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Financial Markets and the Allocation of Capital

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Financial markets appear to improve the allocation of capital – across 65 countries, those with developed financial markets increase investment more in growing industries, and decrease investment more in declining industries, than financially undeveloped countries. The efficiency of capital allocation is also negatively correlated with the extent of state ownership in the economy, and positively correlated with the degree of firm-specific movement in domestic stock returns and the legal protection of investors (which appears to be particularly useful for limiting investment in declining industries).

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> *Political economists say that capital sets towards the most profitable trades, and that it rapidly leaves the less profitable non-paying trades. But in ordinary countries this is a slow process. . . . In England, however, . . . capital runs as surely and instantly where it is most wanted, and where there is most to be made of it, as water runs to find its level.*
>
> - Bagehot (1873), as quoted by Levine (1997)

I. Introduction

A fundamental job of the economy is to allocate its scarce capital efficiently. Capital is supposed to be invested in sectors expected to have high returns, and withdrawn from sectors with poor prospects.

Economists have long suspected that formal financial markets and associated institutions improve the capital allocation process, and thus contribute to economic growth. One popular theory is that efficient secondary market prices help investors identify good investments from bad ones through a mechanism like Tobin's Q. Another is that lenders and intermediaries screen out bad projects [Schumpeter (1912) and Diamond (1984)]. Agency theories argue that pressure from external investors, or managerial ownership, encourages managers to pursue value-maximizing investment policies [Jensen (1986)]; in turn, effective laws against misuse of minority investors' funds are a key determinant of their supply of finance to good projects [La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997)].

Despite this body of theory, there is little direct evidence that financial markets actually do improve the allocation of capital – or, if they do, what mechanisms are at work. This paper takes a step toward filling the gap. The basic data set is a 65-country, 28-manufacturing industry, 33-year panel of gross capital formation (investment) and

value added (sales minus cost of intermediate goods). The main result is that financial markets – as measured by the size of the domestic stock and credit markets relative to GDP – do appear to be associated with a better allocation of capital. Financially developed countries increase investment more in their growing industries, and decrease investment more in their declining industries. Thus, although financially developed countries may not invest at a higher *level* [Carlin and Mayer (1998) and Beck, Levine, and Loayza (1999)], they do seem to *allocate* their investment better.

For example, the elasticity of industry investment to value added is several times higher in Germany, Japan, the United Kingdom, and the United States, than in financially undeveloped countries such as Bangladesh, India, Panama, and Turkey. Put differently again, relative to countries with large financial markets, other countries both overinvest in their declining industries and underinvest in their growing industries. Since value added growth is reliably positively correlated with Q (which, unfortunately, cannot be constructed in a consistent way for a wide range of countries and industries), this result suggests that financial development helps a country take better advantage of its investment opportunities. This means that financial markets may do a lot more than just provide a sideshow to the real economy; instead, they may contribute to a fundamental allocative function.

As mentioned above, there are several theoretical reasons to expect this conclusion. The paper attempts to shed light on which features associated with financial development are important for capital allocation. There are three main findings. First, countries with stock markets that impound more firm-specific information into individual stock prices – in other words, those that have less stock price "synchronicity" as

measured by Morck, Yeung, and Yu (1999) – do exhibit a better allocation of capital, at least according to the measure used in this paper. This is consistent with the suggestion (by Morck et al. and many others) that informationally efficient secondary market prices help investors and managers distinguish good investments from bad ones.

Second, state ownership is associated with relatively poor capital allocation. Countries with extensive state ownership in the economy do not increase investment much in growing industries, and do not decrease it much in declining industries. This is consistent with the experience of socialist and government-dominated systems of allocating capital, and provides indirect evidence for Shleifer's (1998) view that "elimination of politically motivated resource allocation [in favor of market allocation] has unquestionably been the principal benefit of privatization around the world."

Third, strong minority investor rights, as measured by La Porta et al. (1998), are associated with better capital allocation. It appears that the allocational benefit of investor rights comes mainly through limiting overinvestment in declining industries as opposed to improving the supply of finance to growing industries. This suggests a straightforward application of Jensen's (1986) free cash flow theory. To the extent that agency problems are more severe when minority investor rights are weak, we might expect them to be manifest in overinvestment in declining industries. That theory is consistent with the evidence.

This paper complements an emerging literature that studies the relationship between finance and economic growth. At the country level, King and Levine (1993), Levine (1998), Levine and Zervos (1998), and Beck, Levine, and Loayza (1999) make an empirical case that financial development causes growth. At the industry level, Rajan and

Zingales (1998) show that industries that are externally financed in the United States – arguably, industries with a technological need for external finance, perhaps to reach an efficient scale – grow faster in financially developed countries. At the U.S. state level, Jayaratne and Strahan (1996) find that economic growth increases in states that relax intrastate bank branching restrictions. At the firm level, Demirguc-Kunt and Maksimovic (1998) use a financial planning model to estimate firms' sustainable growth rates in the absence of external finance, and find that firms in financially developed countries grow faster than the model predicts.

Goldsmith (1969), McKinnon (1973), Shaw (1973), and Greenwood and Jovanovic (1990) conjecture that financial markets improve growth in part because they improve the allocation of capital. Jayaratne and Strahan provide some evidence that their U.S. state-level results reflect improvements in the quality of banks' loan portfolios – i.e., improvements in the allocation of capital. Also, in their cross-country study, Beck, Levine, and Loayza infer that the channel is improved allocational efficiency, as suggested by the fact that financial development (specifically, the banking sector) is not robustly associated with higher capital accumulation. Instead, banking is associated with higher productivity growth, which is how an improvement in the allocation of capital is expressed in their growth accounting framework. This paper gives definition to the finance-growth literature by providing more direct evidence that financial development improves the allocation of capital.

The paper proceeds as follows. Section II motivates and estimates the elasticity of manufacturing industry investment to value added for 65 countries. Section III connects the elasticity estimates to dimensions of financial development. Section IV concludes.

II. Measuring the allocation of capital across countries

A. Prior work

A few authors have attempted to measure the efficiency of capital allocation for a single developing country, with an eye toward assessing changes over time. Gupta and Lensink (1996) summarize studies by Cho (1988) for Korea and Capoglu (undated) for Turkey. Their methodology is to estimate the variance of the expected marginal returns to capital (in some cases, marginal costs of capital) across industries, and compare this variance before and after a financial deregulation event. If the variance falls, it is inferred that the liberalization encouraged flows of capital to equate marginal returns across industries.

While this methodology has the appeal of being grounded in production theory, its power in practice depends on the ability to accurately measure the expected marginal return to capital. Financial economists are acutely aware that how to do this for a single firm, let alone for an entire industry, set of industries, or set of countries, is not uncontroversial. A second difficulty is the lack of data on industry capital stocks. A third is the required inference that any reduction in the dispersion of returns is actually due to improved capital allocation. Shifts in industrial organization, product or factor market shocks, or other types of economic liberalizations are likely to occur near financial liberalizations [Henry (1997)], but they must be ruled out.

B. Data and methodology

Because I am interested in evaluating the allocation of capital across a broad range of financial systems, not just one or two countries, the binding constraint is the availability of comparable international data. The best single source for basic international manufacturing statistics is the United Nations' *General Industrial Statistics* panel (*INDSTAT-3* CD-ROM). Rajan and Zingales (1998) and Carlin and Mayer (1998) also use this data set. It reports gross fixed capital formation, value added, and output for up to 28 ISIC-3 manufacturing industries (approximately SIC-2 level), in several dozen countries, over the period 1963 to 1995. To the CD-ROM data I added approximately 50 country-years of data that were available in recent hard-copy *G.I.S.* volumes. Most countries do not have complete data for all 28 industries and all 33 years.[1]

This data set includes country-industry-year observations of gross fixed capital formation, value added, and output. Unfortunately, the series is not long enough so that one could sum up capital formation to get industry capital stock measures. The consequent lack of capital stock data rules out the prospect of estimating a structural investment equation based on production theory.

Faced with these data constraints, I adopt a simple and transparent methodology. I assume that optimal investment implies increasing investment in industries that are growing rapidly, and decreasing investment in industries that are declining. Since the sum

[1] A few countries do not report data for a very wide range of manufacturing industries. Barbados, Libya, and Swaziland usually report on fewer than ten industries per year. Cameroon and Malawi also report on fewer than ten industries in a significant number of years. This likely reflects a combination of unsuitably aggregated statistics as collected by the country as well as their real lack of industrial diversification.

of value added across all firms in the economy is GDP, and economic growth is typically measured as growth in GDP, growth in industry value added is the natural way to measure industry growth. I use growth in industry gross fixed capital formation to measure growth in investment, since an investment measure net of depreciation is not available.

Table I reports summary statistics for total manufacturing investment, industry log investment growth and industry log value added growth.[2] (Logs reduce skewness.) I study the 65 non-socialist countries that had at least 50 useful industry-year observations, and for which I could find some financial development data (described later).[3] The table indicates the range of years for which data is available in each country. The average manufacturing investment to output ratio is 6.9% (equal-weighted across countries) and is usually under 10% except in certain oil-producing countries that invested very heavily, relative to output, around the time of the oil shocks. Annual industry investment growth averages 3.0% and value added growth averages 5.0% (both weighted by the number of observations). The industry growth series are naturally much more volatile than their aggregated counterparts. Industries in the United States have been the most stable over this period, both in terms of investment growth and value added growth.

[2] Raw data on capital formation and value added were adjusted to current U.S. dollars using the year-average exchange rate reported by the IMF's *International Financial Statistics*. To convert into real dollars, capital formation was deflated by the U. S. capital goods PPI and value added was deflated by the U. S. finished goods PPI (base year 1982 for both series). This procedure implicitly assumes purchasing power parity for capital goods and finished goods. I also used price indexes for capital goods and finished goods from the Penn World Tables (Summers and Heston (1991)] to adjust for deviations from PPP. This did not alter any main results, but reduced sample sizes because price indexes are not available for all countries and years for which I had industry-level data. Therefore I chose the simpler adjustment.

[3] In an effort to reduce the influence of outliers, I exclude observations in which the absolute value of either log investment growth or log value added growth exceeded one – that is, an increase of more than 172%, or a decrease of more than 63%. Also, to focus on economically important industries, I exclude those in which value added was less than 0.1% of the country's total manufacturing value added in that year. (Including these small industries does not alter any results.) These criteria eliminate about 12% of the otherwise available observations.

With this data I estimate the following specification for each country:

$$\ln \frac{I_{ict}}{I_{ict-1}} = a_c + h_c \ln \frac{V_{ict}}{V_{ict-1}} + e_{ict} \qquad (1)$$

where I is gross fixed capital formation, V is value added, i indexes manufacturing industry, c indexes country, and t indexes year. The slope estimate in (1) is an elasticity. It answers the following question: to what extent does country c increase investment in its growing industries, and decrease investment in its declining industries?

Before proceeding to the empirical results, there are a number of remarks to make about this specification. First, is there a traditional way to think about this slope coefficient? Hubbard (1998) discusses a widely used model of firm investment in which "capital adjustment costs" are quadratic, and the response of investment to Q depends inversely on the multiplicative adjustment cost parameter. The intuition is that investment is more responsive to investment opportunities when adjustment costs are low. By analogy, one way to view the country-specific slope coefficients estimated from (1) is that they reflect a general notion of capital adjustment costs. The fact that the slope coefficients turn out to be very strongly related to financial development measures suggests capital market frictions, as opposed to purely technological adjustment costs.

Second, given the assumption that value added growth reflects investment opportunities, it would be nice to verify that value added growth actually is correlated with more traditional measures of investment opportunities. The *WorldScope* database contains enough data on U.S. firms to make a meaningful comparison, at least for the U.S. series. The correlation of industry value added growth with industry Q is .344, with

industry price-earnings ratio is .513, and with industry sales growth is .614.[4] All of these correlations are highly significant. They indicate that value added growth is a reasonable, if imperfect, measure of investment opportunities.[5]

Another potential concern in this regression framework is reverse causality – perhaps investment does not respond to an exogenous change in investment opportunities, but rather causes a contemporaneous improvement in value added. Prior literature has found, however, that fixed capital does not become productive until an average of two years after the investment decision has been made (see Mayer (1960) or Hall (1977) for U.S. evidence on gestation lags). In order for investment to influence value added contemporaneously, fixed capital expenditures would have to become productive immediately.

A related concern is that firms in some countries may be differentially financially constrained, and this could show up as a higher sensitivity of investment to current cash flow, as in Fazzari, Hubbard, and Petersen (1988). But we will see that the pattern of elasticity estimates across countries is inconsistent with this interpretation. One would need to explain why firms in Germany and the United States (which have comparatively high elasticity estimates) are more financially constrained than firms in India and Indonesia, for example. Only the reverse pattern seems plausible.

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[4] Primary SIC codes were used to group U.S. firms in *WorldScope* by ISIC industry, using the U. S. Department of Commerce (1979) SIC to ISIC correspondence. Average values of average Q, the log price-earnings ratio, and log sales growth were then computed across all U.S. firms within that ISIC industry-year. To ensure that the industry-level aggregate is an accurate reflection of broad industry conditions, I include only industries in which at least twenty firms are covered in *WorldScope*. *WorldScope* reports at most ten years of data on any one firm, and does not include inactive firms, so most of the observations are from 1986 or later.

[5] These correlations would surely be higher if the matching across data sets was more exact. In practice, constructing industry-level aggregates from *WorldScope* requires one to group many highly diversified firms along with single line of business firms according to primary SIC, to force firm fiscal years into calendar years even if the overlap is barely more than six months, and to make arbitrary classifications where the SIC to ISIC correspondence is not one-to-one.

One might also suggest various modifications to the form of (1). I arrived at this simple specification after estimating several more elaborate ones, all of which give similar results. For instance, industry effects are rarely even jointly significant, so including 28 of them is not worth the degrees of freedom lost in countries with few observations. Nor does including lags of value added growth change the basic results. The coefficients on contemporaneous value added growth tend to be three or four times higher than coefficients on one-year-lagged value added growth. Another benefit is expositional: excluding these lags also allows us to focus on just a single coefficient for cross-country comparisons.

More significantly, the specification does not include year effects. Thus, the slope coefficient in (1) credits the country both for investing in the right industries at a given point in time, and for marshaling higher overall investment when overall growth is high.[6] Obviously, both dimensions are required for a complete understanding of capital allocation. Later in the paper, I discuss the results of decomposing these elasticity estimates into within-year and between-year components. I also discuss the results of allowing asymmetry in the elasticity, which answers the question whether a high sensitivity of investment growth to value added growth reflects increased investment in growing industries, decreased investment in declining industries, or both. These exercises are important not just for determining the robustness of the results but also for understanding their sources.

In summary, for the purpose of this investigation, the most important criterion for a measure of the efficiency of capital allocation is that it be comparable across countries.

[6] The two dimensions are analogous to the two problems facing a fund manager: portfolio selection (with a given amount of capital at a point in time) and market timing (varying the total invested across time).

From this perspective, using industry growth as an investment opportunity measure has some appeal. It is simple to measure, appears to have a reasonably high correlation with more sophisticated measures of investment opportunities, and is directly comparable across countries and industries. This allows us to study a large number of countries within a common framework, and to exploit the fact that international variation in financial institutions dwarfs within-country variation due to financial deregulation events. Another advantage vis-à-vis the methodology of prior studies is that (1) allows us to judge allocative efficiency from direct observation of investment flows. This is more satisfying (and perhaps more convincing) than inferring it from the distribution of estimated shadow prices and shadow values of capital.

C. Estimates of the efficiency of capital allocation in 65 countries

Table II reports the country elasticity estimates from equation (1). All but two of the country elasticities are estimated to be positive. The range of estimates, and the fraction of variation explained by value added growth, is wide. The mean country elasticity is .429, with a cross-country standard deviation of .288. The highest elasticity estimate is Germany's, at .988. The next highest estimates are for Hong Kong, New Zealand, France, Spain, Denmark, and Sweden. Japan is 9th highest, the United Kingdom is 10th, and the United States is 13th. Value added growth also explains by far the highest fraction of variation in investment growth in Germany, .364, and for the most part the countries with high elasticity estimates also have better fits. By contrast, in several developing countries the elasticity estimate is not significantly positive, and R^2 is close

to zero. In these countries, investment does not get ramped up in growing industries, and does not get slowed down in declining industries.

Since these are elasticities, cross-country differences are easy to interpret. For instance, consider a shock which causes value added growth of 10%. (This is a smaller-than-one-SD shock for all countries but the United States, per Table I.) The estimates in Table II imply that investment will increase by a bit more than 7%, on average, if the industry is in the United States, but only by 1% if the industry is in India. This difference appears sensible and economically important.

One potential criticism of these results is the possibility that data quality varies across countries, and this causes an attenuation bias. However, the differences in data quality required to account for the range of estimates in Table II would have to be very large. For example, suppose the true country elasticity is .800 (e.g., as estimated for Belgium) but the least-squares estimate is .200 (e.g., as estimated for Indonesia). If white noise measurement error is to account for this difference, the variance of the measurement error (the noise) in industry value added growth must be *three times* the true variance of industry value added growth (the signal).[7] Thus, while it does seem plausible that data quality differs across countries, it does not appear that this could be the driving force behind the sizeable differences apparent in Table II.

[7] This follows from the formula for asymptotic bias due to a badly measured independent variable:

$$\text{plim}\,\hat{\gamma} = \gamma\,/(1+\frac{\sigma_u^2}{\sigma_{x^*}^2})$$

where $\hat{\gamma}$ is the least-squares estimate, γ is the true parameter, $x = x^* + u$ is the observed badly measured variable, and u is white noise measurement error.

III. Financial determinants of the allocation of capital

A. Theories

Efficient investment, and hence an efficient allocation of capital, depends on two processes running smoothly. First, managers and investors must be able to distinguish promising investment opportunities from mediocre ones. Second, managers must have incentives to actually invest in the most promising opportunities, not pursue other objectives.

In theory, financial development can facilitate both processes. In terms of identifying opportunities, economists have long emphasized the role of secondary market prices as public signals. These signals may be more informative in larger, more liquid markets. One reason is that larger markets encourage arbitrage, through liquidity, the existence of more and better substitutes to use as hedges for trading against mispriced securities, and reduced transaction costs. Another reason is that liquidity and size increases the returns to private information acquisition, since informed traders may more easily hide their information in a series of trades [e.g. Grossman and Stiglitz (1980), Kyle (1984), and Holmstrom and Tirole (1993)].

Other economists believe that banks help to aggregate important information about investment opportunities. Bagehot (1873) and Schumpeter (1912) wrote about the screening role of banks, and Diamond (1984) shows how centralized intermediaries economize on the costs of acquiring information about disparate opportunities. This saves individual investors from having to evaluate each project themselves, and thereby

increases the level of information acquired prior to the supply decision. Boyd and Prescott (1986) study related functions of intermediaries.

But even if it is reasonably clear which investments are best, without good governance there is no assurance that self-interested managers and insiders will pursue the value-maximizing investment policy. Jensen (1986) argues that a symptom of such agency problems is the waste of free cash flow – cash generated from operations that isn't earmarked for good projects or to repay suppliers of finance and is instead reinvested in projects with fundamentally poor prospects, but which provide insiders with some private benefit.

These problems extend to state-owned firms with equal or greater force. In state-owned firms, resource allocation is particularly unlikely to be guided by value-maximization. Instead, political motives are often central, and – even where politics aren't at issue – soft budget constraints and poor monitoring give managers in state-owned firms extremely weak incentives for efficiency [see for example Shleifer (1998)]. Thus the incentives for efficiency provided by private ownership and governance institutions can directly impact the allocation of capital.

B. Financial development data

A first step toward evaluating these theories is to explore the basic relationships between the development of financial markets and the allocation measures in Table II. The ideal measure of financial development would be the all-in cost of capital for a given investment project. XXXX because this summarize supply conditions XXXXX

Unfortunately, I am not aware of reliable international data on the cost of external capital. Lacking data on the price of finance, researchers have used its quantity as a summary indicator of financial development. The assumption is that more financing activity reflects a lower cost of capital, and, implicitly, a more competitive financial market with better institutions. I follow Goldsmith (1969), King and Levine (1993), La Porta et al. (1997), and Rajan and Zingales (1998) in taking the size of a country's equity and credit markets relative to its GDP as a proxy for the general level of financial development.[8]

The aggregate market capitalization of international public equity markets is tabulated in the IFC's *Emerging Stock Markets Factbook*. Private domestic credit and non-financial public credit are tabulated in the *International Financial Statistics Yearbook*. I obtain nominal GDP from the Penn World Tables, version 5.6 [Summers and Heston (1991)]. I compute 1980, 1985, and 1990 values for the market capitalization to GDP and credit to GDP, then average these values to smooth out cyclical variations. (Equity market data is not available for a wide range of countries before 1980.) *STK/GDP* ("stock capitalization to GDP") and *CRED/GDP* ("credit to GDP") are logs of one plus these average values. A summary measure of financial development, *FD*, is the log of one plus the average sum of stock market capitalization and credit to GDP.

These variables are summarized in Appendix I. *FD* is lowest in Zambia, which had no stock market during this period, and highest in Japan, which had an expansive credit market. In the typical country in the sample, the credit market is two to three times the size of the stock market. These figures and the cross-country ranges are similar to those reported by La Porta et al. (1997) and Rajan and Zingales (1998) for smaller sets of

[8] La Porta et al. (1997) measure the amount of purely external finance in stock markets by adjusting for ownership by insiders. Their measure and the broader measure turn out to be highly correlated.

countries. Appendix I also reports the 1960 value of per capita GDP; the date is chosen to minimize the potential for endogeneity.

C. Basic relationships

What determines the elasticity of industry investment to value added? As a first step, Figure I plots the elasticity estimates from Table II on the summary measure of financial development. Hong Kong and Macao are not plotted due to missing data on the size of their credit markets, but based on the size of their stock markets, we would expect Hong Kong to plot near the upper-right extreme, and Macao to plot at the lower-left. Although there are a few countries that do not fit the pattern, the figure reveals a strong positive association between the country elasticity estimates and the general level of financial development. The correlation between the country elasticities and the size of financial markets is .554. This is the central result of the paper.

Table III explores this relationship in more detail. I regress the country elasticity estimates on measures of financial development. Specification (1) shows that the summary financial development measure is strongly positively associated with the country elasticity (t-statistic = 5.28), as shown the figure. Specifications (2) and (3) show that the size of both stock markets and credit markets are individually also associated with high investment-value added elasticities. When both stock market size and credit market size are included in the same specification, as in (4), credit market size dominates. Specification (5) shows that per capita GDP is also strongly positively associated with the country elasticities, partly reflecting the correlation of financial development and income

but also suggesting non-financial determinants of the allocation of capital. However, a strong independent effect of financial development remains even after controlling for *GDP* [specification (6)].

One might argue that financial markets capitalize the expectation that a firm's future investment opportunities will or will not go unfunded. Therefore valuations could be higher in certain countries *because* they are better at allocating capital. In an attempt to isolate the exogenous influence of financial development, specifications (8) and (9) use country of legal origin – English, French, German, or Scandinavian – as an instrument for *FD*. La Porta et al. (1997) argue that the legal protections provided to outside investors are an important determinant of financial development. They also observe that these legal protections are determined to a large extent by the colonial history of the country. Country of legal origin therefore makes a plausible instrument for financial development.[9]

Specification (8) shows that the component of *FD* predetermined by legal origin actually has a larger impact on the investment-value added elasticity than in the analogous OLS specification. This does not support the endogeneity hypothesis offered above. Instead, the independent effect of financial development over per capita GDP suggests that the relationship in Figure I reflects, at least in part, the influence of financial characteristics.

Since the total level of manufacturing investment does not vary across countries according to the degree of financial development [Carlin and Mayer (1998), Beck, Levine, and Loayza (1999)], Table III implies that financially undeveloped countries

[9] Levine (1997) uses this instrument to study the effects of financial development on economic growth.

underinvest in growing industries, overinvest in declining industries, or both.[10] But which is it? Table IV explores the determinants of these more subtle dimensions. The dependent variable in specifications (1) – (3) is the investment to value added elasticity estimated using just the observations in which industry value added was growing (15,898 out of 25,201 industry-years; 63% of the sample). Specifications (4) – (6) analyze the elasticity of investment to value added in declining industries (9,303 out of 25,201 industry-years; 37% of the sample).

The results indicate that financial development is associated with *both* increasing investment in growing industries, and decreasing investment in declining industries. Interestingly, specification (6) shows that the level of income is not a significant determinant of the extent to which declining industries restrain investment, but financial development is. This suggests a characteristic governance role for external finance, a hypothesis supported by evidence I present later on the importance of investor rights.

Specifications (7) – (12) analyze the between-year and within-year components of the elasticity estimates. The between-year elasticity answers the question, does manufacturing-sector-wide investment growth respond to manufacturing-sector-wide value added growth? It is estimated by regressing the average investment growth across industries in a given year on the average value-added growth across industries in that year. Thus, there are at most 33 observations in a given country for this regression, one per year. The within-year elasticity is just the year fixed effects estimator – equation (1)

[10] Consistent with the results of Carlin and Mayer and Beck et al., I find no significant positive relationship between the average manufacturing investment ratio (reported in Table I) and financial development. Nor is there a significant (or even positive) relationship after excluding the relatively financially undeveloped countries with unusually high investment ratios (above 0.1).

including year dummies. It answers the question, within a given year, is investment growth across industries related to value added growth?

The results in Table IV indicate that financial development is significantly positively related to both within-year and between-year aspects of capital allocation. Both of these sources of variation in value added growth turn out to be important to the overall variation; the mean within-year estimate is 0.239, the mean between-year estimate is 0.766, and the mean overall estimate (from Table II) is .429. Note that the overall estimate is a weighted average of the within-year and between-year estimates, with the weights dependent upon which source of variation dominates the overall variation. For the average country, a proportion of .543 of the overall estimate is due to the between-year estimate, and the remainder comes from the within-year estimate.[11]

Interestingly, this decomposition also identifies a difference between the role of credit markets and stock markets. Credit markets appear to be more important for between-year allocation, while stock markets appear to be more important for within-year allocation. Why this should be the case is not obvious. Perhaps the signal function of stock prices is more useful for distinguishing between firms at a given point in time and less successful at identifying economy-wide opportunities. The evidence in the next subsection does indeed indicate that the "synchronicity" of the domestic stock market – the extent to which firms' stock returns move together (and thereby may not reflect firm-specific information that would be useful for distinguishing between firms) – is associated with relatively poor overall allocation.

[11] That is, for each country, $\hat{h}_c = m_c \hat{h}_c^b + (1-m_c)\hat{h}_c^w$. The average m is .543.

D. Other determinants

How do financial markets improve the allocation of capital? The theories outlined above point to channels that emphasize the identification of good investments as well as the incentives to pursue them. In this subsection I give an initial evaluation of some of the ideas. The results need to be viewed with some caution because, due to data availability, the number of countries in the sample is sometimes less than two dozen. But it is reassuring that they are in line with theoretical predictions.

The most frequently cited social function of stock prices is to provide public signals of investment opportunities. But if stock prices are not very informative, they will not be useful guides to investment. Morck, Yeung, and Yu (1999) measure the "synchronicity" of stock prices in a few dozen stock markets in 1995. They argue that this synchronicity measure captures the amount of firm-specific information impounded into stock prices, with more firm-specific information being associated with less synchronicity. I use the data they report on the fraction of stocks which move in the same direction in a given week in the first half of 1995 (the period for which they report data) to construct a country-specific measure of stock market synchronicity, *SYNCH*.

Specification (1) of Table V shows that *SYNCH* is indeed strongly negatively associated with the basic capital allocation measure. This provides some initial evidence that stock market prices may be useful guides to investment, though the result obviously applies only to countries that actually do have stock markets.

Another way financial markets can improve capital allocation is by association with institutions that provide managers with good incentives. Two institutions that may

be important in this regard are state ownership and the legal rights of minority investors. State-owned firms often have political considerations as first-order determinants of allocation policy. Similarly, if legal protections of minority investors are poor, insiders may be free to invest in ways that do not maximize value.

Yearly data on the share of total non-agricultural GDP due to state owned enterprise is reported by the World Bank (1995). The earliest reported data is from 1978. I take the 1978-1985 average for each country since the data is sometimes missing for some years.[12] Data on the effective legal rights of external investors is from La Porta et al. (1998). They tabulate how many out of six shareholder protections (e.g., proxy voting by mail is permitted) are written in the commercial code of each country, and how many out of four creditor protections (e.g. secured creditors are first in line for distribution of bankruptcy proceeds) are written in its bankruptcy and reorganization laws. To form a summary measure of the effective legal rights, *RIGHTS*, I multiply the number of these investor rights that exist in the law (0 to 10, integer) by a measure of the domestic "rule of law" (0 to 1, continuous). This reflects an intuition that strong but unenforced laws are not useful, nor is strict enforcement of fundamentally weak laws.[13]

Specifications (2) and (3) show that both these variables are associated with capital allocation in the expected direction. When they are considered jointly with stock price synchronicity, and also financial development and per capita GDP, their individual effects tend to diminish, though the negative effect of synchronicity remains statistically significant. However, due to data availability, these regressions contain only a third of the

[12] For countries with no data before 1985, I take the 1986-1991 average.
[13] Among countries covered by La Porta et al. (1998), Mexico scores lowest (.54 out of 10). Colombia and Peru are next lowest. The United Kingdom scores highest (7.71 out of 10), followed closely by Hong Kong and New Zealand.

full sample, and it is probably misleading to conclude too much from them. The strongest statement to make is that these variables are significantly correlated with the measured efficiency of capital allocation in the direction of theoretical priors.[14]

Finally, the last two specifications in Table V look for a potential asymmetry – are some countries particularly effective at increasing investment in growing industries, or keeping investment out of declining industries? The agency theory of free cash flow emphasizes the potential for overinvestment in declining industries. Consistent with this theory, investor rights are associated with a differential ability to keep investment from declining industries. This may reflect the greater influence of minority investors' pressure to maximize value that is possible in countries where their rights are protected, influence which limits the inefficient reinvestment of free cash flow.

IV. Conclusions

Despite the fact that economics is commonly defined as the study of the allocation of scarce resources, the reality of the capital allocation process has received relatively little attention. Financial economists, for example, have concentrated on the portfolio allocations of individual investors to the exclusion of the allocation problem of the economy as a whole.

This paper explores international differences in the efficiency of real capital allocation and argues that financial markets are behind a considerable portion of these

[14] One way to improve on these broad cross-country results would be to examine within-country changes in the allocation of capital over time, such as before and after a privatization wave or stock exchange opening.

differences. Relative to financially undeveloped countries, financially developed countries boost investment more in growing industries and cut it more in declining industries. This identifies a specific mechanism by which financial markets improve the real economy, and calls into question the typical macroeconomic modeling assumption that, no matter what country is being studied, capital flows effortlessly to equate marginal returns across sectors and across time.

The results also shed some light on the broad mechanisms by which financial markets improve capital allocation. Stock markets appear to provide useful public signals of investment opportunities, particularly those that exhibit a high proportion of firm-specific price movements; economies dominated by state-owned firms do not allocate capital efficiently; and minority investor rights may help to reduce overinvestment in declining industries. While these results are subject to the limitations of cross-country analysis, they are consistent with theoretical priors. A few results also raise interesting new questions. For instance, why are stock markets more important for within-year allocational efficiency, and banks more important for between-year allocational efficiency?

In terms of implications, is better capital allocation a reason why financial development is associated with economic growth? Some evidence suggests that it is. Bagehot (1873) cites better capital allocation as a primary reason for England's comparatively fast growth in the mid-to-late 19th century. And Beck, Levine, and Loayza (1999) find that countries with a developed banking sector exhibit higher productivity growth, a result they attribute to superior capital allocation.

As a closing remark, the results of this paper do not support the rationale given for taxes on securities transactions as advocated by Keynes (1936), Tobin (1982), and (more cautiously) Summers and Summers (1989). Kenyes writes, “Wall Street[’s] . . . proper social purpose is to direct new investment into the most profitable channels in terms of future yield.” A transaction tax is supposed to throw enough “sand into the gears” (Tobin’s phrase) to remove some of the purely speculative interests from financial markets, and leave the real, allocative interests to work unfettered. But the assumption that large and liquid capital markets allocate capital less efficiently than smaller, less liquid markets is directly contradicted by the evidence presented here.

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Table I. Summary statistics of total manufacturing investment, industry investment growth, and industry value added growth

Summary statistics for the total manufacturing investment-output ratio, log industry investment growth, and log industry value added growth for 65 non-socialist countries. ISIC-3 industry-year data on gross capital formation, output, and value added are from the 1997 United Nations' *INDSTAT-3* database. Countries report nominal data for up to 28 ISIC-3 manufacturing industries per year. The third column indicates the first and last years for which useful data is available, but for some countries there are interruptions within this range. Values are converted to current U.S. dollars using the year-average exchange rate reported by the IMF's *International Financial Statistics*. Real gross capital formation in industry i in country c in year t (I_{ict}) is then computed by deflating the nominal series by the U.S. capital goods PPI (base year 1982). Real value added (V_{ict}) and real output are computed by deflating the nominal series by the U.S. finished goods PPI (base year 1982). The manufacturing investment-output ratio is the ratio of total manufacturing investment to total manufacturing output, averaged across years. Observations with absolute values exceeding one for either log investment growth or log value added growth, and those that comprised less than 0.1% of the country's total manufacturing value added, are excluded.

Country	N	Data range	Mean mfg. investment - output ratio	$\ln \frac{I_{ict}}{I_{ict-1}}$ Mean	$\ln \frac{I_{ict}}{I_{ict-1}}$ SD	$\ln \frac{V_{ict}}{V_{ict-1}}$ Mean	$\ln \frac{V_{ict}}{V_{ict-1}}$ SD
Australia	526	1963 – 85	.043	-.009	.327	.015	.123
Austria	686	1969 – 94	.059	.041	.316	.042	.162
Bangladesh	180	1981 – 92	.033	.051	.479	.066	.302
Barbados	149	1970 – 94	.040	-.002	.506	.03	.325
Belgium	510	1963 – 95	.053	.029	.330	.043	.152
Bolivia	193	1970 – 94	.069	.109	.487	.083	.273
Cameroon	87	1976 – 94	.074	.046	.516	.018	.380
Canada	670	1963 – 90	.044	.034	.311	.031	.111
Chile	500	1964 – 94	.059	.020	.481	.022	.238
Colombia	598	1963 – 94	.037	.029	.461	.050	.183
Cyprus	472	1971 – 95	.056	.006	.444	.067	.203
Denmark	604	1963 – 91	.044	.044	.359	.040	.152
Ecuador	579	1963 – 94	.098	.066	.463	.047	.269
Egypt	434	1967 – 93	.147	-.038	.520	.032	.356
El Salvador	117	1978 – 85	.036	-.049	.516	-.037	.325
Ethiopia	179	1965 – 89	.134	-.031	.530	.053	.183
Fiji	197	1970 – 92	.050	-.021	.514	.039	.282
Finland	723	1963 – 94	.062	.021	.401	.039	.176
France	325	1963 – 95	.064	.027	.223	.052	.134
Germany	631	1964 – 92	.048	.040	.216	.040	.132
Greece	629	1963 – 92	.066	.012	.416	.055	.166
Guatemala	198	1974 – 88	.027	-.024	.499	-.006	.330
Hong Kong	318	1975 – 93	.036	.045	.421	.042	.181
India	413	1977 – 93	.066	.058	.369	.020	.197
Indonesia	434	1970 – 95	.085	.036	.454	.140	.296

Iran	302	1963 – 93	.073	-.012	.480	.013	.367
Ireland	550	1963 – 91	.043	.034	.404	.049	.159
Israel	431	1963 – 94	.053	.065	.404	.049	.170
Italy	522	1967 – 91	.055	.052	.245	.045	.176
Japan	814	1963 – 93	.047	.054	.276	.080	.140
Jordan	263	1974 – 94	.362	.010	.400	.080	.287
Kenya	61	1967 – 71	.085	.054	.491	.122	.152
Korea (South)	682	1966 – 94	.092	.116	.425	.148	.188
Kuwait	290	1968 – 94	.080	.024	.508	.062	.349
Libya	99	1964 – 80	.365	.065	.450	.060	.333
Macao	145	1978 – 93	.003	-.020	.539	.093	.300
Malawi	172	1964 – 94	.069	-.025	.527	.012	.365
Malaysia	334	1968 – 94	.064	.159	.402	.150	.192
Malta	390	1963 – 93	.041	-.027	.485	.062	.226
Mexico	362	1970 – 91	.043	.053	.428	.041	.229
Morocco	108	1985 – 94	.060	.094	.405	.078	.163
Netherlands	616	1963 – 93	.047	.031	.292	.043	.139
New Zealand	377	1963 – 90	.043	.013	.388	.038	.153
Nigeria	161	1963 – 90	.102	.018	.493	.093	.358
Norway	717	1963 – 92	.053	.035	.379	.025	.156
Pakistan	176	1965 – 91	.087	-.032	.438	.078	.283
Panama	333	1963 – 91	.054	-.018	.504	.041	.215
Peru	201	1982 – 92	.031	.009	.492	.032	.366
Philippines	527	1963 – 93	.047	.035	.469	.041	.306
Portugal	557	1971 – 94	.066	.034	.409	.047	.197
Singapore	642	1963 – 94	.053	.074	.424	.099	.194
Spain	563	1964 – 92	.039	.041	.329	.046	.159
Sri Lanka	126	1979 – 93	.049	.050	.551	-.021	.341
Swaziland	53	1970 – 90	.127	-.013	.517	.012	.329
Sweden	565	1963 – 87	.062	.010	.297	.031	.139
Tanzania	220	1965 – 91	.086	-.049	.479	.042	.314
Trinidad & Tobago	73	1967 – 91	.044	-.023	.531	-.004	.282
Tunisia	387	1963 – 95	.074	.047	.437	.087	.215
Turkey	596	1963 – 94	.052	.038	.434	.062	.259
United Kingdom	620	1968 – 91	.040	.018	.263	.027	.142
United States	868	1963 – 95	.034	.027	.186	.022	.091
Uruguay	85	1989 – 93	.027	-.009	.468	.038	.227
Venezuela	352	1976 – 93	.065	-.051	.457	-.029	.273
Zambia	106	1963 – 75	.070	-.009	.498	.132	.257
Zimbabwe	403	1963 – 94	.052	.019	.456	.027	.197
Full Sample	25,201	1963 – 95	.069 (equal-wtd.)	.030 (*N*-wtd.)	.402 (*N*-wtd.)	.050 (*N*-wtd.)	.217 (*N*-wtd.)

Table II. Estimates of the elasticity of industry investment to value added

Estimates of the elasticity of industry investment to industry value added in 65 non-socialist countries. The estimates are obtained from the following regression, estimated for each country *c*:

$$\ln \frac{I_{ict}}{I_{ict-1}} = a_c + h_c \ln \frac{V_{ict}}{V_{ict-1}} + e_{ict}$$

where *i* indexes ISIC-3 manufacturing industries, *c* indexes countries, *t* indexes years. The number of observations in each country is reported in Table I. Robust standard errors are in parentheses.

Country	$\hat{h}_c$	(*se*)	R^2	Rank of $\hat{h}_c$
Australia	.681	(.134)	.065	14
Austria	.835	(.085)	.182	8
Bangladesh	.131	(.120)	.007	54
Barbados	.072	(.123)	.002	60
Belgium	.803	(.098)	.137	11
Bolivia	-.202	(.128)	.013	65
Cameroon	.134	(.149)	.010	53
Canada	.547	(.115)	.038	26
Chile	.294	(.100)	.021	40
Colombia	.130	(.108)	.006	55
Cyprus	.421	(.117)	.037	30
Denmark	.853	(.123)	.131	6
Ecuador	.305	(.071)	.031	39
Egypt	.326	(.069)	.050	36
El Salvador	.262	(.165)	.027	46
Ethiopia	.135	(.247)	.002	52
Fiji	.154	(.133)	.007	51
Finland	.557	(.087)	.059	25
France	.893	(.075)	.289	4
Germany	.988	(.061)	.364	1
Greece	.635	(.104)	.064	20
Guatemala	.633	(.091)	.176	21
Hong Kong	.948	(.132)	.166	2
India	.100	(.097)	.003	57
Indonesia	.217	(.077)	.020	50

Iran	.446	(.067)	.116	29
Ireland	.666	(.114)	.069	15
Israel	.263	(.107)	.012	45
Italy	.652	(.063)	.220	16
Japan	.819	(.074)	.174	9
Jordan	.322	(.096)	.053	37
Kenya	.068	(.389)	.000	61
Korea (South)	.646	(.089)	.082	18
Kuwait	.047	(.087)	.001	63
Libya	.387	(.122)	.082	31
Macao	.237	(.147)	.017	32
Malawi	.075	(.115)	.003	59
Malaysia	.285	(.118)	.019	42
Malta	.268	(.102)	.016	44
Mexico	.344	(.114)	.034	34
Morocco	.638	(.227)	.066	19
Netherlands	.573	(.093)	.074	24
New Zealand	.896	(.130)	.125	3
Nigeria	.364	(.106)	.070	33
Norway	.575	(.093)	.056	23
Pakistan	.255	(.130)	.027	47
Panama	.064	(.125)	.001	62
Peru	.651	(.081)	.234	17
Philippines	.313	(.075)	.042	38
Portugal	.539	(.097)	.068	27
Singapore	.486	(.088)	.049	28
Spain	.867	(.077)	.175	5
Sri Lanka	.273	(.156)	.029	43
Swaziland	-.069	(.217)	.002	64
Sweden	.852	(.083)	.159	7
Tanzania	.087	(.102)	.003	58
Trinidad & Tobago	.340	(.250)	.032	35
Tunisia	.287	(.116)	.020	41
Turkey	.242	(.072)	.021	48
United Kingdom	.812	(.092)	.192	10
United States	.723	(.069)	.126	13
Uruguay	.218	(.257)	.011	49
Venezuela	.593	(.082)	.125	22
Zambia	.123	(.182)	.004	56
Zimbabwe	.726	(.116)	.099	12
Mean	.429		.071	(out of 65)
Median	.344		.042	
SD	.288		.078	

Table III. The allocation of capital and broad measures of financial development

The dependent variable is the estimated elasticity of manufacturing investment to value added from Table II. The independent variables are a summary measure of financial development (*FD*), a measure of stock market capitalization to GDP (*STK/GDP*), a measure of credit outstanding to GDP (*CRED/GDP*), and the 1960 value of log per-capita GDP. These variables are summarized in Appendix I. In specifications (1) – (7), estimation is by least squares. In specifications (8) and (9), legal origin dummies (English, French, German, or Scandinavian) from La Porta et al. (1998) are used as instruments for the financial development measures (first stage R^2 between 0.23 and 0.30, *F*-statistics significant at 1%). Robust standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable: $\hat{n}_c$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) (I.V.)	(9) (I.V.)
FD_c	.565***					.323***		.637**	
	(.107)					(.105)		(.276)	
STK/GDP_c		.718***		.227			.186		.038
		(.175)		(.247)			(.160)		(.370)
$CRED/GDP_c$			.736***	.614***			.304*		.872***
			(.132)	(.187)			(.157)		(.322)
GDP_c					.211***	.154***	.157***	.114*	.109*
					(.024)	(.030)	(.030)	(.059)	(.059)
Intercept	.147**	.319***	.131**	.146**	.289***	.163***	.171***	.059	.030
	(.058)	(.038)	(.063)	(.066)	(.033)	(.054)	(.060)	(.118)	(.115)
R^2	.307	.226	.289	.301	.432	.519	.517	.380	.374
N	63	65	63	63	62	61	61	45	45

Table IV. Comparing capital allocation in growing vs. declining industries, and between-year vs. within-year

The dependent variable in (1) – (3) is the elasticity of manufacturing investment to value added, estimated using only observations in which industry value added increased versus the prior year. The dependent variable in (4) – (6) uses only observations in which industry value added decreased versus the prior year. The dependent variable in (7) – (9) is the between-year estimator (for a given country, a regression of mean industry investment growth in that year on mean industry value added growth in that year). The sample in (7) – (9) includes only countries with at least 15 years of data. The dependent variable in (10) – (12) is the within-year estimator (the year fixed effects estimator). The independent variables are a summary measure of financial development (*FD*), a measure of stock market capitalization to GDP (*STK/GDP*), a measure of credit outstanding to GDP (*CRED/GDP*), and the 1960 value of log per-capita GDP. These variables are summarized in Appendix I. Estimation is by least squares. Robust standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	$\hat{\kappa}_c^+$			$\hat{\kappa}_c^-$			$\hat{\kappa}_c^b$			$\hat{\kappa}_c^w$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
FD_c	.571***		.268*	.577***		.449**	.551**		.425**	.278***		.213**
	(.130)		(.162)	(.172)		(.179)	(.215)		(.196)	(.081)		(.082)
STK/GDP_c		.077			.071			-.010			.293*	
		(.264)			(.308)			(.380)			(.150)	
$CRED/GDP_c$		.746***			.745***			.773**			.166	
		(.245)			(.279)			(.331)			(.129)	
GDP_c			.178***			.093			.088			.053*
			(.046)			(.071)			(.102)			(.030)
Intercept	.058	.030	.088	.068	.043	.069	.419***	.382**	.430***	.095*	.122**	.091*
	(.077)	(.090)	(.078)	(.101)	(.112)	(.103)	(.146)	(.152)	(.145)	(.052)	(.057)	(.051)
R^2	.219	.232	.386	.155	.160	.206	.109	.118	.147	.138	.139	.208
N	63	63	61	63	63	61	55	55	53	63	63	61

Table V. Capital allocation and the synchronicity of stock prices, state ownership, and investor rights

The dependent variable in (1) – (6) is the estimated elasticity of manufacturing investment to value added from Table II. The dependent variable in (7) and (8) is the difference between the elasticity estimate for growing industry-year observations and the estimate for declining industry-year observations. The independent variables are a measure of stock price synchronicity (the average fraction of stocks moving in the same direction in a given week of the first 26 weeks of 1995) from Morck et al. (1999) (mean = .664, SD = .043, n = 33). *SOE* is the fraction of an economy's output due to state-owned enterprises (mean = .132, SD = .106, n = 39) from the World Bank (1995). *RIGHTS* is an index of effective investor rights. It is the product of a measure of the rule of law (0 – 1, continuous) and the number of important shareholder and creditor rights (0 – 10, integer) in the country's legal code (mean = 3.73, SD = 1.93, n = 41). Both variables are from La Porta et al. (1998). Other independent variables are a summary measure of financial development (*FD*) and the 1960 value of log per-capita GDP, as summarized in Appendix I. Estimation is by least squares. Robust standard errors are in parentheses. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	$\hat{h}_c$						$\hat{h}_c^- - \hat{h}_c^+$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$SYNCH_c$	-3.185***			-3.042***	-2.492***	-1.682**		-1.370
	(.745)			(.927)	(.609)	(.741)		(1.895)
SOE_c		-.904**		-1.904***	-1.824***	-1.094		1.306
		(.369)		(.596)	(.500)	(.726)		(.982)
$RIGHTS_c$			.062***	.016	-.033	-.033	.100***	.117***
			(.015)	(.023)	(.026)	(.024)	(.028)	(.037)
FD_c					.580**	.434	-.503**	-.771
					(.204)	(.278)	(.211)	(.499)
GDP_c						.121		.039
						(.081)		(.137)
Intercept	2.714***	.536***	.315***	2.727***	2.208***	1.557***		.724
	(.500)	(.074)	(.070)	(.657)	(.420)	(.526)		(1.352)
R^2	.289	.103	.200	.591	.680	.723	.167	.358
N	33	39	41	22	22	22	40	22

Appendix I. Summary statistics of financial development

Summary statistics of measures of financial development for 65 non-socialist countries. Financial development is computed as the sum of stock market capitalization to GDP and private and non-financial public domestic credit to GDP. (The components are averaged over 1980, 1985, and 1990 values, or as available.) The capitalization of stock markets is from the IFC's *Emerging Stock Markets Factbook*, and domestic credit is from the *International Financial Statistics Yearbook*. The size of the credit market is the sum of lines 32c and 32d (claims on the private sector and claims on the non-financial public sector; these are items in the "Domestic Monetary Survey" category) and lines 52c and 52d as available (items in the "Financial Survey" category), or 42c and 42d (items in the "Other Financial Institutions" category) where 52c and 52d were not available. *GDP* is the 1960 value of per capita GDP, in $000 1960, from the Penn World Tables version 5.6 [Summers and Heston (1991)].

Country	Financial development, 1980 – 1990 [FD_c = ln(1+ .)]	Stock market cap. to GDP, 1980 – 1990 [STK/GDP_c = ln(1+ .)]	Credit claims to GDP, 1980 – 1990 [$CRED/GDP_c$ = ln(1+ .)]	Per capita GDP, 1960 ($000 1960) [GDP_c = ln(.)]
Australia	.80	.36	.44	7.75
Austria	.86	.09	.77	5.14
Bangladesh	.21	.01	.20	.94
Barbados	.45	.06	.39	2.64
Belgium	.55	.23	.32	5.47
Bolivia	.17	.00	.17	1.13
Cameroon	.31	.00	.31	.634
Canada	1.23	.43	.80	7.24
Chile	.85	.31	.54	2.90
Colombia	.33	.03	.30	1.69
Cyprus	.91	.14	.77	2.08
Denmark	.72	.21	.51	6.73
Ecuador	.24	.03	.21	1.46
Egypt	.72	.04	.68	.80
El Salvador	.31	.00	.31	1.43
Ethiopia	.24	.00	.24	.26
Fiji	.29	.00	.29	2.11
Finland	.81	.11	.70	5.28
France	1.06	.17	.89	5.82
Germany	1.22	.21	1.01	6.57
Greece	.67	.11	.56	2.09
Guatemala	.17	.00	.17	1.66
Hong Kong	.	1.21	.	2.23
India	.36	.08	.28	.77
Indonesia	.28	.03	.25	.64

Iran	.79	.04	.75	2.99
Ireland	1.42	.72	.70	3.30
Israel	.71	.23	.48	3.45
Italy	.69	.11	.58	4.58
Japan	2.67	.67	2.00	2.94
Jordan	1.19	.46	.73	1.16
Kenya	.34	.02	.32	.65
Korea (South)	.98	.20	.78	.90
Kuwait	1.20	.49	.71	.
Libya	.20	.00	.20	.
Macao	.	.00	.	.
Malawi	.17	.00	.17	.38
Malaysia	1.44	.72	.72	1.41
Malta	.58	.00	.58	1.38
Mexico	.29	.07	.22	2.83
Morocco	.34	.03	.31	.83
Netherlands	1.56	.39	1.17	6.09
New Zealand	.79	.30	.49	7.95
Nigeria	.16	.03	.13	.56
Norway	1.11	.15	.96	5.59
Pakistan	.32	.05	.27	.64
Panama	.57	.01	.56	1.57
Peru	.13	.04	.09	2.03
Philippines	.40	.09	.31	1.13
Portugal	.82	.06	.76	1.86
Singapore	2.26	1.23	1.03	1.63
Spain	.90	.14	.76	3.13
Sri Lanka	.31	.09	.24	1.25
Swaziland	.20	.00	.20	1.24
Sweden	1.43	.29	1.14	7.57
Tanzania	.07	.00	.07	.32
Trinidad & Tobago	.58	.12	.46	5.62
Tunisia	.97	.05	.92	1.10
Turkey	.26	.07	.19	1.62
United Kingdom	1.36	.66	.70	6.81
United States	1.44	.56	.88	9.91
Uruguay	.41	.00	.41	3.96
Venezuela	.49	.08	.41	6.31
Zambia	.12	.00	.12	.95
Zimbabwe	.53	.23	.30	1.00
Mean	.71	.19	.52	2.94
SD	.52	.27	.34	2.44
Mean [ln(1+.)]	.49	.15	.40	not used
SD [ln(1+.)]	.28	.19	.21	not used
Mean [ln(.)]	not used	not used	not used	.71
SD [ln(.)]	not used	not used	not used	.90

Figure I. Elasticity of industry investment to value added vs. financial development