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Poolability and the finance-growth nexus: a cautionary note

by

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Abstract

The present contribution tests whether countries can be pooled when studying the finance-growth nexus. Overall, our results point toward a 'pragmatic' positive answer, though considerable heterogeneity is present among developing countries.

JEL codes: C23, O16

Keywords: poolability, finance, growth

1 The framework of reference

This paper investigates the issue of poolability of different countries to study the connection between finance and growth.

The relationship between financial development and growth is a long-standing issue in economics. Recently, empirical research has moved from cross-country studies to the widespread use of panel regressions in accordance with the direction taken by the growth literature as a whole and in order to avoid simultaneity bias (Levine, 2005). One issue that is largely overlooked in most panel studies concerns the poolability of individual series. Levine and Zervos (1993) recognizes the relevance of the problem, but they do not take a stance on it, focusing rather on testing the robustness of the specification of the estimated model.

On the contrary, in the present work we do concentrate specifically on whether series are poolable. In so doing, we follow Baltagi (1981) who very clearly notes that this question has to be answered before the data are pooled, instruments identified and models estimated. If

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pooling is in fact rejected, then there will be no scope for a multi-country analysis and policy recommendations will simply be based on wrong premises. Far from being a simple econometric exercise, our contribution highlights the importance of unveiling the priors standing behind econometric estimates, especially when the latter have far reaching policy implications.

2 Dataset and specification

We exploit the dataset used by Levine et al. (2000), which is available on-line[1]. It contains data on 74 countries spanning the 1960–1995 period. As customary in growth regressions, data are averaged over non-overlapping five years windows to focus on long-run relationships. We opt for a simple linear specification, which is almost standard in this stream of the literature (see Levine et al., 2000; Calderón and Liu, 2003; Beck and Levine, 2004).

The dependent variable is the growth rate of real per capita gross domestic product (GDP). Regressors include the level of financial development, along with a set of conditioning variables: the level of initial real per capita GDP, educational attainment, government size, openness to trade, inflation, and the black market exchange rate premium. Three alternative measures of financial development are used: (i) liquid liabilities of the financial system divided by GDP; (ii) the ratio of commercial bank assets divided by commercial bank plus central bank assets; (iii) the value of credit extended to the private sector over GDP. The first is a typical index of financial depth; the second measures the degree of involvement of the private sector in providing financial services and hence proxies the maturity of the system; the third excludes credit extended by the central bank and government agencies and also credit issued to public-owned enterprises.

3 Methods, Results and Conclusions

Suppose that the matrix of the regressors X can be partitioned into two parts, X_1 and X_2. In our case, X_2 are the financial indicators taken one at a time and X_1 are all the other regressors including a constant. We test the poolability of X_2 only. The restricted model is:

$$y = \beta_1 X_1 + \beta_2 X_2 + u$$

while the unrestricted one is

$$y = \beta_1 X_1 + b_2 X_2^* + e$$

[1] http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

where y is the dependent variable, β_2 and b_2 are the restricted and the unrestricted vectors of coefficients, u and e are stochastic errors, and X_2^* is the counterpart of X_2 for the unrestricted model. Given that we are interested in testing for poolability in an unbalanced setting, X_2^* is obtained from X_2 in two steps. First, one obtains its rows as follows:

$$_iX_2^* = {}_iX_2 \otimes {}_iD$$

where the i subscript marks the i-th row of a matrix and D is a matrix of country dummy variables. Second, one stacks $_iX_2^*$ in a single matrix to obtain X_2^*.

A review of existing poolability tests is offered in Baltagi (2001). On the basis of a Monte Carlo study, Baltagi (1981) recommends the Roy-Zellner test and the McElroy (1977) criteria. The latter ones do not test the null hypothesis of poolability, but help to choose 'pragmatically' between the pooled and the un-pooled estimator on the basis of the lower mean squared error (MSE). In this study we stick to these recommendations. Finally, given that we have an unbalanced dataset we estimated the variance-covariance matrix of the errors relying on Davis (2001).

Results are presented in Table 1. At first we study the behavior of the whole sample: although poolability is always rejected by the Roy-Zellner test, the MSE criteria support it, save in one instance for private credit. The picture is even more robust for the group of developed countries, whilst quite a lot of heterogeneity appears to characterize developing economies. Therefore, pooling seems to be especially problematic for those countries representing the usual target of policy recommendations.

To conclude, while not supported on a purely statistical ground, pooling may indeed be justified from a 'pragmatic' point of view as the additional information granted by a pooled cross-section analysis outweighs the distortion generated by superimposing an identical coefficient across all countries. At the same time, though, our results highlight that the behavior of developing countries is less homogenous. This may be caused by a number of reasons: first, data for developing countries might be of lesser quality; second, substantial heterogeneity across developing countries might actually exist, but we cannot fully capture it due to the relatively short time dimension of the dataset. Our results appear to suggest a critical attitude toward a 'one-fits-all' approach for growth policies and reassess the importance of a country-specific attitude capable to take into account historical, legal and cultural aspects as well (see for instance Rodrik et al., 2005).

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Table 1: Poolability tests across countries for different financial indicators

	Whole sample			Developed Countries			Developing Countries		
test	liquid liabilities	commercial-central bank	private credit	liquid liabilities	commercial-central bank	private credit	liquid liabilities	commercial-central bank	private credit
Roy-Zellner[a]	2.40 (0.00)	2.24 (0.00)	1.85 (0.00)	2.53 (0.00)	2.15 (0.00)	3.56 (0.00)	2.30 (0.00)	2.26 (0.00)	1.78 (0.00)
Pooling is better?	No	No	No	No	No	No	No	No	No
Strong MSE[b]:	$\lambda_{NT} = 0.00$	$\lambda_{NT} = 0.02$	$\lambda_{NT} = 0.12$	$\lambda_{NT} = 0.04$	$\lambda_{NT} = 0.00$	$\lambda_{NT} = 0.01$	$\lambda_{NT} = 0.51$	$\lambda_{NT} = 2.33$	$\lambda_{NT} = 0.24$
Pooling is better?	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
1^{st} Weak MSE[c]:	θ_{NT}=0.49	θ_{NT}=0.22	θ_{NT}=0.04	θ_{NT}=0.22	θ_{NT}=0.48	θ_{NT}=0.02	θ_{NT}=0.04	θ_{NT}=0.14	θ_{NT}=0.04
Pooling is better?	Yes	Yes	No	Yes	Yes	Yes	No	No	No
2^{nd} Weak MSE[d]:	(N-1)/2=38	(N-1)/2=38	(N-1)/2=38	(N-1)/2=10.5	(N-1)/2=10.5	(N-1)/2=10.5	(N-1)/2=27	(N-1)/2=27	(N-1)/2=27
Pooling is better?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

a. The Roy-Zellner test has an F distribution with (76,363) degrees of freedom in the case of the whole sample, (21,124) for developed countries, and (54,232) for developing ones. The null hypothesis is poolability, p-values in parentheses

b. $\lambda_{NT} \leq 0.5$

c. $\lambda_{NT} \leq \theta_{NT}$

d. $\lambda_{NT} \leq (N-1)/2$