Financial markets, financial dependence, and the allocation of capital

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ABSTRACT

We explore one specific channel through which finance promotes growth: the allocation of capital. Using international industrial data, we find that countries with developed financial markets invest more in growing industries, and pull out more funds of declining ones. Most interestingly, this pattern is more eminent for those industries more dependent on external financing. Various robustness checks show that the results are not driven by reverse causality, omitted variables, specific countries or industries.

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1. Introduction

A large body of research has documented that financial development in a country has a robust positive effect on economic performance (see Levine (2005), for a comprehensive survey). Given the compelling empirical evidence, efforts have been made to find channels through which financial markets contribute to growth and development. This paper explores one important channel: the allocation of capital. It has long been recognized that financial sectors have important roles in channeling funds to uses with highest returns (e.g., Bagehot, 1873; Schumpeter, 1912). Recent theoretical studies argue that financial development promotes the efficiency of capital allocation since a well-established financial system can alleviate asymmetric information problems, screen out bad projects, and exert monitoring efforts to ensure that funds are used for productive purposes (e.g., Greenwood and Jovanovic, 1990). The theoretical literature implies that countries with more developed financial sectors should allocate capital more efficiently. In fact, Wurgler (2000) confirms this implication in a pioneering cross-country study. He constructs a proxy to measure the efficiency of capital allocation in a country and shows that it is positively associated with the level of financial development.

This paper goes one step further by looking at the differential effect of financial markets on capital allocation across industries, and

whether this differential effect is related to the level of financial development. The hypothesis is as follows: since financial development can reduce information asymmetry and lower the cost of raising funds from outsiders as argued by theory, industries more dependent on external finance should benefit more from the development of the financial sector such that their investment is more responsive to growth opportunities, i.e., the efficiency improvement of capital allocation should be more prominent in these industries.

We test the hypothesis with a data set that contains annual data of 27 industries in 45 countries from 1963 to 2002. Based on the method of Wurgler (2000), the efficiency of capital allocation is estimated for each industry in each country as the elasticity of investment to value added in that industry. The financial dependence index is taken from Rajan and Zingales (1998) and measures the degree to which an industry relies on external funds to finance its activities due to technological factors. Then we regress the efficiency measure at the industry level on an interaction term of industrial dependence on external finance and country level financial development. Our results confirm that financial development has differential effects on industrial capital allocation, namely industries more dependent on external funds have higher investment elasticities in countries with better developed financial sectors. Thus financial markets not only improve the overall efficiency of capital allocation in a country as found in Wurgler (2000), but also benefit more toward those financially dependent industries. Our results are robust to possible reverse causality, different specifications, subsamples and outliers.

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This paper is most closely related to the seminal work of Wurgler (2000), who developed the method to estimate the efficiency of capital allocation used in this paper. He constructs the efficiency measure at the country level, and shows that financial development improves the efficiency of capital allocation across countries. However, his result suffers the common problems of cross-country regressions. In contrast, we estimate the efficiency of capital allocation at the industry level, and the cross-industry and cross-country nature of our panel data allows us to avoid most problems of cross-country studies. First, our results are less prone to the endogeneity problem as we focus on a specific mechanism through which financial markets affect capital allocation efficiency. Second, we control for unobserved industry and country specific effects, and greatly alleviates the omitted variable problem. Third, we allow for heterogeneous effects of financial development on capital allocation due to differential financial dependence of industries. Hence our paper is a complement and extension to Wurgler's work.

This paper is also related to the large empirical literature on financial development and economic growth initiated by King and Levine (1993). [1] Among the ample empirical studies, the work by Rajan and Zingales (1998) is particularly relevant to our paper. They propose a new approach to look at the differential effects of financial development across industries. The idea is that, if a developed financial sector can provide funds at relatively low costs, then it should benefit most those industries that have highest demand for external funds. Using an interaction term between industrial dependence on external finance and country level of financial development, they confirm their hypothesis that industries more dependent on external finance tend to grow faster in countries with more developed financial markets. We follow their methodology and contribute to the literature by looking at one specific channel through which finance promotes growth, i.e., the allocation of capital.

There are also a number of studies that pay attention to other channels through which financial markets facilitate growth. Beck et al. (2000b) study whether financial development promotes growth through higher saving rates, capital accumulation or technological progress. Using both pure cross-country and dynamic panel analysis, they find that financial markets enhance economic growth mainly through productivity growth, while its effects on saving and capital investment are rather limited. Carlin and Mayer (2003) also examine whether financial markets encourage capital investment or R&D investment. Using cross-country and industry data, they show that countries with better financial markets tend to have more R&D investment in industries which depend more on external finance, while there is little differential effect of financial development on industrial physical capital investment.

2. Hypothesis and methodology

Economic theory points to the positive effect of financial markets on the allocation of capital since well developed financial markets are more able to resolve information asymmetry problem, screen out bad projects, reduce the extent of moral hazard, and hence lower the cost of external financing (e.g., Schumpeter, 1912; Diamond, 1984; Boyd and Prescott, 1986). Our hypothesis is a natural extension of the theoretical literature. Consider two industries, A_L and A_H, with low and high dependence on external funds respectively, in two countries, C_L and C_H, with low and high level of financial development, respectively. Now suppose there is an unexpected growth opportunity in both industries. What will happen to investment of the two industries in the two countries?

For industry A_L, its investment mainly uses internal funds, so it can respond quickly no matter whether it is in country C_L or C_H. Financial markets may influence investment, but are not expected to cause a big effect since industry A_L relies little on external funds. In other words, the efficiency of capital allocation of industry A_L in country C_H may be a little higher than in country C_L, given that C_H has a more developed financial sector. However, the difference in capital allocation efficiency should be relatively small since this industry does not use much external finance.

On the other hand, it is a different scenario for industry A_H as it depends highly on external funds, and hence the level of financial development plays a much more important role in investment and capital allocation. In country C_L, the underdeveloped financial market makes it more costly and difficult to obtain external funds than in country C_H. This implies that, though facing the same growth opportunity, industry A_H in country C_L may invest significantly less than its counterpart in country C_H. Unlike industry A_L, the difference in financial market development is expected to cause relatively large difference in investment in industry A_H since it relies more on the financial sector.

Thus our main hypothesis can be stated as follows: if financial development improves the efficiency of capital allocation, those countries with better developed financial markets should invest more in growing industries and reduce investment more in declining industries, and this pattern should be more prominent for those industries more dependent on external finance. One implication of the hypothesis is that financial development affects the elasticity of investment to growth opportunities disproportionately across industries, but may not affect the average level of industrial investment over a long period of time since those industries that receive more investment when growing will also experience a larger drop when declining. This prediction also serves as an indirect test for our hypothesis.

As our focus is on the differential effects of financial markets on capital allocation across industries, it is natural for us to employ the seminal methodology of Rajan and Zingales (1998, RZ hereafter) and estimate the following equation:

$$\text{Efficiency}_{ic} = \Phi_i + \Phi_c + \gamma * \text{Share}_{ic} + \beta$$
$$* \text{External Financial Dependence}_i$$
$$* \text{Financial Development}_c + \epsilon_{ic},$$

where Efficiency_{ic} is the efficiency measure of capital allocation of industry i in country c, Φ_i and Φ_c are vectors of industry- and country-specific effects, respectively, Share_{ic} is the share of value added of industry i in total manufacturing sector in country c in 1963, External Financial Dependence$_i$ denotes the dependence on external finance by industry i, and Financial Development$_c$ measures the level of financial development in country c. Share_{ic} is included to control for possible size effect: small industries might be more responsive to growth opportunities as they usually involve less investment in fixed assets than large industries. Our main interest is in the sign and significance of parameter β. Since our hypothesis is that financial development has a bigger positive impact on the capital allocation efficiency of those industries more dependent on external funds, it implies $\beta > 0$ in the above regression equation.

Compared with standard cross-country regressions as in Wurgler (2000), our specification makes a closer examination of the relationship between financial development and capital allocation efficiency. By looking at a specific mechanism by which finance affects the efficiency of capital allocation, our results suffer less from reverse causality. It also greatly reduces the problem of omitted variables bias by including industry- and country-specific effects. Moreover, it allows the effect of financial development on capital allocation efficiency to be heterogeneous across industries, as a function of external financial dependence.

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[1] Levine (2005) provides an excellent survey on this topic.