI x INS	-	-	-	-	0.50	-
					(2.74)***	
DOC x INS	-	-	-	-	-	0.46
						(3.46)***
Adj R^2	0.50	0.58	0.56	0.62	0.67	0.65
Jarque-Bera	3.16	3.11	2.76	3.24	3.08	2.77
(χ^2-stat)	(0.20)	(0.21)	(0.25)	(0.19)	(0.21)	(0.24)
Ramsey	1.21	1.72	1.13	1.25	1.89	1.20
RESET	(0.31)	(0.17)	(0.34)	(0.30)	(0.14)	(0.31)
(F-stat)						
Breusch –	0.08	0.46	0.15	0.11	0.45	0.16
Pagan Test	(0.77)	(0.49)	(0.69)	(0.73)	(0.50)	(0.68)
(χ^2-stat)						
N	68	68	68	68	68	68

Notes: Figures in parentheses are t-statistics except for Jarque-Bera, Ramsey RESET and Breusch-Pagan tests, which are p-values. Significance at 1%, 5% and 10% denoted by ***, ** and * respectively.

Table AII: ENDOGENEITY TEST RESULTS

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	(without interaction term)			(with interaction term)		
Endogenous Variable	Financial Development			Financial Development		
Instrumental Variables	Legal Origins, Initial Income			Legal Origins, Initial Income		
Hausman Test	5.06 (0.41)	9.95 (0.07)	7.56 (0.18)	0.66 (0.99)	1.51 (0.95)	1.85 (0.93)
Endogenous Variable	Institutions			Institutions		
Instrumental Variables	Mortality Rates, Initial Income			Mortality Rates, Initial Income		
Hausman test	4.17 (0.52)	3.42 (0.63)	4.92 (0.42)	0.86 (0.99)	1.19 (0.97)	1.35 (0.96)
Multiple Endogenous Variables	Financial Development and Institutions			Financial Development and Institutions		
Instrumental Variables	Legal Origins, Mortality Rates and Initial Income			Legal Origins, Mortality Rates and Initial Income		
Hausman Test	6.08 (0.29)	8.94 (0.11)	0.40 (0.99)	1.83 (0.93)	1.59 (0.95)	1.02 (0.98)

Notes: The null and alternative hypotheses of Hausman test are: H_0: Regressors are exogenous versus H_A: they are endogenous. This test is based on an asymptotic chi-squared distribution with k degrees of freedom. The mortality rates data are from Acemoglu *et al*. (2001), whereas the legal origins data are from La Porta et. al. (1997) and the World Bank Group homepage:
http://rru.worldbank.org/DoingBusiness/SnapshotReports/EconomyCharacteristics.aspx .

Table AIII: 2SLS ESTIMATION
Dependent Variable: Real GDP Per Capita
(Sample Period: 1985 – 2000)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	22.65	19.28	19.40	23.35	19.07	18.90
	(0.99)	(1.19)	(0.93)	(0.91)	(1.17)	(0.88)
$(n+g+\delta)$	-0.31	-0.41	-0.36	-0.36	-0.35	-0.37
	(-0.18)	(-0.23)	(-0.22)	(-0.21)	(-0.22)	(-0.19)
K	0.30	0.25	0.37	0.36	0.27	0.41
	(1.38)	(0.61)	(0.70)	(1.40)	(0.64)	(0.72)
INS	0.45	0.40	0.42	0.32	0.33	0.36
	(2.22)**	(2.04)**	(2.60)***	(2.08)**	(2.01)**	(2.91)***
LIA	0.28	-	-	0.25	-	-
	(2.07)**			(1.85)*		
PRI	-	0.41	-	-	0.27	-
		(2.30)**			(2.01)**	
DOC	-	-	0.32	-	-	0.22
			(1.76)*			(1.72)*
LIA x INS	-	-	-	0.40	-	-
				(2.16)**		
PRI x INS	-	-	-	-	0.52	-
					(2.34)**	
DOC x INS	-	-	-	-	-	0.42
						(2.36)**
Sargan Stat	0.13	0.15	0.14	0.12	0.19	0.14
(χ^2-stat)	(0.71)	(0.69)	(0.70)	(0.71)	(0.66)	(0.70)
N	68	68	68	68	68	68

Notes: Figures in parentheses are t-statistics except for Sargan tests, which are p-values. Significance at 1%, 5% and 10% denoted by ***, ** and * respectively.