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Are Banks and Stock Markets Complements or Substitutes?

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Abstract: We examine the determinants of stock market and bank liquidity in an economy in a SUR framework in which stock market turnover and available bank credit denoting access to long and short term capital respectively are interdependent and the errors are correlated. The SUR results suggest that available bank credit and stock market turnover are inversely related to each other, confirming their substitutability in terms of external financing needed by corporations. Other significant common factors for stock market turnover and available bank credit include stock market growth, legal origin, and whether the stock market is developed or emerging, an indicator of path dependence. These common determinants of stock market and bank liquidity are generally stable over time.

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A. Introduction

The impact of a liquid financial system that includes banks and the stock market as providers of short and long term capital respectively on economic growth is well documented in the “finance and growth” literature (Levine and Zervos, 1998; Beck, Levine, and Loayza, 2003; Williamson, 1994; Rajan and Zingales, 1998).¹ However, the empirical results mostly do not consider the interdependence between banking and stock market activities and the relevance of banks and stock markets in the context of legal and institutional development (path dependence) of different countries. In this paper, we examine and provide evidence on the common determinants of bank credit and stock market turnover as proxies for bank and stock market liquidity in several developed and emerging markets after controlling for their interdependence and the institutional details of the respective economies such as legal origin and stock market development.

There are two reasons for stock market and banking activities to be interdependent. First, existing literature argues that banking and financial intermediation has a positive impact on stock market development and performance (Clayton et al, 2000; Boyd and Prescott, 1986; Diamond, 1984) and also that an efficient capital market improves banking activities through fostering economic growth (Dow and Gorton, 1997; Demirguc-Kunt and Maksimovic, 2003). Empirically, Levine (2001) finds support for a “financial services” view in which banking and stock market activities are complements in achieving economic growth, even though the evidence in Beck et al (2000) suggests

¹ For a comprehensive survey of the literature refer to Levine (1997).

that the growth in stock markets is due to the increasing preference of firms to obtain external financing from the equity markets rather than from banks. This later view dubbed as “corporate finance” view implies banks and stock markets are substitutes and the competition among banks and stock markets in providing external financing to corporations will result in an inverse relation between banking development and stock market turnover. In either case, an argument exists for a simultaneous relation between banking development and stock market turnover and its resultant effect on economic growth.

Second, stock markets and banks are integral components of the financial infrastructure of national economies, which operate under a common institutional framework that includes legal origin and other institutional characteristics like liberalization denoted by growth in stock market, which affect both stock market turnover and banking development.² The effectiveness of banks and intermediaries as monitors depends on the disclosure and shareholder protection laws of countries, which owe their legal origins to English Common or Roman Civil laws (French, German, and Scandinavian). La Porta et al (1998) report that English common law countries are better in protecting creditors’ rights and promoting debt and equity markets relative to countries with civil law traditions. In an inter country study, Levine (1998) reports that certain civil law regimes foster banking development. Eleswarapu and Venkataraman (2003), Jain (2002), and Dey (2005) report that legal origin and stock market microstructure which affect market efficiency also determine stock market turnover.

² Arguably banking sector efficiency is also an integral part of the common institutional efficiency. However, banking sector efficiency is likely to have a more local (certain sectors) than economy wide impact. Further compared to those of stock market efficiency, determinants of banking efficiency are primarily internal e.g., competition in the banking sector.

This research complements the existing literature on the relationship between banking development and stock market turnover and efficiency in several ways. First, we develop a system of equations to account for the interdependence between available bank credit and stock market turnover as measures of bank and stock market liquidity respectively. We estimate the parameters of this system of equations via a SUR model where available bank credit and stock market turnover are simultaneously determined. Other determinants of available bank credit and turnover include stock market growth, legal origin, and whether a stock market is a developed or an emerging market.³ Second, we use a panel data set that covers 32 exchanges from 27 countries over a period of 60-84 months during 1995-2001. We find that available bank credit (turnover) is a significant determinant of turnover (available bank credit) with a consistently negative coefficient in several regression models. We also find stock market growth and whether the stock market is developed or emerging are significant determinants of both turnover and available bank credit and that the estimates are more efficient when we adjust for simultaneity bias. Our results are generally robust regardless of the year and whether Asian countries are included or not.

The paper progresses as follows. Section B contains a brief literature review; Section C presents an empirical methodology to estimate the parameters of the system of equations; and Section D presents the data, sample statistics, and the results from the econometric model for joint determination of stock market turnover and available bank credit availability. Section E concludes.

³ In our regression model, we use $\log(\text{bank credit})$ which measures rate of change in available bank credit availability. This transformation to rate also makes banking development comparable to turnover, which is also a rate or proportion measure. However in the text, we use 'bank credit' and not 'rate of change in available bank credit availability' for convenience of use and also to be consistent with the usage in the existing literature.

B. Literature Review

We provide a brief summary of the existing literature on determinants of stock market turnover and banking development in developed and emerging markets.

Financial institutions provide valuable economic services directly through their risk and information sharing and monitoring roles (Allen and Gale, 2000; Diamond, 1984; Boyd and Prescott, 1986; Bencivenga and Smith, 1991) and also indirectly through lowering cost of transaction in stock markets and thereby increasing the efficiency of stock market (Bencivenga, Smith, and Starr, 1995; Mishkin, 2000).⁴ Dow and Gorton (1997) argue that the stock market provides a similar direct (monitoring) and indirect (information signaling) role vis-à-vis corporate performance that banks use in their forecast of economic growth and hence of future banking activity.

While sufficient research exists on the determinants of bank liquidity and some on the determinants of stock market turnover on inter country levels, there is none on their joint determinants. The primary determinant of bank liquidity is competitive efficiency in the banking sector. Demirguc-Kunt and Maximovic (2003) test the conflicting theories on the relation between bank liquidity and competition on a sample of 74 developed and developing countries. Levine (1998) reports differences in bank liquidity between alternative civil law regimes.

Jain (2002), Dey (2005), Frost et al (2002), and Eleswarapu and Venkatraman (2003) conduct cross sectional and panel data studies on the determinants of stock market

⁴ The existing literature on the effect of banking on stock market activity and economic growth is quite rich and subtle. At the same time there are also sophisticated arguments for how financial markets facilitate growth, and further how growth may cause banking and financial markets development. For the purpose of this paper, we are not concerned about the relative nuances, completeness, and/or validity of those arguments.

turnover.⁵ They find that size and growth as surrogates of financial market liberalization and composition, and legal system as a proxy for shareholder protection, disclosure rules, and corporate governance practices are significant determinants of market turnover. Boutchkova and Megginson (2000), Minier (2000), and Clayton et al (2000) report state initiated privatization (SIP) and macro economic variables, such as GDP growth rate, are important predictors of stock market liquidity and formation.

C. System of Equations and Econometric Modeling

We use an SUR model to simultaneously estimate the parameters of the following system of (parametric) equations:

$$\begin{aligned}
 1. \text{Turnover}_{it} &= \alpha_1 + \sum_{j=1-4} \beta_{1j} X_j + \beta_{15} \text{Trend}_{it} + \beta_{16} \text{Growth}_{it} + \beta_{17} \ln(\text{Bankcredit})_t + \varepsilon_{1t} \\
 2. \ln(\text{Bankcredit})_{it} &= \alpha_2 + \sum_{j=1-4} \beta_{2j} X_j + \beta_{25} \text{Growth}_{it} + \beta_{26} \text{Turnover}_{it} + \varepsilon_{2t} \\
 3. E(\varepsilon_{1t}, \varepsilon_{2t}) &= \sigma_{12} \neq 0
 \end{aligned}$$

The SUR (seemingly unrelated regression) model provides efficient estimates of all the parameters of a system of equations, where the errors are correlated. All the model parameters are simultaneously estimated. The model suggests a linear relation between turnover, stock market growth, and bank credit, where both turnover and available bank credit are dependent on each other after controlling for a deterministic time trend in turnover and changes in the respective means of turnover and available bank

⁵ Liquidity and cost of liquidity are often used interchangeably in the context of securities and market liquidity. While cost of liquidity is generally a price-based measure, liquidity is based on trading volume. A huge literature exists on the determinants of *cost* of liquidity for specific exchanges (e.g., NYSE, NASDAQ, LSE) as well as for individual firms, but significantly less in regard to volume based market liquidity.

credit due to differences in legal and institutional developments. Turnover denotes stock market liquidity, a measure of market activity. Similarly, available bank credit denotes bank liquidity and thus the extent of information about available investment opportunities and monitoring provided by banks.

The foundations for the model are as follows. Available bank credit (stock market turnover) impacts stock market turnover (available bank credit). There is significant theoretical research on the influence of banking activity on stock market turnover (Allen and Gale, 2000; Diamond, 1986; Boyd and Prescott, 1987), which suggests that banking development positively impacts stock market activities through its role of risk and information gathering. Recently, Dow and Gorton (1997) suggest that stock markets perform similar functions, monitoring and providing information, which increases market liquidity that banks use in forecasting economic growth and future banking activities. Empirically, Clayton et al (2000) and Garcia and Liu (1999) find evidence of the impact of banking development on stock market development and market capitalization respectively; and Demirguc-Kunt and Maksimovic (2003) on the impact of market efficiency on banking development. However, to the best of our knowledge, there is no direct empirical evidence of the bilateral relation between banking development and stock market liquidity.

Further bank and stock market liquidity are functions of a set of common variables, e.g., growth in market capitalization, legal origin, and market type (developed vs. emerging stock markets). Dey (2005) shows that growth in stock market capitalization denotes the composition of a market and finds it has more explanatory power than market capitalization (size) itself in determining liquidity. La Porta et al

(1998) determine that stock market growth proxies for liberalization and effective shareholder protection laws in the context of international corporate governance. Country specific disclosure and corporate governance laws are based on a legal tradition, English Common laws or Roman Civil laws, which explains variations in inter exchange liquidity (Dey, 2005) and inter country banking development (Levine, 1998).

D. Data and Empirical Results

D.1. Data

As of the end of 2001, the FIBV⁶ (Federation of International Stock Exchanges) database contains trading and capitalization data on its 55 member-exchanges spanning all the continents. We exclude seven exchanges and for each of the remaining 48 exchanges, we obtain monthly data on market capitalization and dollar value of equity trading for the period 1995 to 2001.⁷ After matching the FIBV stock exchange data with country specific data on ‘credit claims on the private sector’ available from the International Monetary Fund’s *International Financial Statistics* (IFS) the sample contains 2,359 observations from 32 exchanges.⁸ We compute monthly turnover ratio as the value of shares trading in any month over market capitalization at the beginning of that month and growth as percentage change in market value. Due to the use of lagged

⁶ All data from FIBV used in this study are publicly available from FIBV website www.fibv.org.

⁷ We exclude seven exchanges on which data are available only since 1998 or later e.g., CDNEX, Bermuda, Ljubljana, Malta, Valencia, and Colombo, and exchanges that are not primarily stock exchanges e.g., Chicago Mercantile Exchange. The most common reasons are that the exchange did not exist /submit operational data since the beginning of the sample period in 1995 and/or suspended their operations before the end of the sample period in 2001.

⁸ Three US exchanges are excluded because USA reports only quarterly claims data (-84 observations). Imputed data for six observations was used to complete the data for Hong Kong (+6 observations), and the Tehran exchange was dropped due to the difficulty in assigning a legal origin (the official legal origin is Islamic) (-84 observations). A total of 16 exchanges are dropped due to these adjustments.

market capitalization in computing turnover and growth, the final data set contains 2,327 monthly observations from 32 exchanges. Specific sources corresponding to each type of data used in this research are detailed in Table 2.

D. 2. Descriptive Statistics

Table 3 reports means and standard deviations for market capitalization, dollar value of trading, turnover ratio, bank credit, and growth in equity market for each of our sample exchanges and also for the entire sample. Market capitalization denotes size, while dollar trading volume (dollar value of shares traded) and turnover denote liquidity. In terms of size, Tokyo (\$3 billion), Osaka (\$2.5 billion), and London (\$2.04 billion) are the largest stock markets in the sample, while the smallest markets are Vancouver (\$6.5 million), Lima (\$12 million), and New Zealand (\$27 million). The three largest markets are also the most risky markets with standard deviations (of market capitalization) of \$0.6 million, \$0.4 million, and \$0.5 million for Tokyo, Osaka, and London respectively. In terms of dollar trading volume the two most liquid markets are London (\$237 million) and Tokyo (\$108 million); the most illiquid markets are Lima (\$225,000) and Vancouver (\$424,000). However, in terms of turnover, the most liquid markets are South Korea (17%) followed by Istanbul (13%), while the most illiquid markets are Osaka and Montreal both at less than 1.0% (.07%).⁹ Evidently, different measures of liquidity produce different ranking of the subjects, and yet there isn't a consensus measure of market liquidity, although Datar et al (1998) indicate that compared to value of trading volume indicate that turnover is a superior measure of liquidity.

⁹ Note that both in terms of size (market capitalization) and liquidity (turnover) US exchanges NYSE, NASDAQ, and AMEX dominate the world exchanges. This ranking is for non-US exchanges.

For available bank credit, Australia ranks at the top with \$299 million followed by Rio de Janeiro (\$211 million) and Sao Paolo (\$195 million), while Istanbul (\$0.03 million), and the two Japanese exchanges, Osaka and Tokyo (each \$5 million) have the smallest bank credit.¹⁰ While Australia's dependence on available bank credit as shown by its top rank in spite of a relatively active stock market is somewhat surprising, Japan provides a clear example of the trade off between banks and equity markets in terms of external financing (Prowse, 2000). Clearly, available bank credit has a huge cross sectional dispersion as evidenced by the range. Even the time series dispersion of available bank credit as measured by standard deviation for each exchange varies from \$27 million (Australia) to \$0.01 million (Istanbul).

Stock market growth computed as $\left(\frac{\text{market capital}_t}{\text{market capital}_{t-1}} - 1 \right)$ denotes several market characteristics such as size, composition, liberalization, and shareholder protection (La Porta et al 1998, Dey, 2005). Growth for all the exchanges in our sample remains within a tight bound, between 0.99 and 1.03. Thus there is very little cross sectional dispersion in growth in market capitalization.

D.3. Analysis of Dummy Variables

Given the importance of the institutional details on banking development, stock market turnover, and economic growth four dummy variables defined below are used to classify the sample into groups based on legal origin and indicators of stock market efficiency:

¹⁰ Available bank credit is a country level variable and thus all exchanges in a country have the same value for bank credit.

X_1 = Market dummy indicating developed vs. emerging markets
 X_2 = Legal dummy indicating civil vs. common law origin

Detailed definitions of the dummy variables are contained in Table 2. We conduct two pair wise tests of association among the dummy variables: a Pearson correlation and a maximum likelihood chi-square test. Table 4 presents the results. The Pearson correlation tests indicate a significantly negative (at 1% level) linear association between market and legal dummy variables ($\rho=-0.13$) i.e., developed markets are associated with common law countries. This supports prior research findings that there are more developed stock markets in English Common law countries than in Roman Civil law countries due to strong shareholder and creditor rights protection laws in common law countries (Dey, 2005).

The likelihood ratio chi-square tests of association reject the null hypothesis of no-association for all pairs of dummy variables at less than 1% significance level. Since tests of association do not give a relative measure of association, we compute odd ratios for each pair of dummy variables. Odd ratios are comparable across pairs, a relatively higher ratio indicates a stronger pair wise association between the variables. For example, an odds-ratio of 3.14 suggests that an efficient order market is three times likely, but an order market in a developed market is only .40 times likely. Similarly, any association between legal and exchange dummy is 2.93 times likely against only 0.88 times for any association between legal and settlement efficiency.

D.4. Analysis with Dummy Variables

La Porta et al (1998) and Levine (1998) find legal origin to be a significant explanatory variable when examining banking and stock market development. Dey (2005) and Jain (2001) report that market design impact stock market liquidity. In order to determine the impact of all the dummy variables on mean turnover and bank credit, we run the following regression model:

$$9. \text{Turnover}_{it} = a + \sum_{i=1}^4 b_i X_i + e_{it}$$

where X_1 and X_2 are dummy variables as noted above. The model yields expected turnover for different combinations of the dummy variables. For example $E(\text{Turnover}/X_1 = 0, X_2 = 0) = a$ implies mean turnover for an exchange in an emerging market with common law origin and $E(\text{Turnover}/X_1 = 1, X_2 = 1) = (a+b_1+b_2)$ implies mean turnover for an exchange in a developed market with civil law origin. Hypothesis testing of each regression parameter is done by the usual t-test. For example, the null hypothesis $b_1 = 0$ tests if the mean turnover is different between exchanges in civil and common law countries, ceteris paribus. A similar model is run with available bank credit as the dependent variable.¹¹

Table 5A presents the parameter estimates and the corresponding standard error for both regressions. All the parameters except the one associated with legal dummy for turnover are significant at less than 1%. The estimated parameters indicate that mean turnover is not different between exchanges in common and civil law countries (difference in mean 0.002 with standard error 0.002), but higher for emerging than

¹¹ We also run a similar test for mean differences for growth in stock market capitalization. All the parameters are insignificant suggesting mean growth is not different between any two groups of exchanges classified as developed or emerging, order or quote, civil or common law origin, and in order of settlement efficiency. The most surprising part of this finding is that there is no difference between developed and emerging markets in terms of growth.

developed markets. Mean available bank credit is significantly lower (difference in means is -3.011 with standard error 0.145) for civil law countries than that in common law countries, but higher for emerging than developed markets. The means of turnover and available bank credit maybe computed from Table 5A for some exchanges classified by combinations of the dummy variables. For example, mean turnover (bank credit) for an exchange in an emerging market in a country with common law origin is 0.052 (\$8.562 billion). Similarly, mean turnover (bank credit) for an exchange in an emerging market in a country with civil law origin is 0.048 (\$5.551 billion).

D.5. SUR model results for available bank credit and stock market turnover

Pooled Sample Results

We present OLS and SUR estimates of the parameters and their corresponding t-statistics for the pooled sample in Table 6. Models 1 and 1A are OLS models for stock market turnover and available bank credit respectively; Models 2 and 2A are the corresponding SUR models. The following are some of the highlights from Table 6.

In terms of overall model significance (F-stat not reported) all OLS and SUR models for both turnover and available bank credit are significant at 1% level. Comparing the t-statistics associated with the parameter estimates in the OLS (Models 1 and 2) and SUR models (Models 1A and 2A), it is evident that the SUR estimates are more efficient than their OLS counterparts resulting in a higher system wide R^2 of 34% in the SUR model against 16% and 29% for turnover and available bank credit in the OLS models. In fact, all the parameters of SUR models are significant at 1% level; in the OLS models, all parameters except growth in the model for available bank credit are

significant at 1% level. The signs associated with all the parameters are consistent across both OLS and SUR models and hence we discuss the implication of the parameter estimates of only the SUR model in the next paragraph.

We verify the interdependence between stock market turnover and available bank credit. Available bank credit and turnover are significant determinants of turnover and available bank credit respectively with parameter estimates (t-stat) of -0.55 (-21.93) and -33.55 (-21.71) respectively. This inverse relation between stock market turnover and available bank credit contradicts the findings of Demirgüç-Kunt and Levine (1996b), Levine and Zervos (1998), and Garcia and Liu (1999) who report that stock market and financial intermediary developments are positively correlated. The inverse relation is contrary to the “financial services” perspective based on complementarities of banking and stock markets activities (Levine, 2001), but supports claim by Beck et al (2003) that banking and stock market activities are substitutes.

In terms of other parameters of the model, both turnover and available bank credit are directly related to stock market growth with estimated parameters (t-stats) 10.72 (11.99) and 3.89 (5.12) respectively for SUR models. Thus stock market growth fosters not only stock market turnover, but also promotes banking activity. La Porta et al (1998) argue that growth is a proxy for market liberalization. Dey (2005) shows how growth may also indicate the composition of the market. The significant dummy variables in Models 1A and 2A suggest that mean turnover (bank credit) is lower for developed markets, for civil law countries, for order (quote) markets, and for high efficiency i.e., lower settlement period exchanges. Note that mean turnover has previously been found not to be different between exchanges in civil and common law countries (Table 5A).

The similarities in the signs of all the coefficients for both turnover and available bank credit indicate that these factors affect banks and stock markets in a similar way. Hence the inverse relation between turnover and available bank credit is not due to supply factors, but related to competitive nature of their product market as held by the “corporate finance” view. We find evidence of a significantly (at 1%) positive deterministic time trend of 0.025 for turnover in support of similar findings in Dey (2005).¹²

Overall the results from the individual regression on turnover support similar findings by Dey (2005), and on available bank credit by Maksimovic (2001) and Levine (1998). Further the regression results also support our hypotheses of interdependence between stock turnover and bank credit, and common factors determining turnover and bank credit. Stock market turnover measured by turnover, and banking development measured by rate of change in available bank credit are inversely related to each other. Further both turnover and available bank credit share a set of common determinants i.e., the same variables that determine stock market turnover also determine bank credit, which proxies for banking activities such as information gathering and monitoring. Stock market growth, legal origin, whether a stock market is developed or emerging are individually significant in all models and are not subsumed by each other.

Yearly regression results

We test the stability of the regression estimates and the impact that financial integration may bear on those estimates by running a cross sectional regression for each

¹² We test for a time trend in available bank credit too, which turns out to be insignificant. This is expected since we use log (bank credit) as the dependent variable, which denotes rate of change and thus does not contain any time trend.

year. To conserve space, we report only SUR estimates of the parameters from the yearly samples in Tables 7A-7D.

Table 7A contains the regression coefficients and the corresponding t-statistics from the yearly samples of all countries for turnover. Table 7A indicate that stock market growth (positive) and available bank credit (negative) are significant and consistent determinants of turnover in every year. The legal dummy is significant for every year in Table 7A. However, market dummy is insignificant in 2000-'01 in both the full and non-Asian samples, which points to increased liberalization and increased financial integration through foreign direct investment and portfolio flows (Bekaert and Harvey, 2003).

Table 7B contains yearly regression coefficients for the entire sample which indicates that while growth is not a consistent determinant of bank credit, turnover (negative) is.

The principal findings of the yearly regression results for the sample are as follows: First, although we do not specifically test for differences in the parameter estimates for each year, we find in Tables 7A-7B, most estimates are significant at 10% level, and also within 95% prediction intervals of the estimates reported in Table 6. Nevertheless, some parameter estimates are not stable over time, which lend support to Harvey (1995) regarding time variability of risk characteristics of international markets.

Second, contrary to the suggestion of Levine (2001) and Zhu (2004) we do not find any evidence of Asian exchanges bias in the parameter estimates. However, the goodness of model fit given by R^2 is consistently the lowest for 1997, the year of Asian financial crisis in all the tables. We conclude that the poor model fit (28%) in the full

sample is due to the large cross sectional variation caused by the Asian exchanges; however, in the sample excluding Asian exchanges, the low model fit (54%) in 1997 maybe due to the contagion effect of the Asian financial crisis. The Asian exchanges/countries are also more segmented than the non-Asian countries in our sample. This explains the overall difference between the full sample and non-Asian sample regression results. In the non-Asian sample, the financial sector integration shown by the insignificant difference between emerging and developed markets during 2000-01 is clear; however it is not so in the full sample. Bekaert and Harvey (2003) note this issue of regional vs. global integration.

Finally, turnover and available bank credit are significant determinants of each other regardless of the time period or the exclusion of Asian countries. These results suggest that available bank credit and turnover are substitutes and contradicts the results of Levine (2001) and Garcia and Liu (1999).

E. Conclusion

We investigate the common determinants of stock market turnover and available bank credit in global economies. We recognize that stock market turnover and available bank credit are not independent and thus estimate the parameters of a SUR model for both stock market turnover and bank credit. We find evidence that stock market turnover and available bank credit are inversely related to each other in support of “corporate finance” perspective of financial system. We also find evidence of three common determinants of stock market turnover and available bank credit- stock market growth, legal origin, and whether the domestic stock market is developed or emerging. The common determinants suggest path dependence for stock market and banking activities.

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Table 2: Data definitions and sources.

IMF/IFS refers to the International Monetary Fund's *International Financial Statistics*. FIBV refers to the Federation of International Stock Exchanges.

Variable	Description	Source	Frequency	Units
Market capitalization	Outstanding shares*price	FIBV	Monthly, 1995-2001	US\$
Dollar value of equity trades	Trading volume*price	FIBV	Monthly, 1995-2001	US\$
Bank credit	Private credit by banks	IMF/IFS	Monthly, 1995-2001	US\$
Turnover	Dollar value of trades _t /market capitalization _{t-1}	Computed	Monthly, 1995-2001	Ratio – number
Growth	% change in market capitalization	Computed	Monthly, 1995-2001	Per cent – number
Legal dummy	0 if common law origin, 1 if civil law origin	Frost et al (2002)	Constant	Number
Market dummy	0 if emerging, 1 if developed	Frost et al (2002)	Constant	Number

Table 3: Descriptive Statistics by Exchange and for all exchanges

All values are in U.S. dollars.

EXCHANGE		TURNOVER	MARKET GROWTH	BANK CREDIT	MARKET VALUE	TRADING VALUE
Australia	Mean	0.0460	1.0116	298,977.10	351,150.74	15,554.20
	Std. Dev.	0.0118	0.0991	27,919.07	108,521.79	4,646.97
Barcelona	Mean	0.0081	1.0187	436.10	281,109.82	2,408.73
	Std. Dev.	0.0034	0.0487	32.49	117,919.77	1,559.02
Bilbao	Mean	0.0485	1.0159	436.10	284,619.56	14,202.14
	Std. Dev.	0.0209	0.0510	32.49	102,471.97	8,345.17
Brussels	Mean	0.0224	1.0127	195.78	147,088.63	3,357.74
	Std. Dev.	0.0055	0.0580	11.71	42,542.79	1,574.39
Buenos Aries	Mean	0.0423	1.0038	61,633.98	46,138.71	1,866.57
	Std. Dev.	0.0273	0.0918	7,826.57	9,432.61	1,065.14
Hong Kong	Mean	0.0469	1.0132	259.52	438,343.22	21,068.82
	Std. Dev.	0.0203	0.0885	24.12	123,048.26	12,755.57
Istanbul	Mean	0.1318	1.0266	0.03	49,661.72	6,547.39
	Std. Dev.	0.0523	0.1829	0.01	25,410.88	4,696.49
Jakarta	Mean	0.0362	1.0075	69.28	47,735.57	1,723.50
	Std. Dev.	0.0148	0.1797	38.22	25,917.43	1,174.64
Johannesburg	Mean	0.0204	0.9985	85,712.34	227,642.78	4,367.16
	Std. Dev.	0.0104	0.0826	4,528.91	37,645.02	1,989.24
S. Korea	Mean	0.1693	1.0132	312.50	163,464.42	27,965.18
	Std. Dev.	0.0994	0.1605	59.94	60,369.71	21,754.68
Kuala Lumpur	Mean	0.0336	1.0036	121,746.40	167,009.71	6,383.84
	Std. Dev.	0.0206	0.1290	16,161.90	76,195.28	5,732.45
Lima	Mean	0.0178	0.9964	13,596.05	12,008.67	225.19
	Std. Dev.	0.0105	0.0520	836.12	2,392.14	140.52
Lisbon	Mean	0.0596	1.0129	89.72	52,993.66	3,186.01
	Std. Dev.	0.0200	0.0789	11.23	12,891.01	1,440.01
London	Mean	0.1119	1.0083	1,614.66	2,039,303.26	237,352.81
	Std. Dev.	0.0345	0.0403	229.89	511,569.78	116,055.78
Madrid	Mean	0.0775	1.0151	436.10	333,706.67	30,623.42
	Std. Dev.	0.0646	0.0560	32.49	113,745.68	31,998.73
Mexico	Mean	0.0307	1.0071	89,230.79	120,352.10	3,754.50
	Std. Dev.	0.0200	0.0927	11,919.57	22,541.02	2,990.41
Montreal	Mean	0.0074	1.0209	392.55	426,641.58	2,933.50
	Std. Dev.	0.0024	0.0900	37.27	115,654.81	766.31
New Zealand	Mean	0.0371	0.9968	59,201.64	27,329.06	950.03
	Std. Dev.	0.0153	0.0633	5,004.38	6,515.08	336.23
Osaka	Mean	0.0076	1.0004	5.06	2,506,701.15	18,980.69
	Std. Dev.	0.0065	0.0530	0.52	424,365.89	16,601.39
Oslo	Mean	0.0716	1.0111	98.36	56,805.02	4,073.19
	Std. Dev.	0.0237	0.0870	11.36	9,755.30	1,631.62
Philippines	Mean	0.0256	0.9907	32.27	44,019.93	1,213.95
	Std. Dev.	0.0126	0.1161	5.38	20,904.89	813.22
Rio de Janeiro	Mean	0.0076	1.0122	211,652.38	194,914.76	1,563.35
	Std. Dev.	0.0119	0.1130	25,324.79	53,442.89	2,680.20

Table 3: Descriptive Statistics by Exchange and for all exchanges (continued)

All values are in U.S. dollars.

EXCHANGE		TURNOVER	MARKET GROWTH	BANK CREDIT	MARKET VALUE	TRADING VALUE
Santiago	Mean	0.0086	0.9997	41.16	66,119.89	579.47
	Std. Dev.	0.0052	0.0629	5.05	9,242.07	343.95
Sao Paolo	Mean	0.0436	1.0071	195,124.74	200,933.79	8,889.26
	Std. Dev.	0.0140	0.0954	34,642.23	45,998.58	4,235.35
Singapore	Mean	0.0478	1.0025	86,851.20	133,977.94	6,268.46
	Std. Dev.	0.0199	0.0871	7,647.16	27,005.37	2,618.77
Stockholm	Mean	0.0785	1.0117	92.97	266,129.34	21,676.63
	Std. Dev.	0.0294	0.0880	6.95	80,592.23	11,923.72
Switzerland	Mean	0.0838	1.0087	447.05	553,721.56	45,378.12
	Std. Dev.	0.0170	0.0508	41.99	137,136.33	12,121.59
Tel Aviv	Mean	0.0269	1.0095	75,581.06	48,322.26	1,329.23
	Std. Dev.	0.0088	0.0709	14,138.69	13,101.00	687.02
Thailand	Mean	0.0524	0.9953	138.51	67,039.48	3,003.68
	Std. Dev.	0.0314	0.1376	28.98	44,497.96	1,922.59
Tokyo	Mean	0.0345	0.9973	5.06	3,099,154.15	108,640.20
	Std. Dev.	0.0133	0.0666	0.52	631,508.07	55,029.39
Toronto	Mean	0.0499	1.0105	415.23	571,738.30	29,325.98
	Std. Dev.	0.0102	0.0599	48.05	162,221.20	13,214.73
Vancouver	Mean	0.0643	1.0076	391.02	6,506.50	424.04
	Std. Dev.	0.0275	0.1105	36.96	2,048.03	243.85
Total	Mean	0.0486	1.0081	7.01	433196.67	21010.05
	Std. Dev.	0.0460	0.0984	3.95	782493.07	53057.89

Table 4: Tests of Association Between Dummy Variables Used in the Analysis.

Results of three tests of association among the the dummy variables indicating whether the stock market is developed or emerging (developed=1) and legal origin (civil=1). Designations of developed vs. emerging and civil vs. common are based on Frost et al. (2002).

	Civil/Common	Test
Developed/ Emerging	-0.126*	Pearson Correlation
	37.411*	Likelihood Ratio Chi ²
	0.603	Odds-Ratio

* Indicates significance at 1% level.

Table 5A: Parameter Estimates and Corresponding Standard Errors for Regression Models with Dummy Variables

$$Turnover_{it} = a + \sum_{i=1}^4 b_i X_i + e_{it}$$

$$Ln(Bankcredit)_{it} = a + \sum_{i=1}^4 b_i X_i + e_{it}$$

where, X₁= Market dummy (developed vs. emerging) and X₂= Legal dummy (English common vs. Roman civil)

	Turnover		Bank Credit	
	Estimate	Std. Error	Estimate	Std. error
Intercept	0.052*	0.002	8.562*	0.142
Civil/Common	0.002	0.002	-3.011*	0.145
Developed/Emerging	-0.006*	0.002	-1.641*	0.149

* Significant at less than 1%.

Table 6: OLS and SUR Regression Estimates.

The estimates use pooled data for 32 exchanges, which have between 40 and 84 monthly observations during the sample period. The estimated parameters and the corresponding t-statistics are for the following models.

$$Turnover_{it} = \alpha_1 + \sum \beta_{1j} X_j + \beta_{15} Trend_{it} + \beta_{16} Growth_{it} + \beta_{17} \ln(Bankcredit)_t + \varepsilon_{1t}$$

$$\ln(Bankcredit)_{it} = \alpha_2 + \sum_{j=1-2} \beta_{2j} X_j + \beta_{25} Growth_{it} + \beta_{26} Turnover_{it} + \varepsilon_{2t}$$

$$E(\varepsilon_{1t} \varepsilon_{2t}) = \sigma_{12} \neq 0$$

The dummy variables in the regression model above include market (emerging vs. developed) dummy and legal (common vs. civil) dummy.

	Model 1	Model 2	Model 1A	Model 2a
	Turnover-OLS	Turnover-SUR	Bank – OLS	Bank-SUR
Intercept	-4.729 (-4.90)*	-2.150 (-2.23)*	8.429 (11.60)*	7.498 (10.32)*
Time trend	0.028 (-7.35)*	0.025 (6.82)*		
Growth	11.071 (12.45)*	10.806 (12.15)*	1.048 (1.45)	2.783 (3.84)*
Market dummy	-0.919 (-4.84)*	-1.355 (-7.15)*	-1.746 (-11.97)*	-1.844 (-12.64)*
Legal dummy	-0.648 (-3.32)*	-1.428 (-7.35)*	-2.985 (-21.08)*	-2.964 (-20.93)*
Log (Bank claim)	-0.290 (-11.35)*	-0.546 (-21.93)*		
Stock Turnover			-17.821 (-11.25)*	-33.554 (-21.71)*
Nos. of observations	2326	2326	2326	2326
Adj./System R ²	0.163	0.342	0.289	0.342

* indicates significance at 1% level.

Table 7A: SUR Regression Estimates for Stock Market Turnover- All Countries.

The estimated parameters and the corresponding t-statistics are for the model described in Table 6. The estimates are for pooled data for 32 exchanges, which have between 50 and 84 monthly observations during the sample period.

	1995	1996	1997	1998	1999	2000	2001
Intercept	1.449 (0.49)	-5.623 (2.20)**	0.152 (0.09)	-2.066 (1.28)	-0.967 (0.29)	5.711 (1.69)***	-2.107 (0.62)
Growth	8.782 (3.12)*	12.974 (5.24)*	7.264 (4.24)*	10.756 (7.38)*	12.258 (4.23)*	6.937 (2.07)**	14.620 (4.48)*
Market Dummy	-2.940 (6.98)*	-1.422 (4.17)*	-1.397 (4.30)*	-1.745 (4.03)*	-2.172 (2.89)*	0.137 (0.23)	0.110 (0.17)
Legal Dummy	-1.600 (3.90)*	-1.317 (3.83)*	-0.875 (2.63)*	-0.673 (1.49)	-1.244 (1.65)***	-3.039 (5.11)*	-3.235 (4.80)*
Bank Credit	-0.741 (13.99)*	-0.397 (8.71)*	-0.298 (6.69)*	-0.413 (6.83)*	-0.649 (6.83)*	-0.748 (10.76)*	-0.754 (9.71)*
Observations	319	359	382	381	322	288	276
System R²	0.565	0.377	0.279	0.312	0.316	0.432	0.416

Table 7B: SUR Regression Estimates for Bank Credit- All Countries.

The estimated parameters and the corresponding t-statistics are for the model described in Table 6. The estimates are for pooled data for 32 exchanges, which have between 50 and 84 monthly observations during the sample period.

	1995	1996	1997	1998	1999	2000	2001
Intercept	7.521 (2.86)*	4.043 (1.44)	6.785 (3.58)*	8.059 (6.38)*	9.117 (5.10)*	7.855 (3.07)*	5.235 (2.19)**
Growth	3.343 (1.28)	6.307 (2.25)**	3.779 (1.94)***	2.054 (1.60)	0.452 (0.27)	3.422 (1.32)	5.688 (2.38)**
Market Dummy	-3.290 (9.09)*	-2.732 (7.74)*	-2.155 (6.10)*	-1.899 (5.43)*	-1.449 (3.43)*	-0.528 (1.18)	-0.324 (0.70)
Legal Dummy	-2.625 (7.61)*	-3.287 (9.67)*	-2.870 (8.41)*	-2.676 (7.77)*	-2.628 (6.59)*	-3.408 (7.98)*	-3.671 (8.31)*
Stock Turnover	-61.225 (13.99)*	-47.873 (8.71)*	-37.036 (6.69)*	-27.895 (6.83)*	-20.756 (6.83)*	-44.007 (10.76)*	-38.200 (9.71)*
Observations	319	359	382	381	322	288	276
System R²	0.565	0.377	0.279	0.312	0.316	0.432	0.416

For Tables 7A-7B, *, **, *** denote significant at 1%; 5%, and 10% levels respectively