Financial development and economic growth in industrialized and emerging economies

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Overview

- The cross-country relationship between financial development and growth seems among the most robust in the macro economic literature (King and Levine 1993; Beck, Levine and Loayza 2000; and many others).

- There have been warnings, however, that a “one size fits all” policy prescription of high growth through finance may overlook differences in how the nexus works across countries (Demetriades and Hussein 1996; Rioja and Valev 2004).

- In this talk, I review a few of the studies and methodologies using cross-country, time series, and panel data that established the empirical link from finance to growth in the first place, and describe areas where progress has been less rapid.

Early contributions:

- McKinnon (1973): Financial development, and indeed, simple monetization, can relax investment indivisibilities in policy environments conducive to growth (i.e., low inflation, market-based) and improve resource allocations. Also Gurley and Shaw (1955), Goldsmith (1969). Baseline neoclassical model cannot deliver complementarity between money and capital.

- A period of relative quiet ensued.

- Greenwood and Jovanovic (1990) embed an endogenously-arising financial sector in a dynamic general equilibrium model where growth kick-starts finance, which leads to more growth, more finance etc., while generating a quasi-Kuznets curve for the distribution of income. Also Bencivenga and Smith (1991).

How it all began (again)

- Cross-section: King and Levine (1993) augment the standard Barro-style growth regressions to include measures of financial development using cross-country data from 1960-1989. The correlations were strong and seem to be among the most robust in the macro economic literature.

- Time series for individual countries (Jung 1986; Demetriades and Hussein 1996; Rousseau and Wachtel 1995,1998; among others). Strong statistical causation from finance to growth in developing economies, less so for industrialized.

- Dynamic models with cross-country data (Beck, Levine, and Loayza 2000; Rousseau and Wachtel 2000). Picks up causation in more recent data for industrialized and developing countries.

TABLE VIII
GROWTH AND INITIAL FINANCIAL DEPTH: 1960–1989

Independent variable	(1)	(2)	(3)	(4)
c	0.042***	0.035***	0.033***	0.035***
	(0.005)	(0.007)	(0.009)	(0.010)
LYO	−0.014***	−0.016***	−0.016***	−0.014***
	(0.003)	(0.003)	(0.003)	(0.003)
LSEC	0.013***	0.013***	0.013***	0.010***
	(0.002)	(0.002)	(0.002)	(0.003)
GOV in 1960		0.070*	0.072*	0.044
		(0.035)	(0.036)	(0.040)
PI in 1960		0.037	0.032	0.040
		(0.031)	(0.033)	(0.033)
TRD in 1960		−0.003	−0.004	0.001
		(0.006)	(0.006)	(0.001)
Index of civil liberties			0.001	0.001
			(0.002)	(0.002)
Number of revolutions			−0.010	−0.010
			(0.009)	(0.009)
Number of assassinations			−0.001	0.001
			(0.004)	(0.003)
Sub-Saharan Africa dummy				−0.011
				(0.007)
Latin American dummy				−0.010*
				(0.005)
LLY in 1960	0.030***	0.028***	0.028***	0.020**
	(0.007)	(0.007)	(0.008)	(0.009)
R^2	0.57	0.61	0.63	0.66

(standard errors in parentheses)

Dependent variable: *GYP* − Real per capita GDP growth, 1960–1989.
Observations: 57
* significant at 0.10 level, ** significant at 0.05 level, *** significant at 0.01 level.
LYO = log of initial real per capita GDP in 1960, *LSEC* = log of secondary school enrollment rate in 1960, *GOV* = government consumption/GDP, *PI* = inflation rate, *TRD* = (imports & exports)/GDP.

Time series approach to the causation question:

The VAR model has the form

$$x_{1,t} = a_{1,0} + \sum_{i=1}^{k} a_{1,i} x_{1,t-i} + \sum_{i=1}^{k} b_{1,i} x_{2,t-i} + \sum_{i=1}^{k} c_{1,i} x_{3,t-i} + u_{1,t},$$

$$x_{2,t} = a_{2,0} + \sum_{i=1}^{k} a_{2,i} x_{1,t-i} + \sum_{i=1}^{k} b_{2,i} x_{2,t-i} + \sum_{i=1}^{k} c_{2,i} x_{3,t-i} + u_{2,t},$$

$$x_{3,t} = a_{3,0} + \sum_{i=1}^{k} a_{3,i} x_{1,t-i} + \sum_{i=1}^{k} b_{3,i} x_{2,t-i} + \sum_{i=1}^{k} c_{3,i} x_{3,t-i} + u_{3,t},$$

where x_1 is output, x_2 is the monetary base, and x_3 is a measure of the intensity of financial intermediation. Standard tests for Granger causality are F-distributed if the residuals are stationary.

The error correction representation is:

$$\Delta x_{1,t} = \mu_1 + \sum_{i=1}^{k-1} \lambda_{1,i} \Delta x_{1,t-i} + \sum_{i=1}^{k-1} \delta_{1,i} \Delta x_{2,t-i} + \sum_{i=1}^{k-1} \eta_{1,i} \Delta x_{3,t-i} + \alpha_1 (\beta_1 x_{1,t-1} + \beta_2 x_{2,t-1} + \beta_3 x_{3,t-1}),$$

$$\Delta x_{2,t} = \mu_2 + \sum_{i=1}^{k-1} \lambda_{2,i} \Delta x_{1,t-i} + \sum_{i=1}^{k-1} \delta_{2,i} \Delta x_{2,t-i} + \sum_{i=1}^{k-1} \eta_{2,i} \Delta x_{3,t-i} + \alpha_2 (\beta_1 x_{1,t-1} + \beta_2 x_{2,t-1} + \beta_3 x_{3,t-1}),$$

$$\Delta x_{3,t} = \mu_3 + \sum_{i=1}^{k-1} \lambda_{3,i} \Delta x_{1,t-i} + \sum_{i=1}^{k-1} \delta_{3,i} \Delta x_{2,t-i} + \sum_{i=1}^{k-1} \eta_{3,i} \Delta x_{3,t-i} + \alpha_3 (\beta_1 x_{1,t-1} + \beta_2 x_{2,t-1} + \beta_3 x_{3,t-1}),$$

where the β are the loadings in the cointegrating vector and α are the speed of adjustment parameters.

Trivariate VARs with Per Capita Real Output, the Monetary Base, and a Measure of Financial Intensity, United States 1870-1929

Intensity Measure (Coint. Vector)	Error Correction Model Eq.#	ECT	R^2/(DW)	Levels VAR Granger Tests GNP	MB	FI	R^2/(DW)
Fin. Interm. Assets (1, 0.582, -0.737)	1	-0.471 (0.000)	0.411 (2.07)	0.610 (0.000)	-0.212 (0.051)	0.276 (0.002)	0.954 (2.07)
	2	-0.021 (0.837)	0.182 (1.94)	-0.042 (0.564)	0.951 (0.000)	0.013 (0.147)	0.922 (1.94)
	3	0.112 (0.255)	0.310 (2.04)	0.171 (0.279)	0.117 (0.066)	0.853 (0.000)	0.993 (2.04)
Bank Assets (1, 0.812, -0.910)	1	-0.412 (0.000)	0.390 (2.07)	0.638 (0.000)	-0.237 (0.047)	0.291 (0.008)	0.952 (2.07)
	2	-0.012 (0.901)	0.184 (1.93)	-0.056 (0.431)	0.944 (0.000)	0.021 (0.093)	0.923 (1.95)
	3	0.121 (0.166)	0.324 (2.08)	0.148 (0.316)	0.183 (0.024)	0.815 (0.000)	0.992 (2.03)
M3 less Base Money (1, 0.425, -0.588)	1	-0.500 (0.003)	0.309 (2.00)	0.511 (0.001)	-0.215 (0.117)	0.280 (0.007)	0.958 (2.04)
	2	0.102 (0.465)	0.204 (1.95)	0.096 (0.785)	0.995 (0.000)	-0.055 (0.229)	0.928 (1.98)
	3	0.012 (0.937)	0.177 (1.96)	0.108 (0.264)	0.068 (0.611)	0.921 (0.000)	0.992 (1.92)

Panel Approach with Cross-Country Data

Estimation of Dynamic Panel VAR

To examine timing relationships in a panel of N countries for T years, construct VAR:

$$y_{i,t} = \sum_{j=1}^{k} \alpha_{1,j} y_{i,t-j} + \sum_{j=1}^{k} \beta_{1,j} m_{i,t-j} + \sum_{j=1}^{k} \gamma_{1,j} s_{i,t-j} + \eta_{1,i} + \Phi_{1,t} + \varepsilon_{1,i,t}$$

$$m_{i,t} = \sum_{j=1}^{k} \alpha_{2,j} y_{i,t-j} + \sum_{j=1}^{k} \beta_{2,j} m_{i,t-j} + \sum_{j=1}^{k} \gamma_{2,j} s_{i,t-j} + \eta_{2,i} + \Phi_{2,t} + \varepsilon_{2,i,t}$$

$$s_{i,t} = \sum_{j=1}^{k} \alpha_{3,j} y_{i,t-j} + \sum_{j=1}^{k} \beta_{3,j} m_{i,t-j} + \sum_{j=1}^{k} \gamma_{3,j} s_{i,t-j} + \eta_{3,i} + \Phi_{3,t} + \varepsilon_{3,i,t}$$

where $y_{i,t}$ is output for country i at time t, $m_{i,t}$ is liquid liabilities (M3), $s_{i,t}$ is a measure of stock market development, η_i is a country-specific fixed effect, Φ_t is a time effect, and $\varepsilon_{i,t}$ is a random disturbance.

Since LSDV is known to be biased in the dynamic fixed-effects model with small T, differencing removes fixed effects and (1a) becomes

$$\left(y_{i,t} - y_{i,t-1}\right) = \sum_{j=1}^{k} \alpha_{1,j} \left(y_{i,t-j} - y_{i,t-j-1}\right) + \sum_{j=1}^{k} \beta_{1,j} \left(m_{i,t-j} - m_{i,t-j-1}\right)$$
$$+ \sum_{j=1}^{k} \gamma_{1,j} \left(s_{i,t-j} - s_{i,t-j-1}\right) + \left(\Phi_{1,t} - \Phi_{1,t-1}\right) + \left(\varepsilon_{1,i,t} - \varepsilon_{1,i,t-1}\right)$$

Note that this introduces possible correlation between $y_{i,t-1}$ and $\varepsilon_{i,t-1}$.

The estimated VARs thus take the form

$$\bar{y}_{i,t} = \sum_{j=1}^{k} \alpha_{1,j} \bar{y}_{i,t-j} + \sum_{j=1}^{k} \beta_{1,j} \bar{m}_{i,t-j} + \sum_{j=1}^{k} \gamma_{1,j} \bar{s}_{i,t-j} + \bar{\Phi}_{1,t} + \bar{\varepsilon}_{1,i,t}$$

$$\bar{m}_{i,t} = \sum_{j=1}^{k} \alpha_{2,j} \bar{y}_{i,t-j} + \sum_{j=1}^{k} \beta_{2,j} \bar{m}_{i,t-j} + \sum_{j=1}^{k} \gamma_{2,j} \bar{s}_{i,t-j} + \bar{\Phi}_{2,t} + \bar{\varepsilon}_{2,i,t}$$

$$\bar{s}_{i,t} = \sum_{j=1}^{k} \alpha_{3,j} \bar{y}_{i,t-j} + \sum_{j=1}^{k} \beta_{3,j} \bar{m}_{i,t-j} + \sum_{i=1}^{k} \gamma_{3,j} \bar{s}_{i,t-j} + \bar{\Phi}_{3,t} + \bar{\varepsilon}_{3,i,t}$$

where $\bar{y}$, $\bar{m}$, $\bar{s}$ and $\bar{\varepsilon}$ are first differences.

The errors of the transformed equations satisfy the orthogonality conditions

$$E\left[y_{i,s}\,\bar{\varepsilon}_{i,t}\right] = E\left[m_{i,s}\,\bar{\varepsilon}_{i,t}\right] = E\left[s_{i,s}\,\bar{\varepsilon}_{i,t}\right] = 0 \qquad s<(t-1)\ ,$$

which imply that the vector of instrumental variables available to identify the parameters of equation (1) of the differenced VAR has the form

$$z_{i,t} = \left[y_{i,t-2},\ldots,y_{i,1}\,,\,m_{i,t-2},\ldots,m_{i,1}\,,\,s_{i,t-2},\ldots,s_{i,1}\right].$$

Panel GMM Estimates, Full 45 Country Sample, 1980-1995

	Y	M3	MCAP	Y	M3	VT
Y_{-1}	1.286** (.051)	0.160 (.128)	-0.686 (.830)	1.260** (.063)	0.225* (.146)	-0.119 (.347)
Y_{-2}	-0.438** (.050)	-0.143 (.117)	0.639 (.515)	-0.406** (.058)	-0.213** (.121)	0.387* (.249)
$M3_{-1}$	0.042* (.032)	1.010** (.086)	0.093 (.149)	0.009 (.022)	0.987** (.083)	-0.012 (.109)
$M3_{-2}$	-0.022 (.028)	-0.125* (.087)	-0.027 (.121)	0.011 (.021)	-0.053 (.085)	-0.062 (.114)
STK_{-1}	0.025** (.007)	0.034** (.018)	0.949** (.054)	0.026** (.005)	0.068** (.029)	0.928** (.132)
STK_{-2}	-0.014* (.010)	-0.012 (.020)	-0.086 (.104)	0.005 (.005)	-0.047 (.026)	-0.278** (.110)
F-Y	NA	0.33 (.722)	0.73 (.483)	NA	0.75 (.472)	1.12 (.326)
F-M3	2.60 (.076)	NA	0.22 (.803)	1.36 (.256)	NA	0.39 (.678)
F-STK	5.38 (.005)	1.13 (.324)	NA	7.98 (.000)	2.95 (.053)	NA
Sargan test	208.0 (.85)	194.2 (.96)	234.5 (.41)	206.1 (.87)	184.9 (.99)	221.5 (.65)
n (obs)	45 (478)	45 (475)	45 (477)	43 (465)	42 (462)	43 (466)

Panel GMM Estimates,Industrialized and Emerging Markets, 1980-1995

	Industrialized Countries			Emerging Markets		
	Y	M3	MCAP	Y	M3	MCAP
Y_{-1}	1.294** (.077)	0.045 (.165)	-0.907 (.845)	1.055** (.079)	-0.010 (.154)	-0.145 (.181)
Y_{-2}	-0.523** (.066)	-0.133 (.176)	0.802** (.447)	-0.129** (.063)	0.345** (.161)	0.191* (.148)
$M3_{-1}$	0.054** (.030)	1.040** (.090)	0.163 (.162)	-0.018 (.041)	0.828** (.083)	0.493** (.219)
$M3_{-2}$	-0.022 (.027)	-0.132* (.101)	-0.114 (.148)	0.004 (.034)	-0.232** (.063)	-0.579** (.307)
$MCAP_{-1}$	0.015** (.007)	0.033** (.016)	0.961** (.042)	0.0370** (.015)	0.019* (.012)	0.870** (.040)
$MCAP_{-2}$	-0.006 (.009)	-0.008 (.024)	-0.102 (.095)	-0.010 (.011)	0.046* (.032)	0.014 (.109)
F-Y	NA	0.16 (.850)	0.61 (.544)	NA	10.77 (.000)	0.11 (.898)
F-M3	3.54 (.031)	NA	0.19 (.827)	0.07 (.929)	NA	3.06 (.049)
F-MCAP	1.30 (.273)	0.60 (.555)	NA	2.46 (.088)	2.23 (.110)	NA
Sargan test	116.0 (1.00)	96.0 (1.00)	121.5 (.99)	118.3 (1.00)	116.4 (1.00)	121.8 (1.00)
n (obs)	19 (240)	19 (239)	19 (240)	26 (238)	26 (236)	26 (237)

Panel GMM Estimates, Industrialized and Emerging Economies, 1980-1995

	Industrialized Countries			Emerging Markets		
	Y	M3	VT	Y	M3	VT
Y_{-1}	1.268** (.079)	0.327** (.158)	-0.418 (.386)	1.079** (.073)	-0.021 (.128)	-0.172 (.194)
Y_{-2}	-0.521** (.088)	-0.396** (.187)	0.429* (.305)	-0.140** (.056)	0.379** (.146)	0.392** (.188)
$M3_{-1}$	-0.002 (.021)	0.985** (.095)	-0.005 (.114)	-0.039 (.035)	0.773** (.071)	0.990** (.366)
$M3_{-2}$	0.031 (.028)	-0.046 (.103)	-0.050 (.126)	-0.022 (.030)	-0.258** (.051)	-0.786** (.385)
VT_{-1}	0.012** (.007)	0.080** (.034)	0.941** (.121)	0.044** (.020)	0.071** (.020)	0.648** (.069)
VT_{-2}	0.021** (.006)	-0.063** (.033)	-0.273** (.103)	0.018** (.008)	0.073** (.020)	-0.254** (.083)
F-Y	NA	0.92 (.400)	0.22 (.802)	NA	12.68 (.000)	1.07 (.344)
F-M3	2.08 (.128)	NA	0.11 (.899)	0.69 (.501)	NA	8.63 (.000)
F-VT	4.43 (.013)	1.79 (.169)	NA	3.23 (.041)	5.19 (.006)	NA
Sargan test	116.6 (.99)	89.9 (1.00)	109.7 (1.00)	104.4 (1.00)	106.9 (1.00)	114.4 (1.00)
n (obs)	19 (229)	19 (228)	19 (229)	24 (236)	23 (234)	24 (237)

Does inflation affect the finance-growth nexus?

- Negative relation between inflation and growth in the cross-section is driven by a few high-inflation observations.

- Finance is related to growth in the cross-section only for sufficiently low-inflation environments, with a threshold of about 8.5 percent. With higher inflation, the finance-growth link vanishes.

- Inflation arrests the smooth operation of the finance-growth nexus with effects in inflation ranges low enough to be an important factor in industrialized countries as well as developing ones.

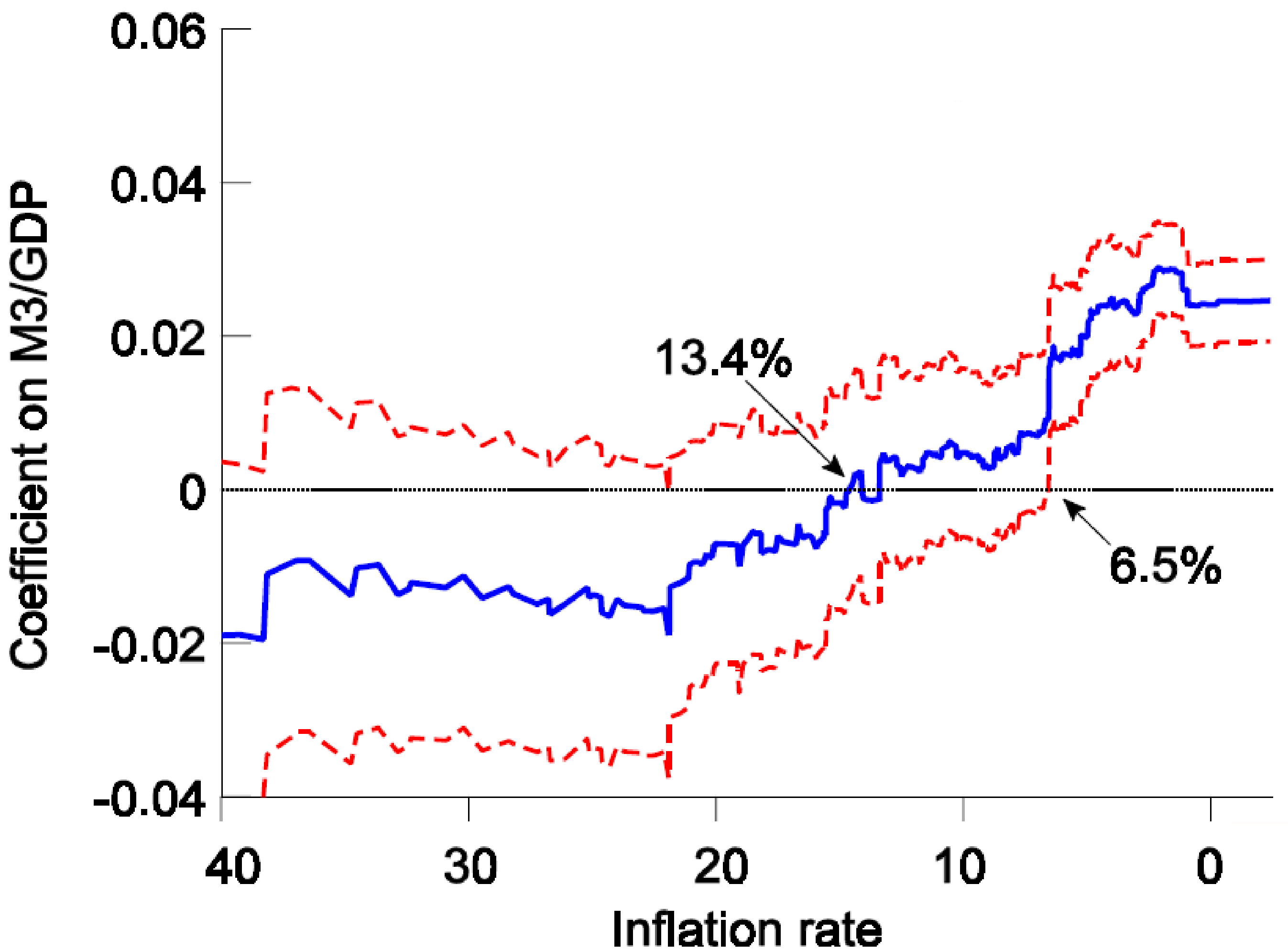
Cross-country instrumental variables growth regressions, 1960-95

	Dependent variable: % Growth of per capita real GDP			
	(1)	(2)	(3)	i < 500%
Log initial real per capita GDP	-0.133 (-1.1)	-0.219 (-1.7)	-0.259 (-2.0)	-0.244 (-1.9)
Log initial secondary school enrollment rate	1.026 (5.1)	0.832 (3.9)	0.907 (4.0)	0.848 (3.9)
Inflation Rate	-0.004 (-2.4)		-0.003 (-2.5)	0.004 (0.7)
M3 as percent of GDP		0.025 (4.6)	0.023 (4.2)	0.025 (4.6)
adjusted R^2 (No. observations)	.169 (517)	.231 (479)	.221 (479)	.219 (479)

The table reports IV regressions with t-statistics in parentheses. Data items are 5-year averages. Instruments include initial values of all regressors, trade/gdp, and gov/gdp, with initial values taken as the first observation in each 5-year period. Time dummies are included in all regressions but are not reported.

Cross-country instrumental variables growth regressions by inflation rate, 1960-95

	Dependent variable: % Growth of per capita real GDP	
	i < 8.3%	i > 8.3%
Log initial real per capita GDP	-0.389 (-2.3)	-0.114 (-0.6)
Log initial secondary school enrollment rate	1.023 (3.7)	0.796 (2.3)
M3 as percent of GDP	0.033 (5.3)	0.005 (0.5)
adjusted R^2 (No. observations)	.305 (240)	.160 (239)



Coefficients on M3/GDP in rolling growth regressions as lower inflation observations are added to the sample, 1960-1995

Finance and Growth: A Disappearing Phenomenon?

- Cross country regressions with five-year averages of growth for 84 countries from 1960-2004, and then 1960-89 and 1990-2004 separately show weakening.

- The nature of this weakening is also apparent in separate 5-year cross sections.

Table 1
Baseline instrumental variables growth regressions, 1960-2003

	Dependent variable: % Growth of per capita real GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of initial real per capita GDP (1995 US)	-0.143 (0.102)	0.005 (0.107)	-0.168 (0.104)	-0.034 (0.109)	-0.082 (0.116)	0.024 (0.118)
Log of secondary enrollment rate	0.750** (0.178)	0.681** (0.177)	0.757** (0.178)	0.705** (0.177)	0.878** (0.176)	0.812** (0.174)
Liquid liabilities (M3) (% of GDP)	0.017** (0.004)	0.017** (0.004)				
M3 less M1 (% of GDP)			0.026** (0.005)	0.023** (0.006)		
Private sector credit (% of GDP)					0.006 (0.004)	0.007* (0.004)
Gov't expenditure (% of GDP)		-0.084** (0.022)		-0.083** (0.023)		-0.077** (0.021)
Trade (% of GDP)		0.009** (0.004)		0.009** (0.004)		0.012** (0.003)
R^2 (No. observations)	.218 (625)	.251 (620)	.235 (605)	.262 (601)	.202 (639)	.241 (633)

Instruments include initial values of government expenditure, international trade, and the respective financial variable as a percentage of GDP, with initial values taken as the first observation of each 5-year period. The regressions also include dummy variables for the 5-year time periods that are not reported.

Table 2A
Instrumental variables growth regressions, 1960-1989

	Dependent variable: % Growth of per capita real GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of initial real per capita GDP (1995 US)	-0.054 (0.123)	-0.037 (0.126)	-0.137 (0.132)	-0.064 (0.134)	-0.118 (0.146)	-0.056 (0.146)
Log of secondary enrollment rate	0.528** (0.196)	0.508** (0.193)	0.616** (0.196)	0.601** (0.104)	0.716** (0.194)	0.676** (0.191)
Liquid liabilities (M3) (% of GDP)	0.026** (0.006)	0.028** (0.006)				
M3 less M1 (% of GDP)			0.033** (0.007)	0.034** (0.007)		
Private sector credit (% of GDP)					0.021** (0.007)	0.024** (0.007)
Gov't expenditure (% of GDP)		-0.086** (0.028)		-0.074** (0.029)		-0.075** (0.027)
Trade (% of GDP)		0.005 (0.005)		0.006 (0.005)		0.012** (0.005)
R^2 (No. observations)	.272 (412)	.298 (412)	.272 (410)	.292 (410)	.257 (412)	.289 (412)

Instruments include initial values of government expenditure, international trade, and the respective financial variable, with initial values taken as the first observation of each 5-year period. The regressions also include dummy variables for the 5-year time periods that are not reported.

Table 2B
Instrumental variables growth regressions, 1990-2003

	Dependent variable: % Growth of per capita real GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of initial real per capita GDP (1995 US)	-0.402** (0.194)	-0.101 (0.217)	-0.373** (0.188)	-0.101 (0.211)	-0.261** (0.207)	-0.077 (0.217)
Log of secondary enrollment rate	1.505** (0.454)	1.236** (0.458)	1.444** (0.463)	1.238** (0.465)	1.504** (0.432)	1.320** (0.430)
Liquid liabilities (M3) (% of GDP)	0.008 (0.006)	0.003 (0.007)				
M3 less M1 (% of GDP)			0.014* (0.008)	0.007 (0.009)		
Private sector credit (% of GDP)					0.001 (0.005)	-0.007 (0.006)
Gov't expenditure (% of GDP)		-0.084** (0.038)		-0.100** (0.041)		-0.080** (0.036)
Trade (% of GDP)		0.015** (0.005)		0.014** (0.005)		0.013** (0.004)
R^2 (No. observations)	.096 (213)	.148 (208)	.121 (195)	.168 (191)	.099 (227)	.158 (221)

Instruments include initial values of government expenditure, international trade, and the respective financial variable, with initial values taken as the first observation of each 5-year period. The regressions also include dummy variables for the 5-year time periods that are not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels.

Table 3
Instrumental variables growth regressions with M3 (% of GDP), 5-year cross sections 1960-2003

	Dependent variable: % Growth of per capita real GDP								
	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-03
Log of initial	0.470	-0.285	-0.085	-0.016	-0.131	0.330	-0.028	-0.024	-0.253
GDP (1995 US)	(0.360)	(0.262)	(0.303)	(0.359)	(0.336)	(0.286)	(0.395)	(.282)	(.465)
Log of	0.348	0.783**	0.629	-0.162	0.720	0.684	1.911**	0.950	-0.313
enrollment rate	(0.448)	(0.330)	(0.433)	(0.562)	(0.610)	(0.603)	(0.797)	(0.621)	(1.046)
M3	-0.003	0.044**	0.033**	0.040**	0.035**	0.015	-0.001	-0.001	0.016
(% of GDP)	(0.019)	(0.013)	(0.013)	(0.016)	(0.015)	(0.012)	(0.014)	(0.009)	(0.014)
Gov't	-0.033	0.014	-0.085	-0.128*	-0.022	-0.186**	-0.177**	-0.019	-0.037
(% of GDP)	(0.113)	(0.066)	(0.067)	(0.072)	(0.062)	(0.059)	(0.072)	(0.051)	(0.073)
Trade	-0.006	-0.006	0.003	0.019	-0.007	0.020*	0.025**	0.005	0.012
(% of GDP)	(0.014)	(0.011)	(0.012)	(0.013)	(0.012)	(0.010)	(0.010)	(0.007)	(0.011)
R^2	.133	.371	.218	.101	.115	.249	.268	.098	.103
(No. obs.)	(52)	(66)	(67)	(74)	(78)	(75)	(81)	(79)	(48)

The table reports coefficients from two-stage least squares regressions with standard errors in parentheses. Instruments include initial values of the full set of regressors, with initial values taken as the first observation of each 5-year period. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively.

Table 4

Instrumental variables growth regressions with M3 less M1 (% of GDP), 5-year cross sections 1960-2003

	Dependent variable: % Growth of per capita real GDP								
	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-03
Log of initial	0.464	-0.350	-0.265	0.136	-0.247	0.083	-0.130	0.062	-0.292
GDP (1995 US)	(0.392)	(0.256)	(0.342)	(0.382)	(0.355)	(0.284)	(0.408)	(.306)	(.376)
Log of	0.514	0.725**	0.528	0.056	0.819	0.718	1.833**	0.956	0.217
enrollment rate	(0.482)	(0.318)	(0.456)	(0.580)	(0.606)	(0.564)	(0.821)	(0.711)	(0.837)
M3 less M1	0.003	0.066**	0.044**	0.012	0.039**	0.035**	0.012	-0.007	0.001
(% of GDP)	(0.026)	(0.014)	(0.020)	(0.019	(0.018)	(0.013)	(0.014)	(0.015)	(0.016)
Gov't	-0.031	0.068	-0.060	0.129*	-0.011	-0.172**	-0.174**	-0.035	-0.033
(% of GDP)	(0.123)	(0.065)	(0.069)	(0.078)	(0.065)	(0.057)	(0.077)	(0.057)	(0.069)
Trade	-0.002	-0.011	0.006	0.027**	-0.006	0.015	0.023**	0.009	0.013
(% of GDP)	(0.015)	(0.011)	(0.012)	(0.013)	(0.013)	(0.010)	(0.010)	(0.008)	(0.009)
R^2	.181	.441	.158	.134	.119	.297	.279	.109	.099
(No. obs.)	(55)	(64)	(68)	(73)	(77)	(73)	(76)	(72)	(43)

The table reports coefficients from two-stage least squares regressions with standard errors in parentheses. Instruments include initial values of the full set of regressors, with initial values taken as the first observation of each 5-year period. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively.

Table 5
Instrumental variables growth regressions with private credit (% of GDP),5-year cross sections 1960-2003

	Dependent variable: % Growth of per capita real GDP								
	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-03
Log of initial GDP (1995 US)	0.561 (0.388)	-0.266 (0.333)	-0.107 (0.354)	0.049 (0.409)	-0.109 (0.371)	-0.128 (0.334)	-0.054 (0.418)	0.173 (.286)	-0.429 (.443)
Log of enrollment rate	0.325 (0.428)	0.899** (0.357)	0.713 (0.440)	0.078 (0.566)	0.940 (0.603)	0.838 (0.565)	2.018** (0.761)	0.903 (0.611)	0.041 (0.924)
Private credit (% of GDP)	0.004 (0.022)	0.029 (0.019)	0.026 (0.018)	0.020 (0.020)	0.014 (0.017)	0.037** (0.014)	-0.002 (0.012)	-0.005 (0.007)	0.014 (0.010)
Gov't (% of GDP)	-0.033 (0.098)	0.042 (0.070)	-0.059 (0.068)	-0.121 (0.074)	-0.018 (0.062)	-0.173** (0.057)	-0.163** (0.070)	-0.039 (0.051)	-0.025 (0.064)
Trade (% of GDP)	-0.009 (0.012)	0.007 (0.012)	0.010 (0.012)	0.029** (0.013)	0.001 (0.012)	0.025** (0.010)	0.021** (0.008)	0.010* (0.006)	0.011 (0.007)
R^2 (No. obs.)	.217 (52)	.266 (66)	.189 (66)	.143 (74)	.099 (79)	.309 (75)	.251 (82)	.151 (83)	.107 (56)

The table reports coefficients from two-stage least squares regressions with standard errors in parentheses. Instruments include initial values of the full set of regressors, with initial values taken as the first observation of each 5-year period. * and ** denote statistical significance at the 10 percent and 5 percent levels respectively.

- We propose two possible explanations:

  1) Financial development may be beneficial if not done to excess, meaning that credit booms may lead to lower quality projects, more defaults and a higher incidence of financial crises.

  2) The observation that finance promotes growth is subject to a Lucas-type critique, meaning that recent liberalizations and the accompanying growth of financial systems have not been as effective as other ways of building a financial system had been.

- The main findings support the former explanation, though the two could well be related.

Is an increased incidence of financial crises affecting the operation of the finance-growth link?

- Interact measures of financial development with dummy variables for major and minor financial crises (Caprio and Klingbiel 2003).

Table 6
Instrumental variables growth regressions by crisis status, 1960-2003

	Dependent variable: % Growth of per capita real GDP					
Financial Variable:	M3 (% GDP)		M3-M1 (% GDP)		Credit (% GDP)	
Log of initial real per capita GDP (1995 US$)	-0.150 (0.102)	-0.005 (0.106)	-0.183* (0.104)	-0.057 (0.109)	-0.132 (0.117)	-0.028 (0.119)
Log of secondary school enrollment rate	0.722** (0.177)	0.654** (0.176)	0.739** (0.177)	0.695** (0.176)	0.876** (0.175)	0.814** (0.173)
Finance	0.021** (0.004)	0.022** (0.005)	0.032** (0.006)	0.030** (0.006)	0.012** (0.005)	0.013** (0.005)
Finance x major financial crisis	-0.016** (0.005)	-0.017** (0.005)	-0.024** (0.008)	-0.024** (0.008)	-0.014** (0.005)	-0.015** (0.005)
Finance x minor financial crisis	-0.007 (0.007)	-0.005 (0.007)	-0.013 (0.010)	-0.009 (0.010)	-0.010* (0.006)	-0.007 (0.006)
Government expenditure (% of GDP)		-0.087** (0.022)		-0.082** (0.023)		-0.078** (0.021)
Trade (% of GDP)		0.008** (0.004)		0.008** (0.004)		0.011** (0.003)
R^2 (No. observations)	.230 (625)	.262 (620)	.247 (606)	.272 (602)	.214 (639)	.252 (633)

Or is it forced liberalization?

- Define liberalization as the opening of the equity market to foreign investors (Campbell, Harvey, and Lundblad 2005)

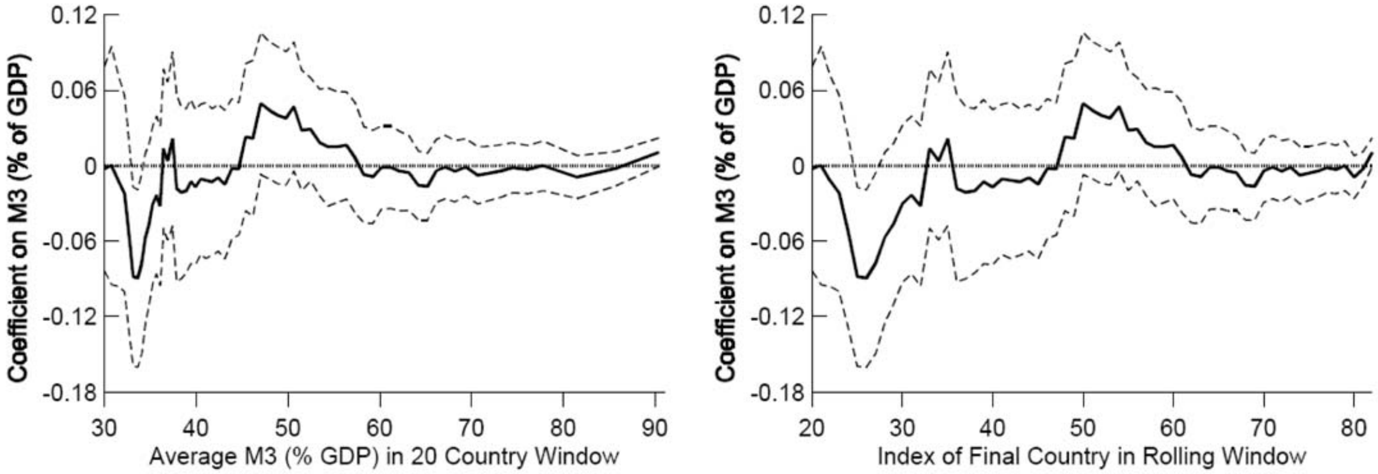
- Interact measures of financial development with dummy variables for pre-liberalization, post-liberalization, and never liberalized.

Table 7
Instrumental variables growth regressions by liberalization status, 1960-2003

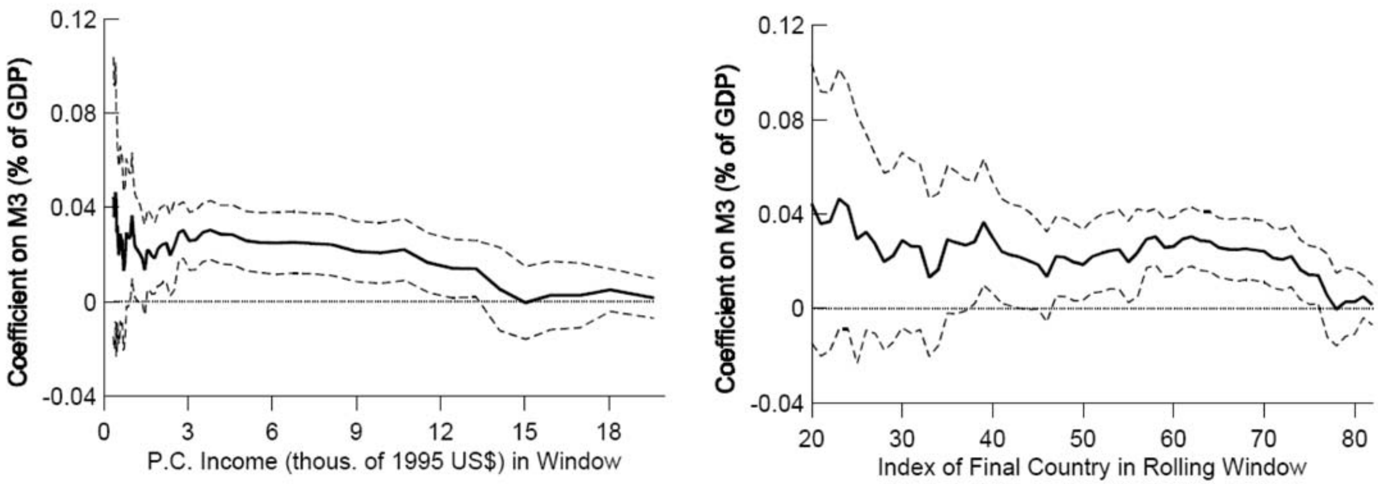
	Dependent variable: % Growth of per capita real GDP					
Financial Variable:	M3 (% GDP)		M3-M1 (% GDP)		Credit (% GDP)	
Log of initial real per capita GDP (1995 US$)	-0.138 (0.104)	0.012 (0.108)	-0.161 (0.110)	-0.026 (0.111)	-0.087 (0.117)	0.024 (0.120)
Log of secondary school enrollment rate	0.740** (0.181)	0.669** (0.178)	0.755** (0.180)	0.709** (0.178)	0.873** (0.176)	0.811** (0.174)
Finance	0.017** (0.004)	0.016** (0.005)	0.025** (0.006)	0.022** (0.006)	0.007* (0.004)	0.007* (0.004)
Finance x never liberalized	0.002 (0.005)	0.004 (0.005)	0.004 (0.007)	0.007 (0.007)	-0.001 (0.004)	0.001 (0.004)
Finance x pre-liberalization	-0.001 (0.006)	-0.002 (0.006)	-0.005 (0.009)	-0.007 (0.009)	-0.005 (0.006)	-0.006 (0.006)
Finance x post liberalization	0.002 (0.006)	0.001 (0.006)	0.003 (0.009)	0.000 (0.009)	0.007 (0.006)	0.003 (0.007)
Government expenditure (% of GDP)		-0.087** (0.022)		-0.088** (0.023)		-0.076** (0.022)
Trade (% of GDP)		0.009** (0.004)		0.010** (0.004)		0.011** (0.003)
Exclude liberalization variables (p-value)	0.934	0.344	0.797	0.536	0.437	0.692
R^2 (No. observations)	.219 (625)	.253 (620)	.243 (606)	.265 (602)	.205 (639)	.242 (633)

Does one size really fit all?

- Use rolling 20-year regressions to examine whether the finance-growth relationship varies with the level of financial development and the level of per capita income.



(a) 20-country rolling window ordered by increasing M3 (% of GDP)



(b) 20-country rolling window order by increasing per capita income (thousands of 1995 U.S.$)

Conclusions

- We have come a long way in documenting the link from finance to growth in the last 15 years. *But:*

- It has become increasingly clear that cross-country regressions emphasize between country variation, rather than within country variation. Tell us little about *how* finance promotes growth. Time series analysis allows us to better answer the question “How much would China grow if its financial sector were 10 percent larger?”

- Institutional and comparative analyses could better answer the question “How would finance interact with the real sector to support growth?”

- Going forward these questions seem to be the ones that beg for answers and require our more focused attention.