A new measure of financial development: Theory leads measurement

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ABSTRACT

This study presents a new measure of financial development that is directly derived from theory. Our measure, the Marginal Utilization of Debt (hereafter, *MUD*) comes from the seminal work of Myers (1984), Myers and Majluf (1984) and Shyam-Sunder and Myers (1999). Further, it is directly related to the development facts of Gurley and Shaw (1955). *MUD* is a *global measure* that reflects conditions in both debt and equity markets. It varies enormously across nations; from 0.23 in Australia at one extreme to 0.96 in Turkey at the other. Cross-country variations in *MUD* are not random; they are related to special-purpose measures of debt and equity market advancement from the financial development literature. Richer, more advanced nations have smaller average *MUD*s. We argue that the *MUD* may be useful for a variety of purposes and provide three example applications.

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1. Introduction

We present a new measure of financial development, the Marginal Utilization of Debt (hereafter, *MUD*). This measure is directly derived from theory, has many applications, and has some unique attributes. It is beautifully consistent with the Gurley and Shaw (1955) development facts, and can turn discrete indicators into continuous variables. A noted empirical researcher in financial development, Ross Levine, points out "…… one problem plaguing the entire study of finance and growth pertains to the proxies for financial development. Theory suggests that financial systems influence growth by easing information and transactions costs and thereby improving resource mobilization, and financial exchanges. Too frequently empirical measures of financial development do not directly measure these financial functions." (Levine, 2005, p. 922). Our work seeks directly to fill the void noted by Levine (2005), and focuses on the role of information and transaction costs in financial markets.

In the financial market development literature, cross-country differences in the size of banks, the size and trading volume of stock markets as a share of GDP, stock market turnover and number of listed companies have been widely used as measures of financial market development and efficiency. However, these variables are based on aggregate country-level data and may not adequately use all available information, especially the information in widely available cross-country micro data sets. There are also development indicators and

surveys compiled by a number of institutions such as the IMF, The World Bank and various independent research centers. These measures are frequently subjective, and limited in scope.

In fairness, however, it should be noted that there do exist other theory-based financial development indicators. In particular, there have been a number of efforts to use asset pricing models to capture cross-country risks and financial market development. The works of Bekaert and Harvey (2003), Demirgüç-Kunt and Levine (1995), Ferson and Harvey (1993), Harvey and Zhou (1993), Korajczyk (1999), Korajczyk and Viallet (1989), and Levine and Zervos (1998), and others are notable in developing and applying international CAPM and international APT models. However, the weaknesses of these measures have been widely discussed in the literature. For example, in a perfectly integrated market, we should observe alpha = 0. However, a failure to reject alpha = 0 means either the market is not integrated or, more problematically, the underlying model is mis-specified. In addition to violations of the underlying CAPM assumptions and the difficulty of finding an appropriate benchmark portfolio,[1] these measures are not particularly useful in developing countries with non-functioning equity markets. In comparison, our *MUD* estimates use all available firm-level data and can be updated or calculated for any country or time period where data are available.

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[1] "One shortcoming with this measure is that as a country becomes more integrated internationally, the relevant benchmark portfolio shifts away from being a benchmark of domestic assets. The relevant benchmark becomes more "internationalized." Thus, domestic risk mis-pricing as measured by CAPM may rise even as the stock market becomes more integrated and efficient."—Demirgüç-Kunt and Levine (1995).

Table 1
Sample characteristics. Country development, average market capitalization, assets, sales, and net income of firms in the sample of non-financial and non-utility public companies over the sample period 1981 to 2005. Data reflect only companies that report debt-issuing activities. All numbers are in thousands of US Dollars.

Country	Level of development (income)	Market cap	Total assets	Sales	Net income	Number of companies
Argentina	Upper Middle	1,134,443	1,278,602	655,793	42,461	58
Australia	High	318,205	366,677	341,512	14,898	1397
Austria	High	466,085	1,061,691	911,136	29,002	99
Belgium	High	996,957	1,725,988	1,949,517	52,684	124
Brazil	Lower Middle	983,979	2,280,781	1,037,135	65,055	214
Canada	High	671,980	836,350	665,253	22,193	1247
Chile	Upper Middle	585,296	697,761	413,354	35,119	87
China	Lower Middle	464,304	532,415	347,695	22,513	462
Colombia	Lower Middle	594,048	444,514	230,216	15,647	33
Denmark	High	507,783	496,949	516,576	26,960	183
Finland	High	771,134	1,254,382	1,216,864	49,164	236
France	High	1,324,892	2,655,984	2,284,238	56,617	1054
Germany	High	1,932,312	3,638,357	3,719,658	81,308	749
Greece	High	930,697	906,113	616,978	35,417	94
Hong Kong	High	389,261	573,105	283,149	22,272	914
Hungary	Upper Middle	422,176	451,200	385,341	26,214	32
India	Low	411,155	420,310	340,760	25,188	490
Indonesia	Lower Middle	192,770	259,493	154,960	7954	255
Israel	High	609,183	865,038	462,340	12,901	135
Italy	High	1,361,512	3,252,962	2,034,208	45,699	340
Japan	High	1,989,018	3,680,689	3,724,613	46,191	1776
Korea	High	266,447	1,044,010	996,680	12,741	669
Malaysia	Upper Middle	211,819	273,200	155,061	9951	815
Mexico	Upper Middle	1,439,053	1,739,613	1,151,512	82,839	137
Netherlands	High	2,920,330	2,785,409	3,090,415	140,997	328
New Zealand	High	462,280	757,672	507,797	29,342	103
Norway	High	434,360	844,744	698,690	24,773	221
Pakistan	Low	101,440	122,655	127,753	10,005	107
Peru	Lower Middle	264,294	271,247	144,489	14,682	43
Philippines	Lower Middle	193,994	259,172	128,914	8044	148
Poland	Upper Middle	277,485	325,372	312,661	12,132	89
Portugal	High	550,910	740,325	476,431	22,229	95
Russia	Upper Middle	4,321,914	7,267,307	3,390,559	540,609	40
Singapore	High	285,230	356,975	205,591	13,914	594
South Africa	Upper Middle	551,764	565,815	661,720	40,561	336
Spain	High	1,893,679	2,343,311	1,599,872	83,468	157
Sweden	High	1,090,359	1,428,035	1,356,171	54,344	307
Switzerland	High	3,248,727	2,642,422	2,061,472	145,298	237
Thailand	Lower Middle	177,904	245,027	145,755	6701	421
Turkey	Upper Middle	379,573	361,479	479,047	20,988	168
UK	High	716,277	714,834	708,717	34,879	2809
US	High	1,037,982	970,680	938,456	31,342	18,662

1.1. Theory and its application here

In essence, the *MUD* is the slope coefficient obtained by regressing new debt issuance against firms' total needs for external financing in a micro dataset. This provides an estimate of how much debt (equity) firms are using in their on-going financing. The theoretical under-pinning for this approach comes from a large corporate finance literature (Myers, 1984; Myers and Majluf, 1984; Shyam-Sunder and Myers, 1999) that will be discussed in the following section. It is important to note exactly what *MUD* represents: it is the actual, marginal utilization of debt in firms' periodic external fund raising. As such, it is a "revealed-preferred" measure that reflects what firms are actually doing in practice and at the margin. A high (low) *MUD* means that they mostly employ debt (equity) for such periodic adjustments. Balance sheet data do not work for this purpose. Development scholars have studied the balance sheet data and found that developing countries have more debt than developed (Booth et al., 2001). However, there is a problem. Consider two firms that both have debt/assets balance sheet ratios of 0.5. It is possible that one was founded last year, and accessed external equity markets for half its total funding. The other could have built up 50% equity over as long period by retaining earnings. From a development finance perspective the two are hardly equivalent. But based on balance sheet levels (or any aggregates thereof) one can never distinguish between the two. *MUD* can and does distinguish, and

this is important. By using a large, panel dataset including 42 countries, we can examine the effect of variations in financial arrangements across countries. As we shall see these effects can be substantial so that, for example, the average *MUD* in Australia is estimated to be 0.23 and in Turkey 0.96.[2]

1.2. Empirical findings and example applications

First, we show that there is a robust relationship between economic development (represented by real per capita GDP in US dollars) and *MUD*. High (low) economic development is associated with small (large) *MUD*s. Next, we show that across nations *MUD*s are significantly related to widely employed market-specific measures of debt and equity market development.[3] Countries with well-developed debt (equity) markets exhibit systematically higher

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[2] There have been some attempts to study the capital structure implications of the pecking order theory in individual or a small group of non-US countries, such as, Adedeji (2001), Beattie et al. (2006), and Ozkan (2001) in UK; Bontempi (2002) in Italy; Brounen et al. (2006) and Gaud et al. (2007) in Europe; Delcoure (forthcoming) in Central and Eastern European Countries; DeMiguel and Pindado (2001) in Spain; Drobetz and Fix (2003) in Switzerland; Chen (2004) and Zou and Xiao (2006) in China; Booth et al. (2001) in ten emerging countries; etc. However, none of these studies looks at a broad sample of nations as is done here and none uses *MUD*.

[3] These existing measures are not global measures—they are market specific measures. Some represent debt markets and others represent equity markets.