Journal of Banking & Finance 39 (2014) 177–191

Contents lists available at ScienceDirect

Journal of Banking & Finance

journal homepage: www.elsevier.com/locate/jbf

Corporate financial structure, misallocation and total factor productivity ☆

Burak R. Uras *

Department of Economics, Tilburg University, European Banking Center and CentER, Room K 322B, P.O. Box 90153, 5000 LE Tilburg, The Netherlands

ARTICLE INFO

Article history:
Received 15 March 2013
Accepted 4 November 2013
Available online 20 November 2013

JEL classifications:
G11
G32
O47

Keywords:
Financial structure
Distortions
Misallocation
Total factor productivity

ABSTRACT

This paper studies the quantitative relevance of the cross-sectional dispersion of corporate financial structure in explaining the intra-industry allocation efficiency of productive factors. I solve a heterogeneous firms model with financial constraints and distortions to the marginal rental-rate of capital, and develop a measure for the intra-industry misallocation of factors of production. The distribution of capital rental rate and two types of firm-level balance sheet characteristics (pledgeability and liquid asset positions) determine the extent of misallocation and industry level total factor productivity (TFP). I calibrate the model using firm-level balance sheet data from seven major industry clusters of the US economy. The counterfactual policy experiments show that weakening the observed balance sheet positions for financially constrained firms leads to a reallocation of production factors from firms with high cost distortions to firms with low cost distortions and cause quantitatively important industry level TFP losses.

1. Introduction

Understanding the rationale behind the empirically observed dispersion of financial structure across firms is a central research theme in corporate finance. The seminal article by Modigliani and Miller (1958) shows that when markets are complete, a firm's financial structure is not relevant for its economic performance; and therefore, the industry-wide dispersion of financial structure should not be related to the heterogeneity of firms's profitability. Following the Modigliani–Miller proposition, a non-exhaustive list of empirical studies have shown that weak financial conditions constrain access to capital at the firm level and deteriorate firm profitability when there are credit market imperfections.[1] In this paper, I contribute to the debate on financial structure and economic performance by exploiting a novel research angle: I study the relevance of corporate financial structure in explaining the cross-sectional allocation efficiency of productive resources in an economy with capital market imperfections.

The main purpose of my study is to quantify the importance of the dispersion in financial structure for the observed intra-industry misallocation of capital and labor in the US economy. I argue that weak balance sheet conditions and the resulting lax financial access generate inefficiencies in the intra-industry distribution of marginal products of capital and labor. These inefficiencies cause large TFP losses by inhibiting the reallocation of productive factors from large companies to small scale establishments.

To investigate the effects of the dispersion in financial structure on resource misallocation, I utilize a suitable heterogeneous firms model which accounts for the cross-sectional resource misallocation. Hsieh and Klenow (2009) develop a structural model to measure the misallocation generated by the heterogeneity of the distortionary wedges in capital rental rates. In this paper, I extend the Hsieh–Klenow set-up, and allow for firm-level financial structure idiosyncracies: Firms in the model are heterogeneous in their financial market ratings (pledgeability) and internal finance ability (liquidity). Financial constraints generated by weak financial positions together with capital rental rate distortions, a la Hsieh and Klenow (2009), drive wedges between marginal product of capital and labor across firms. In equilibrium, ceteris paribus, firms with low financial pledgeability and weak liquidity operate inefficiently small and labor intensive production units compared to firms with high financial pledgeability and strong liquidity. Capital rental-rate distortions augment the relation between financial structure and

☆ For their helpful suggestions and comments, I would like to thank Ping Wang, Bruce C. Petersen, Gaetano Antinolfi, Sebastian Galiani, and Yongseok Shin, conference participants at 2011 Econometric Society Meetings at Washington University in St. Louis, SAET Meetings in Faro Portugal and the seminar participants at Washington University in St. Louis Economics and Federal Reserve Bank of Philadelphia. All errors are mine.

* Tel.: +31 013 466 3650.
E-mail address: r.b.uras@uvt.nl

[1] Rajan and Zingales (1998), Eugene and French (2002), and Frank and Goyal (2003) provide empirical evidence on the effects of corporate financial structure for firm performance.

0378-4266/$ - see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.jbankfin.2013.11.011

the labor intensity of production. I use measures of internal finance ability (asset liquidity) and financial pledgeability (bond ratings) to test the analytical predictions of the model by running a set of panel regressions for a sample of US firms from the Compustat database. The empirical study shows that low bond ratings and low asset liquidity are associated with labor intensive production and widening cross-sectional dispersion of marginal products.

I conduct a quantitative exercise to measure the effects of financial structure dispersion on cross-sectional allocation efficiency of productive factors for seven major US industry clusters. Similar Hsieh and Klenow (2009), I utilize two productivity concepts developed by Foster et al. (2008): *Revenue Productivity* and *Physical Productivity*. Revenue productivity (the product of physical productivity and a firm's output price) is an industry-wide deflator and should be equalized across firms in the absence of any distortions. The extent of revenue productivity dispersion is a measure for the misallocation of production factors. Higher cross-sectional variance of revenue productivity results in larger misallocation and associated TFP losses. With imperfect markets, as in Hsieh and Klenow (2009), the heterogeneity in capital rental rates generates a cross-sectional variance in individual revenue productivity. In the current model, financial access mitigates the distortionary effects of capital rental-rate heterogeneity and suppresses the cross-sectional variance of revenue productivity. I conduct a set of quantitative experiments for the following industry clusters: *Finance-Insurance and Real Estate*, *Information Technologies*, *Textiles and Fabrics*, *Food and Beverages*, *Minerals and Metal Manufacturing*, *Chemicals and Petroleum*, *Transportation Equipment*. Quantitative experiments show that when firm-level balance sheet positions (financial pledgeability and liquidity positions) are weakened to the same extent, for all financially constrained firms in a given industry, cross-sectional variance of the revenue productivity increases, which generates TFP losses of significant proportions. For example, in IT and Textile&Fabric industries, where dependence on external finance plays an important role in industry performance, shutting down financial access lowers aggregate industry TFP to as low as 50% of the pre-experiment level. This quantitative result suggests that the distribution of financial structure across firms is important for aggregate industry productivity when a large fraction of firms in the industry require external funds to mitigate the distortionary effects of capital rental-rates. This observation is in line with the findings of Rajan and Zingales (1998), who show that financial development is important for economic growth in industries where external finance dependence is high.

This paper is closely related to literature that measures the impact of factor misallocation on Total Factor Productivity. Recent studies have documented that misallocation of production factors can have sizeable quantitative effects on the aggregate total factor productivity. For example, Banerjee and Duflo (2005) show that the marginal product of capital differs widely among firms in India, which potentially reduces overall output, and Restuccia and Rogerson (2008) develop a model of firm dynamics and present calibration results for the US economy documenting that reallocation of resources, up to the point where marginal products are equalized across firms, could lead to substantial TFP gains. Using a cross-country approach, Hsieh and Klenow (2009) illustrate that if capital and labor are reallocated to equalize marginal products across production plants to the extent observed in the US, TFP gains for the manufacturing industry would be about 30–50% in China and 40–60% in India.

Similar to my paper, a number of other studies analyzed the interaction between financial frictions, non-financial distortions and aggregate economic performance. Buera and Shin (2013) study a neo-classical growth model with heterogeneous firms. Their study shows that when non-financial distortions are removed from the economy, the presence of financial distortions determines the speed of adjustment to the new steady-state. Midrigan and Xu (2013) present a parameterized growth model and demonstrate that financial constraints cannot account for a substantial fraction of the cross-country differences in factor misallocation and TFP. Pratap and Urrutia (2011) and Sandleris and Wright (2011) show that financial frictions can explain a significant fraction of the cross-country differences in factor misallocation and TFP during a financial crises. This paper also argues that access to finance can account for a significant fraction of the empirically observed factor misallocation and TFP losses when financial constraints exist in addition to distortions in capital rental rates. However, different from the existing studies in the literature, to the best of my knowledge, this paper is the first that exploits the empirically observed dispersion in corporate financial structure to explain factor misallocation and industry TFP.

The rest of the paper is organized as follows. Section 2 develops a heterogeneous firms model, which I apply to derive a disciplined measure of firm level distortionary wedges and firm's revenue productivity. Section 3 presents an empirical analysis showing firm level financial pledgeability and liquid asset positions of firms are important in determining the labor-intensity of production plants and firm-level revenue productivity. Section 4 quantifies the importance of financial structure dispersion in explaining firm-level input allocation distortions and the aggregate industry TFP. Section 5 discusses the main findings and concludes the paper.

2. The model

I study the extent of static TFP gains from resource reallocation as in Hsieh and Klenow (2009) by utilizing a heterogeneous firms model. Specifically, I assume that in the economy there is a finite number of industry level composite consumption good. These consumption goods are constant elasticity of substitution (CES) aggregates over a supply of differentiated intermediate products. The supply of intermediate products in the economy is exogenously determined. Differentiated intermediate good producers in each industry are heterogeneous in intrinsic productivity as well as in financial structure. There are credit market imperfections in the economy that determine the extent of real effects of financial structure on economic performance at the firm and also at the aggregate industry level. The details of production and the flow of funds in economy are as follows.

2.1. Composite consumption good production

The consumption good produced in an industry s, denoted by Y_s, is a CES aggregate over a fixed supply of differentiated intermediate products, Y_{si}, produced in the same industry

$$Y_s = \left(\sum_{i=1}^{M_s} Y_{si}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}.$$

M_s measures the total number of differentiated input products in industry s, and σ is the constant elasticity of substitution across these input varieties. If we denote P_{si} as the unit price of the intermediate good supplied by a firm i for the industry s production, demand for each variety, Y_{si}^d, can be found from the standard cost minimization problem:

$$\min_{Y_{si}^d} \sum_{i=1}^{M_s} P_{si} Y_{si}^d, \text{ s.t. } Y_s = \left(\sum_{i=1}^{M_s} Y_{si}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}.$$

First order conditions from the industry level cost minimization problem lead to the individual variety demand functions