Stock Markets, Banks, and Growth: Correlation or Causality

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Abstract: This paper investigates the impact of stock markets and banks on economic growth using a panel data set for the period 1976-98 and applying recent GMM techniques developed for dynamic panels. Econometrically, the paper illustrates the differences that emerge from different panel procedures. On balance, we find that stock markets and banks positively influence economic growth and these findings are not due to potential biases induced by simultaneity, omitted variables or unobserved country-specific effects.

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1. Introduction

Do well-functioning stock markets and banks boost economic growth? Theory provides conflicting predictions about both the impact of overall financial development on growth and about the separate effects of stock markets on growth and banks on economic growth. Many models emphasize that well-functioning financial intermediaries and markets ameliorate information and transactions costs and thereby foster efficient resource allocation and hence faster long-run growth [Bencivenga and Smith, 1991; Bencivenga, Smith, and Starr, 1995; King and Levine, 1993a]. These models, however, also show that financial development can hurt growth. Specifically, financial development, by enhancing resource allocation and hence the returns to saving, may lower saving rates. If there are sufficiently large externalities associated with saving and investment, then financial development slows long-run growth. Theory also provides conflicting predictions about whether stock markets and banks are substitutes, compliments, or whether one is more conducive to growth than the other. For instance, Boyd and Prescott (1986) model the critical role that banks play in easing information frictions and therefore in improving resource allocation, while Stiglitz (1985) and Bhide (1993) stress that stock markets will not produce the same improvement in resource allocation and corporate governance as banks. On the other hand, some models emphasize that markets mitigate the inefficient monopoly power exercised by banks and stress that the competitive nature of markets encourages innovative, growth-enhancing activities as opposed to the excessively conservative approach taken by banks [Allen and Gale, 2000]. Finally, some theories stress that it is not banks or markets, it is banks and markets; these different components of the financial system ameliorate different information and transaction costs.[1]

[1] See, Levine (1997), Boyd and Smith (1998), Huybens and Smith (1999) and Demirguc-Kunt and Levine (2001).

This paper rigorously explores the interactions between stock markets, banks and economic growth. Specifically, using a panel dataset for 40 countries over the period 1976-98 we examine (i) whether financial development has a positive impact on economic growth, and (ii) whether banks and stock markets each have an independent impact on economic growth. We use new panel econometric techniques that reduce statistical shortcomings with existing growth studies. Furthermore, we apply these techniques to assess the independent impact of both stock markets and banks on growth, while most existing studies focus only on the bank-growth relationship.

Although a burgeoning empirical literature suggests that well-functioning banks accelerate economic growth, these studies generally do not simultaneously examine stock market development. More specifically, King and Levine (1993a,b) show that bank development helps explain economic growth, while Levine (1998, 1999) and Levine, Loayza, and Beck (2000) show that the positive relationship between bank development and growth is not due to simultaneity bias. These studies generally include over 80 countries. They omit measures of stock market development because measures of stock market development for a twenty-year period are only available for about 40 countries. Omitting stock market development makes it difficult to assess whether (a) the positive relationship between bank development and growth holds when controlling for stock market development, (b) banks and markets each have an independent impact on economic growth, or (c) overall financial development matters for growth but it is difficult to identify the separate impact of stock markets and banks on economic success.

Existing empirical assessments of stock markets, banks, and economic growth suffer from an assortment of econometric weaknesses. Levine and Zervos (1998) find that initial measures of stock market liquidity and banking sector development are both strong predictors of economic growth over the next 18 years. This approach, however, does not account formally for potential simultaneity bias, nor does it control explicitly for country fixed effects.[2] Arestis, Demetriades and Luintel (2000) use quarterly data and apply time series methods to five developed economies and show that while both banking sector and stock market development explain subsequent growth, the effect of banking sector development is substantially larger than that of stock market development. The sample size, however, is very limited and it is not clear whether the use of quarterly data and Johansen's (1988) vector error correction model fully abstracts from high frequency factors influencing the stock market, bank, and growth relationship. Rousseau and Wachtel (2000) make an important contribution to the literature by using panel techniques with annual data to assess the relationship between stock markets, banks, and growth. They use the *difference* panel estimator -- developed by Arellano and Bond (1991) and Holtz-Eakin, Newey, and Rosen (1990) -- that (a) differences the growth regression equation to remove any omitted variable bias created by unobserved country-specific effects, and then (b) instruments the right-hand-side variables (the differenced values of the original regressors) using lagged values of the original regressors to eliminate potential parameter inconsistency arising from simultaneity bias. Rousseau and Wachtel (2000) show that both banking sector and stock market development explain subsequent growth, even after controlling for reverse causality. The use of annual data does not, however, abstract from business cycle phenomena. Furthermore, Alonso-Borrego and Arellano (1996) show that the instruments in the difference panel estimator are frequently weak, which induces biases in finite samples and poor precision asymptotically. Blundell and Bond (1998) show that a *system* panel estimator that simultaneously uses both the *difference* panel data and the data from the original *levels* specification produces dramatic increases in both consistency and efficiency.

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[2] See Harris (1997) and Levine (2001) for cross-country studies of stock markets and economic growth using instrumental variables. Also, see Atje and Jovanovic (1993).

This paper improves upon past econometric methods used to examine stock markets, banks, and long-run growth and thereby permits us to (a) shed additional evidence on the relationship between overall financial development and growth and (b) rigorously assess the independent impact of both stock markets and banks on economic growth.[3] Methodologically, we (1) construct a panel with data averaged over five-year intervals from 1976 to 1998 to abstract from business cycle relationships and (2) employ the *system* panel estimator developed by Arrellano and Bover (1995) to improve upon the differenced panel estimator used by Wachtel and Rousseau (2000).[4] We also use different variants of the system panel estimator. As discussed in Arellano and Bond (1998), the one-step system estimator assumes homoskedastic errors, while the two-step estimator uses the first-step errors to construct heteroskedasticity-consistent standard errors (e.g., White, 1982). Due to the large number of instruments that are employed in the system estimator, however, the asymptotic standard errors from the two-step panel estimator may be a poor guide for hypothesis testing in small samples where over-fitting becomes a problem. This is not a problem in the one-step estimator. Consequently, we use the one-step panel estimator, the two-step estimator, and a novel, alternative procedure developed by Calderon, Chong and Loayza (2000). This alternative system estimator reduces the dimensionality of the instruments to avoid the over-fitting problem but still permits the construction of heteroskedasticity consistent standard errors. The shortcoming of this alternative procedure is that we lose a period from the sample.

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[3] This paper also improves on previous efforts by constructing the data on stock market and bank development more carefully. Indicators of financial development are frequently measured at the end of the period. These financial development indicators, however, are frequently divided by the Gross Domestic Product, which is measured over the period. Traditionally, researchers have not carefully addressed the bias that is introduced when taking the ratio of a stock variable measured at the end of a period and a flow variable measured over a period. This bias might be especially strong in high-inflation countries. Following Levine, Loayza, and Beck (2000) and Beck, Demirguc-Kunt and Levine (2000), we deflate the stock variables by end-of-period deflators and the flow variables by a deflator for the whole period. Then we take the average of the real stock variable in period t and period t-1 and relate it to the real flow variable for period t.

[4] Note, we use only three observations in the last period.

Thus, besides assessing the impact of stock markets and banks on economic growth, this paper contributes to the literature on panel estimation procedures. While Arellano and Bond (1991) and Blundell and Bond (1998) note the potential biases associated with standard errors emerging from the two-step estimator in small samples and while they recognize that these potential biases must be balanced against advantages of using heteroskedasticity-consistent standard errors, this paper exemplifies the differences that emerge from these two procedures. Moreover, we use Calderon, Chong, and Loayza (2000)'s modification that limits the over-fitting problem and thereby reduces potential biases associated with the two-step estimator. We provide evidence using all three approaches. The results suggest that it is indeed important to use all three estimates in drawing economic inferences.

This paper finds that markets and banks are important for economic growth. Bank and stock market development always enter jointly significant, regardless of the panel methodology or the conditioning information set that we employ. These findings are strongly consistent with models that predict that well-functioning financial systems ease information and transaction costs and thereby enhance resource allocation and economic growth. Further, the measure of stock market development and the measure of bank development frequently both enter the growth regression significantly after controlling for other growth determinants, country specific effects, and potential simultaneity bias. This suggests that both banks and markets are important for growth. This conclusion, however, must be qualified. The two-step indicator always indicates that both stock markets and banks independently boost growth. There are, however, a few combinations of control variables -- government size, inflation, trade openness and the black market premium – when using the one-step and alternative panel estimators in which only bank development or stock market liquidity enters with a p-value below 0.05. While we read the bulk of the results as suggesting that both markets and banks independently spur economic growth, the fact that the results are not fully consistent across all econometric methods and specifications may lead some to conclude that overall financial development matters for growth but it is difficult to identify the specific components of the financial system most closely associated with economic success.

The remainder of the paper is organized as follows. Section 2 presents the data. Section 3 introduces the econometric methodology. Section 4 presents the main results and section 5 concludes.

2. The Data

We analyze the link between stock market and bank development and economic growth in a panel of 40 countries and 146 observations. Data are averaged over five 5-year periods between 1976 and 1998.[5] Moving to a panel from pure cross-sectional data allows us to exploit the time-series dimension of the data and deal rigorously with simultaneity. The theories we are evaluating focus on the long-run relationships between stock markets, banks, and economic growth. Thus, we use five-year averages rather than annual (or quarterly) data to focus on longer-run (as opposed to higher frequency) relationships. This section describes the indicators of stock market and bank development, the conditioning information set and presents descriptive statistics.

To measure stock market development we use the *Turnover Ratio* measure of market liquidity, which equals the value of the trades of shares on domestic exchanges divided by total value of listed shares. It indicates the trading volume of the stock market relative to its size. Some models predict countries with illiquid markets will create disincentives to long-run investments because it is comparatively difficult to sell ones stake in the firm. In contrast, more liquid stock markets reduce disincentives to long-run investment, since liquid markets provide a ready exit-option for investors.

This can foster more efficient resource allocation and faster growth [Levine, 1991; Bencivenga, Smith, and Starr, 1995].[6]

To measure bank development, we use *Bank Credit*, which equals bank claims on the private sector by deposit money banks divided by GDP. This measure isolates loans given by deposit money banks to the private sector. It excludes loans issued to governments and public enterprises. This indicator of bank development does not directly measure the degree to which banks ease information and transaction costs. Unlike many studies of finance and growth that use the ratio of broad money to GDP as an empirical proxy of financial development, however, the Bank Credit variable isolates bank credit to the private sector and therefore excludes credits by development banks and loans to the government and public enterprises. Thus, while problematic, the Bank Credit measure improves upon alternative measures of bank development that are available for a broad cross-section of countries.[7]

To assess the strength of the independent link between both stock markets and growth and bank development and economic growth, we control for other potential determinants of economic growth in our regressions. In the *simple conditioning information set* we include the initial real GDP per capita to control for convergence and the average years of schooling to control for human capital accumulation. In the *policy conditioning information set*, we use the simple conditioning information

[5] Thus, the first period covers the years 1976-1980, the second period covers the years 1981-1985, and so on. The last period only comprises the years 1996-98. Financial data are from Beck, Demirguc-Kunt and Levine (2000).

[6] We experimented with other measures. *Value Traded* equals the value of the trades of domestic shares on domestic exchanges divided by GDP. *Value Traded* has two potential pitfalls. First, it does not measure the liquidity of the market. It measures trading relative to the size of the economy. Second, since markets are forward looking, they will anticipate higher economic growth by higher share prices. Since *Value Traded* is the product of quantity and price, this indicator can rise without an increase in the number of transactions. Turnover Ratio does not suffer from this shortcoming since both numerator and denominator contain the price. We also considered *Market Capitalization*, which equals the value of listed shares divided by GDP. Its main shortcoming is that theory does not suggest the mere listing of shares will influence resource allocation and growth. Levine and Zervos (1998) show that *Market Capitalization* is not a good predictor of economic growth. Our results confirm this finding. These results are available on request.

[7] This is the same indicator of bank development used by Levine and Zervos (1998).

set plus either (i) the black market premium, (ii) the share of exports and imports to GDP, (iii) the inflation rate or (iv) the ratio of government expenditures to GDP.

Table 1 presents descriptive statistics and correlations. There is a wide variation of bank and stock market development across the sample. While Taiwan had a Turnover Ratio of 340% of GDP in 1986-90, Bangladesh had a Turnover Ratio of only 1.3% in 1986-90. While Taiwan's banks lent 124% of GDP to the private sector in 1991-1995, Peru's financial intermediaries lent only 4% during 1981-85. We note that while Economic Growth is correlated significantly with the Turnover Ratio, it is not significantly correlated with Bank Credit. Turnover is significantly correlated with bank development.

3. The Methodology

While Levine and Zervos (1998) show that stock market development and banking sector development are robust predictors of growth, their results do not imply a causal link between the financial sector and economic growth. To control for possible simultaneity, they use initial values of stock market and bank development. Using initial values of the explanatory variables, however, implies not only an efficiency (informational) loss but also a potential consistency loss. If the contemporaneous behavior of the explanatory variables matters for current growth, we run the risk of grossly mis-measuring the "true" explanatory variables by using initial values, which could bias the coefficient estimates. Using proper instruments for the contemporaneous values of the explanatory variables is therefore preferable to using initial values.

To assess the relationship between stock market development, bank development and economic growth in a panel, we use the Generalized-Method-of Moments (GMM) estimators developed for dynamic panel models by Holtz-Eakin, Newey and Rosen (1990), Arrellano and Bond

(1991) and Arrellano and Bover (1995). We can write the traditional cross-country growth regression as follows.

$$y_{i,t} - y_{i,t-1} = \alpha y_{i,t-1} + \beta' X_{i,t} + \eta_i + \varepsilon_{i,t} \tag{1}$$

where y is the logarithm of real per capita GDP, X represents the set of explanatory variables, other than lagged per capita GDP and including our indicators of stock market and bank development, η is an unobserved country-specific effect, ε is the error term, and the subscripts i and t represent country and time period, respectively. We also include time dummies to account for time-specific effects.

Arrellano and Bond (1991) propose to difference equation (1):

$$(y_{i,t} - y_{i,t-1}) - (y_{i,t-1} - y_{i,t-2}) = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta'(X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \tag{2}$$

While differencing eliminates the country-specific effect, it introduces a new bias; by construction the new error term, $\varepsilon_{i,t} - \varepsilon_{i,t-1}$ is correlated with the lagged dependent variable, $y_{i,t-1} - y_{i,t-2}$. Under the assumptions that (a) the error term, ε, is not serially correlated, and (b) the explanatory variables, X, are weakly exogenous (i.e., the explanatory variables are assumed to be uncorrelated with future realizations of the error term), Arrellano and Bond propose the following moment conditions.

$$E\left[y_{i,t-s} \cdot \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0 \quad for\ s \geq 2; t = 3, \ldots, T \tag{3}$$

$$E\left[X_{i,t-s} \cdot \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0 \quad for\ s \geq 2; t = 3, \ldots, T \tag{4}$$

Using these moment conditions, Arellano and Bond (1991) propose a two-step GMM estimator. In the first step the error terms are assumed to be independent and homoskedastic across countries and over time. In the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumptions of independence and homoskedasticity. The two-step estimator is thus asymptotically more efficient relative to the first-step estimator. We refer to the GMM estimator based on these conditions as the *difference* estimator. This is the estimator that Rousseau and Wachtel (2000) use with annual data to examine the relationship between stock markets, banks, and economic growth.

There are, however, conceptual and statistical shortcomings with this difference estimator. Conceptually, we would also like to study the cross-country relationship between financial sector development and economic growth, which is eliminated in the *difference* estimator. Statistically, Alonso-Borrego and Arellano (1996) and Blundell and Bond (1998) show that in the case of persistent explanatory variables, lagged levels of these variables are weak instruments for the regression equation in differences. This influences the asymptotic and small-sample performance of the difference estimator. Asymptotically, the variance of the coefficients rises. In small samples, Monte Carlo experiments show that the weakness of the instruments can produce biased coefficients. Finally, differencing may exacerbate the bias due to measurement errors in variables by decreasing the signal-to-noise ratio (see Griliches and Hausman, 1986).

To reduce the potential biases and imprecision associated with the difference estimator, we use an estimator that combines in a *system* the regression in differences with the regression in levels [Arellano and Bover, 1995 and Blundell and Bond, 1998]. The instruments for the regression in differences are the same as above. The instruments for the regression in levels are the lagged *differences* of the corresponding variables. These are appropriate instruments under the following <u>additional</u> assumption: although there may be correlation between the levels of the right-hand side variables and the country-specific effect in equation (1), there is no correlation between the *differences* of these variables and the country-specific effect. Given that lagged levels are used as instruments in the regression in differences, only the most recent difference is used as an instrument in the regression in levels. Using additional lagged differences would result in redundant moment conditions (Arellano and Bover, 1995). Thus, additional moment conditions for the second part of the system (the regression in levels) are:

$$E\left[\left(y_{i,t-s} - y_{i,t-s-1}\right)\cdot\left(\eta_i + \varepsilon_{i,t}\right)\right] = 0 \quad \text{for } s = 1 \tag{5}$$

$$E\left[\left(X_{i,t-s} - X_{i,t-s-1}\right)\cdot\left(\eta_i + \varepsilon_{i,t}\right)\right] = 0 \quad \text{for } s = 1 \tag{6}$$

Thus, we use the moment conditions presented in equations (3) – (6) and employ the *system* panel estimator to generate consistent and efficient parameter estimates.

The consistency of the GMM estimator depends on the validity of the assumption that the error terms do not exhibit serial correlation and on the validity of the instruments. To address these issues we use two specification tests suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). The first is a Sargan test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. The second test examines the hypothesis that the error term $\varepsilon_{i,t}$ is not serially correlated. We test whether the differenced error term is second-order serially correlated (by construction, the differenced error term is probably first-order serially correlated even if the original error term is not). Failure to reject the null hypotheses of both tests gives support to our model.

Both the difference and the system estimator present certain problems when applied to samples with a small number of cross-sectional units. As shown by Arrellano and Bond (1991) and Blundell and Bond (1998), the asymptotic standard errors for the two-step estimators are biased downwards. The one-step estimator, however, is asymptotically inefficient relative to the two-step estimator, even in the case of homoskedastic error terms. Thus, while the coefficient estimates of the two-step estimator are asymptotically more efficient, the asymptotic inference from the one-step standard errors might be more reliable. This problem is exacerbated when the number of instruments is equal to or larger than the number of cross-sectional units. This biases both the standard errors and the Sargan test downwards and might result in biased asymptotic inference.

We address this problem threefold. First, we consider the first-stage results. While the coefficient estimates are less efficient, the asymptotic standard errors are unbiased. Second, we include a limited number of control variables at a time. Specifically, for the policy conditioning information set, we only include one additional policy variable at the time, rather than including them all at once, as in the usual cross-country growth regressions. This reduces the number of instruments to less than the number of cross-sectional observations. By keeping the instrument set small, we minimize the over-fitting problem and maximize the confidence that one has in the more efficient two-step system estimator.

Third, we use an alternative specification of the instruments employed in the two-step system estimator. Typically, users of the difference and system estimator treat the moment conditions as applying to a particular time period. This provides for a more flexible variance-covariance structure of the moment conditions (Ahn and Schmidt, 1995) because the variance for a given moment condition is not assumed to be the same across time. This approach has the drawback that the number of overidentifying conditions increases dramatically as the number of time periods increases. Consequently, this typical two-step estimator tends to induce over-fitting and potentially biased standard errors. To limit the number of overidentifying conditions, we follow Calderon, Chong and Loayza (2000) and apply each moment condition to all available periods. This reduces the over-fitting bias of the two-step estimator. However, applying this modified estimator reduces the number of periods in our sample by one. While in the standard DPD estimator time dummies and the constant are used as instruments for the second period, this modified estimator does not allow the use of the first and second period. While losing a period, the Calderon, Chong, and Loayza (2000) specification reduces the over-fitting bias and therefore permits the use of a heteroskedasticity-consistent system estimator.

4. The Results

The results in Table 2 show that (i) the development of stock markets and of banks have both a statistically and economically large positive impact on economic growth, and (ii) these results are not due to simultaneity bias, omitted variables or country-specific effects. The p-values in parentheses are from the two-step estimator. The stars in Table 2 indicate the significance of the coefficients on the stock market and bank variables based on the one-step standard errors. Thus, Table 2 indicates the significance of stock market and bank development for both the two-step and one-step estimators.[8]

The Turnover Ratio and Bank Credit both enter significantly (at the one-percent level) and positively in all five regressions using the two-step estimator. The one-step estimator, however, indicates that Bank Credit does not always enter with a p-value below 0.10. Specifically, Bank Credit does not enter significantly when controlling for either trade openness or inflation.[9] However, even with the one-step estimator, the financial indicators always enter jointly significantly. Our specification tests indicate that we cannot reject the null-hypothesis of no second-order serial correlation in the differenced error-term and that our instruments are adequate.

The two-step results in Table 2 are not only statistically, but also economically significant. If Mexico's Turnover Ratio had been at the average of the OECD countries (68%) instead of the actual 36% during the period 1996-98, it would have grown 0.6 percentage points faster per year. Similarly,

[8] None of the other explanatory variables enters significantly in the first-step regressions.
[9] These results are consistent with the findings by Boyd, Levine, and Smith (2000) that inflation exerts a negative impact on financial development.

if its Bank Credit had been at the average of all OECD countries (71%) instead of the actual 16%, it would have grown 0.8 percentage points faster per year.[10] These results suggest that both bank and stock market development have an economically large impact on economic growth.

Since the one-step and two-step estimators provide different conclusions on the independent impact of banks on economic growth, we examine the Calderon, Chong, and Loayza (2000) method for reducing the over-fitting problem of the two-step estimator in order to obtain heteroskedasticity-consistent standard errors. Unlike in Table 2 we only report the significance levels of the two-step estimator in Table 3 because we do not have an over-fitting problem.

Stock market liquidity and bank development each enter the growth regressions significantly in Table 3, except when controlling for trade openness. In the regression controlling for trade openness, Bank Credit enters with a p-value below 0.05, but Turnover is insignificant. Even in this regression, however, they enter jointly significantly. Both bank development and stock market development, however, enter individually significantly in the other four regressions. Overall, these results suggest an independent link between growth and both stock market liquidity (Turnover) and bank development (Bank Credit). The Calderon, Chong and Loayza (2000) adjustment to the standard two-step system estimator produces both consistent standard errors and heteroskedasticity consistent standard errors in the Table 3 results. It does this at the cost of reducing the size the instrumental variable matrix. Since the regressions in Table 3 pass the Sargan and serial correlation tests, this adjusted two-step system estimator seems to offer a particularly useful assessment of the stock market, bank and growth relationship.

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[10] We calculate this by taking the lowest coefficients across the five columns, 0.958 in the case of Turnover Ratio and 0.538 in the case of Bank Credit.

5. Conclusions

In sum, the results strongly reject the notion that overall financial development is unimportant or harmful for economic growth. Using three alternative panel specifications, the data reject the hypothesis that financial development is unrelated to growth. Stock market development and bank development jointly enter all of the growth regressions significantly using alternative conditioning information sets and alternative panel estimators. Thus, after controlling for country-specific effects and potential endogeneity, the data are consistent with theories that emphasize an important positive role for financial development in the process of economic growth.

This paper also assessed the independent impact of both stock market development and bank development on economic growth. In general, we find across different estimation procedures and across different control variables that both stock markets and banks enter the growth regression significantly. For instance, with the traditional two-step system estimator, both stock market liquidity and bank development each enter the growth regressions significantly regardless of the control variables. Similarly, with the Calderon, Chong, and Loayza (2000) two-step alternative estimator that reduces the over-fitting problem of the two-step estimator but obtains heteroskedasticity-consistent standard errors, we find that both stock market liquidity and bank development enter all of the growth regressions significantly except for one. These findings suggest that stock markets provide different financial services from banks, or else mulitcollinearity would produce jointly significant results but would not produce results where both enter the growth regression significantly. However, the one-step system estimator provides a more cautious assessment. In two out of the five specifications, only one financial development indicator enters individually significantly. While we interpret the bulk of the results as suggesting that both markets and banks independently spur economic growth, the one-step results may lead some readers to conclude that overall financial development matters for growth but it is difficult to identify the specific financial institutions associated with economic success.

Econometrically, this paper's findings suggest that it is important to use alternative specifications of the system panel estimator in drawing inferences. The two-step estimator produces heteroskedasticity-consistent standard errors, but may produce standard errors that are biased downwards in small samples. The one-step estimator produces consistent standard errors, but does not yield heteroskedasticity-consistent standard errors, which is important in economic growth regressions. The Calderon, Chong and Loayza (2000) adjustment to the standard two-step system estimator produces both consistent standard errors and heteroskedasticity consistent standard errors, but it does this by reducing the information content of the instrumental variable matrix. In small samples, this adjusted measure seems to offer a reasonable compromise, especially if the system passes the Sargan- and serial correlation tests.

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Table 1: Summary Statistics: 1975-1998

Descriptive Statistics

	Economic Growth	Turnover Ratio	Bank Credit
Mean	1.89	41.54	50.00
Maximum	8.57	340.02	124.38
Minimum	-4.77	1.31	4.13
Std. Dev.	2.23	42.91	28.16
Observations	146	146	146

Correlations

	Economic Growth	Turnover Ratio	Bank Credit
Economic Growth	1		
	(0.001)		
Turnover Ratio	0.38	1	
	(0.001)		
Bank Credit	0.11	0.41	1
	(0.194)	*(0.001)*	

p-values are reported in parentheses

Table 2: Stock Markets, Banks and Growth

Regressors	(1)	(2)	(3)	(4)	(5)
Constant	-0.774	-1.757	-4.095	-1.062	-0.156
	(0.570)	*(0.090)*	*(0.048)*	*(0.265)*	*(0.855)*
Logarithm of initial income per capita	-0.717	-0.350	-0.242	-0.189	-0.384
	(0.008)	*(0.099)*	*(0.291)*	*(0.356)*	*(0.010)*
Average Years of Schooling[2]	-0.388	-1.156	-1.492	-1.297	-1.629
	(0.646)	*(0.111)*	*(0.076)*	*(0.040)*	*(0.013)*
Government Consumption[1]		-0.073			
		(0.868)			
Trade Openness[1]			0.679		
			(0.045)		
Inflation Rate[2]				-0.35	
				(0.257)	
Black Market Premium[2]					0.549
					(0.444)
Bank Credit[1]	1.756***	1.539**	0.977	0.538	1.045*
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
Turnover Ratio[1]	0.958**	1.078***	1.522***	1.667***	1.501***
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
Sargan test[3] (p-value)	0.488	0.602	0.452	0.558	0.656
Serial correlation test[4] (p-value)	0.595	0.456	0.275	0.272	0.335
Wald test for joint significance (p-value)	0.001***	0.001***	0.001***	0.001***	0.001***
Countries	40	40	40	40	40
Observations	146	146	146	146	146
	p-values in parentheses				

[1] In the regression, this variable is included as log(variable)
[2] In the regression, this variable is included as log(1 + variable)
[3] The null hypothesis is that the instruments used are not correlated with the residuals.
[4] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.
*,**,*** indicate significance at the 10%, 5%, and 1% level in the first-stage regression.

Table 3: Stock Markets, Banks and Growth, Alternative GMM Estimator

Regressors	(1)	(2)	(3)	(4)	(5)
Constant	1.898	6.156	4.582	3.113	1.884
	(0.394)	*(0.182)*	*(0.685)*	*(0.189)*	*(0.430)*
Logarithm of initial income per capita	-0.683	0.048	-0.299	-0.619	-0.723
	(0.275)	*(0.945)*	*(0.691)*	*(0.249)*	*(0.239)*
Average Years of Schooling[2]	-3.004	-3.738	-4.08	-3.221	-2.979
	(0.277)	*(0.119)*	*(0.168)*	*(0.157)*	*(0.283)*
Government Consumption[1]		-2.581			
		(0.111)			
Trade Openness[1]			-0.693		
			(0.753)		
Inflation Rate[2]				-1.976	
				(0.079)	
Black Market Premium[2]					-0.069
					(0.966)
Bank Credit[1]	2.202	1.762	2.133	1.954	2.262
	(0.001)	*(0.025)*	*(0.048)*	*(0.003)*	*(0.001)*
Turnover Ratio[1]	0.993	0.944	0.736	0.950	1.058
	(0.012)	*(0.064)*	*(0.172)*	*(0.008)*	*(0.014)*
Sargan test[3] (p-value)	0.448	0.554	0.649	0.698	0.552
Serial correlation test[4] (p-value)	0.558	0.752	0.528	0.422	0.507
Wald test for joint significance (p-value)	0.001	0.002	0.018	0.001	0.001
Countries	40	40	40	40	40
Observations	106	106	106	106	106
	p-values in parentheses				

[1] In the regression, this variable is included as log(variable)

[2] In the regression, this variable is included as log(1 + variable)

[3] The null hypothesis is that the instruments used are not correlated with the residuals.

[4] The null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation.

*,**,*** indicate significance at the 10%, 5%, and 1% level in the first-stage regression.

Table A1: List of Countries

Australia	Greece	Norway
Austria	India	Pakistan
Bangladesh	Indonesia	Peru
Belgium	Israel	Philippines
Brazil	Italy	Portugal
Canada	Jamaica	South Africa
Chile	Japan	Sweden
Colombia	Jordan	Taiwan
Denmark	Korea	Thailand
Egypt	Malaysia	U.S.
Finland	Mexico	Uruguay
France	Netherlands	Venezuela
Germany	New Zealand	Zimbabwe
Great Britain		