Finance-Growth Nexus in open economies with outliers[1]

Alessandra Dal Colle Stievano[2]

November 2004[3]

Abstract

This paper offers a contribution to the empirical literature on the links between financial and economic development.

In the investigation of the finance-growth nexus for 18 non-OECD countries plus Mexico and Korea, the paper firstly introduces an indicator of restrictions on the establishment of foreign banks. Secondly, it links financial development to the capital–output ratio rather to the level of income per se, implicitly assuming that a sound financial development has to be relatively capital-intensive. A new procedure is systematically applied to take proper consideration of crisis periods through the use of dummies.

The paper finds that in the long run most countries support the capital-output ratio specification for the inancial development relationship. Also, "fairly liberal" countries show a negative contribution of financial openness to financial development. The non-linearity between finance and growth seems to be confirmed by the growing elasticity of the capital output ratio in relatively developed countries. Finally, some large countries seem to support the endogenous growth hypotheses while most African countries turn out as "cursed", since neither accumulation nor openness can explain their growth (or, rather, lack thereof).

JEL classification: O16, G15, G28

Keywords: Financial Development, Economic Growth, Cointegration

[1] I would like to thank Pasquale Scaramozzino, Bassam Fattouh and Laixiang Sun (CeFiMS). Heino Bohn Nielsen (University of Copenhagen) and Andrea Brasili (UBI Research Department, Milan) deserve special thanks for their help with stats programs. Data acknowledgements in the Appendix. All errors remain of course mine. The views expressed in this article are those of the author only and do nor represent those of Banca Intesa or of any member of the Banca Intesa Group.

[2] CeFiMS, SOAS, University of London (UK) and Banca Intesa Research Department, Milan (Italy). Email: 115147@soas.ac.uk

[3] Previous versions of this paper have been presented to "Economics Policies for the New Millennium" Conference (Coimbra, Portugal), at the RIEF Conference at the Ecole Nationale des Ponts et Chaussées (Paris, France) and at the Money, Macro and Finance Research Group 36th Annual Conference (London, UK). Do not quote without written permission by the author

1 Introduction

The empirical literature on the links between financial development and economic development/growth is wide and very differentiated and there is no single way to classify it. Clustering the literature around some common themes one can find among the main researched topics:

- the importance of financial development in the process accumulation and hence in economic development/growth
- the non-linearity of the relationship between financial and economic development
- the relationship between trade- or financial openness and economic development/growth.

A cornerstone of empirical studies is Rousseau - Sylla (2001) who find a robust correlation between financial factors and economic growth that is consistent with a leading role for finance for 17 countries with data from 1850 to 1997. This is further supported by Harrison-Sussman-Zeira (1999) who find a feedback effect between the real and the financial sector that helps to explain international differences in output per capita. Luintel - Khan (1999) using the VAR technique find two cointegrating vectors identified as long-run financial depth and output relationship linking financial and economic development. They also find a negative contemporaneous correlation between the level of financial development (depth) and growth in per capita income in 7 out of 10 countries and a strong positive correlation between the levels of financial depth and per capita output in all sample countries. Beck-Levine-Loayza (2000) in their panel studies for 77 countries from 1960 to 1995 confirm an economically large and statistically significant relationship between financial development and both real per capita GDP growth and total factor productivity growth. In their study the positive link between financial intermediary development and both physical capital accumulation and private savings rates is however ambiguous since it is not robust to alterations in estimation techniques and to measures of financial intermediary development.

A tentative explanation of such puzzle might lie either in differences in long run relationship and short-run dynamics on in the non-linearity of the relationship itself that is therefore not significantly picked up by standard estimation techniques. In fact, Loayza - Ranciere (2002) with a regression on 17 countries find a positive long-run relationship between financial intermediation and output growth coexists with a, mostly, negative short-run relationship. Also, Deidda - Fattouh (2002) with a threshold regression find a positive relationship between the level of financial depth and economic growth for countries with high income per capita but no significant relationship for lower-income countries, which is consistent with the non monotonic relationship implied in the model.

On the relationship between openness and financial development Rousseau - Sylla (2001), using the ratio of trade to GDP as a dependent variable, show that countries with more sophisticated financial systems engage in more trade and appear to be better integrated with other economies. Rappaport (2000), comparing the open-economy and closed economy versions of a calibrated model shows that openness to capital flows causes only a very small increase in the rate of per capita output growth. Alternative calibrations, which instead suggest a large effect of openness on growth, either generate strongly counterfactual closed-economy series or depend on the unrealistic assumption that individuals can borrow against future labour earnings. Also, on the more exquisitely financial side, Clarke-Cull-Martinez Peira (2001) through survey data and a database on bank regulation and supervision find that foreign bank penetration improves firm' access to credit. It is worthwhile underlining, however, that Buch (2000) using both cointegration and regression analysis finds that liberalising regulation - EU's single market program and the Basle Capital Accord in particular - have had a positive impact on cross-border banking and the evidence is less convincing for capital account liberalisation as such.

In conclusion, the brief survey of the literature seems to support the view that financial development is linked to economic development/growth even if in non-linear fashion. Furthermore, financial openness might be "good" for the economic development/growth but the different empirical definitions used in the literature are not able to support a robust case in favour of a positive effect of financial openness on economic and financial development.

In this paper the empirical analysis of the finance-growth nexus is attempted within a cointegration framework. The cointegrating relations aim to describe long run relationships between the level of financial and economic development rather than growth, even if the growth dynamics are implicitly considered in the lag structure of the time series model. In line with the empirical literature on financial development and growth credit to private sector as a percentage of GDP will be used as a financial development indicator.

Secondly, as in Clarke-Cull-Martinez Peira (2001) and Loyaza - Ranciere (2002) a composite indicator proxying financial openness will be introduced as an explanatory variable. Thirdly, given the volatility of variables for the sample countries and the consequent need of using dummies a newly developed specific technique has been used. And finally, in accordance with the simple model sketched in section 2, the cointegrating equation describing the long run equilibrium relation between financial development and the "the real economy" will be specified with a role for the capital income ratio rather than income per capita alone.

In what follows section 2 will specify the model, section 3 will briefly describe the data and attempt an interpretation of the stlylised facts around the links between finance and growth in open economies. Section 4 will sketch the cointegration methodology and results with a special reference to the outlier detection and estimation procedure. In section 5 the conclusions will be wrapped up.

2 Model Specification

A non-linear relationship between financial and economic development where financial institutions endogenously emerge has a significative tradition in theoretical models. The pillars of such models[4] can be summarised in

- standard 2-period OLG structure where individuals inelastically supply labour during the first period of life and receive a salary which is partly consumed and partly saved and the savings are deposited and receive a real interest rate R_t^d
- constant or increasing- return production function of the type

$$Y_t = \psi A_t K_t^{\beta} l_t^{1-\beta} \text{ or } \ln y_t = \psi + \beta_{2,3} \ln(k_t) \tag{2.1}$$

  where $k_t = \frac{K_t}{l_t}$ and $y_t = \frac{Y_t}{l_t}$. $A_t = k_t^{1-\beta}$ is an externality effect associated with capital accumulation (i.e. $\beta_{2,3} \approx 1$)and ψ is the exogenous productivity coefficient. The representative firm's demand for loans b_t stems from the equilibrium equation for the yield on loans

$$b_t|_{R_t^l = \frac{\partial Y_{t+1}}{\partial K_{t+1}}} = l_{t+1} k_{t+1} = \left(\frac{R_t^l}{\beta \psi A_{t+1}} \right)^{\frac{1}{\beta - 1}} \tag{2.2}$$

- firms have no capital endowment, they operate if and only if they are externally funded,
- banks fund themselves by issuing deposit contracts to households and have a fixed set up cost and non-linear variable costs. The representative bank's balance sheet can be thought of as

$$D_t = \int_0^{z_t} b_t dz + \int_0^{z_t} c(z) b_t dz + E = \int_0^{z_t} \left[1 + c(z) \right] b_t dz + E \tag{2.3}$$

where D_t are deposits, b_t is the amount of loans per firm, z_t is the bank's market size in the loan market, E is the fixed amount of physical resources consumed each period t to set up a bank and $c(z)$ is the unit capital cost for the bank's lending activity.

Solving the model, an equilibrium relationship among the amount of credit outstanding in the system b_t, capital per capita k_t and the real interest rate R_t emerges and it is subsequently log-linearised as

$$\ln b_t - \ln y_t = \beta_{1,0} - \beta_{1,2} \ln y_t + \beta_{1,3} \ln(k_t) + \beta_{1,5} \ln(R_t) \tag{2.4}$$

Therefore the credit/GDP ratio b_t / y_t should have a positive link with the capital/output ratio (i.e. $\beta_{1,3} = -\beta_{1,2}$ and $\beta_{1,3}, \beta_{1,2} > 0$) and also an explicit positive relationship with the real interest rate.

In what follows for each country the estimation of a cointegration relationship of rank 2 will be carried out for enriched versions of (2.4) and (2.1) to take into account the effect of financial openness. ψ will be modelled as $\approx (\beta_{2,0} + \beta_{2,5} \ln(R_t))$.

[4] For details see amog others A. Dal Colle Stievano (2001) and L. Deidda - B. Fattouh (2002)

3 Data Description

Inasmuch as financially open economies represent the focus of the analysis, the 20 countries for estimation have been selected among those analysed in M. Kono - L. Shuknecht (1998) [KS98 from now] where a long enough time series could be found in either in the May 2003 World Development Indicators [WDI03] or in Heston-Summers-Aten (2001) [PWT6.1]. Ideally the sample for each country includes 41 yearly observations from 1961 to 2001 of real income per capita (YC), real capital stock per capita (KC), real interest rate (RR), credit to private sector as a percentage of GDP (CR) as a financial development indicator and the financial openness proxy (OP). Details on sources and calculations for each variable in each country are summarised in Appendix A.1.

CR has been chosen rather than deposits on GDP because of both a better fit with the theoretical reference model and longer time series readily available from WDI03 that would have minimised calculation errors. CR has been similarly preferred to other frequently used measures of financial development such as M2/GDP since the focus of the estimation is the (hopefully) useful role of money as technology to transfer value and give way to investment rather than money as a facilitator of exchange, which is best represented in M2.

The Restrictions on practices by Foreign Establishments (RFE) indicator is derived by KS98 from the GATS Schedules[5]. GATS commitments are minimum guarantees of market access or national treatment and current policy cannot be reversed to standards below those subscribed in GATS agreements. The value of the RFE indicator for China and Chinese Taipei has been assessed following KS98 methodology. Restrictions on activities by foreign affiliates on domestic funding, retail operations, equity limits and new licenses for China and Chinese Taipei have been personally assessed in accordance to the respective WTO documents[6]. The OP variable has been built as the (log of the) product of a constant indicator (RFE) and trade openness in constant prices. RFE has been rescaled in the construction of OP so that maximum restrictiveness (i.e. $RFE = 4$) lowers the impact of trade openness while minimum restrictiveness increases it.

It might be argued that in constructing the OP variable RFE indicators have been associated with each economy's trade openness in years well before GATS agreements were actually signed by any of the sample countries and therefore OP cannot properly act as a dummy for financial openness.

Support for the use of OP throughout the sample length comes from at least three lines of argument.

First of all, KS98 argue that the nature of GATS commitments may make them more valuable than current policies, especially in emerging markets with a volatile policy

[5] The policy commitments are listed in the WTO Members' Schedules of Specific Commitments made at the end of the Uruguay Round in December 1993 and the updates following the progress of global negotiations.

[6] See WTO (2002) for China and WTO (2001) for Chinese Taipei.

record, as proxies for financial services trade policy restrictions as perceived by market participants.

Secondly, since the average country has been a member of pro-openness institutions such as the IMF and the WTO for more than half and two thirds respectively of the standard sample period, it is argued that associating RFE to the whole length of the trade openness series might indeed be considered as a good proxy for the willingness of the country to liberalise the financial sector. Such hypothesis is also consistent with a follow-thy-client strategy by incumbent banks originating from states exporting in each sample country.

And finally Do - Levchenko (2004) analyse the so-called financial comparative advantage, i.e. whether countries endowed with better financial systems produce and export financially-dependent goods. Using panel data for 77 countries they find that trade should be associated with faster financial development although in a non-linear fashion.

As to the quality of all variables, as shown in tables A2-A6, most of them, with the exception of RR, are normally distributed and should grant quality estimates. Problems might be detected for some Latin American and African countries such as Argentina, Chile, Egypt, Ghana, Mexico, Senegal and South Africa (non normal KC and/or CR). For Chinese Taipei and Mexico a financially-closed economy specification of the model might give better results than a open economy one, given the detected non-normality in their OP variable. South African data, in addition to shorter series suffer from non normality with the exception of OP. Such bad quality does not bode well for the estimation exercise.

[TABLE 1: SOME SUMMARY STATISTICS here]

Summarising, the sample will be composed by 20 countries, all, with the exception of Korea and Mexico, non-OECD member. All of the countries are member of the WTO though, and apart from Chinese Taipei and Egypt all are subscribers to art. 8[7] the IMF statues. More specifically, the average country has been a member of the WTO, or its predecessor, for over 30 years and of the IMF for nearly 20.

As a first assessment of the explanatory power of the main dependent variables within each sample country the main correlations in level and growth rates with CR are shown in table 2.

[TABLE 2A: CR CORRELATIONS and TABLE 2B: YC CORRELATIONS here]

Legend:

ΔX = annual growth rate of variable X

$\rho(X, Z)$ = correlation of variables X and Z over the sample period

[7] Article 8 sets forth the general obligations of each member with special reference to the avoidance of restrictions on current payments and of discriminatory currency practices and to the convertibility of foreign-held balance.

Table 2a shows that the contemporaneous correlations between the level of real income, or real capital per capita, and financial development are positive with the exception of Costa Rica, Ghana, Mexico, Senegal and South Africa. Correlation with the levels of the capital income ratio is also positive but for Chile, Costa Rica, Ghana, Mexico and South Africa. Correlation with openness is positive with the exception of Costa Rica, Egypt, Mexico, Senegal and Venezuela. Both in the correlation with KY and OP minus signs prevail, although six countries show a positive sign. Correlation between CR and RR is, on average, lower than that with other endogenous variables and positive signs prevails and this support the interpretation of interest rates as a proxy for technical progress and therefore as input in financial development along with capital, income and, possibly, openness.

In the correlation between CR and growth rates (i.e. ΔYC, ΔK, ΔOP and ΔKY), negative signs prevail in the first three cases, while correlation of CR and ΔOP shows a split with eight negative signs and ten positive ones. In the end a weak indication in favour of opposite sign relationships between financial development and real variables in the long vs. the short-term seem to emerge, while no precise pattern for the relationship of CR and with OP seems visible at this stage.

Table 2b shows the prevalence of positive signs in level correlation between YC and either KC, KY or OP. Partial exception are the African countries, except Morocco, and Chile and Venezuela. $\rho(YC, RR)$ is less clear-cut than that between CR and RR since positive and negative signs are equally split. In correlation between YC and growth rates of the variables negative signs prevail with the exception of ΔOP.

3.1 Stylised facts

Considering the World Bank income thresholds in real terms, to carry out intertemporal comparisons, table 1 shows that in 1961:

- 9 countries were considered Low Income (YC<US$745): China, Egypt, Ghana, India, Indonesia, Morocco, Philippines, Senegal and Thailand
- 9 countries were considered Lower Middle Income (US$746<$YC$<US$2975): Brazil, Chile, Chinese Taipei, Costa Rica, Korea, Malaysia, Mexico, Singapore and South Africa
- 2 countries were considered High Middle Income (US$2976<$YC$<US$9205): Argentina and Venezuela
- No country reached High Income (YC>US$9206).
- the KY ratio was not very dissimilar across income group being 1.7<KY<1.9 while financial development was quite heterogeneous being 14%<CR<25% with Lower Middle income countries showing the highest CR.

Forty-one years later some miracles and catastrophes have hit the universe of the sample countries. The main miracle is that only three countries, namely Ghana, India and Senegal, are below the US$745 income poverty line in 2001. The same three countries, however, still show a CR similar to that of Lower Middle Income back in 1961!

Also, 6 countries (4 Asian and 2 African) are now in the Lower Middle Income group, 8 in the High Middle Income Group (all of them South American with the exception of Malaysia and South Africa) and the 3 Asian Tigers are in the High Income Group.

Ghana represents the "economic development" catastrophe par excellence given that it is the only country with a negative average annual growth of KY in the whole sample. Senegal and Venezuela show a negative average annual growth of YC but in no country the misfunctioning of the economy seem to have gone so deep as to touch the accumulation process as in Ghana.

Mexico represents the "financial development" catastrophe as it is the only country where financial development is decreasing over the sample period.

End-of-period values of economic and financial development seem to be more closely clustered as CR and KY mostly grow with income. CR in Low Income countries does not go beyond 30%, while in Lower Middle Income countries it starts at 36% except for Indonesia and in High Income countries where it starts above 100%! High Middle Income countries remain a bit of a problem in so far as their end-of-period CR remains low (starting from 11%) and also ends at 69% if it were not for the two non-Latin American countries in the group. Yet another clear evidence of the need of dummy variables for crisis-prone countries such as the Latin American ones.

KY pattern goes along the same lines with Low and Lower Middle Income countries in the $2.3<KY<3$ area. High Middle Income countries again show some problems since two countries, Chile and Costa Rica, have a lower KY than the best Lower Middle income and again the two non-Latin American countries in the group fare better than their peers.

High Income countries' KY starts at 2.6. At first sight it seems difficult to reconcile Chinese Taipei's reputation of (pre-1997) "Asian Tiger" and the lowest KY at the end of the period. The recent difficulties of Taiwanese banks[8], however, seem to give credit both to the importance of the KY indicator for "sound" financial development and the exceptionally of Taiwan among High Income countries.

3.2 The need of proper consideration for dummy variables

With the exception of China, Chinese Taipei, India and Singapore the average country in the sample has experienced more than 10 years of either banking crises and/or some form of default in loans or bonds during the sample period[9]. Given that these shocks affects a subset of the variables (mainly CR and RR usually asymmetrically), and the effect will hardly disappear in the cointegration relation, dummies should be included for nearly all countries.

[8] In August 2001 the Resolution Trust Commission was set up with a capital of TWD 14bn (euro 4.62 bn) to bail out all insolvent institutions. In May 2003 the government asked the Parliament to increase the fund's budget allocation to TWD 540 bn (euro 17.5 bn) only to recapitalise insolvent banks. The latest proposal is still undergoing parliamentary debate. Source: Fitch Ratings (2003)

[9] see table 5

The heavy use of such ad hoc dummy variables is also justified by Loayza and Ranciere (2002) who find them essential in order to obtain results for countries subject to the effect of financial crisis longer than the average economic cycle. They observe that "in the case of private credit its correlation with growth is strongly negative prior to the crisis, and it becomes close to neutral in the aftermath". This effect is at odds with the long run nature of cointegration results and therefore needs proper consideration.

On the other hand, the usual practice to detect outlying observations from the estimated residuals in cointegrated VAR and to include unrestricted (innovational) dummies to whiten residuals, has no sound justification in theory.

More precisely, if there is a fixed number of outliers asymptotic distributions of estimates are unaffected and hence inference in the cointegration model is unchanged. But in finite samples distortionary effects could be relevant especially if outliers are not innovational but are additive instead. This should not be surprising considering that the innovation specification of the estimation model is the fairly standard one:

$$\Delta Y_t = \alpha\beta' Y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \alpha\beta' t + D_t + \mu_0 + \varepsilon_t \tag{3.1}$$

where Y_t is the vector of the endogenous variables in levels, k the lags (of the unrestricted, i.e. level, model), t the (eventual) time trend and D_t the dummy variable(s) while the additive specification of the estimation model is

$$\Delta Y_t = (\beta' : \beta_0' : \beta_1') \begin{pmatrix} Y_{t-1} \\ t \\ D_{t-1} \end{pmatrix} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \theta_i \Delta D_t + \sum_{i=0}^{k-1} \theta_i \Delta D_{t-i} + \mu_0 + \varepsilon_t \tag{3.2}$$

$$\text{subject to } \begin{cases} \beta_1 = \theta'\beta \\ \theta_i = -\Gamma_i\theta \quad \text{for } i = 1, ..., k-1 \end{cases}$$

where θ is the k-dimensional vector of parameters for the full lag structure of the dummy variables.

It is important to note that an additive impulse dummy eliminates the contribution from the observation to the likelihood function rather that the contribution from the residual.

In order to prevent a dangerously excessive use or deliberate misuse the objective detection and estimation procedure pioneered by Bohn Nielsen (2004) [BN04 from now] has been used.

4 Cointegration estimation

Before proceeding with the estimation of the cointegrated VAR model[10] for each coun-

[10] All calculations have been conducted in EViews®. Codes for estimating the model can be obtained from

try, the stationarity of the series is checked with a (non reported) standard Augmented Dickey fuller test. Hence the following procedure has been followed:

1. Assume an order of cointegration and obtain lag length tests for the proposed VAR with no dummies;
2. Detect and estimate the type and the position of dummy variables with BN04 procedure;
3. Re-assess lag length and order of integration and proceed with identifying restrictions.

The first two steps are particularly crucial: on the one hand the lag, trend and order of cointegration are to be assumed and then held fixed for all the iterations needed for the outlier detection and estimation procedure and on the other hand these parameters - especially the lag length - may differ when the model is estimated with or without the dummies.

4.1 Lag choice

The lag, in no case higher than four in order not to limit degrees of freedom in the estimation of parameters excessively, has been chosen according to a hierarchy of criteria. First of all, as suggested by Johansen-Mosconi-Nielsen (2000), the Hannan-Quinn criterion has been tried, then lags suggested by other information tests, shown in the five coloumns on the left-hand section of table 3, are considered. If no meaningful result has been obtained this way, the lag showing better normality of residuals, as suggested by the last four coloumns of table 3, has been used instead. Occasionally, a lag alien to the one suggested by the tests has been chosen on the basis of a more appealing interpretation of resulting coefficients. This has been the case for Indonesia, Singapore and South Africa, countries with serious problems in the data.

[TABLE 3: CHOICE OF THE LAG LENGTH here]

Table 3 shows for each country all the results of the lag length tests. For each country the first row of results represents tests calculated with no dummies and the second row tests calculated at the end of the BN04 procedure, as shown in tables 4.1-4.6. With the exception of Korea and Malaysia the inclusion of dummies always increases the preferred lag. In 5 cases the HQ-after-dummies has been the favoured choice and in 2 cases the HQ-before-dummies. A two-lag model has been the most frequent choice, being estimated for 12 countries. The use of four-lag model, particularly consuming in terms of degrees of freedom, has been limited to two countries and this is just one of the advantages of the BN04 procedure.

---

the author.

4.2 Outlier Detection & Estimation

The main steps of the iterative procedure can be outlined as follows:

1. Calculate residuals from Vector Error Correction Model (VECM) with lag order and cointegration rank assumed in table 3 with no dummy (VECM_0 from now on) and pick out data where residuals are higher than twice the standard deviation (i.e. outliers)
2. Calculate the VECM_0's statistic $t_0 = -\frac{n}{2} \lg |\Omega_0|$ where $|\Omega_0|$ is the determinant of the residuals' covariance matrix and n the number of observations
3. For the Innovation Outlier (IO) estimation insert an unrestricted dummy variable at the observed outlier's date ($_{year}$) and, using the same cointegration rank and a lag order of VECM_0 calculate $t_{IO,year} = -\frac{n}{2} \lg |\Omega_{IO}|$
4. Obtain the likelihood ratio test $\tau_{IO,year} = -2 * (t_0 - t_{IO,year})$
5. Repeat for all the outlying observations and order the test results in descending order
6. For the Additive Outlier (AO) start assuming $\theta = 0$ and follow the iteration algorithm for Maximum Likelihood estimation in par 3.1 of BN04
7. Once convergence, say at θ^*, is reached, obtain the likelihood estimation of (3.2) and the likelihood ratio test $\tau_{AO,year} = -2 * (t_0 - t_{AO,year})$
8. Repeat for all the outlying dates and sort the test results in descending order
9. Insert a dummy at the observation where $\max_{year} \tau_i \; i = AO, IO$ and estimate a VECM model (VECM_{dd})
10. Repeat the routine with VECM_{dd}=VECM_0 with the highest test value until no significant test values remain.

The value of the $\tau_{IO,year}$ and $\tau_{AO,year}$ tests for outliers in the single countries are shown in tables 4.1-4.6.

[TABLES 4.1-4.6: OUTLIER DETECTION & ESTIMATION here]

Iteration 0 is carried out on all observations with a standardised residual higher than 2, subsequent iterations pick the highest-test year (thick-bordered in the table) and insert an innovation or additive dummy in that year. The critical value, below which no further dummy is included in the model, is $\chi^2_{.9995}(5)$ and it is calculated focusing on the fact that the highest value statistics is chosen.

[TABLE 5: DUMMY VARIABLES AND CRISIS PATTERNS
and GRAPHS 1 & 2 here]

The rationale of the BN04 procedure can be assessed by comparing tables 4.1-4.6 with table 5 and graphs 1 & 2, where parsimoniousness of the dummies used in BN04 vs. the years of crisis reported by the literature is striking. Table 5 and the graphs show that, according to different literature sources, the probability that in a random year in the sample period no country was in a crisis is 34%, that one country was in a crisis 12%. Also the "worst case scenario" would be to be one country in the sample in the years 1988 or 1989: then the probability that a country would be in a crisis is, stunningly, 60%!!!! To name-and-shame Argentina and Indonesia, closely followed by Mexico, make it to the top of crisis-prone countries.

According to the BN04 approach, the might with which such financial quakes have hit the sample panel and the width of their effects come out much curtailed. Along with the results of the iterations, the probability that in a random year in the sample period no country was in a crisis is 22%, that one country was in a crisis 24%. The probability of crisis of 2 or 3 countries together is still double digit but dies down afterwards and abruptly stops at 7. In other words, crisis, as detected by the BN04 procedure, seem to be much less infectious than in the literature-source world. Also the "worst case scenario" would be to be one country in the sample in year 1974: then the probability that a randomly chosen country would be in a crisis is a less shattering 35%. This is not surprising when one considers that in the Seventies 17 countries had average negative real interest rates - a frequently-cited indicator of economic and/or financial difficulties of some sort - comparing with 6 in the Sixties, 5 in the Eighties and 4 in the Nineties. In this new scenario Brazil and Ghana lead the crisis-prone countries hit list.

[GRAPH 3 here]

Please note that two notoriously crisis-prone countries with shorter times series available and a heavy lag structure, namely Indonesia and Mexico, have produced intelligible cointegration results thanks to the parsimonious BN04 procedure. Also the estimation of the CR series for China, specified in Appendix A.2, does not seem to have distorted the panel pattern, given that the outliers identified by the BN04 procedure are 1967-1970 (the Cultural Revolution) and 1993 (the double-digit inflation and the FEC[11] unification with the renminbi).

4.3 Cointegration results

Table 6 shows the eigenvalues and the cointegration test with two models with either i) intercepts in the cointegrating equations and no deterministic trends in the level data or ii) intercepts in the cointegrating equations and linear trends in the level data.

[11] The renminbi was massively overvalued in the 1980s and early 1990s, and a parallel currency, foreign-exchange certificates (FECs), circulated until 1994 to enable entities engaged in foreign trade to purchase foreign exchange at a more reasonable rate. The currencies were unified in 1994 and the renminbi pegged at Rmb 8.7:US$1. The average exchange rate in 1993 was Rmb 5.8:US$1.

[TABLE 6: EIGENVALUES AND COINTEGRATION TEST here]

All countries support at least 2 cointegrating equations - financial depth relationship and output relationship from here on - at least at 1% confidence - according to critical values from J.A. Doornik (1998) - with the exception of Malaysia.

The identification of parameters has proceeded imposing the following restrictions:

1. Normalisation: CR equation represents the link between financial development and economic development and YC equation represent the production function$\Rightarrow$ $\beta_{1,1} = \beta_{2,1} = 1$
2. CR equation is linked to KY : $\beta_{1,2} = -\beta_{1,3}$
3. one of the cointegrating equations is not negatively influenced either by RR or by OP[12]

Should the above restrictions yield equations that cannot be meaningfully interpreted, the specification where capital does not enter the financial development equation,i.e. $\beta_{1,2} = 0$, has been estimated instead of nr.2.

[TABLE 7: PARAMETER OVERIDENTIFYING RESTRICTIONS here]

The results in table 7 show for each country the specification, among those obtainable with the above restrictions and the identified dummies[13], with the highest $\chi^2(1)$ probability associated with the overidentifying restriction test. Chinese Taipei and South Africa, given the (poor) quality of the data already shown in A2-A6 tables, only manage to get significant restrictions at 1% level.

A few common elements seem to emerge. First of all, only in five cases, namely Brazil, China, Chinese Taipei, Costa Rica and Thailand the $\beta_{1,2} = 0$ model of financial intermediation is the preferred identification choice rather than the KY specification ($\beta_{1,2} = -\beta_{1,3}$). With the exception of Chinese Taipei, whose recent banking difficulties have already been mentioned, all these countries are concentrated in Lower or High Middle income group. $|\beta_{1,2}|$ ranges seem roughly to increase with income with $0.1 < |\beta_{1,2}|_{Low} < 0.58$, $0.04 < |\beta_{1,2}|_{LowerMid} < 0.76$, and $0.09 < |\beta_{1,2}|_{HighMid} < 0.98$, at least until the High Middle income level.

Secondly, there are six negative contributions of financial openness to financial development: two among "fairly liberal" countries (i.e. $RFE < 2$), namely Mexico and Morocco and four among "financially closed" countries, namely Brazil, Egypt, India and Venezuela. The two control countries, Costa Rica and Senegal, show a positive sign.

---

12 In practical terms this means testing one of the following restrictions a) $b_{1,4} = 0$, b) $b_{2,4} = 0$; c) interest rates is positively linked either with CR or YC i.e. $(b_{1,5} + b_{2,5}) = (b_{1,5_{unrestricted}} + b_{2,5_{unrestricted}})$ or $b_{1,5} = 0$ or $b_{2,5} = 0$ or $b_{i,5} = 0$ if $b_{\overline{i},5_{unrestricted}}$ where $i = 1, 2$ when $\overline{i} = 2, 1$ is near zero

13 Only in the case of Morocco and South Africa fewer dummies than those identified with the BN03 procedure have been used. IO at 1974 and 1986 have been used for Morocco and IO at 1974 and 1988 for South Africa.

No High Income country, all of them with $RFE > 2$, show a negative contribution of openness to financial development and so do Low Income ones with the exception of India, which is however saddled with 5 crisis dummies. History of crisis for Brazil and Venezuela, and special trends in variables in Egypt (the only country in the sample with decreasing OP) rather than long-term relationship might be the reasons for $\beta_{1,4} < 0$. If,on the other hands, one considers caveats for the poor quality of estimations for South Africa, there is a weak evidence that "financial openness is bad for growth" especially in the Middle Income group with Morocco and Mexico supporting the evidence. The evaluation of China's RFE to 3, i.e. fairly restrictive, seems therefore to be justified, given the resulting positive contribution of financial openness to to financial development. Such assessment is less clear cut for Chinese Taipei, which suffers from already mentioned data and significance problems.

Thirdly, although table A6 unequivocally warns against the good quality of RR data, in terms of statistical properties such as normality, one cannot fail to observe that 12 out of 20 countries show a non negative $\beta_{1,5}$ and three countries show a $\beta_{1,5} < 0 \cap \beta_{2,5} < 0$. The only countries with $\beta_{1,5} > 0 \cap \beta_{2,5} > 0$ are China, Chinese Taipei and Korea, all considered "tigers" in terms of development with Egypt joining the group.

As far as the economic development cointegrating vector is concerned, "big" economies, i.e. Argentina, Brazil, China and India are the nearest one to the endogenous growth condition $\beta_{2,3} \rightarrow 1$. KC always gives a significative and positive contribution with the exceptions of Ghana, Morocco, Senegal and Venezuela. OP is nearly always significant and it is also positive with the exception of Brazil, India, Morocco, Senegal and Venezuela. Brazil and India are among the closest countries in the sample, with a trade/GDP ratio barely above 15%. When considering $\beta_{2,3}$ and $\beta_{2,4}$ together Chile shows a record of $\beta_{2,4} \approx 1$, maybe as a compensation to the low $\beta_{2,3}$ than to a long-term feature itself, and Egypt[14] stands out as the only African country able to escape the "African curse" whereby neither KC nor OP are able to account for development (or, rather, lack thereof).

Finally,the evidence on the contribution to the economic development equilibrium relationship by $\beta_{2,5}$ is quite inconclusive, with only Argentina, China, Chinese Taipei, Egypt, Korea and Venezuela showing a positive contribution from RR.

5 Concluding Remarks

The contribution that this paper aims to offer is a qualification of the link between financial and economic development with reference to restrictions to the role of financial openness.

To this purpose, a link between economic and financial development has been tested for 20 sample countries especially selected from a set of financially open economies

[14] Together with South Africa, whose bad quality of data and estimation results have already been mentioned

underwriters of the GATS protocol of the WTO. Financial openness has been proxied by the product of trade openness and an inverse function of the restrictiveness of foreign establishment indicator.

For China and Chinese Taipei, the newest WTO members, the foreign restrictiveness indicator has been assessed from their own protocol of admission to the WTO. For China the financial development indicator, i.e. the credit/GDP ratio for years 1961-1976 has also been estimated from data on growth rate of loans to enterprises stated in the relevant five-year plans.

Furthermore, in order to deal with crisis periods in the time series a special detection and estimation procedure has been used to identify dummies. This procedure has identified crises precisely - as shown in table 8 - yet it has allowed for a parsimonious use of dummies with respect to literature.

[TABLE 8: DETECTED OUTLIERS MATCH WITH REFERENCES IN THE LITERATURE here]

The main results of the paper are:

- evidence of a non-linear relationship between KC v KY model in financial development since the KY model is more frequent among Low and High income countries whereas the KC one is more frequent in the Middle Income countries;
- evidence of a non-linear relationship between financial development and accumulation in line with the literature reviewed, as $|\beta_{1,2}|$ values seem to increase with income at least until the High Middle Income countries;
- evidence of non-linearity in the relationship between trade, closely linked to the financial openness variable OP, and financial development, in line with Do-Levchenko (2004) given that High and High-Middle income countries present a significant and positive $\beta_{1,4}$, whereas Lower Middle Income countries mostly show a significant $\beta_{1,4} < 0$. Exceptions are represented by relativley poor countries but with above average growth in OP, (China and the Philippines both with $\beta_{1,4} > 0$) or relatively rich but trade-closed countries (Brazil and Mexico both with $\beta_{1,4} < 0$);
- weak evidence that financial openness could be bad for financial development as no High Income country, all of which are financially closed (i.e. RFE>2), show a negative contribution of openness to financial development and so do Low Income ones;
- positive effect of real interest rate on financial development for most countries, in line with Arestis-Demetriades-Fattouh-Mouratidis (2002);
- as far as economic development is concerned, there is evidence of endogenous growth for "big" economies, i.e. Argentina, Brazil, China and India showing $\beta_{2,3} \longrightarrow 1$;
- KC and OP nearly always gives a significative and positive contribution to economic development with the exception of

- Egypt and South Africa, which are hence the only African countries able to escape the "African curse" whereby neither KC nor OP are able to account for development (or, rather, lack thereof).

.

References

[1] P. Arestis, P. Demetriades, B. Fattouh, K. Mouratidis (2002) The impact of financial liberalisation policies on financial development: evidence from developing economies, mimeo

[2] T. Beck, R. Levine, N. Loayza (2000) Finance and the sources of growth, Journal of Financial Economics 58:261-300

[3] G. Bekaert - C. R, Harvey (2001) Economic Growth and Financial Liberalisation, mimeo

[4] H. Bohn Nielsen (2004) Cointegration Analysis in the Presence of outliers, The Econometrics Journal 7(1): 249-271

[5] C.M. Buch (2000) Information or regulation: What is Driving the International Activities of Commercial Banks, Kiel Working Paper no 1011

[6] W. Byrd (1983) China's Financial System: the Changing Role of Banks, Westview, Colorado

[7] R.G. Clarke, R. Cull, M.S. Martinez Peira (2001) Does foreign bank penetration reduce access to credit in developing countries? Evidence from asking borrowers, mimeo, The World Bank

[8] A. Dal Colle Stievano (2002) Intermediation and Growth in Financially Open Economies, CeFiMS Discussion Paper no.29, SOAS University of London

[9] L. Deidda - B. Fattouh (2002) Non linearity between finance and growth, Economic Letters, 74(3):339-345

[10] Department of Statisics on Investment in Fixed Assets National Bureau of Statistics of China (2002) Statistics on Investment in Fixed assets of China 1950-2002, Beijing, People's Republic of China

[11] Q. Do - A. A. Levchenko (2004) Trade and Financial Development, Policy Re-

search Working Paper no.3347, The World Bank, June

[12] J.A. Doornik (1998) Aproximations to the Asymptotic Distribution of Cointegration Tests, Journal of Economic Surveys, 12(5), 573-593

[13] W. Easterly - R. Levine (2001) It's not Factor Accumulation: Stylized Facts and Growth, mimeo, World Bank, March

[14] H.J. Edison, R. Levine, L. Ricci, T. Sl̨k (2002) International Financial Integration and economic growth, mimeo IMF

[15] EViews 4.1 ® by Quantitative Micro Software

[16] B. Fattouh, L. Harris, P. Scaramozzino (forthcoming), Capital Structure in South Korea: A Quantile Regression Approach, Journal of Development Economics

[17] Fitch Ratings (2003) Taiwanese Banks: 1H03 Results and the Outlook for 2002, December, www.fitchratings.com

[18] M. G. Guzman (2000) Bank structure, capital accumulation and growth: a simple macroeconomic model, Economic Theory 16, 421-455

[19] P. Harrison, O. Sussman, J. Zeira (1999) Finance and Growth: Theory and New Evidence, Federal Reserve Board, July, mimeo

[20] D. F. Hendry - K. Juselius (1999a) Explaining Cointegration Analysis: Part I, mimeo

[21] D. F. Hendry - K. Juselius (1999b) Explaining Cointegration Analysis: Part II, mimeo

[22] A. Heston, R.Summers, B. Aten, (2001) Penn World Tables Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP), December

[23] K. Hsiao (1971) Money and Monetary Policy in Communist China, Columbia University Press, NY

[24] K. Hsiao (1984) Money and banking in the Chinese Mainland, Tzong-shian Yu, Taiwan, Republic of China

[25] S. Johansen, R. Mosconi, B. Nielsen (2000) Cointegration analysis in the presence of structural breaks in the deterministic trend, Econometric Journal 3:216-249

[26] K. Juselius (2002) The Cointegrated VAR model: Econometric Methodology and Macroeconomic Applications, Lecture Notes, CIdE, Bertinoro, Italy

[27] M. Kono - L. Shuknecht (1998) Financial Services Trade, Capital Flows and Financial Stability, WTO Staff Working Papers ERAD-98-12

[28] N. Loayza - R. Ranciere (2002) Financial Development, Financial Fragility, and Growth, Central Bank of Chile, Working Papers nr.145

[29] K. B. Luintel - M. Khan (1999) A quantitative reassessment of the finance-growth nexus: Evidence from a multivariate VAR, Journal of Development Economics, 60: 381-405

[30] A. Maddison (1998) Chinese Economic Performance in the Long run, OECD Development Centre, Paris.

[31] Moody's Investors Service (2003) Sovereign Bond Defaults, Rating Transitions, and Recoveries (1985-2002), February

[32] P. Manasse, N. Roubini, A.Schimmelpfennig (2003) Predicting Sovereign Debt Crises, IMF Working Paper 03/221, November

[33] M. H. Pesaran (1999) On Aggregation of Linear Dynamic Models, mimeo, University of Cambridge, December

[34] J. Rappaport (2000) How does openness to capital flows affect growth?, mimeo, Research Division, Federal Reserve Bank of Kansas City, December

[35] P.L. Rousseau - R. Sylla (2001) Financial Systems, Economic Growth and Globalization, NBER Working Paper 8323, June

[36] Standard & Poor's (2002) Sovereign Defaults: Moving Higher Again in 2003?, Credit Week, October

[37] World Bank (2003) World Development Indicators ©

[38] WTO (2001) Report on the Working Party on the Accession on the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu,WT/ACC/TPKM/18/Add.2, 5 October

[39] WTO (2002) The People's Republic of China, GATS/SC/135, 14 February

[40] www.parisclub.org

[41] www.bbc.co.uk

Appendix A. Data Description

A.1 Data & Sources

TABLE A1: VARIABLES AND SOURCES[15]

VARIABLE	DESCRIPTION	SOURCE
CR	Credit to private sector/GDP	WDI03[16]
YC	Real income per capita in 1995 US$	Ratio of real income to population from WDI03[17]
KC	Real capital stock per capita in 1995 US$	Calculated from real investment data from WDI03[18]
OP	Composite financial openness indicator = openness*rescaled RFE	
	openness in constant prices = (import+export)/GDP	WDI03[19]
	rescaled RFE[20]	KS98
RR	Real interest rate = Discount rate - annual inflation	
	Discount rate	IFS[21]
	Annual inflation	WDI03[22]
KY	Capital-income ratio	KC/YC

15 I would like to thank the Central Bank of China, Nicholas Kwan (HKMA) and Cesar M.Calderon (Central Bank of Chile) for their help in providing data.

16 **Chinese Taipei**: Central Bank of China. **China** 1961-1977: see Appendix B

17 **Chinese Taipei** 1961-98: PWT6.1, 1999-01 calculated with growth rate from nominal income per capita from Directorate-General of Budget, Accounting and Statistics, Monthly Statistics, Taiwan District, Republic of China [TW-MonStat]

18 calculated with Easterly - Levine (2001) perpetual inventory formula.

19 Taiwan: 1999-2001 Rescaled [Imp(line98c)+exp(90c)]/gdp(99b) from [TW-MonStat]

20 Rescaled RFE =[1+(6-original RFE)/5]; Rescaled RFE =1 if original RFE not ranked; Rescaled RFE =2.2 if original RFE = 0 [minimum restrictions]; Rescaled RFE =1.4 if original RFE = 4 [maximum restriction]

21 **Argentina**: 1961-1967 and 1974-1976: Tasas de interes vencidas abonadas por depositos a plazo fijio, en bancos diciembre; 1968-1973: Tasas de interes abonadas a los investitores en el mercato de aceptaciones diciembre from Memoria Anual - Banco Central de la Republica Argentina, various years. **Brazil**: money market rate. **Chile**: interest on short run loans from Cesar Calderon Banco Central de Chile. **China**: 1961-1978 annual rate on demand deposit as calculated from monthly interest rate from table 10 pag 154 of W. A. Byrd (1983). **Chinese Taipei**: Rediscount rate from the Central Bank of China. **Korea** 1961-66: real interest rate from Luintel-Khan (1999). **Indonesia** 1965-1969: Lowest regulated interest rate for credit from the Report of Bank Indonesia, various years. **Singapore** 1961-72: Malaysia's money market rate. **Mexico** 1965-1976: Annual interest rate of Bonos hipotecarios ordinarios in December from: Indicatores Economicos - Banco de Mexico, various years; 1977 onwards deposit rate WDI03. **Thailand** 1961-76: real interest rate from Luintel-Khan (1999).

22 **Brazil**: annual percentage growth of the FGV Index from Banco Central do Brazil. **China** 1961-1969: regression with the rate of growth of the Gross Value Added in Industry in Table B.3. of Maddison (1998) as

[TABLES A2-A6 here]

A.2 Domestic Credit on GDP ($CHCR$) for China in 1961-1976[23]

Domestic credit for China in the period 1961-1976 has been calculated applying the average yearly growth rate of loans to enterprises from table 2 page 138 (gr) of W. Byrd (1983) to:

1. initial working capital loans in 1957 ($L57$) as estimated on page 125 of K. Hsiao (1971) + Investment in Fixed assets funded by domestic loans (FX) of coloumn 3 of table on page 25 of Department of Statistics on Investment in Fixed Assets National Bureau of Statistics of China (2002) and to
2. the level of bank loans in 1980 by table 2 page 27 K. Hsiao (1984).

So the final formula sums the (forward) smoothed working capital loans from 1957 and the (backward) smoothed bank loans from 1980

$CHCR_{year} = [f_{year} + h_{year}] / (2 * \text{no min al} GDP_{year})$

where

$f_{year} = gr\,(L57)_{year} + FX_{year}$

$h_{year} = gr^{-1}\,(L80)_{year}$

independent variable. **Ghana** 1961-64: calculated from a regression of the difference of real and nominal GDP growth rates from WDI03.

[23] A special thank you goes to Jinming Luo and Liu Yuntao, students at the Master in Finance and Financial Law at CeFiMS, for the precious help I got in consulting Chinese language sources

TABLE 1[1]

I. LOW INCOME (2001 LEVEL) COUNTRIES

Country	Sample	WTO	IMF8	IYC	IKC	IKY	ICR	EYC	EKC	EKY	ECR	GYC	GKY	GCR	GOP	RFE
Ghana	1961-01	17/10/57	21/02/94	444	1739	3.9	6%	421	1283	3.0	29%	-0.1%	-0.5%	7.7%	-0.9%	0
India	1961-01	01/07/48	20/08/94	186	346	1.9	9%	472	1122	2.4	29%	2.4%	0.7%	3.3%	1.2%	3.5
Senegal	1962-01	27/03/63	01/06/96	673	1011	1.5	17%	629	1453	2.3	19%	-0.1%	1.2%	1.2%	0.2%	

II. LOW MIDDLE INCOME (2001 LEVEL) COUNTRIES

Country	Sample	WTO	IMF8	IYC	IKC	IKY	ICR	EYC	EKC	EKY	ECR	GYC	GKY	GCR	GOP	RFE
China	1961-01	11/11/01	01/12/96	82	177	2.1	27%	878	2440	2.8	127%	5.4%	0.7%	7.9%	2.5%	*3*
Egypt	1961-01	09/05/70		367	695	1.9	23%	1243	2829	2.3	62%	3.1%	0.5%	3.6%	-0.6%	3
Indonesia	1965-01	24/02/50	07/05/88	259	193	0.7	4%	1012	2620	2.6	20%	3.6%	3.6%	8.9%	0.9%	3
Morocco	1961-01	17/06/87	21/01/93	663	1018	1.5	15%	1436	3983	2.8	55%	1.9%	1.6%	6.0%	1.0%	0.5
Philippines	1961-01	27/12/79	08/09/95	742	1222	1.6	20%	1185	3216	2.7	36%	1.3%	1.3%	2.4%	2.3%	3
Thailand	1961-01	20/11/82	04/05/90	476	985	2.1	11%	2853	8590	3.0	98%	4.6%	1.0%	6.0%	3.0%	3

III. HIGH MIDDLE INCOME (2001 LEVEL) COUNTRIES

Country	Sample	WTO	IMF8	IYC	IKC	IKY	ICR	EYC	EKC	EKY	ECR	GYC	GKY	GCR	GOP	RFE
Argentina	1961-01	11/10/67	14/05/68	5610	10481	1.9	14%	7550	19042	2.5	21%	1.0%	0.8%	3.9%	3.5%	0
Brazil	1961-01	30/06/48	30/11/99	1864	3051	1.6	19%	4636	11950	2.6	35%	2.5%	1.2%	7.9%	2.7%	4
Chile	1961-01	16/03/49	27/07/77	1998	3703	1.9	13%	5443	10978	2.0	69%	2.6%	0.3%	6.0%	2.3%	2.5
Costa Rica	1961-01	24/11/90	01/02/65	1842	2199	1.2	24%	3886	7893	2.0	28%	1.8%	1.4%	1.1%	2.6%	
Malaysia	1961-01	24/10/57	11/11/68	1015	1479	1.5	8%	4708	14756	3.1	149%	4.0%	2.0%	8.3%	1.9%	3
Mexico	1965-01	24/08/86	12/11/46	1669	4649	2.8	22%	3739	12323	3.3	11%	2.1%	0.5%	-0.2%	3.5%	1
South Africa	1965-01	13/06/48	15/09/73	2849	6576	2.3	69%	4068	11590	2.8	149%	1.0%	0.6%	2.3%	0.1%	0
Venezuela	1961-01	31/08/90	01/07/76	3685	7427	2.0	13%	3326	10716	3.2	12%	-0.2%	1.3%	1.4%	0.2%	4

IV.HIGH INCOME (2001 LEVEL) COUNTRIES

Country	Sample	WTO	IMF8	IYC	IKC	IKY	ICR	EYC	EKC	EKY	ECR	GYC	GKY	GCR	GOP	RFE
Chinese Taipei	1961-01	12/11/01		1525	1424	0.9	15%	21951	35347	1.6	134%	6.9%	1.5%	5.9%	4.6%	*3*
Korea	1961-01	14/04/67	01/11/88	1351	1455	1.1	20%	13420	34653	2.6	108%	5.9%	2.3%	4.9%	7.6%	3
Singapore	1963-01	20/08/63	09/11/68	2933	5680	1.9	36%	27118	88934	3.3	128%	5.9%	1.4%	3.6%	0.6%	3.5

Legend: negative growth rates in red
E***X*** = variable ***X*** at the end year of the sample
G***X*** = average annual growth rate of variable ***X***
I***X*** = variable ***X*** at the initial year of the sample

[1] The value of RFE for China and Chinese Taipei has been assessed following the KS98 methodology

TABLE 2A. *CR* CORRELATIONS IN

I. LOW INCOME COUNTRIES

Country	YC	KC	KY	OP	RR	ΔYC	ΔKC	ΔKY	ΔOP
Ghana	0.46	-0.14	-0.56	0.32	0.33	0.19	0.22	-0.07	-0.03
India	0.64	0.74	0.69	0.38	0.31	0.28	-0.06	-0.31	0.33
Senegal	-0.47	0.58	0.61	-0.04	0.02	-0.12	-0.72	-0.17	-0.10

II. LOW MIDDLE INCOME COUNTRIES

Country	YC	KC	KY	OP	RR	ΔYC	ΔKC	ΔKY	ΔOP
China	0.92	0.93	0.55	0.91	-0.10	0.35	0.42	-0.20	0.23
Egypt	0.87	0.76	0.35	-0.72	0.42	-0.06	-0.38	-0.41	-0.15
Indonesia	0.85	0.78	0.73	0.12	0.29	-0.05	0.05	0.12	0.19
Morocco	0.76	0.74	0.66	0.86	0.20	-0.12	-0.34	-0.06	0.21
Philippines	0.68	0.50	0.30	0.57	0.02	0.01	0.15	0.09	-0.05
Thailand	0.97	0.97	0.79	0.91	0.10	-0.17	-0.10	0.16	0.05

III. HIGH MIDDLE INCOME COUNTRIES

Country	YC	KC	KY	OP	RR	ΔYC	ΔKC	ΔKY	ΔOP
Argentina	0.44	0.71	0.60	0.30	0.51	-0.38	-0.41	0.24	-0.05
Brazil	0.55	0.48	0.34	0.21	0.53	-0.09	0.02	0.08	0.18
Chile	0.61	0.53	-0.52	0.77	0.34	0.14	0.27	0.05	-0.09
Costa Rica	-0.42	-0.63	-0.75	-0.51	-0.35	0.04	0.57	0.35	-0.25
Malaysia	0.97	0.98	0.98	0.91	0.13	-0.19	-0.07	0.17	0.19
Mexico	-0.47	-0.49	-0.38	-0.29	0.52	0.20	0.48	0.14	-0.08
South Africa	-0.40	-0.21	-0.02	0.43	0.62	-0.10	-0.59	-0.55	0.52
Venezuela	0.13	0.81	0.63	-0.67	-0.18	-0.15	-0.06	0.12	-0.13

IV. HIGH INCOME COUNTRIES

Country	YC	KC	KY	OP	RR	ΔYC	ΔKC	ΔKY	ΔOP
Chinese Taipei	0.95	0.95	0.85	0.91	-0.13	-0.04	-0.11	0.02	-0.42
Korea	0.93	0.91	0.93	0.97	-0.20	-0.05	-0.22	-0.09	-0.29
Singapore	0.92	0.94	0.93	0.74	0.09	-0.50	-0.59	0.02	-0.03

TABLE 2B. *YC* CORRELATIONS IN

Country	KC	KY	OP	RR	ΔKC	ΔKY	ΔOP
Ghana	0.58	-0.17	0.79	0.17	0.67	0.19	-0.08
India	0.98	0.16	0.84	0.22	0.53	-0.20	0.32
Senegal	-0.59	-0.85	0.64	-0.02	0.68	0.02	0.26

Country	KC	KY	OP	RR	ΔKC	ΔKY	ΔOP
China	1.00	0.38	0.96	-0.07	0.48	-0.07	0.22
Egypt	0.96	0.66	-0.76	0.24	-0.47	-0.49	-0.17
Indonesia	0.98	0.96	0.13	0.31	-0.10	-0.07	0.01
Morocco	0.98	0.90	0.67	0.29	-0.50	-0.29	0.20
Philippines	0.89	0.71	0.57	-0.04	-0.17	-0.06	0.15
Thailand	0.99	0.78	0.96	0.07	-0.10	0.04	0.06

Country	KC	KY	OP	RR	ΔKC	ΔKY	ΔOP
Argentina	0.70	0.09	0.61	-0.16	0.04	-0.17	0.16
Brazil	0.96	0.76	0.70	0.17	-0.36	0.01	0.18
Chile	0.96	-0.39	0.94	0.12	0.62	0.16	0.10
Costa Rica	0.94	0.75	0.92	0.42	-0.13	-0.09	-0.04
Malaysia	0.99	0.96	0.94	0.08	0.06	0.11	0.29
Mexico	0.98	0.72	0.67	-0.18	-0.58	-0.22	0.40
South Africa	0.87	0.67	-0.62	-0.27	-0.05	0.16	-0.21
Venezuela	-0.09	-0.55	0.43	0.07	0.90	0.41	-0.17

Country	KC	KY	OP	RR	ΔKC	ΔKY	ΔOP
Chinese Taipei	1.00	0.83	0.90	-0.11	-0.17	-0.08	-0.39
Korea	0.99	0.96	0.97	-0.14	-0.22	-0.10	-0.24
Singapore	1.00	0.79	0.84	-0.04	-0.58	-0.18	0.11

Legend: negative correlations in red

TABLE 3. CHOICE OF THE LAG LENGTH

Country	Statistic and lag order selected by criterion each test at 5% level)										Jarque-Brera Residual normality test [$\chi^2(10)$] & p-value (in %) for joint components							
											Lag = 1		Lag = 2		Lag = 3		Lag = 4	
	LR	Lag	FPE	Lag	AIC	Lag	SC	Lag	HQ	Lag	$\chi^2(10)$	p-value	$\chi^2(10)$	p-value	$\chi^2(10)$	p-value	$\chi^2(10)$	p-value
Argentina	40.1	2	1.48E-06	2	0.2	4	2.2	1	1.3	1	100.5	0.0%	**67.4**	**0.0%**	26.9	0.3%	44.3	0.0%
	47.0	2	9.07E-10	2	-6.8	2	-4.7	1	-5.8	**2**	21.1	2.0%	**18.1**	**5.3%**	31.3	0.1%	45.8	0.0%
Brazil	40.0	2	3.66E-05	2	3.9	2	5.4	1	4.5	1	256.6	0.0%	27.1	0.2%	**23.7**	**0.8%**	38.2	0.0%
	47.5	**3**	2.05E-08	4	-5.8	4	0.3	4	-3.7	4	32.9	0.0%	20.2	2.7%	**41.3**	**0.0%**	55.6	0.0%
Chile	63.3	2	6.65E-09	3	-5.3	4	-2.2	1	-3.8	**2**	162.0	0.0%	**39.2**	**0.0%**	25.3	0.5%	40.7	0.0%
	47.2	3	9.75E-11	3	-9.6	4	-5.4	3	-7.9	3	47.7	0.0%	**16.5**	**8.7%**	32.8	0.0%	47.0	0.0%
China	67.4	**2**	1.39E-11	3	-11.3	4	-8.3	**2**	-9.9	3	10.6	38.9%	**10.9**	**36.4%**	32.3	0.0%	46.0	0.0%
	70.6	**2**	1.44E-12	3	-14.9	4	-9.5	**2**	-12.8	4	20.3	2.7%	**30.2**	**0.1%**	47.4	0.0%	58.6	0.0%
Chinese Taipei	39.3	4	2.68E-12	4	-13.2	4	-10.3	1	-11.6	4	21.5	1.8%	**18.5**	**4.7%**	24.7	0.6%	43.4	0.0%
	40.7	4	4.79E-13	4	-14.9	4	-11.3	**2**	-13.3	4	18.6	4.6%	**17.2**	**7.1%**	28.4	0.2%	45.6	0.0%
Costa Rica	44.3	2	5.95E-12	2	-11.8	2	-10.1	1	-10.9	1	22.8	1.2%	**23.3**	**1.0%**	33.5	0.0%	45.5	0.0%
	52.5	2	2.30E-12	2	-12.7	2	-10.5	1	-11.8	**2**	52.4	0.0%	**23.7**	**0.8%**	35.9	0.0%	44.8	0.0%
Egypt	40.9	4	5.00E-12	4	-12.6	4	-10.0	1	-11.0	4	8.9	53.9%	**13.1**	**22.0%**	25.9	0.4%	42.6	0.0%
	68.8	**2**	1.86E-12	4	-13.7	4	-9.9	**2**	-12.0	4	9.8	46.1%	**22.1**	**1.5%**	35.2	0.0%	46.8	0.0%
Ghana	42.3	**2**	2.07E-09	**2**	-6.0	3	-4.3	1	-5.2	1	39.3	0.0%	**17.8**	**5.8%**	30.8	0.1%	44.3	0.0%
	466.7	1	1.50E-11	4	-13.4	4	-7.1	4	-11.2	4	12.5	25.1%	**32.4**	**0.0%**	46.8	0.0%	59.8	0.0%
India	417.8	1	3.36E-13	1	-14.5	1	-13.2	1	-14.1	1	5.4	86.5%	14.5	15.1%	**23.0**	**1.1%**	43.9	0.0%
	46.8	2	8.04E-14	3	-16.9	4	-13.2	1	-15.1	**3**	12.9	22.8%	24.4	0.7%	**42.8**	**0.0%**	53.2	0.0%
Indonesia	76.6	2	4.02E-11	4	-10.9	4	-6.3	2	-9.3	4	274.4	0.0%	30.9	0.1%	**29.8**	**0.1%**	42.9	0.0%
	43.9	**3**	4.25E-11	4	-10.8	4	-6.1	4	-9.2	4	336.2	0.0%	52.8	0.0%	**31.1**	**0.1%**	42.6	0.0%
Korea	47.3	**2**	7.16E-12	4	-12.2	4	-9.6	1	-10.6	4	35.6	0.0%	**15.9**	**10.4%**	32.5	0.0%	47.1	0.0%
	37.9	3	9.04E-13	3	-14.1	3	-10.1	**2**	-12.6	3	19.2	3.8%	**25.9**	**0.4%**	40.8	0.0%		
Malaysia	41.5	4	2.03E-11	4	-11.2	4	-8.6	1	-9.6	4	11.8	29.8%	**16.7**	**8.1%**	32.5	0.0%	46.2	0.0%
	38.1	4	1.02E-11	2	-11.8	4	-8.6	2	-10.3	**2**	11.4	33.0%	**15.4**	**12.0%**	30.0	0.1%	48.6	0.0%
Mexico	51.4	2	3.83E-11	4	-11.0	4	-7.4	1	-9.4	**4**	4.6	91.4%	14.9	13.7%	33.4	0.0%	**47.3**	**0.0%**
	41.2	4	6.80E-12	4	-13.2	4	-8.0	4	-11.4	**4**	7.1	71.1%	18.1	5.4%	34.2	0.0%	**50.7**	**0.0%**
Morocco	304.9	1	5.80E-11	1	-9.4	**2**	-8.1	1	-8.9	1	58.1	0.0%	**22.2**	**1.4%**	27.3	0.2%	41.2	0.0%
	45.7	**2**	7.68E-12	3	-12.3	4	-9.2	1	-10.6	4	17.7	6.1%	**22.4**	**1.3%**	36.2	0.0%	50.4	0.0%
Philippines	56.4	2	1.12E-11	2	-11.2	4	-9.0	1	-10.3	2	8.3	59.6%	19.2	3.8%	31.1	0.1%	**45.6**	**0.0%**
	45.9	4	1.23E-13	4	-17.2	4	-11.6	4	-15.2	**4**	13.0	22.5%	26.6	0.3%	42.7	0.0%	**53.7**	**0.0%**
Senegal	48.1	2	1.80E-11	2	-10.9	4	-8.8	**1**	-9.8	2	**6.1**	**80.7%**	13.5	19.6%	31.9	0.0%	44.0	0.0%
	38.6	3	1.18E-12	4	-14.3	4	-9.9	2	-12.6	4	**8.4**	**58.6%**	15.7	10.8%	36.3	0.0%	50.4	0.0%
Singapore	38.5	4	1.39E-12	4	-14.0	4	-9.8	1	-12.4	4	18.1	5.4%	**14.6**	**14.6%**	34.7	0.0%	46.4	0.0%
	46.2	4	7.68E-13	4	-14.6	4	-10.0	4	-13.0	4	27.8	0.2%	**10.7**	**37.9%**	31.9	0.0%	43.9	0.0%
South Africa	45.7	2	6.73E-13	4	-15.0	4	-11.8	1	-13.4	4	23.3	1.0%	19.5	3.4%	**35.8**	**0.0%**	46.8	0.0%
	39.3	4	6.37E-14	4	-17.8	4	-12.6	4	-16.1	4	11.2	34.3%	23.7	0.8%	**38.8**	**0.0%**	49.0	0.0%
Thailand	60.7	2	1.53E-11	4	-11.5	4	-8.5	1	-9.9	**2**	13.7	18.5%	**12.4**	**26.0%**	24.9	0.6%	43.0	0.0%
	64.1	2	4.49E-12	2	-12.6	4	-9.4	2	-11.1	**2**	14.5	15.3%	**18.1**	**5.3%**	27.4	0.2%	45.4	0.0%
Venezuela	325.1	1	2.55E-10	1	-7.9	1	-6.6	1	-7.5	**1**	**32.7**	**0.0%**	23.3	1.0%	25.8	0.4%	43.4	0.0%
	44.1	4	6.68E-12	4	-13.2	4	-7.6	4	-11.2	4	**8.2**	**60.6%**	28.1	0.2%	44.5	0.0%	57.0	0.0%

Legend: **lag choice in bold**

The first row for each country shows estimates with no dummies the second one estimates with all the dummies identified in table A8

LR: sequential modified LR test statistic
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

TABLE 4.1 OUTLIER DETECTION & ESTIMATION

	Argentina			Brazil			Chile			China			Chinese Taipei			Costa Rica			Egypt			Ghana			India			Indonesia		
	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO
ITERATION 0																														
	1964	**91.1**	**38.1**	1976	17.1	9.5	1973	**112.3**	**58.6**	1967	**22.06**	16.22	1968	**55.61**	5.8	1981	**63.23**	**25.66**	1965	**99.5**	**35.42**	1964	**75.4**	12.3	1965	**22.7**	7.5	1969	9.3	-1.9
	1970	**91.9**	**34.3**	1977	21.6	12.0	1975	**81.4**	**57.6**	1968	**22.11**	9.605	1974	**132.2**	8.4	1982	**116.2**	**47.13**	1974	**100.2**	**27.36**	1965	**76.4**	10.5	1969	**27.7**	12.3	1971	7.5	-2.8
	1977	**100.8**	**37.5**	1981	19.8	6.4	1982	**104.6**	**59.1**	1969	10.01	5.239	1987	**57.85**	9.4	1991	**61.52**	**32.56**	1975	**95.9**	**32.8**	1966	**64.8**	3.3	1974	**43.2**	14.7	1975	**33.7**	-2.6
	1979	**85.3**	**40.6**	1988	**25.9**	3.8	1995	**54.6**	**49.6**	1970	12.87	1.936	1988	**56.04**	5.7	1992	**77.69**	**25.01**	1977	**105.3**	**25.83**	1971	**77.2**	7.9	1975	16.1	5.5	1976	12.5	-7.4
	1985	**112.0**	**47.8**	1989	**153.9**	**25.9**				1973	9.313	6.282	1992	**54.44**	5.7	1998	**62.51**	**29.62**	1981	**115.7**	**29.89**	1975	**83.1**	12.8	1988	8.5	12.5	1980	18.7	-7.3
	1989	**376.9**	**62.5**	1993	**28.1**	**33.7**				1976	14.1	3.201	2001	**53.9**		1999	**79.94**	21.58	1986	**124.2**	**38.37**	1977	**74.7**	17.6	1989	**35.7**	4.3	1994	3.2	0.5
				1994	**31.1**	15.6				1988	13.79	6.063							1988	**101.5**	**25.33**	1978	**75.5**	9.4	1995	21.7	15.2			
				1995	**77.2**	16.6				1990	12.84	8.234										1981	**69.9**	10.1	1999	9.6				
										1993	19.0	12.48										1982	**83.8**	7.8						
										1994	19.55	4.551										1983	**69.7**	9.9						
																						1985	**81.8**	6.3						
																						1992	**60.4**	1.5						
																						2001	**118.1**							
ITERATION 1:	**IO@89**			**IO@89**			**IO@73**			**IO@68**			**IO@74**			**IO@82**			**IO@86**			**IO@01**			**IO@74**			**IO@75**		
	1964	10.5		1976	15.9	4.6	1975	**49.3**	9.9	1967	**22.31**	5.093	1968	19.73	8.143	1981	19.37	7.003	1965	**27.7**	11.26	1964	17.7	14.3	1965	**23.6**	10.4	1969	7.4	1.6
	1970	11.9	2.2	1977	12.6	11.5	1982	**57.8**	9.7	1969	8.829	5.153	1987	11.3	9.159	1991	9.032	10.15	1974	16.9	5.149	1965	**24.8**	12.8	1969	**27.1**	9.3	1971	8.8	-10.9
	1977	12.1	3.3	1981	20.1	9.8	1995	7.0	2.0	1970	13.1	1.935	1988	14.29	3.71	1992	22.45	6.116	1975	14.6	9.458	1966	13.8	3.1	1975	4.0	2.8	1976	19.0	-8.6
	1979	7.4	9.2	1988	**24.2**	2.9				1973	7.945	6.578	1992	15.71	7.509	1998	13.09	9.464	1977	9.2	3.724	1971	**26.6**	10.9	1988	8.4	12.5	1980	19.4	-4.0
	1985	**28.1**	20.6	1993	12.9	8.6				1976	16.0	3.76	2001	15.8		1999	14.98	1.93	1981	**43.1**	10.49	1975	14.0	12.7	1989	**37.1**	6.2	1994	2.7	0.1
				1994	**27.2**	1.0				1988	12.76	6.467							1988	10.0	4.867	1977	**24.8**	17.0	1995	17.7	14.2			
				1995	**29.2**	2.9				1990	13.91	8.348										1978	20.0	8.8	1999	10.3				
										1993	19.85	13.85										1981	9.4	7.4						
										1994	19.39	4.805										1982	**22.4**	6.8						
																						1983	15.3	10.5						
																						1985	13.0	5.4						
																						1992	7.3	1.9						
ITERATION 2:	**IO@85**			**IO@95**			**IO@82**			**IO@67**						**IO@92**			**IO@81**			**IO@71**			**IO@89**					
	1964	10.4	9.9	1976	14.7	9.5	1975	**50.5**	9.3	1969	5.956	8.039				1981	19.55	6.721	1974	17.2	5.1	1964	13.5	16.3	1965	**25.0**	11.3			
	1970	11.7	2.0	1977	**23.0**	12.4	1995	7.9	3.1	1970	**22.93**	3.807				1991	5.327	1.897	1975	15.3	9.4	1965	**25.1**	15.5	1969	**27.0**	9.0			
	1977	11.9	2.6	1981	**24.5**	9.9				1973	7.664	5.867				1998	13.99	9.299	1977	6.4	3.1	1966	16.2	3.8	1975	4.2	-1.1			
	1979	14.3	14.1	1988	13.3	0.8				1976	21.15	3.16				1999	14.9	2.297	1988	8.0	4.0	1975	13.7	10.0	1988	10.8	2.0			
				1993	**40.0**	-0.1				1988	11.05	7.837										1977	19.2	14.6	1995	**25.0**	-11.1			
				1994	**25.5**	-1.3				1990	16.83	9.896										1978	21.5	8.2	1999	11.5	-7.0			
										1993	21.24	13.62										1981	9.7	9.4						
										1994	18.98	4.859										1982	24.0	4.6						
																						1983	12.9	12.3						
																						1985	14.7	8.9						
																						1992	5.3	1.9						

TABLE 4.2 OUTLIER DETECTION & ESTIMATION

	Argentina			Brazil			Chile			China			Chinese Taipei			Costa Rica			Egypt			Ghana			India			Indonesia		
	Outlier tests			Outlier tests			Outlier tests			Outlier tests			Outlier tests			Outlier tests			Outlier tests			Outlier tests			Outlier tests			Outlier tests		
	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO
ITERATION 3:				**IO@93**			**IO@75**			**IO@70**												**IO@65**			**IO@69**					
				1976	14.7	9.4	1995	8.2	3.3	1969	5.525	3.749										1964	10.8	3.4	1965	**27.5**	11.0			
				1977	**23.4**	10.1				1973	8.246	5.806										1966	14.0	4.3	1975	3.5	-0.6			
				1981	**24.6**	4.3				1976	20.97	2.571										1975	20.7	14.3	1988	9.3	0.3			
				1988	**102.4**	7.5				1988	9.682	7.716										1977	**22.6**	14.5	1995	**32.0**	-3.7			
				1994	**29.3**	-0.8				1990	19.58	12.14										1978	12.7	7.7	1999	11.9	-3.4			
										1993	**22.0**	12.41										1981	8.1	7.6						
										1994	19.09	4.562										1982	**33.4**	8.0						
																						1983	13.5	11.0						
																						1985	15.5	7.4						
																						1992	6.2	0.7						
ITERATION 4:				**IO@88**						**IO@93**												**IO@82**			**IO@95**					
				1976	15.6	10.3				1969	5.8	4.244										1964	10.9	3.3	1965	**28.7**	10.8			
				1977	**22.5**	13.4				1973	8.031	5.118										1966	14.9	3.9	1975	5.9	2.5			
				1981	**28.9**	9.3				1976	16.42	2.383										1975	**26.2**	15.8	1988	9.6	-0.6			
				1994	**45.4**	2.0				1988	16.61	11.04										1977	**25.2**	16.7	1999	18.6	-1.2			
										1990	20.44	13.29										1978	7.9	8.6						
										1994	20.61	3.811										1981	7.3	2.9						
																						1983	13.4	13.2						
																						1985	14.2	6.2						
																						1992	6.5	0.7						
ITERATION 5:				**IO@94**																		**IO@75**			**IO@65**					
				1976	16.5	10.7																1964	10.4	3.3	1975	4.1	2.8			
				1977	**26.8**	8.5																1966	17.7	8.1	1988	13.5	-0.7			
				1981	**24.9**	5.8																1977	**25.2**	17.7	1999	17.0	-0.4			
																						1978	20.0	14.3						
																						1981	12.0	5.2						
																						1983	12.5	12.3						
																						1985	14.2	5.9						
																						1992	6.7	1.0						

TABLE 4.3 OUTLIER DETECTION & ESTIMATION

	Argentina			Brazil			Chile			China			Chinese Taipei			Costa Rica			Egypt			Ghana			India			Indonesia		
	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO
ITERATION 6:				**IO@77**																		**IO@77**								
				1976	**28.7**	3.0																1964	12.1	3.4						
				1981	**27.2**	-9.6																1966	14.2	8.1						
																						1978	**25.3**	16.6						
																						1981	16.0	8.1						
																						1983	19.6	14.6						
																						1985	14.2	6.2						
																						1992	9.4	2.1						
ITERATION 7:				**IO@76**																		**IO@78**								
				1981	**28.4**	-8.6																1964	11.5	1.0						
																						1966	11.4	7.1						
																						1981	**24.1**	12.5						
																						1983	18.6	5.3						
																						1985	13.9	3.0						
																						1992	11.2	4.8						
ITERATION 8:				**IO@81**																		**IO@81**								
																						1964	11.6	1.1						
																						1966	14.1	7.3						
																						1983	**31.7**	10.4						
																						1985	21.1	6.5						

TABLE 4.4 OUTLIER DETECTION & ESTIMATION

	Korea			Malaysia			Mexico			Morocco			Philippines			Senegal			Singapore			South Africa			Thailand			Venezuela		
	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO
ITERATION 0																														
	1964	**137.8**	**27.9**	1963		5.8	1970	8.5	0.0	1965	**50.6**	7.0	1974	**39.2**	3.2	1963	8.3	-50.7	1965		-1.2	1974	**22.80**	-3.0	1974	**85.41**	**12.7**	1977	10.2	2.269
	1965	**119.3**	**23.6**	1974	**85.3**	16.4	1973	7.4	4.9	1974	**75.1**	22.0	1980	**23.8**	8.5	1972	8.4	2.2	1968	**138.9**	18.6	1975	20.71	5.9	1975	**80.92**	**7.1**	1983	**30.94**	**25.92**
	1974	**136.4**	**23.3**	1982	**75.5**	8.3	1978	17.4	4.1	1978	**56.3**	1.9	1984	**56.1**	4.0	1976	**22.2**	14.6	1971	**138.6**	10.3	1977	10.72	-1.3	1980	**76.85**	**8.6**	1984	11.0	4.543
	1980	**128.6**	**26.1**	1985	**66.9**	2.0	1985	**38.7**	4.2	1986	**80.9**	9.7	1991	**27.2**	8.3	1977	20.9	21.5	1973	**151.9**	16.1	1988	21.97	4.5	1996	**79.92**	**19.5**	1989	**24.25**	9.955
	1998	**143.0**	**37.8**	1989	**66.2**	4.0	1990	**27.2**	2.9	1990	**56.5**	5.3	1997	15.4	21.0	1978	**27.3**	8.7	1983	**142.4**	15.5	1999	**63.06**		1997	**86.65**	12.8	1990	15.85	5.673
				1992	**86.7**	9.6	1991	**40.4**	3.3				1998	**47.0**		1981	13.0	10.9	1996	**127.6**	10.3				1998	**106.6**	8.5	1994	13.0	3.165
				1998	**87.5**	10.2										1982	9.7	3.6	1998	**143.6**					2000	**74.17**		1996	21.78	15.42
																1984	8.9	8.0										1997	11.11	1.265
																1985	8.2	2.0												
																1994	**32.5**	16.6												
ITERATION 1:	**IO@74**			**IO@98**			**IO@91**			**IO@86**			**IO@84**			**IO@94**			**IO@73**			**IO@99**			**IO@98**			**IO@83**		
	1964	**49.1**	13.2	1963	10.3	7.2	1970	10.7	2.8	1965	15.3	6.7	1974	**68.9**	10.0	1963	8.4		1965			1974	**28.28**	-7.8	1974	14.5	15.1	1977	11.54	2.967
	1965	**24.3**	8.8	1974	**36.7**	16.1	1973	18.1	8.6	1974	25.6	20.9	1980	**43.9**	8.5	1972	8.6		1968	10.0	1.4	1975	10.52	5.5	1975	20.3	7.6	1984	22.9	11.93
	1980	**24.8**	9.2	1982	17.5	7.6	1978	14.2	3.0	1978	14.6	1.3	1991	**31.5**	9.1	1976	**40.6**		1971	7.3	-4.0	1977	15.46	-1.3	1980	10.2	7.4	1989	**26.27**	9.392
	1998	**28.8**	21.6	1985	18.6	2.6	1985	**40.9**	2.0	1990	**61.2**	11.4	1997	15.7	**28.0**	1977	19.5		1983	9.7		1988	**28.37**		1996	11.4	11.0	1990	18.44	6.191
				1989	12.4	3.0	1990	**20.6**	11.2				1998	**63.4**		1978	**31.3**		1996	1.8	0.1				1997	**27.7**	6.4	1994	11.35	2.837
				1992	21.9	13.0										1981	15.2		1998	10.3	-5.9				2000	16.2		1996	**28.0**	16.64
																1982	13.4											1997	9.839	1.31
																1984	9.9													
																1985	13.6													
ITERATION 2:	**IO@64**			**IO@74**			**IO@85**			**IO@90**			**IO@74**			**IO@76**						**IO@88**			**IO@97**			**IO@96**		
	1965	20.4	6.3	1963	14.6	9.5	1970	10.4	0.8	1965	13.6	5.2	1980	**45.7**	12.4	1963	8.7								1974	12.25	13.48	1977	9.392	2.372
	1980	**25.2**	8.6	1982	16.6	4.4	1973	**49.4**	13.2	1974	**28.7**	**22.3**	1991	**37.2**	4.9	1972	10.4								1975	20.95	8.074	1984	**25.7**	13.3
	1998	**32.3**	**24.0**	1985	19.5	3.1	1978	11.5	-1.4	1978	12.9	2.5	1997	15.9	26.0	1977	21.1								1980	8.39	6.778	1989	**31.7**	11.0
				1989	12.8	3.1	1990	8.8	1.3				1998	**68.8**		1978	32.6								1996	13.83	4.718	1990	16.2	6.6
				1992	21.3	11.5										1981	16.1								2000	13.09		1994	18.3	5.7
																1982	15.4											1997	5.1	2.3
																1984	9.8													
																1985	16.1													

TABLE 4.5. OUTLIER DETECTION & ESTIMATION

	Korea			Malaysia			Mexico			Morocco			Philippines			Senegal			Singapore			South Africa			Thailand			Venezuela		
	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO
ITERATION 3:	**IO@98**						**IO@73**			**IO@74**			**IO@98**			**IO@78**												**IO@89**		
	1965	**24.0**	6.3				1970	14.1	5.7	1965	14.9	4.7	1980	**49.7**	16.1	1963	8.5	3.6										1977	8.9	1.402
	1980	**35.4**	8.9				1978	7.6	-2.7	1978	12.9	2.7	1991	**36.4**	5.0	1972	10.1	2.5										1984	**25.4**	13.41
							1990	12.1	2.1				1997	**28.8**	2.4	1977	14.6	5.9										1990	16.2	8.413
																1981	16.3	18.8										1994	24.2	8.018
																1982	17.3	6.6										1997	4.1	2.172
																1984	12.8	15.3												
																1985	19.5	8.0												
ITERATION 4:	**IO@80**												**IO@80**															**IO@84**		
	1965	**26.9**	5.6										1991	**41.0**	6.6													1977	10.16	2.399
													1997	**35.3**	4.1													1990	19.49	10.01
																												1994	**26.1**	7.97
																												1997	2.57	2.286
ITERATION 5:	**IO@65**												**IO@91**															**IO@94**		
													1997	**39.3**	3.5													1977	10.45	2.395
																												1990	**22.13**	11.65
																												1997	2.561	2.304

TABLE 4.6. OUTLIER DETECTION & ESTIMATION

	Korea			Malaysia			Mexico			Morocco			Philippines			Senegal			Singapore			South Africa			Thailand			Venezuela		
	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO	Year	IO	AO
ITERATION 6:																												**IO@90**		
																												1977	11.71	-9.07
																												1997	17.42	0.008
ITERATION 7:																														
ITERATION 8:																														

Legend: **significative (i.e. test $>\chi^2(5)_{.9995}$) dummy in bold**
Dummy chosen for next iteration

TABLE 5: DUMMY VARIABLES AND CRISIS PATTERNS

Year	AG	BR	CL	CH	TW	CR	EY	GH	IN	ID	KO	MY	MO	MX	PH	SG	SP	SA	TH	VE
1961																				
1962																				
1963																				
1964											1									
1965								1	1		1									
1966																				
1967				1																
1968				1																
1969									1											
1970				1																
1971								1												
1972																				
1973			1											1			1			
1974					1				1		1	1	1		1			1		
1975			1					1		1										
1976		1														1				
1977		1						1												
1978								1								1				
1979																				
1980											1				1					
1981		1					1	1												
1982			1			1		1												
1983								1												1
1984															1					1
1985	1													1						
1986							1						1							
1987																				
1988		1																1		
1989	1	1							1											1
1990																				1
1991														1	1					
1992						1														
1993		1		1																
1994	1	1														1				1
1995		1							1											
1996																				1
1997																			1	
1998											1	1			1				1	
1999																		1		
2000																				
2001								1												
Nr of dummies	**3**	**8**	**3**	**4**	**1**	**2**	**2**	**9**	**5**	**1**	**5**	**2**	**2**	**3**	**5**	**3**	**1**	**3**	**2**	**6**
Nr of yrs of crisis	**16**	**14**	**11**			**10**	**8**	**8**		**16**	**7**	**4**	**6**	**15**	**12**	**14**		**5**	**4**	**14**

TABLE 6. EIGENVALUES AND COINTEGRATION TEST

		Asymptotic quantiles for									
		Model with no trend in data & in CE					Model with Linear trend in data & no trend in CE				
Trace Test	1%	84.84	60.81	40.78	24.69	12.53	77.29	54.23	35.21	19.62	6.93
	5%	76.81	53.94	35.07	20.16	9.14	69.61	47.71	29.8	15.41	3.84
Max-Eigenvalue Test	1%	39.47	33.00	26.47	19.69	12.53	38.42	31.99	25.36	18.14	6.63
	5%	34.56	26.41	22.17	15.79	9.14	33.62	27.38	21.03	14.16	3.84
Country		Eigenvalues at most					Eigenvalues at most				
		None	1 CE	2 CE	3 CE	4 CE	None	1 CE	2 CE	3 CE	4 CE
Argentina	Eigenvalue	0.999	0.69	0.38	0.34	0.12					
	Trace Test	330.3 **	83.17 **	38.43 *	20.35 *	4.76					
	Max-Eigenvalue Test	247.2 **	44.74 **	18.08	15.60	4.76					
Brazil	Eigenvalue	0.987	0.74	0.64	0.41	0.10					
	Trace Test	278.2 **	114.0 **	63.47 **	24.30 *	4.13					
	Max-Eigenvalue Test	164.2 **	50.55 **	39.17 **	20.18 **	4.13					
Chile	Eigenvalue						0.7265	0.5949	0.352	0.1928	0.000
	Trace Test						108.2 **	58.97 **	24.63	8.15	0.01
	Max-Eigenvalue Test						49.3 **	34.34 **	16.48	8.14	0.01
China	Eigenvalue						0.6553	0.4826	0.356	0.2534	0.005
	Trace Test						93.5 **	53.05 *	28.01	11.29	0.19
	Max-Eigenvalue Test						40.5 **	25.04	16.72	11.10	0.19
Chinese Taipei	Eigenvalue						0.80	0.66	0.48	0.30	0.17
	Trace Test						148.6 **	86.69 **	45.70 **	20.59 **	6.91 *
	Max-Eigenvalue Test						61.90 **	40.99 **	25.11 *	13.68	6.91 **
Costa Rica	Eigenvalue						0.7298	0.4724	0.3279	0.1683	0.079
	Trace Test						99.3 **	49.53 *	25.23	10.13	3.13
	Max-Eigenvalue Test						49.7 **	24.30	15.10	7.00	3.13
Egypt	Eigenvalue	0.70	0.46	0.39	0.30	0.02					
	Trace Test	102.3 **	56.46 *	33.12	14.31	0.91					
	Max-Eigenvalue Test	45.83 **	23.33	18.82	13.39	0.91					
Ghana	Eigenvalue	0.825	0.79	0.65	0.33	0.03					
	Trace Test	182.1 **	115.8 **	56.50 **	16.52	1.29					
	Max-Eigenvalue Test	66.2 **	59.33 **	39.98 **	15.23	1.29					
India	Eigenvalue						0.8431	0.6902	0.4848	0.1649	0.093
	Trace Test						150.7 **	80.29 **	35.76 **	10.55	3.71
	Max-Eigenvalue Test						70.4 **	44.54 **	25.20 *	6.85	3.71
Indonesia	Eigenvalue						0.68	0.50	0.35	0.23	0.12
	Trace Test						90.74 **	51.48 *	27.65	13.13	4.39 *
	Max-Eigenvalue Test						39.25 **	23.83	14.53	8.73	4.39 *
Korea	Eigenvalue	0.84	0.71	0.60	0.34	0.12					
	Trace Test	173.8 **	103.6 **	55.94 **	21.07 *	5.05					
	Max-Eigenvalue Test	70.22 **	47.64 **	34.87 **	16.02 *	5.05					
Malaysia	Eigenvalue						0.7913	0.2943	0.2899	0.0454	0.00
	Trace Test						87.6 **	28.03	14.78	1.77	0.01
	Max-Eigenvalue Test						59.5 **	13.25	13.01	1.77	0.01
Mexico	Eigenvalue	0.76	0.53	0.42	0.35	0.09					
	Trace Test	110.0 **	61.79 **	36.40 *	17.76	3.23					
	Max-Eigenvalue Test	48.25 **	25.39	18.64	14.52	3.23					
Morocco	Eigenvalue	0.720	0.53	0.33	0.24	0.02					
	Trace Test	103.1 **	54.63 *	26.15	10.96	0.71					
	Max-Eigenvalue Test	48.4 **	28.48 *	15.19	10.25	0.71					
Philippines	Eigenvalue	0.696	0.55	0.34	0.20	0.04					
	Trace Test	101.3 **	56.09 *	25.68	9.95	1.44					
	Max-Eigenvalue Test	45.3 **	30.41 *	15.74	8.51	1.44					
Senegal	Eigenvalue						0.5915	0.5257	0.3761	0.1033	0.00
	Trace Test						84.4 **	50.42 *	22.08	4.15	0.00
	Max-Eigenvalue Test						34.0 *	28.34 *	17.93	4.15	0.00
Singapore	Eigenvalue	0.72	0.60	0.48	0.36	0.12					
	Trace Test	122.8 **	77.40 **	44.62 **	21.00 *	4.71					
	Max-Eigenvalue Test	45.44 **	32.78 *	23.62 *	16.29 *	4.71					
South Africa	Eigenvalue						0.74	0.66	0.37	0.14	0.03
	Trace Test						104.2 **	58.72 **	21.94	6.20	1.18
	Max-Eigenvalue Test						45.50 **	36.78 **	15.73	5.02	1.18
Thailand	Eigenvalue	0.57	0.48	0.33	0.28	0.15					
	Trace Test	91.3 **	58.96 *	33.80	18.53	6.10					
	Max-Eigenvalue Test	32.34	25.17	15.27	12.43	6.10					
Venezuela	Eigenvalue						0.8027	0.51	0.3576	0.2112	0.08
	Trace Test						118.0 **	56.27 **	29.16	12.34	3.33
	Max-Eigenvalue Test						61.7 **	27.11	16.82	9.01	3.33

Legend: ** = accept eigenvalue @5% level

- = accept eigenvalue @1% level

Please note that, as in Bohn Nielsen (2003), critical values have been taken from J.A. Doornik (1998) as opposed to Osterwald-Lenum (1992)

TABLE 7. PARAMETERS' RESTRICTIONS

I. LOW INCOME COUNTRIES

Country	First Cointegrating Vector						Second Cointegrating Vector						IMF art. 8	Restrict. on Foreign Establ.
	$CR=\beta_{1,0}+\beta_{1,2}YC+\beta_{1,3}KC+\beta_{1,4}OP+\beta_{1,5}RR$						$YC=\beta_{2,0}+\beta_{2,3}KC+\beta_{2,4}OP+\beta_{2,5}RR$					OR		
	$\beta_{1,0}$ [t-val]	$\beta_{1,2}$ [t-val]	$\beta_{1,3}$ [t-val]	$\beta_{1,4}$ [t-val]	$\beta_{1,5}$ [t-val]	$\alpha_{1,1}$ [t-val]	$\beta_{2,0}$ [t-val]	$\beta_{2,3}$ [t-val]	$\beta_{2,4}$ [t-val]	$\beta_{2,5}$ [t-val]	$\alpha_{2,2}$ [t-val]	$\chi^2(1)$ [p-val]		
Ghana	-0.14	**-0.10**	**0.10**	**0.07**	**0.001**	**-0.44**	6.53	**-0.39**	**0.45**	**-0.01**	**-0.01**	**0.00**	21/02/94	0
	-1.91	-3.54	3.54	5.62	4.8	-4.14	6.25	-2.49	5.30	-47.26	-0.33	96%		
India	**1.20**	-0.58	0.58	-0.45	**0.11**	-0.009	**0.19**	**0.997**	**-0.30**	**-0.02**	-0.152	**2.16**	20/08/94	3.5
		-0.65	0.65	-1.09	49.71	-0.99		23.93	-3.38	-9.50	-1.44	14%		
Senegal	**-0.10**	-0.14	0.14	0.11	**-0.004**	**-0.07**	**14.87**	**-0.90**	**-0.44**	**-0.01**	-0.22	**0.07**	01/06/96	
		-1.59	1.59	0.70	-4.00	-2.19		-7.21	-3.13	-7.12	-2.83	79%		

II. LOW MIDDLE INCOME COUNTRIES

Country	First Cointegrating Vector						Second Cointegrating Vector						IMF art. 8	Restrict. on Foreign Establ.
	$CR=\beta_{1,0}+\beta_{1,2}YC+\beta_{1,3}KC+\beta_{1,4}OP+\beta_{1,5}RR$						$YC=\beta_{2,0}+\beta_{2,3}KC+\beta_{2,4}OP+\beta_{2,5}RR$					OR		
	$\beta_{1,0}$ [t-val]	$\beta_{1,2}$ [t-val]	$\beta_{1,3}$ [t-val]	$\beta_{1,4}$ [t-val]	$\beta_{1,5}$ [t-val]	$\alpha_{1,1}$ [t-val]	$\beta_{2,0}$ [t-val]	$\beta_{2,3}$ [t-val]	$\beta_{2,4}$ [t-val]	$\beta_{2,5}$ [t-val]	$\alpha_{2,2}$ [t-val]	$\chi^2(1)$ [p-val]		
China	**-2.60**	**0.18**		**0.56**	**0.07**	-0.16	**-0.72**	**0.96**		**0.05**	**-0.05**	**2.16**	01/12/96	*3*
		1.96		4.72	5.03	-1.26		17.54		5.59	-0.57	14%		
Egypt	**2.28**	**-0.54**	**0.54**	**-0.57**	**0.04**	**-0.19**	-0.22	**0.81**	0.15	**0.03**	**-0.43**	**0.00**		3
	2.19	-4.27	4.27	-2.57	43.9	-1.86	-0.24	24.04	0.88	30.32	-4.00	96%		
Indonesia	**-0.04**	**-0.72**	**0.72**	0.01	**0.01**	-0.16	**1.94**	**0.56**	**0.15**	-0.0004	-0.85	**0.01**	07/05/88	3
		-7.13	7.13	0.02	16.50	-2.14		79.75	2.63	-0.89	-2.28	94%		
Morocco	**2.39**	**-0.76**	**0.76**	**-0.41**	**-0.04**	-0.10	**-2.72**	**-0.40**	**-0.24**		**-0.54**	**0.02**	21/01/93	0.5
	2.87	-5.48	5.48	-2.18	-7.24	-1.76	-10.11	-17.03	-3.69		-2.64	90%		
Philippines	**-2.28**	-0.04	0.04	**0.60**	**-0.02**	-0.04	**4.07**	**0.30**	**0.11**	**-0.02**	-0.13	**0.01**	08/09/95	3
		-0.24	0.24	8.02	-8.81	-0.74		6.50	2.42	-8.53	-1.54	94%		
Thailand	**-5.18**	**0.41**		0.53	-0.01	**-0.13**	-0.06	**0.86**		0.004	-0.15	**2.59**	04/05/90	3
	-9.80	2.38		1.74	-0.79	-3.94	-0.44	49.93		1.53	-1.59	11%		

III. HIGH MIDDLE INCOME COUNTRIES

Country	First Cointegrating Vector						Second Cointegrating Vector						IMF art. 8	Restrict. on Foreign Establ.
	$CR=\beta_{1,0}+\beta_{1,2}YC+\beta_{1,3}KC+\beta_{1,4}OP+\beta_{1,5}RR$						$YC=\beta_{2,0}+\beta_{2,3}KC+\beta_{2,4}OP+\beta_{2,5}RR$					OR		
	$\beta_{1,0}$ [t-val]	$\beta_{1,2}$ [t-val]	$\beta_{1,3}$ [t-val]	$\beta_{1,4}$ [t-val]	$\beta_{1,5}$ [t-val]	$\alpha_{1,1}$ [t-val]	$\beta_{2,0}$ [t-val]	$\beta_{2,3}$ [t-val]	$\beta_{2,4}$ [t-val]	$\beta_{2,5}$ [t-val]	$\alpha_{2,2}$ [t-val]	$\chi^2(1)$ [p-val]		
Argentina	**-0.7**	**-0.52**	**0.52**	**0.1**	**0.000**	**-0.344**	-0.9	**1.00**		**0.002**	**-0.21**	**1.46**	14/05/68	0
	-4.9	-5.4	5.4	6.0	-106.8	-2.9	-0.9	10.0		156.1	-2.8	23%		
Brazil	**-4.15**	**0.65**		**-0.29**	**-0.0002**	-0.12	**0.21**	**0.91**	**-0.11**		-0.22	**0.35**	30/11/99	4
	-21.37	20.15		-7.59	-25.72	-1.58	2.26	62.23	-5.34		-0.92	56%		
Chile	**-2.8**	-0.45	0.45	**0.7**	**0.006**	**-0.333**	**2.0**	**0.2**	**0.99**	**-0.004**	-0.12	**0.10**	27/07/77	2.5
		-1.42	1.42	4.37	9.35	-7.51		2.02	7.07	-6.53	-1.48	76%		
Costa Rica	**-2.00**	0.09		0.41	**-0.03**	**-0.32**	**1.87**	**0.50**	**0.48**	**-0.02**	-0.02	**2.03**	01/02/65	
		0.44		1.95	-138.6	-3.33		9.13	4.52	-88.43	-0.08	15%		
Malaysia	**-3.66**	**-0.98**	**0.98**	**0.70**		**-0.54**	**1.86**	**0.48**	**0.36**	**-0.02**	**-0.24**	**0.08**	11/11/68	3
		-3.76	3.76	4.23		-2.77		15.83	5.88	-8.50	-2.73	78%		
Mexico	0.49	-0.26	0.26	**-0.12**	**0.01**	-0.10	-0.05	**0.84**	**0.07**	**-0.001**	-0.71	**0.36**	12/11/46	1
	1.7304	-1.33	1.33	-8.13	78.09	-0.30	-0.64	90.93	21.23	-7.36	-0.76	55%		
South Africa	***-4.53***	*-0.88*	*0.88*	***0.97***		*-0.121*	***4.08***	***0.40***	***0.11***	***-0.004***	*-0.64*	***5.53***	15/09/73	0
		-1.78	*1.78*	*3.06*		*-1.37*		*9.02*	*2.49*	*-3.62*	*-1.70*	*2%*		
Venezuela	**1.37**	-0.26	0.26	-0.32	**-0.01**	-0.07	**10.55**	-0.07	**-0.39**	0.001	-0.03	**0.00**		
		-1.62	1.62	-1.52	-9.27	-1.48		-0.84	-4.24	1.32	-0.54	95%	01/07/76	4

IV. HIGH INCOME COUNTRIES

Chinese Taipei	***-6.27***	***0.76***			***0.12***	*-0.01*	***0.54***	***0.41***	***0.94***	***0.07***	*-0.11*	***5.18***		*3*
		15.60			*11.75*	*-0.16*		*6.86*	*8.78*	*11.20*	*-1.79*	*2%*		
Korea	**-0.47**	-0.18	0.18	**0.40**	**0.01**	-0.06	**2.38**	**0.56**	**0.30**	**0.003**	-0.002	**0.00**	01/11/88	3
	-2.12	-1.06	1.06	5.03	8.97	-0.80	11.23	11.38	3.97	2.00	-0.02	98%		
Singapore	0.48	**-0.76**	**0.76**		**0.02**	-0.02	**2.13**	**0.67**	0.10	-0.02	-0.004	**0.03**	09/11/68	3.5
	1.53	-3.38	3.38		1.66	-0.20	4.74	13.82	0.87	-1.73	-0.05	87%		

Legend: **significative parameters @5% [t-value>1.96; t-value<-1.96] in bold**

Please note that no t-value reported under the parameter's estimation is due to model choice (see table 6).

TABLE 8. DETECTED OUTLIERS' MATCH WITH REFERENCES IN THE LITERATURE[2]

I. 1960-1982

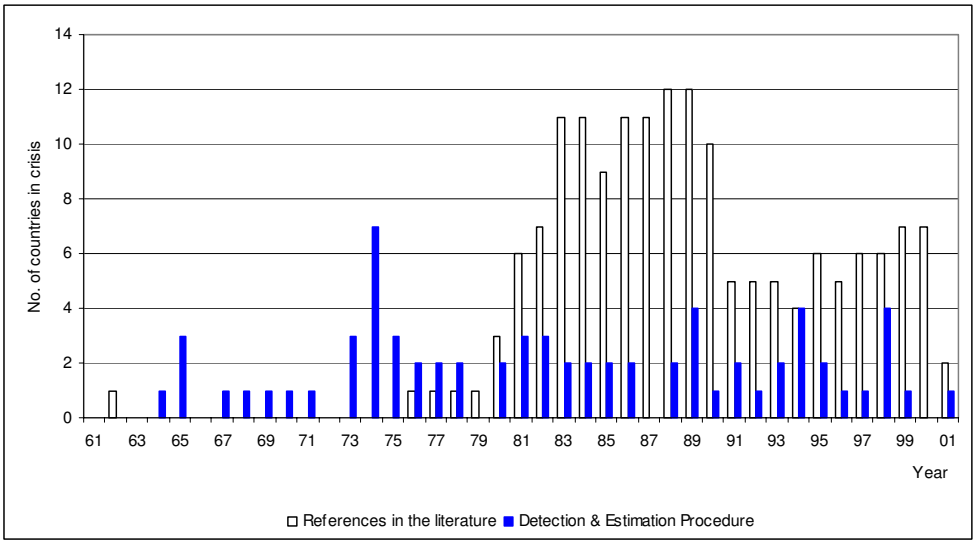
Year	Country	Event	Source
1961			
1962			
1963			
1964	KO	The first 5-year plan by the military government (1962-66) pursuing export promoting policies causes high inflation	
1965	GH	Disorders leading to military overthrow of 1st republic	www.ghanaweb.com
	IN	Second India-Pakistan war	
	KO	The first 5-year plan by the military government (1962-66) pursuing export promoting policies causes high inflation	
1966			
1967	CH	Cultural Revolution (1966-1969)	
1968	CH		
1969	IN	Authoritarian turn of the government with mass jail	
1970	CH	Cultural Revolution only formally ended but social uncertainty remains until 1976. Rivalry between Chou En-Lai and Lin Piao within the Chinese CP	
1971	GH	Austerity measures to rein in domestic and foreign debt followed by bloodless coup d'etat ending the 2nd Republic	www.ghanaweb.com
1972			
1973	CL	Coup d'etat by General A. Pinochet	
	MX		
	SP		
1974	TW	**Oil crisis**	
	IN		
	KO		
	MY		
	MO		
	PH		
	SA		
1975	CL	Authoritarian turn of the military government leading to banking crisis	LR (2002)
	GH	Economic stagnation and lack of FX to import fuel + debt rescheduling	www.ghanaweb.com
	ID	Independence of East Timor followed by invasion by ID	
1976	BR	Import substitution & more borrowing as hetherodox reponse to oil shock	
	SG	Review of Constitution + amnesty for all political prisoners + long-term drought in the Sahel region that lasted into the mid-1970s	http://www.encyclopedia.com/html/section/senegal_history.asp
1977	BR	Import substitution & more borrowing as hetherodox reponse to oil shock	
	GH	Social unrest, economic stagnation with high inflation and halving of 1960s cocoa production	www.ghanaweb.com
1978	GH	Coup d'etat	www.ghanaweb.com
	SG	Elections	http://www.senegal-online.com/anglais/histoire/dates.htm
1979			
1980	KO	Martial law declared. Violent repression of pro-democracy protest	
	PH	Lending boom, negative interest rates. Reduction in tariff and quantitavie resrictions and US$200 mn structural adjustment loan from World Bank	http://countrystudies.us/philippines
1981	BR	Economic crisis that will lead to foreign debt default in 1982	
	EY	Assassination of President Sadat + banking crisis	LR (2002)
	GH	Inflation + stagnation + military-led coup d'etat	www.ghanaweb.com
1982	CL	Banking crisis	LR (2002)
	CR	Austerity program by President Monge + Foreign currency bank debt default (1981-1990)	S&P (2002)
	GH	Stagnation + Banking crisis	LR (2002)

[2] LR(2002) = N. Loayza - R. Ranciere (2002), MRS(2003) = P. Manasse, N. Roubini, A.Schimmelpfennig (2003); S&P(2002) = Standard \& Poor's (2002). When no source is indicated, the information is from www.bbc.co.uk

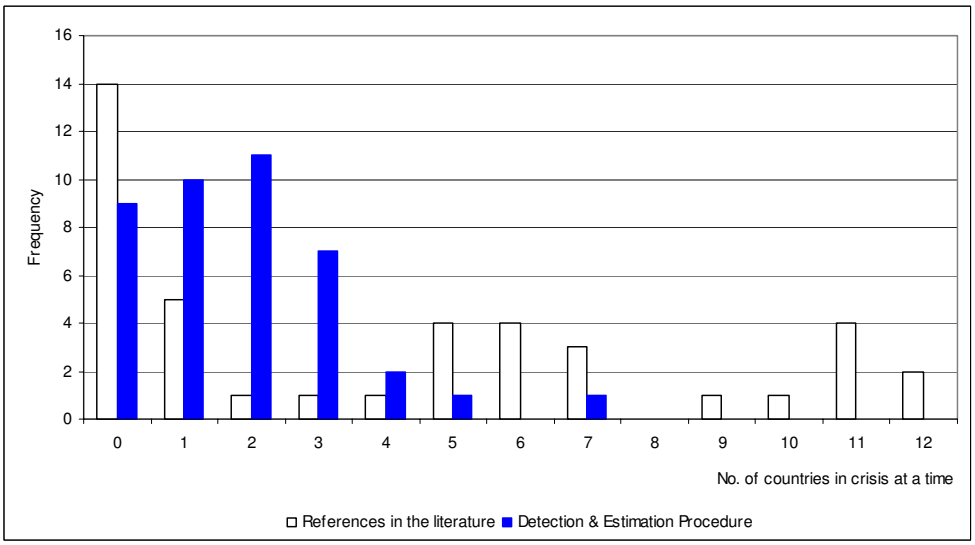
II. 1983-2001

Year	Country	Event	Source
1983	GH	Crop fires + return of Ghanians expelled from Nigeria + Banking crisis + apply to World Bank for assistance	LR (2002), www.ghanaweb.com
	VE	Civil unrest due to cuts in welfare spending following drop in world oil price + Foreign currency bank debt default (1983-1988)	S&P (2002)
1984	PH	Assassination of opposition leader (1983) + Foreign currency bank debt default (1983-1992) + Paris Club Rescheduling	S&P (2002)
	VE	Civil unrest due to cuts in welfare spending following drop in world oil price + Banking crisis + Foreign currency bank debt default (1983-1988)	MRS (2003), S&P (2002)
1985	AG	Banking crisis + Foreign currency bank debt default (1982-1993) + Paris Club Rescheduling	MRS (2003), S&P (2002)
	MX	Earthquake in Mexico city with thousands victims + Foreign currency bank debt default (1982-1990)	S&P (2002)
1986	EY	Banking crisis + Foreign currency debt default (1984) leading to Paris Club Rescheduling	LR (2002), S&P (2002)
	MO	Banking crisis + Foreign currency bank debt default (1986-1990)	MRS (2003), S&P (2002)
1987			
1988	BR	Local currency debt (1986-87) and Foreign currency bank debt (1983-1994) default + Banking crisis + Paris Club Rescheduling	MRS (2003), S&P (2002)
	SA	Further restrictions of civil liberties as a reponse to protest in favour of liberation of Nelson Mandela + banking crisis	MRS (2003)
1989	AG	Banking crisis + Foreign currency bank (1982-1993) and bond (1989) debt + Local currency debt (1989-1990) default + Paris Club Rescheduling	MRS (2003), S&P (2002)
	BR	Banking crisis + Domestic currency debt (1990) and Foreign currency bank debt (1983-1994) default	MRS (2003), S&P (2002)
	IN	High inflation following R.Ghandi expansionary policy + elections	
	VE	Austerity program + IMF loan + Banking crisis	MRS (2003)
1990	VE	Banking crisis + Foreign currency bank debt default (1990)	MRS (2003), S&P (2002)
1991	MX	Banking crisis	MRS (2003)
	PH	Banking crisis + Paris Club Rescheduling	MRS (2003)
1992	CR	Crisis between 1st & 2nd Paris Club Rescheduling	
1993	BR	Banking crisis + Foreign currency bank debt default (1983-1994) + President Collor resigns	MRS (2003), S&P (2002)
	CH	Double digit inflation and FEC's unifcation with RMB	
1994	AG	Foreign currency bank debt default (1982-1993)	S&P (2002)
	BR	Banking crisis + Foreign currency bank debt default (1983-1994) + inflation-curbing and land reform by President Cardoso	MRS (2003), S&P (2002)
	SG	Foreign currency bank debt default (1992-1996) + Paris Club Rescheduling	S&P (2002)
	VE	Banking crisis	LR (2002)
1995	BR	Banking crisis	MRS (2003)
	IN	Widespreand religious riots leading to general elections	
1996	VE	Local currency debt and Foreign currency bond debt default (1995-1997) + Banking crisis	LR (2002), S&P (2002)
1997	TH	Banking crisis	MRS (2003)
1998	KO	Banking crisis	LR (2002)
	MY	Banking crisis	LR (2002)
	PH	Banking crisis	LR (2002)
	TH	Banking crisis	MRS (2003)
1999	SA	Dec 1999 is 38th month of nearly contiuous gold price fall with a cumulative loss of over 375%	www.goldcouncil.com
2000			
2001	GH	Fuel subsidies are removed (+60% in price) + Paris Club Rescheduling	www.ghanaweb.com

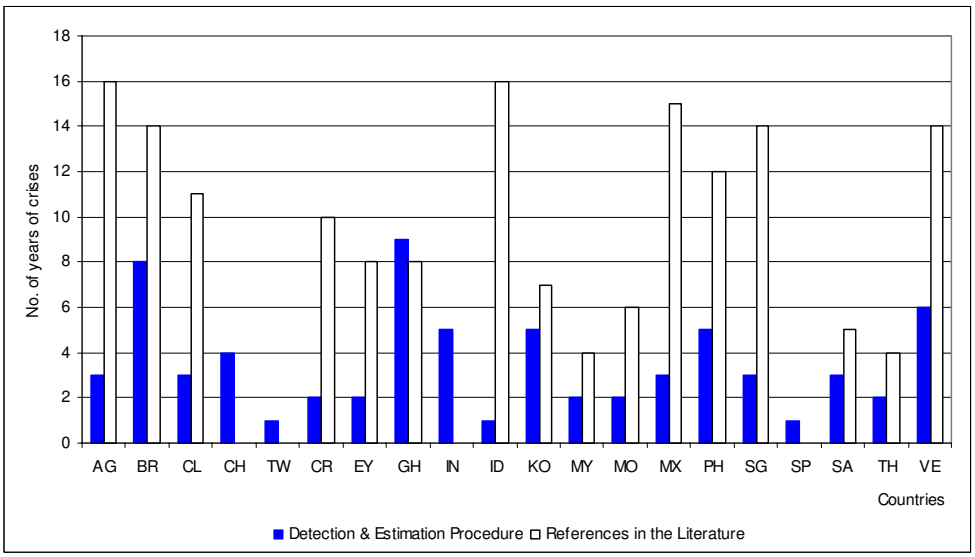
GRAPH 1[3]: DUMMY VARIABLES AND CRISIS PATTERN



GRAPH 2[2]: FREQUENCY OF CRISES



GRAPH 3[2]: REFERENCES IN THE LITERATURE VS. DETECTION & ESTIMATION PROCEDURE



[3] References in the literature: N. Loayza - R. Ranciere (2002), P. Manasse, N. Roubini, A.Schimmelpfennig (2003), Moody's (2003), Standard & Poor's (2002), www.parisclub.org

TABLE A2. (LOG OF) REAL INCOME PER CAPITA (YC)

Country	Sample	Average	Median	Max	Min	SD	Skewness	Kurtosis	Jarque-Brera	Probability
Argentina	1961-01	8.83	8.85	9.04	8.54	0.12	-0.52	2.62	2.11	35%
Brazil	1961-01	8.12	8.27	8.44	7.53	0.33	-0.88	2.16	6.56	3.8%
Chile	1961-01	7.96	7.82	8.60	7.60	0.32	0.86	2.31	5.90	5.2%
China	1961-01	5.40	5.16	6.78	4.34	0.74	0.43	1.88	3.42	18%
Chinese Taipei	1961-01	8.69	8.72	10.02	7.33	0.80	-0.08	1.83	2.38	30%
Costa Rica	1961-01	7.93	7.95	8.28	7.52	0.20	-0.31	2.41	1.26	53%
Egypt	1961-01	6.55	6.61	7.13	5.91	0.38	-0.15	1.55	3.75	15%
Ghana	1961-01	5.98	5.99	6.18	5.73	0.12	-0.17	1.92	2.18	34%
India	1961-01	5.57	5.46	6.16	5.22	0.29	0.67	2.14	4.38	11%
Indonesia	1965-01	6.23	6.27	7.04	5.50	0.52	0.01	1.61	3.28	19%
Korea	1961-01	8.38	8.32	9.50	7.21	0.73	-0.04	1.74	2.72	26%
Malaysia	1961-01	7.72	7.78	8.48	6.92	0.49	0.00	1.79	2.52	28%
Mexico	1965-01	7.93	8.02	8.24	7.42	0.23	-0.75	2.43	4.40	11%
Morocco	1961-01	6.95	7.01	7.27	6.50	0.24	-0.45	1.86	3.62	16%
Philippines	1961-01	6.91	6.95	7.09	6.61	0.14	-0.63	2.15	3.97	14%
Senegal	1961-01	6.38	6.38	6.51	6.26	0.07	0.21	2.03	1.93	38%
Singapore	1963-01	9.22	9.35	10.26	7.96	0.73	-0.33	1.92	2.77	25%
South Africa	1965-01	8.29	8.32	8.49	7.95	0.12	-1.10	4.11	10.42	1%
Thailand	1961-01	7.11	7.05	8.01	6.17	0.59	0.12	1.74	2.81	25%
Venezuela	1961-01	8.24	8.22	8.40	8.08	0.10	0.01	1.59	3.38	18%

TABLE A3. (LOG OF) REAL CAPITAL PER CAPITA (KC)

Country	Sample	Average	Median	Max	Min	SD	Skewness	Kurtosis	Jarque-Brera	Probability
Argentina	1961-01	9.71	9.79	9.90	9.26	0.19	-1.10	2.83	8.33	2%
Brazil	1961-01	8.86	9.06	9.39	8.02	0.45	-0.55	1.79	4.57	10%
Chile	1961-01	8.59	8.47	9.30	8.22	0.29	1.36	3.55	13.10	0.1%
China	1961-01	6.33	6.26	7.80	5.15	0.82	0.19	1.84	2.54	28%
Chinese Taipei	1961-01	8.91	9.09	10.47	7.26	1.00	-0.18	1.81	2.65	27%
Costa Rica	1961-01	8.44	8.61	8.97	7.70	0.38	-0.50	1.95	3.60	17%
Egypt	1961-01	7.45	7.62	7.97	6.54	0.51	-0.36	1.46	4.90	9%
Ghana	1961-01	7.45	7.50	7.67	7.16	0.18	-0.27	1.47	4.50	11%
India	1961-01	6.41	6.39	7.02	5.85	0.32	0.17	2.14	1.47	48%
Indonesia	1965-01	6.53	6.61	7.90	5.14	0.98	-0.01	1.51	3.79	15%
Korea	1961-01	8.91	8.97	10.45	7.28	1.05	-0.05	1.68	2.98	23%
Malaysia	1961-01	8.45	8.47	9.60	7.30	0.73	0.06	1.73	2.80	25%
Mexico	1965-01	9.10	9.28	9.42	8.44	0.29	-0.97	2.62	6.69	4%
Morocco	1961-01	7.80	8.03	8.29	6.93	0.46	-0.66	1.83	5.27	7%
Philippines	1961-01	7.75	7.94	8.08	7.11	0.32	-0.66	1.92	4.95	8%
Senegal	1961-01	7.20	7.22	7.35	6.92	0.11	-1.14	3.54	9.38	1%
Singapore	1963-01	10.22	10.41	11.40	8.64	0.89	-0.41	1.82	3.53	17%
South Africa	1965-01	9.41	9.48	9.71	8.79	0.27	-1.02	2.97	7.13	3%
Thailand	1961-01	8.04	8.04	9.10	6.89	0.69	0.03	1.89	2.12	35%
Venezuela	1961-01	9.36	9.37	9.61	8.91	0.19	-0.62	2.71	2.75	25%

TABLE A4. CREDIT/GDP RATIO (CR)

Country	Sample	Average	Median	Max	Min	SD	Skewness	Kurtosis	Jarque-Brera	Probability
Argentina	1961-01	0.19	0.18	0.40	0.10	0.07	1.05	4.24	10.16	1%
Brazil	1961-01	0.40	0.39	0.96	0.12	0.19	0.87	3.90	6.58	4%
Chile	1961-01	0.38	0.47	0.84	0.06	0.26	0.07	1.51	3.85	15%
China	1961-01	0.73	0.66	1.41	0.38	0.28	0.75	2.78	3.96	14%
Chinese Taipei	1961-01	0.71	0.56	1.47	0.15	0.45	0.58	1.85	4.51	10%
Costa Rica	1961-01	0.22	0.24	0.30	0.11	0.06	-0.43	1.86	3.52	17%
Egypt	1961-01	0.29	0.26	0.62	0.15	0.13	1.17	3.59	9.93	1%
Ghana	1961-01	0.07	0.06	0.29	0.02	0.05	2.84	14.13	266.57	0%
India	1961-01	0.24	0.20	0.61	0.02	0.17	0.77	2.29	4.44	11%
Indonesia	1965-01	0.21	0.24	0.31	0.09	0.07	-0.36	1.71	3.71	16%
Korea	1961-01	0.51	0.52	1.08	0.14	0.23	0.38	3.00	1.00	61%
Malaysia	1961-01	0.64	0.49	1.59	0.08	0.49	0.60	2.07	3.94	14%
Mexico	1965-01	0.23	0.21	0.39	0.11	0.07	0.22	1.96	2.17	34%
Morocco	1961-01	0.28	0.27	0.59	0.12	0.14	0.59	2.20	3.47	18%
Philippines	1961-01	0.33	0.31	0.62	0.17	0.11	0.72	2.69	3.72	16%
Senegal	1961-01	0.25	0.23	0.48	0.13	0.09	0.78	2.56	4.51	11%
Singapore	1963-01	0.82	0.94	1.28	0.36	0.28	-0.27	1.77	2.93	23%
South Africa	1965-01	0.83	0.69	1.49	0.56	0.26	1.13	2.90	7.85	2%
Thailand	1961-01	0.59	0.43	1.65	0.11	0.46	0.86	2.55	5.35	7%
Venezuela	1961-01	0.30	0.26	0.56	0.09	0.15	0.41	1.79	3.65	16%

TABLE A5. REAL INTEREST RATE (IN POINTS) (RR)

Country	Sample	Average	Median	Max	Min	SD	Skewness	Kurtosis	Jarque-Brera	Probability
Argentina	1961-01	299.57	-9.70	14156	-796.13	2222.42	6.13	38.72	2436.87	0%
Brazil	1961-01	548.08	0.11	14720.24	-3014.84	2624.23	4.10	22.44	760.70	0%
Chile	1961-01	-4.44	9.26	138.89	-321.54	78.01	-3.13	13.93	271.07	0%
China	1961-01	0.40	1.26	5.54	-13.12	4.09	-1.54	5.10	23.79	0%
Chinese Taipei	1961-01	3.32	3.98	11.70	-35.32	7.21	-3.88	21.53	689.27	0%
Costa Rica	1961-01	5.94	5.37	25.33	-65.12	15.68	-2.36	11.51	161.67	0%
Egypt	1961-01	0.24	0.89	9.32	-10.86	5.56	-0.12	2.09	1.51	47%
Ghana	1961-01	-13.86	-4.26	22.38	-108.45	31.01	-1.87	6.12	40.58	0%
India	1961-01	0.42	1.56	16.63	-19.60	5.43	-0.89	7.51	40.20	0%
Indonesia	1965-01	-37.36	4.48	16.64	-1064.30	178.90	-5.35	31.05	1389.34	0%
Korea	1961-01	0.66	0.74	17.44	-14.45	7.23	0.13	3.55	0.63	73%
Malaysia	1961-01	1.47	1.75	5.40	-12.44	3.41	-2.09	8.60	83.32	0%
Mexico	1965-01	-6.33	-2.52	10.84	-61.46	14.73	-2.15	7.78	63.76	0%
Morocco	1961-01	0.25	0.77	6.85	-13.06	4.24	-0.86	3.82	6.17	4.6%
Philippines	1961-01	-1.67	-0.06	10.32	-34.57	8.75	-1.90	7.77	63.60	0%
Senegal	1961-01	1.69	2.65	12.75	-23.65	7.74	-1.40	6.06	29.43	0%
Singapore	1963-01	2.26	2.78	5.99	-13.47	3.42	-2.97	13.59	251.66	0%
South Africa	1965-01	1.29	2.10	10.31	-9.16	4.71	-0.18	2.49	0.66	72%
Thailand	1961-01	4.32	4.70	11.14	-10.78	4.21	-1.56	6.27	34.97	0%
Venezuela	1961-01	0.16	2.18	33.13	-54.88	15.44	-1.13	6.49	29.57	0%

TABLE A6. (LOG OF) COMPOSITE FINANCIAL OPENNESS (OP)

Country	Sample	Average	Median	Max	Min	SD	Skewness	Kurtosis	Jarque-Brera	Probability
Argentina	1961-01	3.22	3.08	3.99	2.73	0.39	0.79	2.34	5.01	8%
Brazil	1961-01	2.77	2.68	3.37	2.27	0.28	0.66	2.65	3.23	20%
Chile	1961-01	4.25	4.26	4.76	3.83	0.29	0.23	1.78	2.89	24%
China	1961-01	4.05	4.02	4.78	3.51	0.34	0.55	2.58	2.37	31%
Chinese Taipei	1961-01	4.52	4.67	5.15	3.35	0.53	-0.98	2.71	6.74	3%
Costa Rica	1961-01	4.01	3.93	4.62	3.53	0.30	0.43	2.34	2.02	36%
Egypt	1961-01	4.57	4.60	4.99	4.24	0.20	0.06	1.82	2.40	30%
Ghana	1961-01	5.17	5.21	5.95	4.49	0.40	0.16	2.03	1.77	41%
India	1961-01	3.38	3.37	3.88	3.01	0.21	0.54	2.98	1.99	37%
Indonesia	1965-01	4.40	4.37	4.71	4.10	0.18	0.20	1.91	2.28	32%
Korea	1961-01	3.80	4.06	4.93	2.03	0.82	-0.76	2.54	4.31	12%
Malaysia	1961-01	5.15	5.03	5.82	4.77	0.33	0.78	2.09	5.60	6%
Mexico	1965-01	4.18	3.97	5.26	3.69	0.46	1.13	2.97	8.76	1%
Morocco	1961-01	4.60	4.55	5.00	4.38	0.17	0.87	2.77	5.22	7%
Philippines	1961-01	4.31	4.21	5.04	3.96	0.34	0.77	2.17	5.23	7%
Senegal	1961-01	4.44	4.44	4.67	4.25	0.10	0.14	2.34	0.88	64%
Singapore	1963-01	5.90	5.82	6.24	5.38	0.22	-0.04	2.18	1.15	56%
South Africa	1965-01	4.50	4.52	4.73	4.22	0.16	-0.30	1.64	3.77	15%
Thailand	1961-01	4.44	4.29	5.11	3.98	0.33	0.63	1.95	4.57	10%
Venezuela	1961-01	4.26	4.25	4.50	3.80	0.19	-0.29	2.09	1.98	37%

Legend: p-value<5% in red